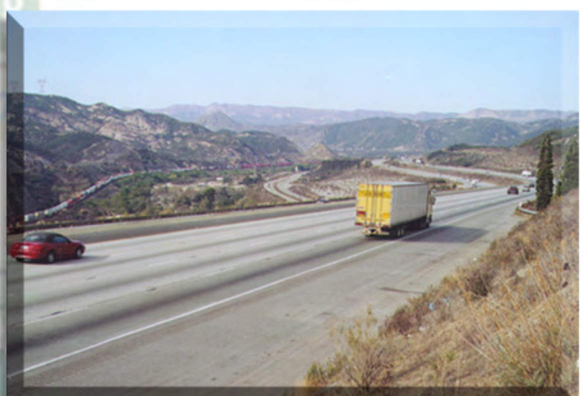
I-15 Comprehensive Corridor Study



Final Report

Prepared for:

Southern California Association of Governments (SCAG)

San Bernardino Associated Governments (SANBAG)

California Department of Transportation (Caltrans) District 8

Prepared by:

PARSONS BRINCKERHOFF

In Association with:

Cambridge Systematics, Inc.
The Tioga Group
Associated Engineers, Inc.
Arellano Associates
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Counts Unlimited

December 20, 2005

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SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG)
SAN BERNARDINO ASSOCIATED GOVERNMENTS (SANBAG)
CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), DISTRICT 8

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SECTION 1 EXECUTIVE SUMMARY

Since being built to replace the historical Route 66 and US 91, Interstate 15 (I-15) has become a vital lifeline carrying people and freight to and from the Los Angeles metropolitan area – serving as a commuter corridor from the High Desert to jobs in the Los Angeles Basin, a freight corridor from Los Angeles to the rest of the continent, and the prime route for recreation trips to the high desert, Las Vegas, and beyond.

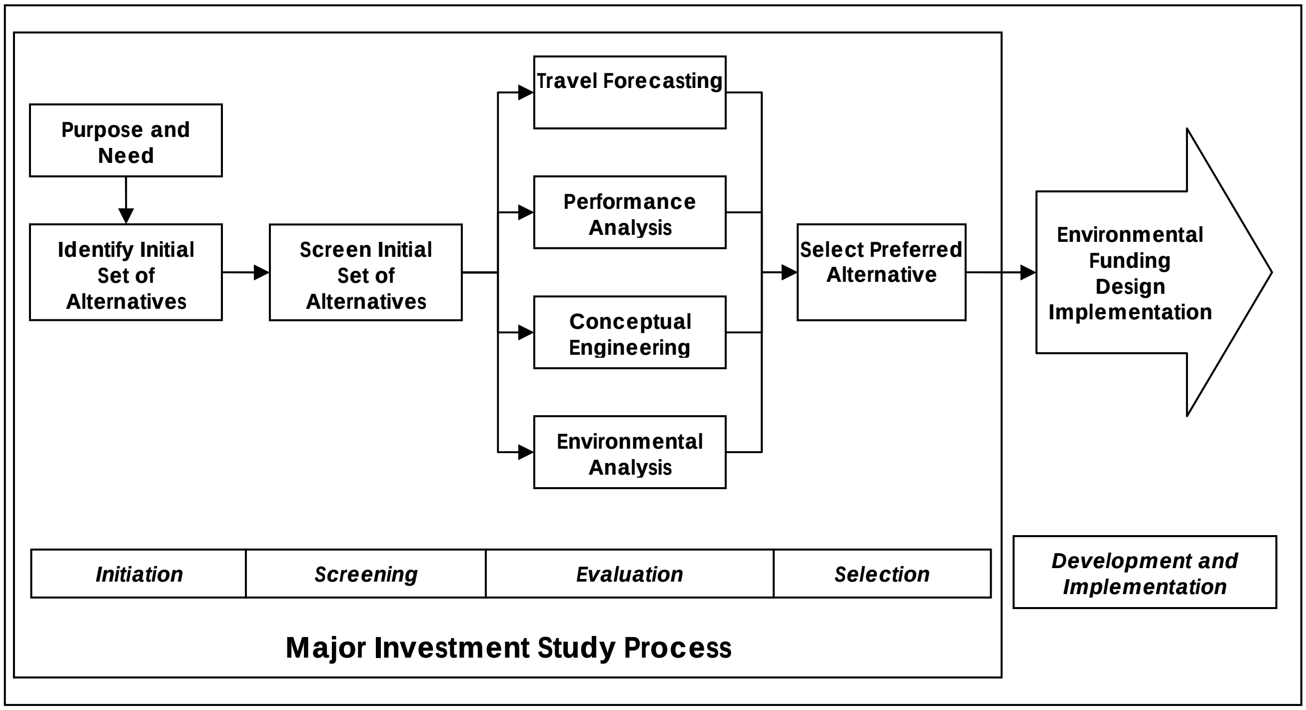
Action should be taken to address current and forecast future travel needs in the I-15 corridor. The I-15 Comprehensive Corridor Study, documented in this final report, was undertaken to study potential means for doing so on the portion of the I-15 corridor between the State Route 60 (SR-60) Freeway interchange in Mira Loma and the Mojave River crossing in Victorville. The Southern California Association of Governments (SCAG), the San Bernardino Associated Governments (SANBAG), and the California Department of Transportation (Caltrans) jointly sponsored this study. They initiated the study in order to address three specific primary needs:

- Caltrans, District 8 has identified future right-of-way needs through much of the high desert area, and needs to finalize this delineation for the purpose of initiating steps toward right-of-way preservation, extending the area southerly to the I-15/I-215 junction in Devore.
- SCAG identified I-15 as a truck lane corridor in its Regional Transportation Plan, and needs to study the feasibility, options, and costs of implementing truck lanes in the corridor.
- SANBAG needs to conduct a comprehensive evaluation of all the transportation needs in the I-15 corridor for the purpose of developing a long-range improvement plan and implementation strategy for the corridor.

The I-15 Comprehensive Corridor Study therefore combined numerous elements in an integrated approach which followed the general format of a Major Investment Study (MIS), but also maintained a focus on truck lane issues and right-of-way needs. In addition, a comprehensive Public Outreach Program was completed in order to ensure public input throughout the study process. **Figure 1-1** provides an overview of the major phases in the MIS process.

The fundamental intent of the Major Investment Study (MIS), like any major transportation planning effort, is to narrow the range of potential options to resolve a particular transportation problem ultimately leading to the selection of a specific strategy for implementation. The study began by defining the purpose and need for improvements on the I-15 study corridor. An initial set of nine alternatives was developed and screened based on the objectives identified in the purpose and need analysis. This resulted in a reduced set of five strategies to be carried forward into detailed evaluation. The detailed evaluation assisted the technical advisory committee and policy committees in identifying two potential Locally Preferred Strategies (LPS). Implementation, financial, and right-of-way delineation plans were also developed. The next few sections summarize these various phases of the I-15 Comprehensive Corridor Study.

Figure 1-1 Major Phases of the MIS Process

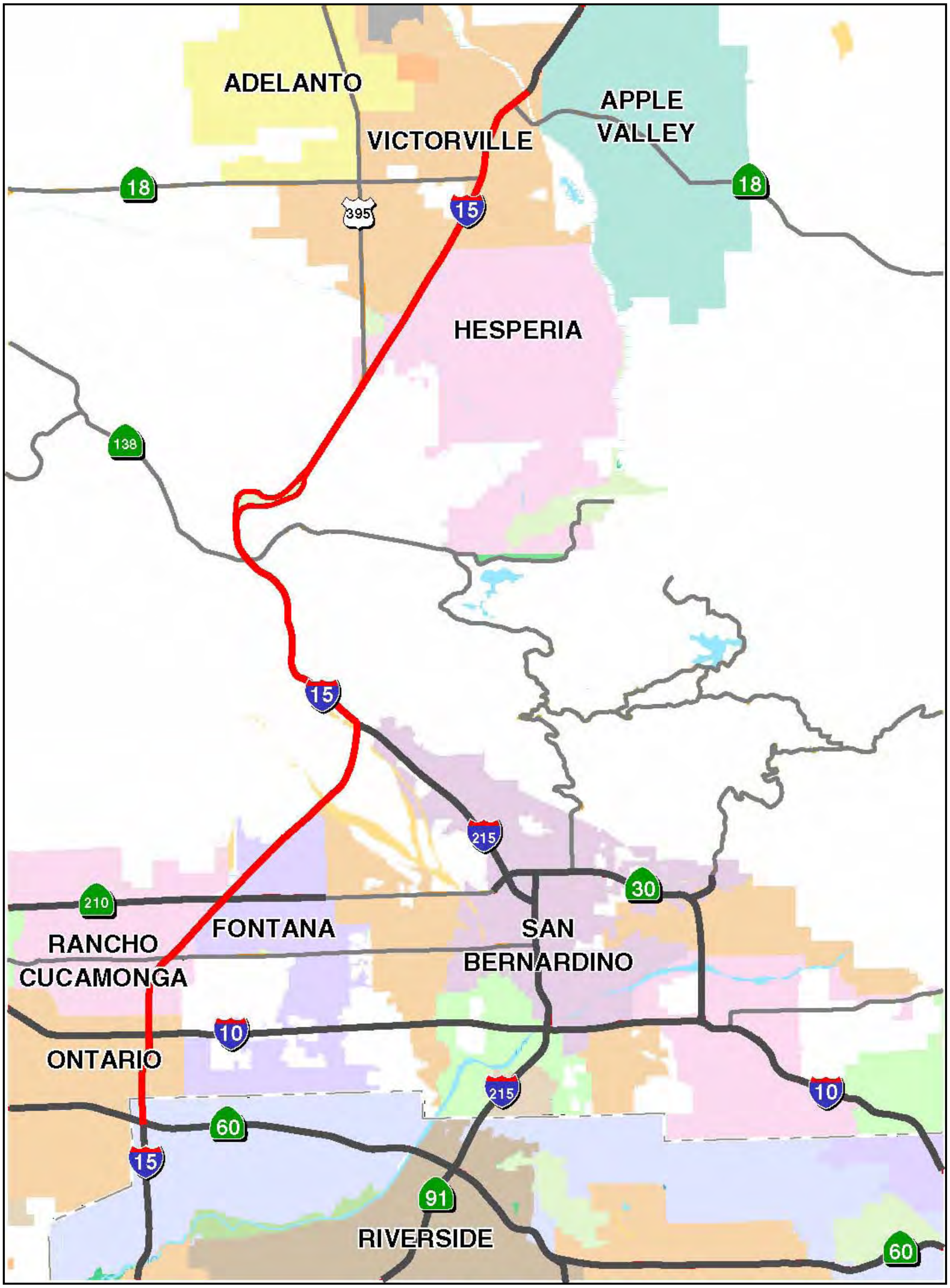


1.1 I-15 CORRIDOR STUDY AREA

The I-15 corridor study area extends from the SR-60 interchange in Mira Loma in the northwest corner of Riverside County, to the Mojave River crossing on the northern edge of the City of Victorville in San Bernardino County. The I-15 corridor study area encompasses over 45 miles of the freeway centered on the Cajon Pass. The study area also incorporates freeway to freeway interchanges with SR-60 in Riverside County, Interstate 10 (I-10) in Ontario, State Route 210 (SR-210) in Rancho Cucamonga and Interstate 215 (I-215) in Devore. Major highway interchanges within the study area include State Route 138 (SR-138) at Cajon Junction, U.S. Route 395 (US-395) at Oak Hill and State Route 18 (SR-18) in Victorville.

Figure 1-2 illustrates the extent of the I-15 Comprehensive Corridor Study area.

Figure 1-2 I-15 Comprehensive Corridor Study Area



1.2 PURPOSE AND NEED STATEMENT

1.2.1 Improvement Purpose

The purposes of potential transportation improvements in the I-15 corridor are to:

- Preserve and enhance peak and off-peak mobility and safety for current and future (through at least year 2030) commuters, freight carriers, and recreational travelers from SR-60 in Riverside County to the Mojave River in Victorville.
- Ensure the economic vitality of existing and future commercial and industrial activity in the corridor.

The transportation improvements in the I-15 corridor are to have their own independent utility and fundability, but should accommodate and support the flows of persons and goods to and from Los Angeles, Orange, and Riverside Counties.

1.2.2 Improvement Need

The I-15 corridor is experiencing considerable performance problems due to a number of interrelated factors. These factors include higher than average truck volumes (10 to 15% of the total traffic), steep grades approaching 6% sustained for approximately 5 miles through the Cajon Pass, roadway design limitations particularly at the I-15/I-215 interchange, heavy traffic demand on both weekends and weekdays, as well as a lack of alternative travel options of sufficient quality. Travel demand for the I-15 corridor has been growing 2 to 2.5% per year on average over the last ten years and is expected to almost double by the year 2030, substantially exacerbating already apparent performance problems.

These performance problems have repercussions such as higher than average traveler delay and accident rates, as well as a disincentive to economic activity in the region. Chronic congestion is readily observed approaching the I-15/I-215 interchange and between I-10 and SR-60. Average peak hour travel speeds are as low as 10 mph through these segments. Congestion is typically worst on Friday and Sunday evenings with demand being 10 to 15% higher than it is during the standard weekday peak periods. The greatest overall number of collisions within the I-15 study area occurs through the Cajon Pass between SR-138 and US-395 where the accident rate is approximately 58% higher than the average for other similar facilities. The increasing congestion and high accident rates on the I-15 make it an unreliable and time consuming travel route. This creates additional costs for commercial and industrial businesses located in the corridor.

1.2.3 Improvement Objectives

The Purpose and Need Statement identified six major problem areas and associated study objectives as follows:

- Traffic Congestion
  - Improve Levels of Service on I-15
  - Provide Sufficient Capacity to Meet Demand
  - Improve Travel Times
  - Reduce Operational Conflict between Auto, Recreational and Truck Traffic
- Goods Movement
  - Improve the Efficiency and Reliability of Goods Movement
  - Reduce Operational Conflict between Trucks and General-Purpose Traffic
- Transit
  - Provide Enhanced Access to Transit Services
  - Provide Reliable Transit Travel Times
  - Increase Commuter Use of Transit and HOV (Carpooling)
- Safety
  - Reduce the Frequency, Severity, and Consequences of Crashes on I-15 by Minimizing Contributing Factors such as Travel Speeds, Vehicle Performance Conflicts, and Freeway Design Deficiencies
- Design Improvements
  - Upgrade Design Features on I-15
- Cost-Effectiveness
  - Pursue Cost-Effective Transportation Solutions
  - Pursue Timely, Viable, and Feasible Transportation Solutions
  - Pursue Innovative and Self Sustaining Funding Mechanisms

1.3 IDENTIFICATION OF INITIAL ALTERNATIVES

The development of the initial alternatives was consistent with the criteria outlined in the National Transit Institute *Training Program for Major Investment Studies Reference Manual*. The following is a summary of the guidelines considered during the development of the set of initial alternatives:

- Alternatives are conceptual in scope.
- Alternatives should be responsive to the purpose and need statement developed for the I-15.
- The alternatives should encompass an appropriate range of capital investment options, without major gaps in the likely costs of the alternatives.
- The number of alternatives should be manageable.
- The conceptual alternatives should include all options that have a reasonable chance of becoming the locally preferred strategy (LPS).
- Each alternative should be capable of being differentiated from other alternatives in terms of costs, benefits and impacts.
- The conceptual alternatives should be designed to address differing study goals and objectives.
- The conceptual alternatives should include a No-Build alternative and a Travel Demand Management/Transportation System Management (TDM/TSM) alternative.

The following set of nine initial alternatives was developed:

- Alternative 1 – No-Build
- Alternative 2 – Travel Demand Management (TDM) and Transportation System Management (TSM)
- Alternative 3 – High-Occupancy Vehicle (HOV) Lane (SR-60 to D Street) with Express Bus
- Alternative 4 – Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)
- Alternative 5 – Full Corridor Dedicated Truck Lanes (SR-60 to D Street)
- Alternative 6 – Single General-Purpose Lane (SR-60 to D Street)
- Alternative 7 – Multiple General-Purpose Lanes (SR-60 to D Street)
- Alternative 8 – Reversible Managed Lanes (SR-210 to US-395)
- Alternative 9 – Commuter Rail Service (San Bernardino to Victorville)

In addition, two I-15/I-215 interchange (Devore Interchange) improvement options were considered during the alternatives analysis. Option 1 would reconfigure the I-15/I-215 interchange to make the number of I-15 through lanes consistent with the lane configuration north of Kenwood Road and south of Glen Helen Parkway. This option would effectively eliminate the existing lane drop and forced weave that occurs as a result of the current interchange configuration. Option 2 would reconfigure the I-15/I-215 interchange similarly to Option 1, but would also include separate truck bypass lanes allowing large vehicles to circumvent the interchange.

1.4 Screening of Initial Alternatives

Consistent with the problem areas and key objectives noted above, screening categories and criteria were defined. A total of six (6) screening categories and ten (10) criteria were developed to represent key aspects of the study objectives. These evaluation categories and criteria were collected into the Screening Evaluation Matrix shown in **Figure 1-3**.

The matrix lists the different alternatives as rows in the first column. The various criteria are represented as columns in the matrix. Each of the alternatives were evaluated against the different criteria based on a comparison with Alternative 1 – No-Build, and rated using a five-grade scale ranging from Least Effective to Most Effective. The rating indicates the effectiveness of each alternative in addressing the problems and issues under each criterion. The ratings were developed after a careful comparative assessment of the preliminary qualitative and quantitative information available for each alternative.

Figure 1-3 Initial Screening Evaluation Matrix

I-15 COMPREHENSIVE CORRIDOR STUDY
INITIAL SCREENING EVALUATION MATRIX

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← ***Most Effective*** — ***Least Effective*** →

	Alternative	A: Future General-Purpose Capacity						B: Future HOV Capacity		C: Future Truck Capacity		D: Safety	E: Environment		F: Cost
		A1			A2			B1	B2	C1	C2	D1	E1	E2	F1
		AM Peak Hour (southbound)			PM Peak Hour (northbound)			AM	PM	AM	PM				
		SR-60 to I-215	I-215 to US-395	US-395 to D St.	SR-60 to I-215	I-215 to US-395	US-395 to D St.	I-215 to US-395	I-215 to US-395	I-215 to US-395	I-215 to US-395	Truck/Auto Traffic Separation	Biological, Cultural, Geology and Hydrology	Noise	Cost/Fundability
1	No-Build	○	○	○	○	◑	◑					○	●	●	●
2	TSM/TDM	○	○	○	○	◑	◑					○	●	●	●
3	HOV Lane (SR-60 to D St) with Express Bus	◔	◑	◔	◔	◕	◕	◕	◑			◔	◕	◑	◕
4	Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)	◑	◔	◑	◑	◑	◕			●	●	◕	◑	◑	◔
5	Full Corridor Dedicated Truck Lanes (SR-60 to D St)	◔	◔	◔	◔	◑	◕			●	●	●	○	○	○
6	Single General-Purpose Lane (SR-60 to D St)	◑	◑	◑	◑	◕	◕					◔	◕	◕	◕
7	Express Lanes (SR-60 to D St)	◑	◕	◕	◑	◕	●					◕	◔	◔	○
8	Reversible Managed Lanes (SR-210 to US-395)	◑	◕	◑	◑	◕	◕					◑	◕	◑	◔
9	Commuter Rail Service (San Bernardino to Victorville)	○	○	○	○	◑	◑					○	◕	◑	◑

1.5 ALTERNATIVES SELECTED FOR DETAILED EVALUATION

Five of the nine initial alternatives were selected to be studied in more detail based on the screening level analysis. These five alternatives were renamed and referred to as follows in the detailed evaluation and subsequent portions of the study:

- Strategy A: No-Build (previously called Alternative 1)
- Strategy B: TDM/TSM (previously called Alternative 2)
- Strategy C: HOV Lanes (previously called Alternative 3)
- Strategy D: Full Corridor Dedicated Truck Lanes (previously called Alternative 5)
- Strategy E: Reversible Managed Lanes (previously called Alternative 8)

In addition to the five selected strategies, the two I-15/I-215 interchange improvement options were also considered during the detailed evaluation. The elimination of this primary bottleneck in the corridor was a high priority for the I-15 Comprehensive Corridor Study.

1.6 DETAILED EVALUATION

The detailed evaluation methodology was designed to enable decision makers to judge the comparative ability of the five strategies to achieve the stated project goals and objectives as discussed in the Purpose and Need Statement. The detailed evaluation was comprised of two primary stages. The first stage involved a broad range of measures of effectiveness (MOEs). The second stage compressed the broad MOE analysis into a concise grading matrix that highlighted the critical analysis points. Both stages of the analysis focused on "order of magnitude" comparisons of Strategies B through E to Strategy A (No-Build) and amongst each other.

The calculation of MOEs was based largely on travel demand forecasts developed as part of the detailed evaluation. Preliminary layout plans developed for the five strategies also contributed to several MOEs, in particular those related to environment, right of way, cost, and feasibility.

Strategies A through E were selected considering that the final recommendation could be a hybrid combining different elements of the five strategies for a variety of reasons such as differing characteristics along the length of the study corridor and financial considerations. To enable this analytical perspective, the study corridor was broken down into seven study segments as follows:

- SEGMENT 1: Mojave River crossing to Bear Valley Road (~7 miles long)
- SEGMENT 2: Bear Valley Road to US-395 (~7 miles long)
- SEGMENT 3: US-395 to SR-138 (~8 miles long)
- SEGMENT 4: SR-138 to I-215 (~7 miles long)
- SEGMENT 5: I-215 to SR-210. (~8 miles long)
- SEGMENT 6: SR-210 to I-10 (~8 miles long)
- SEGMENT 7: I-10 to SR-60 (~2 miles long)

The MOEs calculated are summarized in the list below. They were generally computed separately for each direction of traffic flow, vehicle category (single occupancy, high occupancy, truck), and lane type (general purpose, high occupancy, truck, managed).

- Category 1: Transportation System Performance
  - Sub-Category 1A: Transportation Supply
    - Vehicle Capacity of I-15
    - Peak Period Transit Service Frequency
  - Sub-Category 1B: Travel Demand and Patronage
    - Vehicle Volume (Daily, AM Peak Period, PM Peak Period)
    - Average Daily Person-Trips on I-15
    - Directional Split (Daily, AM Peak Period, PM Peak Period)
    - Percent Heavy Trucks (Daily, AM Peak Period, PM Peak Period)
  - Sub-Category 1C: Traffic Congestion Relief
    - V/C Ratio (AM and PM Peak Periods)
    - Travel Time (AM and PM Peak Periods)
  - Sub-Category 1D: Operations and Safety
    - Degree of Improvement to Operations and Safety

- Category 2: Environmental Impacts
    - Right of Way (acres)
    - Land Use Type Affected (acres)
    - Special Resources Affected
    - Environmental Justice
    - Noise
    - Air Quality

- Category 3: Cost-Effectiveness and Feasibility
    - Estimated Cost

The broad range of MOEs was compressed into the Grading Matrix illustrated in **Figure 1-4**. Each cell in the matrix reflects the ability of a given strategy to achieve a given project goal based on a five point scale.

Figure 1-4 shows that Strategies A and B would not effectively achieve goals 1 through 5, but obviously would be highly feasible and would have low cost. Although Strategy B would have minimal benefit, given the low cost of achieving this benefit, it is a very cost-effective strategy. The TSM/TDM measures of Strategy B have been incorporated into Strategies C through E for this reason.

Strategies C and E perform similarly, although Strategy E slightly outperforms Strategy C for some measures. Both strategies would have similar potential to achieve Goal 1, reducing congestion. However, Strategy E has slightly more potential than Strategy C during the weekend peak periods because the direction of flow of the managed lanes could be reversed to best meet the unique directional peaking during weekends.

Strategy D has some notable differences relative to Strategies C and E. It's effectiveness at achieving Goal 1, congestion reduction, would be comparable except during the weekend peak periods. The exclusive nature of the truck lanes of Strategy D combined with generally lower truck volumes during weekend peaks would limit the effectiveness of this strategy to reduce congestion during weekend peaks. As would be expected, Strategy D would be the most effective at improving goods movement, Goal 2, but the least effective at improving transit service, Goal 3. Its ability to improve safety and operations, Goals 4 and 5, would be greater than Strategies C and E since it would be the only strategy to physically separate a substantial portion of trucks from the general-purpose traffic.

Perhaps the most marked distinction between Strategy D and the other two build strategies (C and E), relates to Goal 6, for which Strategy D received the lowest score. Strategy D would not effectively achieve Goal 6, cost-effectiveness, primarily due to its high cost ranging from about $2 to $3.5 billion. Also, its higher right-of-way requirements and environmental impacts substantially reduce its feasibility.

Figure 1-4 Detailed Evaluation Grading Matrix

● ◕ ◑ ◔ ○

Most Effective ⟵⟶ ***Least Effective***

Goal	Goal Description	Strategy A No Build	Strategy B TSM/TDM	Strategy C HOV Lanes	Strategy D Truck Lanes	Strategy E Managed Lanes
		Existing Conditions plus Funded and Reasonably Anticipated Improvements	Transportation System Management and Demand Management Measures plus Strategy A (No Build)	One Full Corridor HOV Lane per Direction plus Strategy B (TSM/TDM)	Two Full Corridor Exclusive Truck Lanes per Direction plus Strategy B (TSM/TDM)	Two Reversible Managed Lanes (US-395 to I-210) plus One General Purpose Lane per Direction (Mojave River to US-395 & I-210 to SR-60) plus Strategy B (TSM/TDM)
Goal 1 Reduce Congestion	Weekday Peak Periods - General Purpose Lanes	◔	◔	◕	◕	◕
	Weekday Peak Periods - HOV, Truck, or Managed Lanes			●	●	●
	Weekend Peak Periods	○	○	◕	◑	●
Goal 2	Improve Goods Movement	○	○	◑	●	◑
Goal 3	Improve Transit Service	○	◔	◕	◔	◕
Goals 4&5	Improve Safety and Operations	○	◔	◑	◕	◑
Goal 6 Cost-Effective	Cost/Benefit (based on travel time savings)		◕	◕	○	◕
	Feasibility (based on ROW and Environmental Impact)	●	●	◑	○	◕
	Estimated Cost Range (in millions)	$0	$10 - $25	$497 - $719	$2045 - $3548	$573 - $830

1.7 PUBLIC OUTREACH PROGRAM

The public outreach program was implemented in two phases:

Phase I: Prior to the development of alternatives (April, 2004)

Phase II: During the detailed evaluation of project alternatives (March, 2005)

As part of each phase, a project fact sheet was developed, and surveys of corridor travelers were conducted. A press release announcing the survey locations and the community workshops was distributed to surrounding media.

All of the public input gathered over the course of the Public Outreach Program was provided to the project team at each interval so that public comments could be considered on an ongoing basis as the alternatives were being developed and evaluated. The survey responses were excellent, with over 800 surveys completed for Phase II, and provided useful input to the project team from regular users of the I-15 corridor.

The Phase I survey results assisted the technical team in understanding the local vision and set of expectations for the project so that the team could proceed with the development of alternatives within a community context. During Phase II of the Public Outreach Program efforts focused on presenting project findings about specific alternatives for review and comment to the community.

The results of the Phase II survey effort assisted the project team in formulating its recommendations for the I-15 study corridor. Two elements of the Phase II survey results were of particular Interest to the project team as recommendations for the I-15 study corridor were developed: ranking of alternatives and willingness to pay tolls.

Table 1-1 summarizes the responses to ranking of alternatives. Responses to the ranking of alternatives survey question indicated that Alternative E was preferred most by survey respondents, and Alternative A was preferred least, with a rank of 1 being most preferred and 5 being least preferred.

Table 1-1 Rank the Alternatives - Score (Phase II Survey Results)

Alternative	Live In San Bernardino Valley	Live In High Desert	Live In Other Areas	All Areas
	Avg. Ranking	Avg. Ranking	Avg. Ranking	Avg. Ranking
A - No-Build	4.6	4.7	4.6	4.7
B - TSM	3.4	3.4	3.5	3.4
C - HOV	2.6	2.6	2.7	2.6
D - Exclusive Truck Lane	2.6	2.5	2.3	2.5
E - Managed Lane	2.0	1.8	2.1	1.9

For the question on willingness to pay a toll, truck drivers were given the following scenario: "if an exclusive truck lane were available that would save you 15 minutes of travel on the I-15, how much of a toll would you be willing to pay for that time savings?" Auto drivers were asked, "if toll lanes were available that would save you 15 minutes of travel on the I-15, how much of a toll would you be willing to pay for that time savings?" The responses to each of the willingness to pay scenarios are summarized in **Table 1-2**.

Table 1-2 Willingness to Pay a Toll (Phase II Survey Results)

By Type of Driver	Percentage
Truck Driver	
Not willing to pay a toll	54%
Willing to pay a toll	46%
Average amount of those willing to pay	$7.92
Auto Driver	
Not willing to pay a toll	56%
Willing to pay a toll	44%
Average amount of those willing to pay	$1.70

1.8 LOCALLY PREFERRED STRATEGY

Recommendations for the I-15 study corridor were formulated based on the detailed evaluation of the five strategies, as well as on the public outreach efforts described in the previous sections. The recommendations also acknowledge the status of ongoing planning initiatives by the cooperative client agencies for the study. The final recommendations to be carried forward into future phases of the project development process were based on consecutive consideration by the project team, project Technical Advisory Committee (TAC), and the Project Policy Committee. The Project Policy Committee consisted of the members of the SANBAG Plans and Programs Committee (PPC) plus several elected representatives from Riverside County.

The project team worked with the TAC throughout the analysis process to both inform and receive input on the analysis methodology and results. This process culminated in the April 11, 2005 TAC meeting where the project team's preliminary recommendations were presented to the TAC for consideration and were approved and supported by the TAC. These recommendations were then carried forward to the Project Policy Committee. At the April 20, 2005 PPC meeting, the Project Policy Committee reviewed and approved the project team and TAC's recommendations with one addendum; the inclusion of one additional general-purpose lane per direction north of US-395 and south of SR-210 in the Strategy C & E Hybrid option in addition to the HOV lanes identified for these segments.

The recommendation has three parts. These parts are as follows and are discussed in more detail in the subsections below:

- *Part 1: Implementation of Strategy B TDM/TSM elements*
- *Part 2: Reconfiguration of the 15/I-215 Interchange*

- *Part 3: Delineation of two future build strategies to advance for further project development*
    - *Strategy D – Dedicated Truck Lanes (two lanes in each direction from SR-60 to the Mojave River)*
        - *Option A: With Provision for long combination vehicles (LCVs)*
        - *Option B: Without provision for LCVs*
    - *Strategies C & E Hybrid - Reversible Managed Lanes with HOV Lanes (two reversible lanes from SR-210 to US-395 and the addition of one HOV lane and one general-purpose lane in each direction south of SR-210 and north of US-395)*

1.8.1 Recommendation Part 1: Implementation of Strategy B TDM/TSM Elements

The first part of the recommendation involves the implementation of Strategy B (TDM/TSM). Strategy B consists of travel demand management (TDM) and transportation system management (TSM) elements that address existing and future needs in the corridor. The implementation of such measures provides modest benefit to the corridor for a limited cost and with low impacts. For this reason, the elements of Strategy B should be implemented within the study corridor irrespective of any further capital improvements in the corridor, at a time when each of the elements is warranted based on operational need and cost-effectiveness.

1.8.2 Recommendation Part 2: Reconfiguration of I-15/I-215 Interchange

The results of the review of existing conditions on I-15 and findings from the public outreach efforts associated with the study both clearly identify the immediate need to reconfigure the I-15/I-215 interchange to better facilitate primary traffic movements. This interchange is recognized as the primary bottleneck in the corridor and improvement of the interchange was identified as the highest priority for this corridor.

Improvement of the I-15/I-215 interchange is the highest priority need in the corridor, and should be the focus of near-term project implementation efforts. As a first step, Caltrans is undertaking two State Highway Operation and Protection Program (SHOPP) projects to provide better operations through this interchange area. The first project (recently completed) eliminated the lane drop for northbound traffic on the transition from I-15 onto the merged freeway with I-215. This additional lane becomes an auxiliary lane which exits the northbound freeway at Kenwood Avenue. The second project, currently in final design, provides an auxiliary lane from Kenwood Avenue north to Cleghorn Road.

To fully address this most critical need in the corridor, complete reconstruction of the interchange is needed. The new design should enable traffic remaining on I-15 to pass through the interchange without changing lanes, and should maintain the I-15 through lanes without a lane drop.

Currently there are no plans being developed for this type of improvement, though the recently-extended Measure I program includes a substantial amount of funding to improve this interchange. Major reconfiguration to the I-15/I-215 interchange could proceed as a stand-alone project with independent utility and benefit regardless of the final LPS selection. With appropriate considerations, the reconfigured I-15/I-215 interchange could accommodate the future implementation of either candidate LPS along with the connection of Cajon Boulevard through the interchange.

SANBAG and Caltrans should consider promptly initiating appropriate project development efforts (a Project Study Report or a combination Project Study Report/Project Report) to identify more specifically the preferred design and estimated cost to improve this interchange to accommodate long-term traffic needs (including bypass lanes to remove trucks from the merge areas, and with the ability to fit either of the final two corridor improvement strategies). The preliminary cost estimates for the reconfiguration of the interchange range from approximately $60 million to $140 million depending on the extent of inclusion of ancillary improvements such as the truck bypass lanes.

At its meeting on December 12, 2005, the I-15 Technical Advisory Committee identified funding of the Project Study Report (PSR) or Project Study Report/Project Report (PSR/PR) for the I-15/I-215 interchange reconfiguration as a "primary goal for FY 2006-2007". If the PSR and PR are undertaken sequentially, it is expected that the preparation and approval of the PSR will take 1 year to 2 years to complete. Combining the PSR and PR has the potential for streamlining the project development efforts. These project development efforts will need to be considered in the context of the preparation of SANBAG's Measure I Strategic Plan.

With the completion of a PSR, funding could be provided to initiate the preparation of a Project Report and Environmental Documentation (PR/ED) in FY 2007-2008. This process will allow for the preparation of preliminary engineering for the interchange modification and the detailed evaluation of environmental impacts associated with the improvements. Since the proposed improvements are likely to be contained predominately within existing Caltrans rights-of-way, it is possible that the PR/ED could be completed in 12 months to 18 months leading to Final Design in FY 2009-2010.

The Final Design phase of the project would result in the preparation of detailed Plans, Specifications and Estimates (PS&E) for the interchange reconfiguration. These documents support the process for soliciting bids for the construction of the project and the completion of Final Design in FY 2010-2011 could allow construction to commence in FY 2011-2012. Completion of this project may take 2 years to 3 years depending of specific requirements for project phasing to allow traffic operations to be maintained during construction. Alternative construction delivery methods may also be appropriate for the I-15/I-215 interchange.

1.8.3 Recommendation Part 3: Advance Two Future Build Strategies for Further Evaluation and Project Development

The results of the alternatives analysis and public outreach highlighted the relative benefits and associated costs of implementing the various strategies previously identified. However, the findings of these efforts also highlighted contrasting results that require more detailed evaluation and assessment to delineate the most appropriate improvement strategy for the corridor. For this reason, it is recommended that two future build strategies be advanced for further detailed evaluation and comparison as part of the project development process, ultimately leading to the identification of a locally preferred strategy: Strategy D (Dedicated Truck Lanes) and the Strategies C & E Hybrid (Reversible Managed Lanes with HOV Lanes).

Specifically, it is believed that the final selection between Strategy D and the Strategies C & E Hybrid needs to remain open at this time for the following reasons:

- Strategy D has an estimated cost range of $2.0 billion to $3.5 billion to implement. To be most effective, the dedicated truck lanes (Strategy D) should be part of a regional system. Yet there are multiple uncertainties concerning the feasibility and funding of the dedicated truck lanes. The regional truck lane system cannot be ruled out at this point nor can it be assumed to be feasible and fundable. A conclusion on the feasibility of the regional truck lane system will be reached as part of the Multi-County Goods Movement Action Plan (Action Plan). This effort will not be completed until late in calendar year 2006.

- The Strategies C & E Hybrid (reversible managed lanes) is feasible, fundable, and provides substantial benefits to both local and regional travelers. Strategy C & E has an estimated cost range of $632 million to $913 million to complete making it substantially lower in cost than Strategy D. However, it provides slightly less overall traffic benefit than Strategy D. The effectiveness and use of high occupancy vehicle lanes has been demonstrated in recent studies by the Los Angeles County Metropolitan Transportation Authority (MTA) and SCAG. The HOV lanes are therefore included in this alternative to maintain regional HOV lane connectivity.

It is expected that an additional recommendation for long term I-15 improvements will be developed by SANBAG, Caltrans, and SCAG staff following the completion of the Multi-County Goods Movement Action Plan.

1.9 FINANCIAL PLAN FOR THE LPS

A total of three financial strategies were evaluated in detail, one applicable to reversible managed lanes and the remaining two applicable to exclusive truck lanes. As a base assumption, the financial strategies attempted to self-finance the LPS to the extent possible by imposing tolls on the vehicles that use the new reversible managed or truck lanes, depending on which strategy is ultimately adopted. The three financial strategies evaluated are as follows:

1. **Combination HOT/HOV Lanes:** This alternative has two reversible managed high occupancy vehicle or toll-paying vehicle (HOT) lanes on I-15 from SR-210 to US-395. South of SR-210 and north of US-395, this alternative was analyzed as having one high occupancy vehicle only (HOV) lane in each direction. Tolls were assumed to be collected only on the reversible managed lanes portion.

2. **Truck Toll Lanes:** This alternative has two exclusive truck toll lanes in each direction for the entire length of the corridor from SR-60 to D Street. This alternative assumes Longer Combination Vehicles (LCVs) do not use the truck toll lanes. Two variations of this alternative were considered:
   a. Without Mojave River to Bear Valley Road segment on an elevated structure, and
   b. With Mojave River to Bear Valley Road segment on an elevated structure.
3. **LCV Toll Lanes:** From an engineering and design perspective, this alternative is similar to the Truck Toll Lanes alternative. However, from the financial perspective this strategy differs in that it assumes LCV trucks are able to use the truck toll lanes, but not the existing mixed-flow lanes. This alternative also assumes non-LCV trucks continue to use the mixed-flow lanes, but do not use the truck toll lanes. For this alternative to be possible, additional investments would be required for infrastructure outside of this corridor for LCVs to reach I-15. The financial analysis does not include the cost implications of this additional infrastructure. Two variations of this alternative were considered:
   a. Without Mojave River to Bear Valley Road segment on an elevated structure, and
   b. With Mojave River to Bear Valley Road segment
   c. on an elevated structure.

Conclusions about each of these three financial strategies are as follows:

- **Combination HOT/HOV Lanes:** This financial strategy will not generate sufficient toll revenues to fully fund construction of the Strategies C and E Hybrid. At most $665 million or 59 percent of the $1.14 billion escalated construction cost (inflated to anticipated year of construction value) could be financed by leveraging the net revenue collected from HOT lane tolls. The remaining $470 million in construction costs would have to be funded through other federal, state and local sources.

  The construction cost for this strategy includes the sum of both reversible managed lanes and HOV lane improvements although only the managed lanes segments (US-395 to SR-138, SR-138 to I-215 and I-215 to SR-210) are revenue producing. If the cost of the managed lanes element is separated from the HOV lane component, the full construction cost of the reversible managed lanes (approximately $650 million) could be financed by leveraging the net revenue collected from tolls.

- **Truck Toll Lanes:** The financial analysis indicates that the annual revenue from truck lane tolls is similar in magnitude to the annual operating and maintenance cost for the truck lanes. Because of this unfavorable financial operating scenario, none of the $4.6 billion[1] escalated construction cost can be financed by leveraging the net toll revenue. Significant infusion of funding from federal, state and local sources or other types of non-toll user charges will be needed to make this project financially feasible.

[1] $5.3 billion if the Mojave River to Bear Valley Road elevated structure is included.

- **LCV Toll Lanes:** This financial analysis strategy will not generate sufficient toll revenues to fully fund construction of Strategy D, Dedicated Truck Lanes. At most $1.5 billion or 32 percent of the $4.6 billion construction cost of the LCV Lanes Alternative without the Mojave River to Bear Valley Road elevated structure could be financed by leveraging the net revenue collected from truck lane tolls. If the elevated structure is included, the cost goes up to $5.3 billion. About 28 percent of this cost can be covered with project-related debt instruments. The remaining $3.15 billion in construction costs ($3.8 billion with the elevated structure) would have to be funded through other federal, state and local sources or other types of non-toll user charges. It is important to note, however, that an effective LCV strategy would need to extend lanes for LCVs on I-15 from the Mojave River (the north end of the corridor for this study) to the Nevada State Line, so that the LCVs could continue through Nevada, Utah, and Colorado, to the extent possible. The costs of extending the lanes to the Nevada State Line are not included in the costs for this alternative.

1.10 IMPLEMENTATION PLAN FOR THE LPS

Selection of a Locally Preferred Strategy (LPS) for the I-15 Corridor establishes the long-term blueprint for meeting corridor transportation needs over the next 25-30 years. Achievement of this vision involves a multi-step process to plan, fund, design, and construct the various components of the overall strategy. Phased implementation is essential, since funding will be obtained incrementally over time and improvements are not immediately needed throughout the corridor.

The analysis of implementation issues culminated in the development of two action plans: one for the critical near-term improvements to the I-15/I-215 interchange, and one for the long-term corridor improvement process. Each action plan includes near-term steps and the responsible agency, followed by an overview of subsequent steps leading to ultimate implementation of the LPS. These action plans are summarized in the sub-sections below:

1.10.1 Near-Term Improvements Action Plan: I-15/I-215 Interchange

Next Steps:

1. Complete design of the SHOPP project (auxiliary lane from Kenwood Avenue to Cleghorn Road – anticipated to be completed in FY 2005-2006) – Caltrans
2. Construct auxiliary lane from Kenwood Avenue to Cleghorn Road (construction expected to commence in FY 2005-2006) – Caltrans
3. Conduct a PSR and PR/ED for the major interchange improvement (funding PSR identified as a primary goal for FY 2006-2007) – SANBAG and Caltrans.
4. Perform preliminary design and environmental clearance for improvements to Cajon Boulevard (potentially part of PR/ED for I-15/I-215 interchange) – SANBAG and County of San Bernardino.

Overview of subsequent steps leading to reconstruction of the interchange:

1. Identify funding for the I-15/I-215 interchange reconstruction – SANBAG and Caltrans.
2. Perform final design of I-15/I-215 interchange improvements – SANBAG and Caltrans.
3. Acquire right-of-way for I-15/I-215 interchange improvements – Caltrans.
4. Construct I-15/I-215 interchange improvements – Caltrans.
5. Identify funding for Cajon Boulevard improvements (connecting Cajon Boulevard through the I-15/I-215 interchange could potentially be part of the overall funding package for the I-15/I-215 interchange) – SANBAG and County of San Bernardino.
6. Perform final design of Cajon Boulevard improvements – County of San Bernardino.
7. Acquire right-of-way for Cajon Boulevard improvements – County of San Bernardino.
8. Construct Cajon Boulevard improvements – County of San Bernardino.

1.10.2 Long-Term Improvements Action Plan: I-15 Corridor Projects

Next Steps:

1. Based upon results of Multi-County Goods Movement Action Plan, adopt the final LPS for the I-15 Corridor – SANBAG.
2. Request SCAG to include the final LPS in the 2008 RTP update.

Overview of Long-term Corridor Improvement Process:

1. Conduct PSRs for the corridor mainline improvements by segment: southern (SR-60 to SR-210), central (SR-210 to US-395), and northern (US-395 to Mojave River) – SANBAG and Caltrans. Include consideration of need for auxiliary lanes in design studies.
2. Identify funding for the corridor mainline improvements – SANBAG and Caltrans.
3. Conduct PR/EDs for the corridor mainline improvements by segment – SANBAG and Caltrans.
4. Perform final design of the corridor mainline improvements by segment – SANBAG and Caltrans.
5. Acquire right-of-way for corridor mainline improvements by segment – Caltrans.
6. Construct corridor mainline improvements by segment – Caltrans.

Overview of Ongoing TSM/TDM Strategy Implementation

1. Work with corridor cities to plan, design, and implement Intelligent Transportation Systems strategies for the corridor – SANBAG and Caltrans.
2. Work with the California Highway Patrol to identify opportunities and means to enhance enforcement through the corridor – SANBAG and Caltrans.
3. Identify opportunities and means to enhance freeway service patrol in the corridor – SANBAG.
4. Work with Victor Valley Transit and Omnitrans to identify opportunities and means to increase express transit service between the high desert and the Valley area – SANBAG.

SECTION 2 INTRODUCTION

Since being built to replace the historical US Route 66 and US Route 91, Interstate 15 (I-15) has become a vital lifeline carrying people and freight to and from the Los Angeles metropolitan area – serving as a commuter corridor from the High Desert to jobs in the Los Angeles Basin, a freight corridor from Los Angeles to the rest of the continent, and the prime route for recreation trips to the high desert, Las Vegas, and beyond.

Action should be taken to address current and forecast future travel needs in the I-15 corridor. The I-15 Comprehensive Corridor Study, documented in this final report, was undertaken to study potential means for doing so. The Southern California Association of Governments (SCAG), the San Bernardino Associated Governments (SANBAG), and the California Department of Transportation (Caltrans) jointly sponsored this study. They initiated the study in order to address three specific primary needs:

- Caltrans, District 8 has identified future right-of-way needs through much of the high desert area, and needs to finalize this delineation for the purpose of initiating steps toward right-of-way preservation, extending the area southerly to the I-15/I-215 junction in Devore.
- SCAG identified I-15 as a truck lane corridor in its Regional Transportation Plan, and needs to study the feasibility, options, and costs of implementing truck lanes in the corridor.
- SANBAG needs to conduct a comprehensive evaluation of all the transportation needs in the I-15 corridor for the purpose of developing a long-range improvement plan and implementation strategy for the corridor.

The I-15 Comprehensive Corridor Study therefore combined numerous elements in an integrated approach.

The remainder of **Section 2** provides additional introductory information such as:

- A description of the I-15 study corridor (**Section 2.1**)
- The purpose and need for the project (**Section 2.2**)
- Definition of the project's specific goals and objectives (**Section 2.3**)
- A summary of existing corridor transportation conditions (**Section 2.4**)
- Background on the economic forces shaping the corridor, and (**Section 2.5**)
- An outline of the remainder of the report (**Section 2.6**).

2.1 I-15 CORRIDOR STUDY AREA

The I-15 corridor study area extends from the State Route 60 (SR-60) Freeway interchange in the northwest corner of Riverside County, to the Mojave River crossing on the northern edge of the City of Victorville in San Bernardino County. The I-15 corridor study area encompasses over 45 miles of the freeway centered on the Cajon Summit. The study area also incorporates freeway to freeway interchanges with SR-60 in Riverside County, Interstate 10 (I-10) in Ontario, State Route 210 (SR-210) in Rancho Cucamonga and Interstate 215 (I-215) in Devore. Major highway interchanges within the study area include State Route 138 (SR-138) at Cajon Junction, U.S. Route 395 (US-395) at Oak Hill and State Route 18 (SR-18) in Victorville.

Figure 2-1 illustrates the extent of the I-15 Comprehensive Corridor Study area.

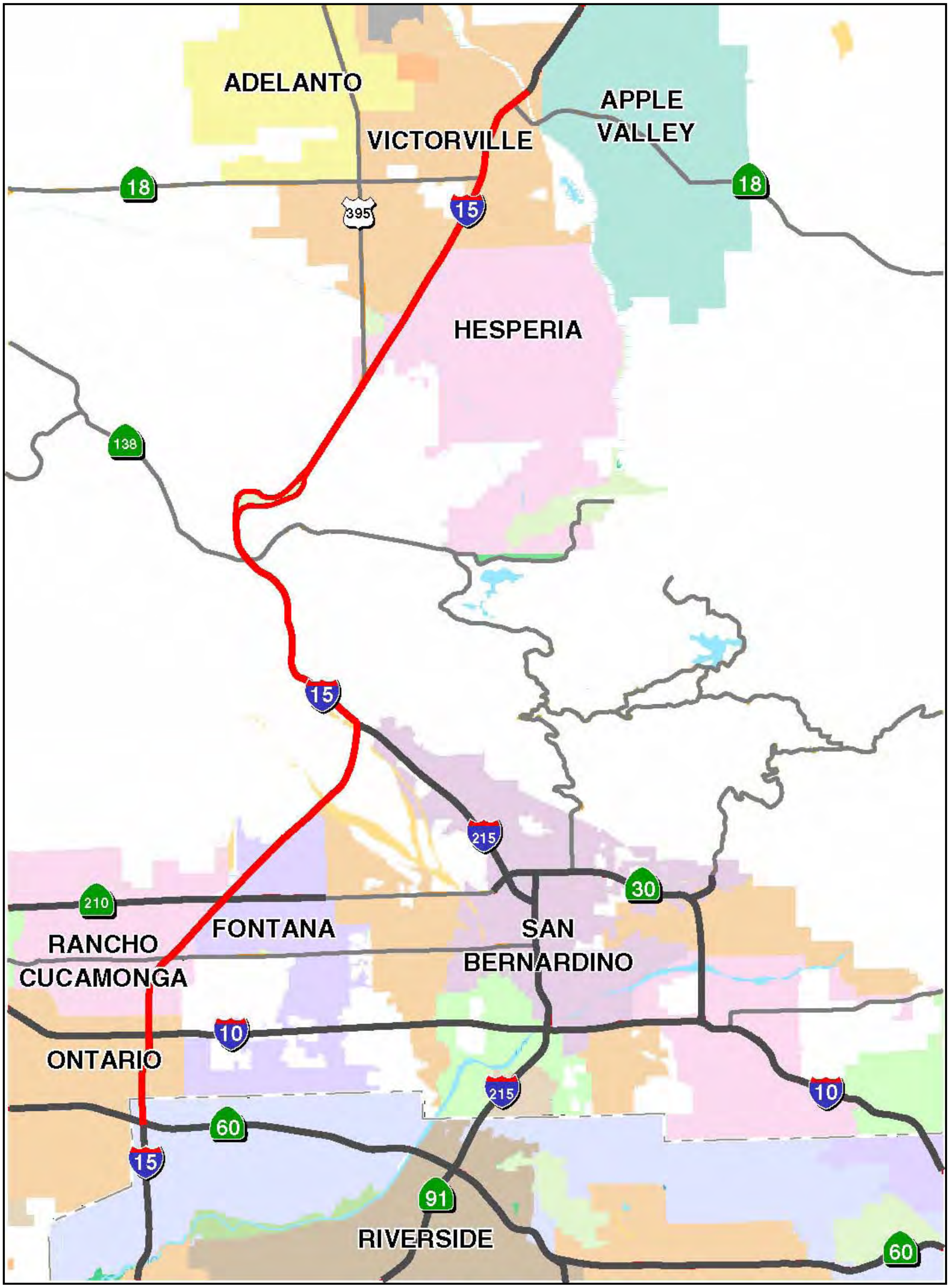
2.2 BACKGROUND

Based on an examination of existing traffic conditions, the I-15 corridor is experiencing considerable performance problems due to a number of interrelated factors. I-15 has become an essential lifeline carrying people and freight to and from the Los Angeles metropolitan area. It is truly a multi-faceted corridor, serving commuters from the Victor Valley to jobs in the Los Angeles Basin, visitors to the high desert, Las Vegas, and places beyond, and the flow of goods between Los Angeles and the rest of North America. Preservation and enhancement of the transportation utility of this vital corridor is necessary to ensure the economic sustainability of the communities within the study area and for the Southern California region as a whole.

The average daily traffic on I-15 at SR-138 is currently between 110,000 and 120,000 vehicles. There is a constant weekday traffic pattern that demonstrates definite peaking characteristics during the AM and PM period. Typically, the AM peak period is between 6:00 AM and 8:00 AM, while the PM peak period is between 3:00 PM and 6:00 PM. The afternoon peak hour is between 5:00 PM and 6:00 PM. In contrast, the weekend, which is comprised of Friday afternoon through Sunday, shows a very different pattern. There is no noticeable AM peak period for either Saturday or Sunday morning (Friday morning reflects a typical weekday peak). The PM peak period is 10% to 15% higher than the average weekday peak. This creates a longer period of congestion and an extended peak, particularly in the northbound direction on a Friday evening and in the southbound direction on a Sunday afternoon. Friday daily traffic at the Cajon Junction Truck Scales immediately south of SR-138 currently exceeds 130,000 vehicles.

The high traffic volumes through the study corridor, particularly during peak periods and on weekends, lead to chronic congestion at several locations. This congestion is most readily observed in the segments of the freeway approaching the I-15/I-215 interchange and between I-10 and SR-60. The chronic congestion is reflected in average travel speeds that are reduced to as low as 10 mph through these segments. **Figure 2-2** illustrates average travel speeds during the Friday evening peak period for the northbound direction on I-15. The impact of high traffic volumes between Summit and I-215 and to a lesser extent between I-10 and SR-60 are clearly noticeable in lower travel speeds due to the resulting chronic traffic congestion.

Figure 2-1 I-15 Comprehensive Corridor Study Area



I-15 is the primary freight corridor between Los Angeles (and western Mexico) and all states (and Canadian provinces) to the north and east. Communities at the base of the study area are significantly developed with truck-related land uses. These uses have developed due to the area's strategic location at the fringe of the metropolitan area with abundant and affordable commercial and residential land, and proximity to the crossroads of major freeways and highways leading to the rest of the country. As a result, I-15 carries a relatively high share of freight traffic compared to similar freeways.

Table 2-1 identifies the weekday traffic by vehicle type on I-15 at the SR-138 overcrossing. The table shows that over 13% of the weekday traffic on I-15 is trucks, with the share of trucks increasing to over 16% during the midday hours.

Figure 2-2 Friday PM Peak Period Travel Speeds (Northbound)

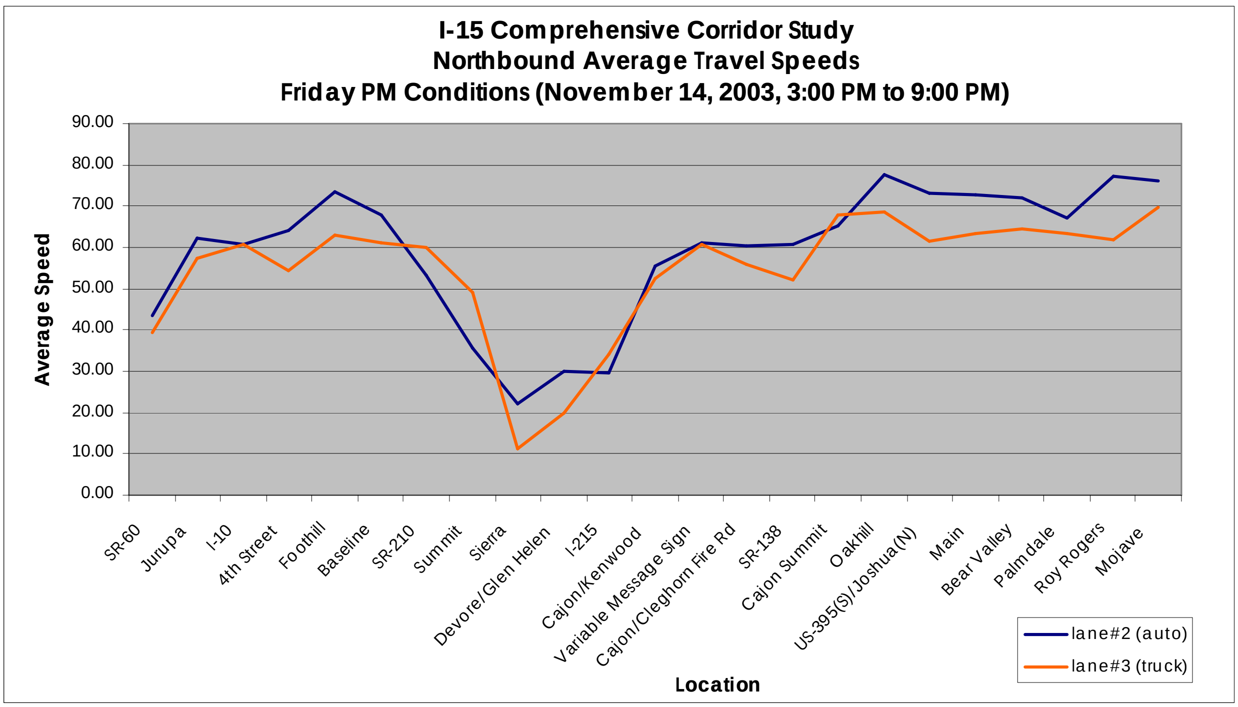


Table 2-1 Traffic by Vehicle Type – Typical Weekday

I-15 Comprehensive Corridor Study
Total Vehicle Classification (I-15 at SR-138 Overcrossing)
Weekday Conditions (Wednesday, November 12, 2003)

Time Period	*Autos*	*Buses and Motorhomes*	*Autos with Trailers*	*Straight Trucks*	*Tractor Trailers*
AM Peak Hour (6 AM to 7AM)	90.5%	0.3%	0.5%	2.6%	6.2%
Noon Hour (12 PM to 1 PM)	82.0%	0.6%	1.2%	3.6%	12.5%
PM Peak Hour (4 PM to 5 PM)	89.0%	0.4%	0.6%	2.0%	8.0%
Night Hour (10 PM to 11 PM)	83.8%	0.2%	0.5%	1.7%	13.8%
Daily (4 AM to 11 PM)	85.6%	0.5%	0.8%	2.7%	10.5%

A complicating factor for the relatively high numbers of trucks that use I-15 is the varying physical characteristics of the freeway, and in particular, the steep grades associated with the ascent and descent of Cajon Summit. Grades through Cajon Pass approach approximately 6% and are sustained for approximately 5 miles. Trucks move at different speeds compared to automobile traffic due to the combination of statutory restrictions and performance limitations while traveling through these steep grades. Specifically within the I-15 study corridor, trucks experience difficulty negotiating the steep grades of Cajon Pass and completing necessary merge and diverge movements at critical interchanges (such as the I-15/I-215 interchange) and the Cajon Junction Truck Scales.

I-15 also represents an important corridor for leisure travel with recreational vehicle traffic volumes above those typically observed elsewhere. Not only is I-15 the direct travel route for people driving to various desert attractions, local mountain resorts and Las Vegas, but it is also used by travelers destined to other recreational locales like the Mojave Desert, Death Valley, the eastern Sierra Nevada and the Colorado River. The I-15 corridor is also the most direct linkage between southern California and driving vacation destinations throughout the mountain west, midwest and northeastern United States and central and eastern Canada.

Table 2-2 indicates the traffic by vehicle types for Sunday on I-15 at the SR-138 overcrossing of the freeway. Buses, motorhomes and vehicles hauling trailers constitute 3.0% of the Sunday traffic at this location. The share of recreational traffic at this location increases to 3.4% during the PM peak period and 3.8% during the middle of the day.

Table 2-2 Traffic by Vehicle Type – Typical Weekend

I-15 Comprehensive Corridor Study Total Vehicle Classification (I-15 at SR-138 Overcrossing) Sunday Conditions (November 16, 2003)					
Time Period	*Autos*	*Buses and Motorhomes*	*Autos with Trailers*	*Straight Trucks*	*Tractor Trailers*
Noon Hour (12 PM to 1 PM)	91.1%	1.3%	2.5%	0.9%	4.2%
PM Peak Hour (4 PM to 5 PM	92.3%	0.8%	2.6%	0.6%	3.6%
Night Hour (10 PM to 11 PM)	88.8%	0.5%	0.7%	1.1%	8.8%
Daily (8 AM to 11 PM)	91.6%	0.9%	2.1%	0.8%	4.7%

The greatest overall number of collisions within the I-15 study area occurs on the segment of the freeway through the Cajon Pass between SR-138 and US-395 where the combination of steep grades, high speed differentials between trucks and autos, and intermittent adverse weather conditions is most prevalent. Consistent with the high number of accidents overall, the accident rate on I-15 through Cajon Pass is approximately 58% higher than the average for other similar facilities.

High traffic speeds is the most notable factor contributing to accidents within the study corridor. Speeding is the primary cause of crashes in most of the study corridor, contributing to up to 50% of the accidents in some segments.

Traffic volumes on I-15 in the Cajon Pass have increased an average of 2 to 2½ percent per year over the last ten years. The availability of affordable housing prices will continue to attract more residents to the Victor Valley and foothill areas of the Inland Empire. Though the job base in the study corridor is increasing, substantial commuting to jobs in the Los Angeles basin will continue.

Furthermore, the influence of national and international economic practices will continue to have impact on the I-15 corridor. The corridor serves as a critical linkage between the manufacturing industries and international ports of Southern California, and consumers throughout North America. As economic growth continues in Southern California, increasing numbers of people and goods will seek to utilize the I-15 corridor to move between this region and the rest of the continent. The result will be the continued deterioration of existing transportation performance on I-15, which could ultimately affect the competitive position of Southern California in the national and international economy.

Traffic demand for the I-15 corridor is expected to increase up to double the current traffic volumes by the year 2025, substantially exacerbating already apparent performance problems. Preliminary traffic forecasts indicate that weekday volumes will almost double on I-15 through the Cajon Pass thereby exceeding the peak hour operational capacity of the freeway despite the completion of currently planned freeway improvements. The volume-to-capacity ratio for I-15 in the vicinity of SR-138 is estimated to approach or exceed 1.00 by 2025 highlighting the need to address additional improvements within the corridor.

In addition to considering roadway improvements within the I-15 corridor, improvements to transit services will need to be considered to better serve those without access to autos for their travel needs or to attract drivers seeking an alternative to their cars. By providing more reliable and adequate transit services, traffic demand for the I-15 freeway can be reduced thereby helping to reduce traffic congestion and contributing to improved air quality.

2.3 PURPOSE AND NEED STATEMENT

2.3.1 Improvement Purpose

The purposes of potential transportation improvements in the I-15 corridor are to:

1. Preserve and enhance peak and off-peak mobility and safety for current and future (through at least year 2030) commuters, freight carriers, and recreational travelers from SR-60 in Riverside County to the Mojave River in Victorville.
2. Ensure the economic vitality of existing and future commercial and industrial activity in the corridor.

The transportation improvements in the I-15 corridor are to have their own independent utility and fundability, but should accommodate and support the flows of persons and goods to and from Los Angeles, Orange, and Riverside Counties.

2.3.2 Improvement Need

The I-15 corridor is experiencing considerable performance problems due to a number of interrelated factors. These factors include higher than average truck volumes (10 to 15% of the total traffic), steep grades approaching 6% sustained for approximately 5 miles through the Cajon Pass, roadway design limitations particularly at the I-15/I-215 interchange, heavy traffic demand on both weekends and weekdays, as well as a lack of alternative travel options of sufficient quality. Travel demand for the I-15 corridor has been growing 2 to 2.5% per year on average over the last ten years and is expected to almost double by the year 2030, substantially exacerbating already apparent performance problems.

These performance problems have repercussions such as higher than average traveler delay and accident rates, as well as a disincentive to economic activity in the region. Chronic congestion is readily observed approaching the I-15/I-215 interchange and between I-10 and SR-60. Average peak hour travel speeds are as low as 10 mph through these segments. Congestion is typically worst on Friday and Sunday evenings with demand being 10 to 15% higher than it is during the standard weekday peak periods. The greatest overall number of collisions within the I-15 study area occurs through the Cajon Pass between SR-138 and US-395 where the accident rate is approximately 58% higher than the average for other similar facilities. The increasing congestion and high accident rates on the I-15 make it an unreliable and time consuming travel route. This creates additional costs for commercial and industrial businesses located in the corridor.

2.4 STUDY OBJECTIVES

Analysis of current and projected conditions in the I-15 Comprehensive Corridor Study area, as well as consideration of public input, led to the identification of six key issue areas for the I-15 Corridor. In order to address these problems and needs, specific objectives were developed for the I-15 Comprehensive Corridor Study. The following discussion presents each of the six issue areas and corresponding study objectives, recognizing that many of these problems are interrelated.

2.4.1 Traffic Congestion

Identified Need: Demand during peak travel periods has been overwhelming the existing design capacity at specific locations within the I-15 study corridor. Under current conditions, high volumes of cars, trucks and recreational vehicles have led to a spreading of peak periods and chronic traffic congestion at particular locations including the vicinity of the I-15/I-215 interchange and between SR-60 and I-10. Congestion is observed during the traditional peak periods and throughout weekend recreational travel peak periods. This pattern of congestion is projected to worsen over the next twenty years.

Study Objective: Improve Levels of Service (LOS) on I-15

Study Objective: Provide Sufficient Capacity to Meet Demand

Study Objective: Improve Travel Times

Study Objective: Reduce Operational Conflict between Auto, Recreational and Truck Traffic

2.4.2 Goods Movement

Identified Need: To remain economically competitive in the national and international marketplace, the Southern California region must facilitate increased demand for the shipment of goods manufactured in, exported from, or passing through this region. The I-15 corridor provides a primary linkage between Southern California and freight destinations throughout North America. With the anticipated increase in goods movement, improvements to the I-15 corridor will be necessary to minimize the disruptive effects of truck traffic on the freeway, particularly through the Cajon Pass, and to maximize the economic benefits of truck movement of freight.

Study Objective: Improve the Efficiency and Reliability of Goods Movement

Study Objective: Reduce Operational Conflict between Trucks and General-Purpose Traffic

2.4.3 Transit

Identified Need: Limited transit services are currently provided to residents within the Victor Valley, and between the Victor Valley and the Los Angeles basin. As the population and employment in the study area continue to grow, additional transit options should be considered to help meet travel demand through the corridor. Additional transit services will improve the mobility of those who currently use public transit, as well as make these services more competitive with the automobile so as to attract new riders to help reduce traffic congestion and improve air quality.

Study Objective: Provide Enhanced Access to Transit Services

Study Objective: Provide Reliable Transit Travel Times

Study Objective: Increase Commuter Use of Transit and HOV (Carpooling)

2.4.4 Safety

Identified Need: Design constraints, high traffic volumes, the vehicle mix of autos and heavy vehicles, varying travel speeds, and weather-related conditions (snow and fog) all contribute to vehicle collisions on I-15. These collisions cause property damage, injuries, and fatalities as well as vehicle delay. The occurrence of traffic incidents, challenges associated with clearing those incidents and the limited availability of alternate routes cause traffic congestion on I-15 that cannot be predicted or avoided. These unexpected delays and resulting economic consequences are severe to freight carriers, manufacturers, and other related business interests. Similarly, the unexpected nature of incident related congestion on I-15 is also inconvenient and highly disruptive to commuters and recreational travelers that depend upon this corridor for their travel.

Study Objective: Reduce the Frequency, Severity, and Consequences of Collisions on I-15 by Minimizing Contributing Factors

- Travel Speeds
- Vehicle Performance Conflicts
- Freeway Design Constraints

2.4.5 Design Improvements

Identified Need: Out-dated design features such as short weave distances, limited ramp queue storage, counter-intuitive interchange design and narrow shoulders may contribute to vehicle conflicts and operational inefficiencies along the I-15 corridor. These atypical features constrain the operational capacity of the I-15 by introducing conflicts to the flow of traffic as a result of vehicles merging, diverging, accelerating, decelerating or queuing in lanes.

Study Objective: Upgrade Design Features on I-15

2.4.6 Cost-Effectiveness

Identified Need: There are limited financial resources and high competition for transportation dollars within California over the next 25 years. Transportation improvements identified for the I-15 corridor must compete for these limited available funds with other worthy projects. To be successful, proposed improvements must be cost-effective, generating the maximum transportation benefits for the dollars invested. Proposed transportation solutions that provide immediate benefits, that can be self-sustaining and that can be implemented quickly and easily should be considered. In addition, proposed transportation improvements should be realistic, achievable, as well as based on known physical, operational, social, institutional and financial parameters.

Study Objective: Pursue Cost-Effective Transportation Solutions

Study Objective: Pursue Timely, Viable, and Feasible Transportation Solutions

Study Objective: Pursue Innovative and Self Sustaining Funding Mechanisms

2.5 EXISTING TRANSPORTATION CONDITIONS

The following section summarizes existing transportation conditions data for the I-15 study area. An understanding of existing traffic conditions in the corridor provides the basis for further evaluation of the study corridor and the identification of future improvement needs. Some of this data was referenced previously in the purpose and need discussion. A full technical memorandum summarizing the existing conditions analysis performed as part of the study is available under separate cover.

Existing traffic in the I-15 study corridor is characterized by the following traffic conditions:

- A constant traditional weekday traffic pattern is observed on I-15
  - AM peak period occurs from 6:00 AM to 8:00 AM
  - PM peak period occurs from 3:00 PM to 6:00 PM
  - Average daily traffic at Cleghorn Road is currently between 110,000 and 120,000 vehicles

- There are notable weekend traffic variations
  - Friday daily traffic at Cleghorn Road exceeds 130,000 vehicles
  - The Friday PM peak hour is 10% to 15% higher than average weekday
  - The Friday northbound PM peak hour volume at Cleghorn Road exceeds 5,800 vehicles
  - The Sunday southbound PM peak period extends from 1:00 to 7:00
  - The Sunday southbound PM peak hour volume at Cleghorn Road exceeds 4,900 vehicles

- There are comparable seasonal traffic patterns through corridor
  - Summer and Autumn traffic patterns are almost identical

- Strong peak directional traffic flows are observed
  - During the AM peak period 70% to 75% of traffic is southbound
  - During the PM peak period 60% to 70 % of traffic is northbound

- Higher traffic volumes occur during holiday weekends
  - Comparable peak hour volumes are observed during holiday weekends
  - Holiday Friday daily traffic at Cleghorn Road approaches 150,000 vehicles
  - The PM peak periods spread throughout the afternoon and evening on holiday weekend Fridays and Mondays

- Traffic flows are considerably impacted by incidents and sustained higher volumes
  - Higher traffic volumes create unstable traffic flows and congestion

- Predominately auto traffic uses I-15 with notable weekday tractor-trailer volumes
    - Autos constitute approximately 85% of weekday daily traffic
    - Tractor-trailers constitute approximately 10% of weekday daily traffic

- Increased auto volumes and reduced tractor-trailers are observed on weekends
    - Autos constitute over 90% of weekend daily traffic
    - Tractor-trailers constitute under 5% of weekend daily traffic

- Truck traffic is highest during mid-weekdays and overnight
    - Tractor-trailers constitute approximately 12% to 15% of total traffic during mid-weekdays and overnight
    - Straight trucks constitute approximately 3% to 4% of total traffic during mid-weekdays
    - Tractor-trailer volumes exceed 300 vehicles per hour per direction during mid-weekdays

- RV traffic is highest during Sunday afternoons
    - Sunday southbound RV/trailer traffic at SR-138 exceeds 200 vehicles per hour during mid-afternoon
    - Although high compared to other facilities, RV traffic is a minor portion of the overall traffic on I-15 (less than 3% of Sunday daily traffic at SR-138)

- There is generally sustained traffic flow throughout the corridor
    - Average travel speeds are between 50 mph and 70 mph
    - Typical travel times are between 40 minutes and 1 hour

- Existing chronic congestion is isolated primarily at the I-15/I-215 interchange
    - Peak congestion is mostly associated with weekend travel
    - Friday northbound congestion occurs between SR-210 and I-215 from 3:00 PM to 7:00 PM
    - Sunday southbound congestion occurs between the Variable Message Sign and I-215 from 5:00 PM to 7:00 PM
    - Average peak travel speeds during periods of congestion are between 10 mph and 20 mph
    - The congestion is directly attributable to the interchange configuration at I-15/I-215 including the northbound lane drops and the triple lane weave in both directions
    - Congestion between I-10 and SR-60 is attributable to excessive demand for this segment and the major merge and weave points

- There is a high speed differential between trucks and autos, particularly on the Cajon Summit grade
    - Truck speeds are restricted below 45 mph on the southbound Cajon Summit grade descent
    - Auto speeds exceed 65 mph

    - High speed weaving occurs across lanes

- The number of collisions in the study area is highest overall between SR-138 and US-395 (through the Cajon Pass)
    - Crash rates through Cajon Pass exceed average rates by 58%
    - Rear-end collisions are the predominate crash type

- Speeding is the primary contributing factor to collisions on I-15
    - Speed contributes to over 40% of collisions on some segments of I-15

- Occurrence of collisions is greatest on Friday (and to a lesser extent on Monday)
    - The highest occurrence of Friday collisions is northbound between SR-210 and SR-138
    - The greatest number of collisions occurs during the AM and PM peak periods

- The Cajon Junction Truck Scales are integrated with the SR-138 ramps limiting the merging/weaving distance between the scales and the ramps
    - Trucks are required to merge with mainline traffic before accelerating to freeway speeds
    - The northbound scale is located at the beginning of Cajon grade ascent limiting the ability of trucks to maintain momentum on the approach to the grade climb

2.6 Economic Background Analysis

Throughout the history of Southern California, there has always been an area whose available undeveloped land has caused it to be the center of very rapid economic development activity. Since about 1980, that area has been the Inland Empire (San Bernardino & Riverside counties). Within San Bernardino County's portion of this region, I-15 plays a role of enormous economic importance.

Over the next two decades, the I-15 freeway will have to handle an increasing amount of local, retail, commuter and truck traffic. This is the case because lack of land elsewhere in Southern California will drive millions of people and thousands of businesses into the Inland Empire including San Bernardino County. The pressures on the I-15 will grow as each of the three major sub-areas of the county that border the I-15 goes through the three stage process (*Dirt Theory*) by which a Southern California peripheral area evolves to become part of the urban core:

- <u>Stage #1 – Affordable housing period</u>: There is very rapid housing and population growth but the vast majority of jobs in the area are in population serving sectors (like retailing, education). In this period, most workers must commute as the jobs-to-housing ratio in the area is very low. Today, the Victor Valley-Barstow area, with its vast amounts of undeveloped land, is experiencing this stage of growth and has a jobs-to-housing ratio of just 0.65 when 1.24 is the average for all of Southern California.

- ♦ Stage #2 – Rapid blue collar job growth: This occurs when an area sees industrial firms coming to the numerous large tilt-up buildings being built on its large amounts of undeveloped industrial land. These jobs are unrelated to its local population as they provide manufacturing products and logistics services to people and firms outside the local area. Early in this stage, the jobs-to-housing ratio begins to rise. By the end, it may be beyond the neutral 1.24 level. In San Bernardino County, the East Valley (Fontana-Yucaipa) has entered this part of its growth cycle since the West end is running out of industrial land. The jobs-to-housing ratio in the East Valley is 1.04.

- ♦ Stage #3 – Housing Stock Goes Upscale: This period occurs because higher prices in the traditional urban core start forcing well educated and/or skilled technicians, professionals, executives and entrepreneurs to migrate to the growing area in search of the upscale homes they can no longer afford in the core. As they move, they bring their skills with them. Eventually, many will work for less to stop commuting, creating an incentive for technology, professional and corporate operations to follow them. In San Bernardino County, the West End (Ontario-Rancho Cucamonga) is now entering this stage. The jobs-to-housing ratio in the West End is 1.40.

With the West End, East Valley and Victor Valley in different phases of Southern California's growth process, conditions within each area and how these conditions could impact the I-15 freeway were studied. Based on this analysis, the following conclusions were drawn as to how the area's stage of growth will likely affect the freeway:

- ♦ The segment of the I-15 bordering the West End and the East Valley will have to handle increasing numbers of local trips because the number of people living along the route will increase as Rancho Cucamonga builds out, the dairy lands of Ontario, Chino and Eastvale become residential neighborhoods and the open spaces of Fontana, Rialto, Bloomington and Devore are developed.

- ♦ The I-15 will have to handle a growing number of shopping trips due to the dominate regional role expected to be played by the huge shopping complex at and around Ontario Mills Mall, plus the upscale shopping complex recently opened at Victoria Gardens, both of which are along the I-15 freeway. The route will thus have to handle an increasing flow of regional shoppers from the 213,000 people expected to be added to the West End from 2000-2020, plus the 258,000 expected to be added in the East Valley and the 185,000 growth expected in the Victor Valley-Barstow area.

- ♦ The I-15 will have to handle a growing volume of commuter trips due to the importance of the industrial and office complexes expected to grow up in the West End and Fontana-Rialto areas along the corridor. Numerous drivers from the West End will want to access jobs in these areas. Commuters from the growing East Valley will have to do so, until that area's Stage #2 job growth creates a better jobs-to-housing balance around 2020. Commuters from the rapidly growing high desert will be driving down the I-15 to jobs in both the West End and East Valley until well beyond 2020.

- The I-15 will have to handle an accelerating volume of truck trips as the volume of international traffic at the ports of Los Angeles and Long Beach puts ever-increasing numbers of intercontinental truck cargo on the route. The growth of trade will also cause a growing volume of truck trips on the I-15 as more and more of Southern California's logistics infrastructure will be located in San Bernardino County, be it warehouses, trucking cross-docks, intermodal rail, inland port or air cargo capability. From 2000-2020, truck trips on the I-15 will grow due to the development of each of its three main sub-areas:

    - In San Bernardino County's West End, the industrial complex will build-out and Ontario International Airport will reach its capacity of 30 million air passengers and 2.6 million tons of air cargo a year.

    - The East Valley will continue adding people and commuters while also moving deep into Stage #2 development of its industrial capability. That trend will improve the areas jobs-to-housing balance. However, it will also mean the addition of millions of square feet of industrial space as well as the possible development of intermodal rail or inland port capability in either San Bernardino or Devore. Together, these warehouses and logistics operations will add pressure on all of the region's freeways, and particularly I-15.

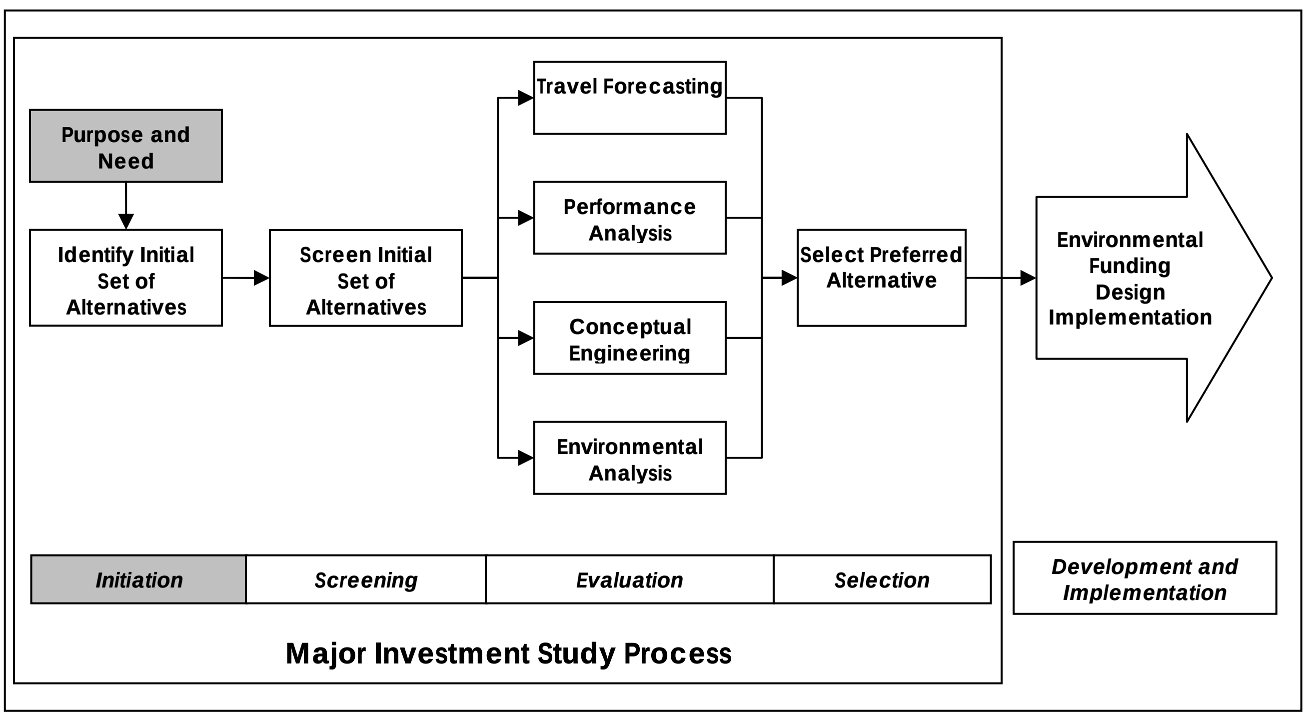
    - The Victor Valley-Barstow area will move deeper into Stage #1 growth of housing and population. This will expand the volume of commuters to jobs markets in the Inland Empire. If intermodal or inland port facilities are developed in the high desert area, it will speed up the migration of blue collar employers to the area and take some pressure off of commuting. However, this type of development in the Victor Valley would add to the truck trips through Cajon Pass.

2.7 OUTLINE OF REPORT

The fundamental intent of the Major Investment Study (MIS), like any major transportation planning effort, is to narrow the range of potential options to resolve a particular transportation problem ultimately leading to the selection of a specific strategy for implementation. To facilitate this process, the MIS is structured so that the options being considered are periodically refined so that the maximum level of effort can be focused on the evaluation of alternatives most likely to be recommended for implementation. This process of strategic elimination simplifies decision making by focusing on the alternatives that have the most viability thereby reducing the volume of information needed by decision makers to more manageable levels.

Figure 2-3 provides an overview of the major phases in the MIS process. This section of the report addressed the "Purpose and Need" portion of the "Initiation" phase. The remainder of the report addresses the remaining portions of the MIS process illustrated in the figure. **Section 3** discusses the identification and screening of the initial set of alternatives. **Section 4** addresses the "Evaluation" phase of the process in which the reduced set of alternatives produced by the initial screening phase is analyzed in increasing detail. **Section 5** addresses public outreach efforts undertaken as part of the I-15 Comprehensive Corridor Study. **Section 6** outlines the "Selection" of a preferred alternative. The remaining sections of the report further develop the recommended alternative by way of engineering plans, right of way (ROW) plans, a financial plan, an implementation plan, and a review of the next steps in the project development process.

Figure 2-3 Major Phases of the MIS Process



SECTION 3 ALTERNATIVES DEVELOPMENT

As described previously, the fundamental intent of the Major Investment Study (MIS), like any major transportation planning effort, is to narrow the range of potential options to resolve a particular transportation problem ultimately leading to the selection of a specific strategy for implementation. To facilitate the process, the MIS is structured so that the options being considered are periodically refined as outlined previously in **Figure 2-3**.

This section relates to the "Initiation" and "Screening" phases of the MIS process. It documents the development and refinement of an initial set of alternatives that address the study corridor issues defined in the Purpose and Need Statement, and related goals and objectives. The task of developing and refining a set of initial alternatives involved several sequential activities that culminated in the identification of five alternatives to be carried to the next stage of the study, "Evaluation". The sequence of alternative development steps were as follows:

- I-15 Freeway Characteristics: The set of initial alternatives was developed with consideration for the physical, operational, and engineering constraints of the study corridor. To this end, the I-15 corridor's existing and planned physical design elements and operational characteristics were assessed prior to the identification of a preliminary set of alternatives. **Section 3.1** summarizes this information.

- Identification of Initial Alternatives: Given this understanding of I-15's existing and planned characteristics, a diverse range of improvement options were considered. A set of initial alternatives that represented a full range of investment levels and that addressed issues defined in the Purpose and Need statement was defined. **Section 3.2** discusses the framework for alternatives development and the set of initial alternatives identified.

- Screening of Initial Alternatives: **Section 3.3** describes the screening methodology, **Section 3.4** describes the screening evaluation, **Section 3.5** summarizes the results of the screening evaluation, and **Section 3.6** presents the reduced set of alternatives produced based on the screening evaluation.

The reduced set of screened alternatives was then analyzed in more detail as will be discussed in **Section 4**, Alternatives Evaluation.

3.1 I-15 FREEWAY CHARACTERISTICS

The I-15 Comprehensive Corridor Study area extends approximately 47 miles from SR-60 in Riverside County in the south, to the Mojave River at Victorville in San Bernardino County to the north. The following section provides an overview of the existing and planned characteristics of the I-15 study corridor.

3.1.1 Existing Characteristics

I-15, also referred to as the Ontario Freeway (south of I-215) and the Mojave Freeway (north of I-215), exists generally as an eight-lane freeway level facility between SR-60 in Riverside County at the southernmost extent of the I-15 Comprehensive Corridor Study area, and US-395 in Hesperia. Between US-395 and D Street in Victorville, I-15 exists as a six lane freeway through the crossing of the Mojave River representing the northernmost extent of the study area.

I-15 has had a complicated history from the original 1947 approved route plan that proposed designating I-15 generally along the current I-215 alignment. The present I-15 alignment through the study corridor has evolved from the redesignation and subsequent upgrading or realignment of various US and state designated highways including US-66, SR-91 and US-395. Along I-15, sections of the pre-existing highways have been integrated into the present day freeway including the southbound lanes of the former highway through Cajon Summit. The current I-15 alignment through the study corridor was constructed primarily during the late 1960's and early 1970's, culminating with the completion of the 'Devore Cut-Off' segment between I-215 and I-10 in 1975.

I-15 currently includes 23 interchanges with intersecting freeways and arterial streets along the study corridor. These interchange locations include:

- SR-60 (Pomona Freeway) in Riverside County
- Jurupa Street in Ontario
- I-10 (San Bernardino Freeway) in Ontario
- 4th Street in Rancho Cucamonga
- Foothill Boulevard (SR-66) in Rancho Cucamonga
- Baseline Road in Rancho Cucamonga
- SR-210 Freeway in Fontana
- Summit Avenue in Fontana
- Sierra Avenue in Fontana
- Glen Helen Parkway in San Bernardino County
- I-215 Freeway in Devore
- Kenwood Avenue/Cajon Boulevard in Devore
- Cleghorn Road/Cajon Boulevard in San Bernardino County
- SR-138 in San Bernardino County
- Oak Hill Road in San Bernardino County
- US-395/Joshua Street in Hesperia
- Main Street in Hesperia
- Bear Valley Road in Victorville
- Palmdale Road (SR-18 West) in Victorville

- Roy Rogers Drive in Victorville
- Mojave Drive in Victorville
- D Street (SR-18 East)/National Trails Highway in Victorville
- E Street in Victorville

As mentioned previously, I-15 exists primarily as an eight-lane freeway facility between SR-60 and US-395. Throughout this portion of the freeway, the cross-section generally consists of a 10' to 15' median with barrier separation, 4' to 8' median shoulder, four 12' general-purpose traffic lanes (in each direction), 8' to 12' outside shoulder, and approximately 12' to 24' of additional vacant right-of-way. Between US-395 and D Street the freeway retains a similar cross-section with the notable exception of a drop in the number of general-purpose traffic lanes from four to three in each direction.

Auxiliary traffic lanes provide additional capacity between various adjacent interchanges along the study corridor. Auxiliary traffic lanes are provided at the following locations:

- Northbound
  - Jurupa on-ramps to I-10 off ramps
  - I-10 on-ramps to 4th off-ramp
  - Baseline on-ramp to SR-210 off-ramps
  - SR-210 on-ramps to Summit off-ramp
  - Roy Rogers on-ramp to Mojave off-ramp

- Southbound
  - D Street on-ramp to Mojave off-ramp
  - Mojave on-ramp to Roy Rogers off-ramp
  - Roy Rogers on-ramp to Palmdale (SR-18W) off-ramp
  - Summit on-ramp to SR-210 off-ramps
  - SR-210 on-ramps to Baseline off-ramp
  - 4th on-ramp to I-10 off-ramps
  - I-10 on-ramps to Jurupa off-ramps

A designated truck climbing lane is provided on northbound I-15 between SR-138 and the Cajon Summit. The truck climbing lane increases northbound capacity to five lanes on this segment of the freeway.

Drop lanes and merge lanes in the vicinity of the I-15/I-215 interchange reduce the capacity of I-15 from four lanes to three lanes in each direction. In the northbound direction, a single lane drop at the Glen Helen off-ramp reduces the capacity of the northbound I-15 to three lanes. A recent improvement by Caltrans has resulted in the restriping of the I-15 and I-215 freeways in the vicinity of the northbound-to-northbound I-15 connector to eliminate the lane drop that previously existed on the connector. While this improvement has helped to improve northbound traffic flow on I-15, it is considered to be an interim improvement in lieu of the reconfiguration of the I-15/I-215 interchange. In the southbound direction three lanes are provided on the southbound-to-southbound I-15 connector with a fourth lane added at the Glen Helen on-ramp.

Arterial frontage roads generally parallel the I-15 freeway through the Victor Valley. On the east (northbound) side of the freeway, a continuous frontage road (Mariposa Road) is provided from Oak Hill to Palmdale. On the west (southbound) side of the freeway, road frontage is provided from Palmdale to Main (Amargosa Road) and from Joshua to Oak Hill (Caliente Road). Frontage roads through the Victor Valley are generally undivided with one lane provided in each direction.

On the west side of the freeway from Cleghorn to Kenwood, Cajon Boulevard (formerly US-66/SR-91/US-395) offers an alternate route to I-15. The former expressway exists as a divided highway with two lanes in each direction, although the roadway presently operates in part as an undivided roadway with one lane in each direction. South of the I-215 interchange, Cajon Boulevard resumes paralleling the I-215 Freeway into San Bernardino.

Glen Helen Parkway follows the former Devore Cutoff Road alignment that parallels I-15 and predates the freeway south of I-215. In combination with Lytle Creek Road and Duncan Canyon Road, the former Devore Cutoff provides a circuitous alternative to I-15 during periods of heaviest congestion, particularly for northbound traffic prior to weekends and holidays.

3.1.2 Planned Improvements

Improvements currently planned for I-15 within the study area include a combination of lane additions and new interchange locations. Ongoing construction, the Southern California Association of Governments (SCAG) 2004 Regional Transportation Plan (RTP) and completed Caltrans Project Study Reports (PSR's) provide an indication of the extent of planned improvements within the study corridor.

The opening of a designated truck climbing lane on northbound I-15 from SR-138 to the Cajon Summit, and the northbound restriping at the I-15/I-215 interchange highlights the most recently completed of the ongoing improvements to I-15 within the study area. Construction is progressing on the widening of I-15 north of the study area toward Barstow and the Nevada State Line. Recent construction between Lenwood Road in Barstow to D Street in Victorville has provided I-15 with three lanes in both directions from the northern extents of the study area and beyond.

In April 2004, SCAG adopted *Destination 2030*, the 2004 RTP for the Southern California region. Destination 2030 delineates significant transportation infrastructure investments planned to occur within the Southern California region through the year 2030. The following list provides an overview of the Destination 2030 plan projects specific to the I-15 study corridor:

- HOV Lane Projects
    - I-15 from San Diego County to SR-60 (2020)
    - I-15 from SR-60 to I-215 (2025)
    - I-15 from I-215 to D Street (2020)

- ♦ Planned/Potential Additional Toll Corridors
  - I-15 Corridor user-fee-backed capacity enhancement (2030)

- ♦ Truck Climbing Lane Projects
  - I-15 from Devore to Summit (2010)

The Planned/Potential Additional Toll Corridors for I-15 is intended to serve primarily as a dedicated truck lane facility as part of a broader regional goods movement program. Consistent with this plan recommendation, the county transportation commissions, SCAG, and Caltrans have recently embarked on a regional goods movement action plan to evaluate a range of improvement strategies, including the feasibility of developing a regional system of dedicated truck lane facilities potentially funded with user fees. The results of this goods movement action plan are expected to be available in 2007.

In addition to the projects identified in the SCAG Destination 2030 plan, Caltrans has completed numerous PSR's detailing improvements to various interchanges along the I-15 study corridor. **Table 3-1** summarizes the PSR's previously completed for locations within the I-15 study corridor.

Table 3-1 Previously Completed I-15 Interchange Project Study Reports

Project Type	Project Description and Location	PSR Completed	Project Status
New Interchange	I-15 at La Mesa Road/Nisquali Road, Victorville	9/14/2001	Draft Environmental Assessment/ Initial Study approval expected late 2005 or early 2006; Consultant PA&ED, PS&E
Interchange Modification	I-15 at Devore Road (Glen Helen Parkway), San Bernardino County	10/26/2003	
Interchange Modification	I-15 at Route 66 (Foothill Boulevard), Rancho Cucamonga	8/31/1990	Project Report approval 8/31/90; project completed 1-20-98
Interchange Modification	I-15 at Mojave Drive, Victorville	3/17/1998	Construction expected to begin Summer 2005
Interchange Modification	I-15 at Bear Valley Road, Victorville	7/28/1989	Project Report approval 7/28/89; project completed 1-31-92
Interchange Modification	I-15 at Main Street, Hesperia	9/26/1995	Construction Complete
Interchange Modification	I-15 at Baseline Road, Rancho Cucamonga	4/25/2002	Project status – City of Rancho Cucamonga conducting PSR/PDS, PA&ED, PS&E. Environmental document approval Feb, 2006
New Interchange	I-15 at Arrow Route, Rancho Cucamonga	5/24/2002	Project status – City of Rancho Cucamonga conducting PSR/PDS, PA&ED, PS&E.

3.2 IDENTIFICATION OF INITIAL ALTERNATIVES

This subsection outlines the development and identification of the set of initial alternatives considered as part of the I-15 Comprehensive Corridor Study.

The development of alternatives builds upon the assessment of existing traffic conditions and future forecast travel demand within the study corridor, and the consideration of physical, operational and engineering constraints. The initial alternatives are designed to cover a range of increasing levels of investment and modal choices that address the Purpose and Need of the corridor. The development of the initial alternatives is consistent with the criteria outlined in the National Transit Institute *Training Program for Major Investment Studies Reference Manual*.

The following is a summary of the guidelines considered during the development of the set of initial alternatives:

- Alternatives are conceptual in scope.
- Alternatives should be responsive to the Purpose and Need Statement developed for the I-15 .
- The alternatives should encompass an appropriate range of capital investment options, without major gaps in the likely costs of the alternatives.
- The number of alternatives should be manageable.
- The conceptual alternatives should include all options that have a reasonable chance of becoming the locally preferred improvement strategy (LPIS).
- Each alternative should be capable of being differentiated from other alternatives in terms of costs, benefits and impacts.
- The conceptual alternatives should be designed to address differing study goals and objectives.
- The conceptual alternatives should include a No-Build alternative and a Travel Demand Management/Transportation System Management (TDM/TSM) alternative.

By definition, all of the No-Build transportation improvements are considered to be inclusive to all of the proposed alternatives. In addition, the various elements of the TDM/TSM Alternative are also considered to be integral to all of the build alternatives. This means that existing and previously committed infrastructure improvements and operational strategies such as added transit service, access management, and intelligent transportation systems (ITS) are included in the proposed build alternatives to maximize the efficiencies of the various major capital investments.

At this stage in the MIS process alternatives are still highly conceptual. Locations of specific facilities are approximated only for the purposes of comparatively evaluating benefits and impacts by orders of magnitude. Cross sections shown for each alternative are illustrative. Each cross section is intended to represent the most typical case for each alternative and highlights the major differences among the proposed alternatives.

Each of the initial alternatives identified is described in detail in the **Sections 3.2.1** through **3.2.9**. The set of initial alternatives is as follows:

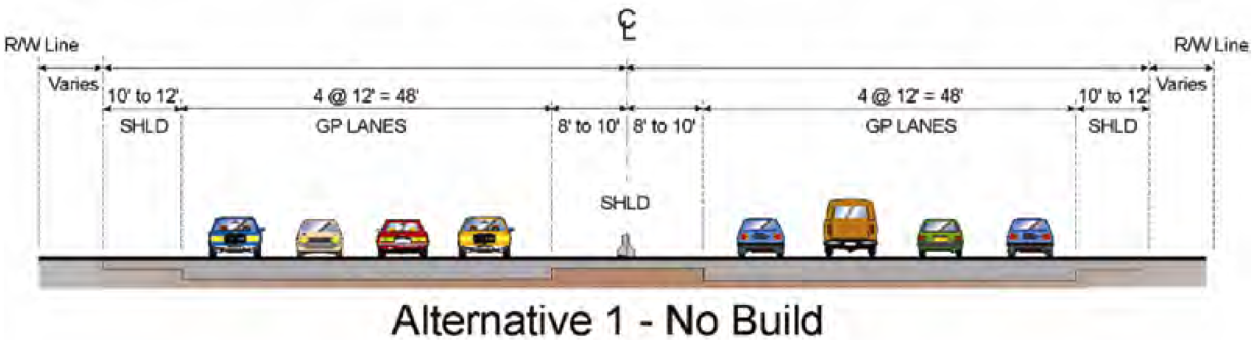
- Alternative 1 – No-Build
- Alternative 2 – Travel Demand Management (TDM) and Transportation System Management (TSM)
- Alternative 3 – High-Occupancy Vehicle (HOV) Lane (SR-60 to D Street) with Express Bus
- Alternative 4 – Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)
- Alternative 5 – Full Corridor Dedicated Truck Lanes (SR-60 to D Street)
- Alternative 6 – Single General-Purpose Lane (SR-60 to D Street)
- Alternative 7 – Multiple General-Purpose/Express Lanes (SR-60 to D Street)
- Alternative 8 – Reversible Managed Lanes (SR-210 to US-395)
- Alternative 9 – Commuter Rail Service (San Bernardino to Victorville)

In addition, two I-15/I-215 north interchange (Devore Interchange) improvement options were considered during the alternatives analysis as discussed in **Section 3.2.10**. Option 1 would reconfigure the I-15/I-215 interchange to make the number of I-15 through lanes consistent with the lane configuration north of Kenwood Road and south of Glen Helen Parkway. This option would effectively eliminate the existing lane drop and forced weave that occurs as a result of the current interchange configuration. Option 2 would reconfigure the I-15/I-215 interchange similarly to Option 1, but would also include separate truck bypass lanes allowing large vehicles to circumvent the interchange. Both options will be evaluated in conjunction with the various alternative subjected to further detailed evaluation.

3.2.1 Alternative 1 – No-Build Alternative

The No-Build Alternative consists of the existing lane configuration for I-15 plus those transportation projects that are currently under construction, or are planned and committed for completion prior to 2030, the planning horizon year for the I-15 Comprehensive Corridor Study. Consequently, the No-Build Alternative represents given future travel conditions in the I-15 Study Area and it is the baseline against which the candidate future build alternatives for the I-15 corridor will be assessed. **Figure 3-1** illustrates the typical cross-section for I-15 south of US-395 within the study corridor under the No-Build Alternative. North of US-395 the typical cross-section is similar with the exception of the number of general-purpose lanes which is reduced from four to three in each direction

Figure 3-1 I-15 Freeway Typical Cross-Section – No-Build Alternative



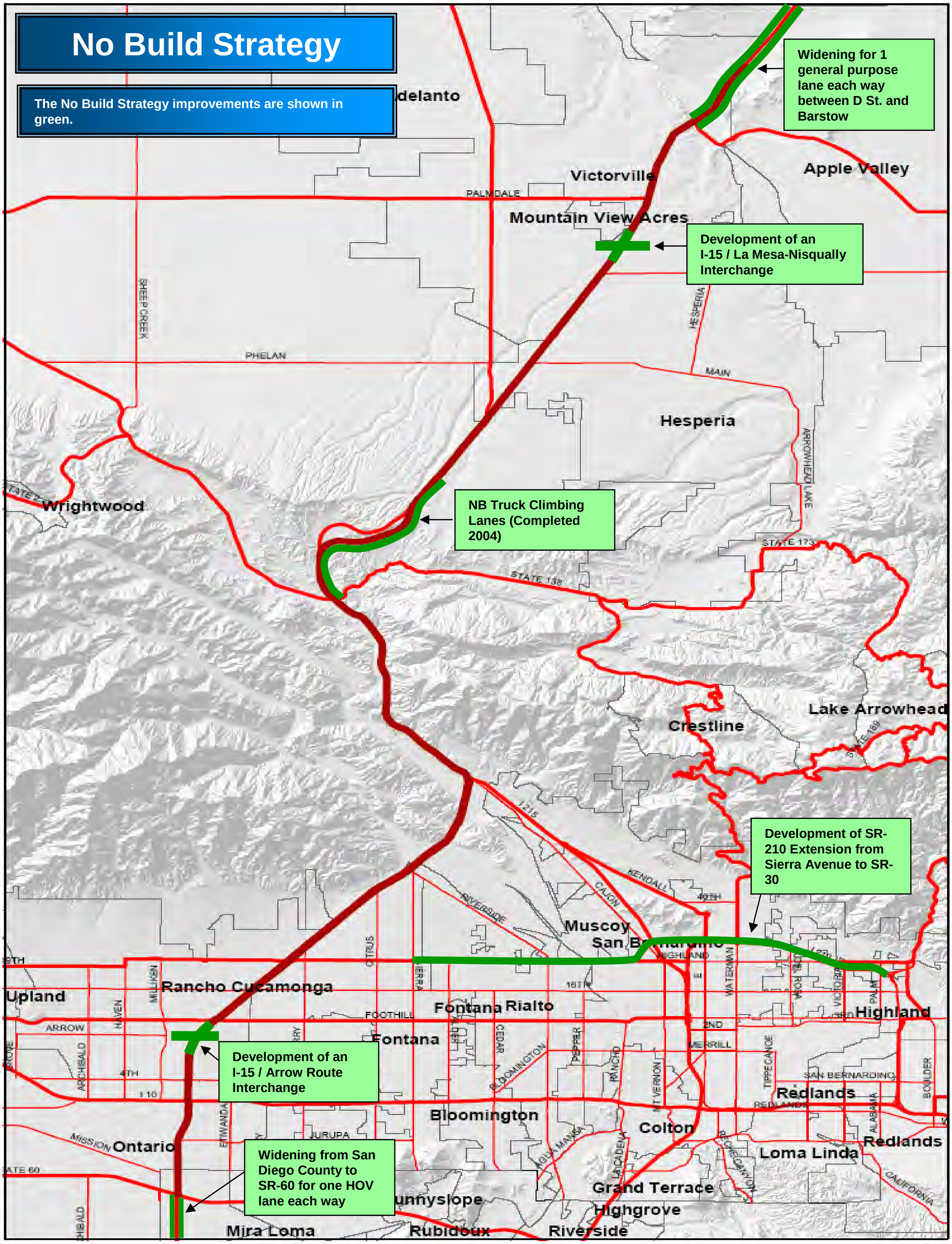
Based on the review of previously completed plans and studies, the following specific projects are included in the I-15 Comprehensive Corridor Study No-Build Alternative:

Freeway System

- I-15, from SR-138 to Cajon Summit, northbound widening to include one additional 'truck climbing' lane (opened to traffic late Spring 2004).
- I-15, from D Street to Lenwood Road (Barstow), widening to include one additional general-purpose lane in each direction (southbound lane opened to traffic late Winter 2004).
- I-15, from San Diego County to SR-60 (immediately south of study area), widening to include one HOV lane in each direction.
- I-15, at La Mesa Road/Nisquali Road, new interchange.
- I-15, at Arrow Route, new interchange.
- SR-210, Sierra to SR-30, new freeway with one HOV lane and two general-purpose lanes in each direction.

Figure 3-2 illustrates the various specific components of the I-15 Comprehensive Study No-Build Alternative.

Figure 3-2 Alternative 1 – No-Build



3.2.2 Alternative 2 – TDM/TSM Alternative

The TDM/TSM Alternative largely consists of operational investments, policies, and actions that are aimed at improving automobile travel, transit service and goods movement through the study corridor in addition to reducing the environmental impacts of transportation facilities and operations. The following list provides an overview of the specific elements to be considered as part of the TDM/TSM Alternative:

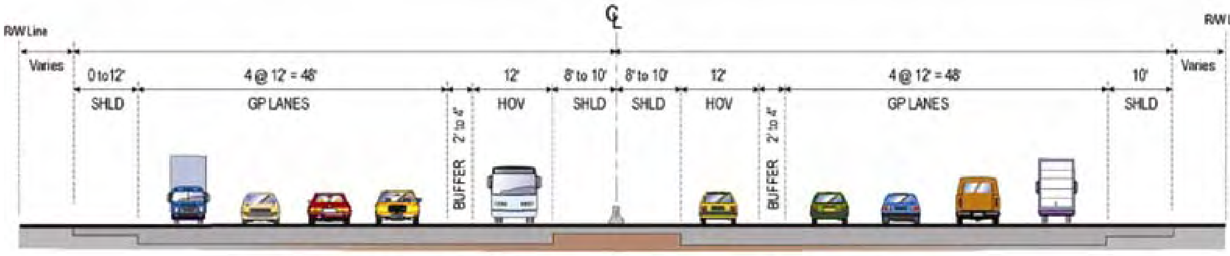
- Additional ramp metering at interchanges.
- Improved freeway directional signage.
- Increased traffic enforcement.
- Expanded truck emission reduction programs.
- Coordination with major truck trip generators to maximize off-peak truck usage of the corridor.
- Increased 'Express Bus' service.
- Enhanced local bus service (local circulators).
- Expanded corridor Intelligent Transportation Systems (ITS).
- Emphasize ITS connectivity and dissemination of information.
- Enhanced Freeway Service Patrol during peak travel periods.
- Coordination with major intermittent event trip generators (such as Glen Helen Pavilion, California Speedway) to minimize impacts during peak travel periods.

3.2.3 Alternative 3 – HOV Lane (SR-60 to D Street) with Express Bus

Alternative 3 represents the first of the future build strategies to be considered. Consistent with the SCAG 2004 RTP recommendations for I-15 through the study area, Alternative 3 includes the addition of one HOV lane in each direction of I-5 between SR-60 in Riverside County and D Street in Victorville. Under this alternative, the HOV lanes would be concurrent flow, buffer separated lanes with regular ingress and egress locations in accordance with the typical design standards for HOV lanes in the Southern California region. The HOV lanes would provide full-time access to HOV users meeting an established minimum occupancy threshold (either 2+ or 3+ occupants per vehicle depending on demand for the facility) and would integrate increased Express Bus service to maximize the utilization of the HOV lane.

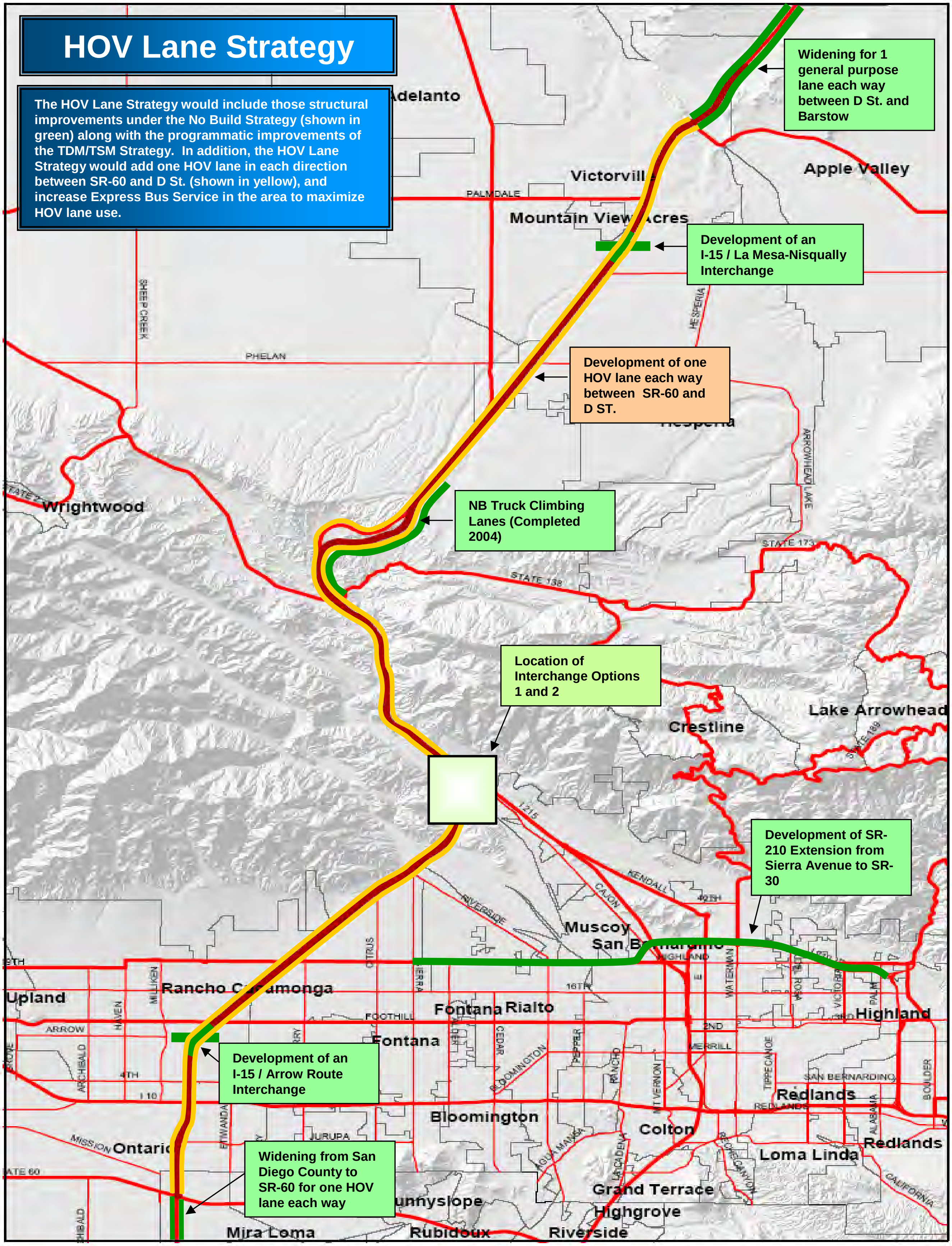
Figure 3-3 illustrates the typical cross-section for I-15 Corridor under Alternative 3. **Figure 3-4** illustrates the elements of Alternative 3 within the overall study corridor.

Figure 3-3 I-15 Freeway Typical Cross-Section – HOV Alternative



Alternative 3 - High-Occupancy Vehicle Lane

Figure 3-4 Alternative 3 - HOV Lanes (SR-60 to D Street) with Express Bus

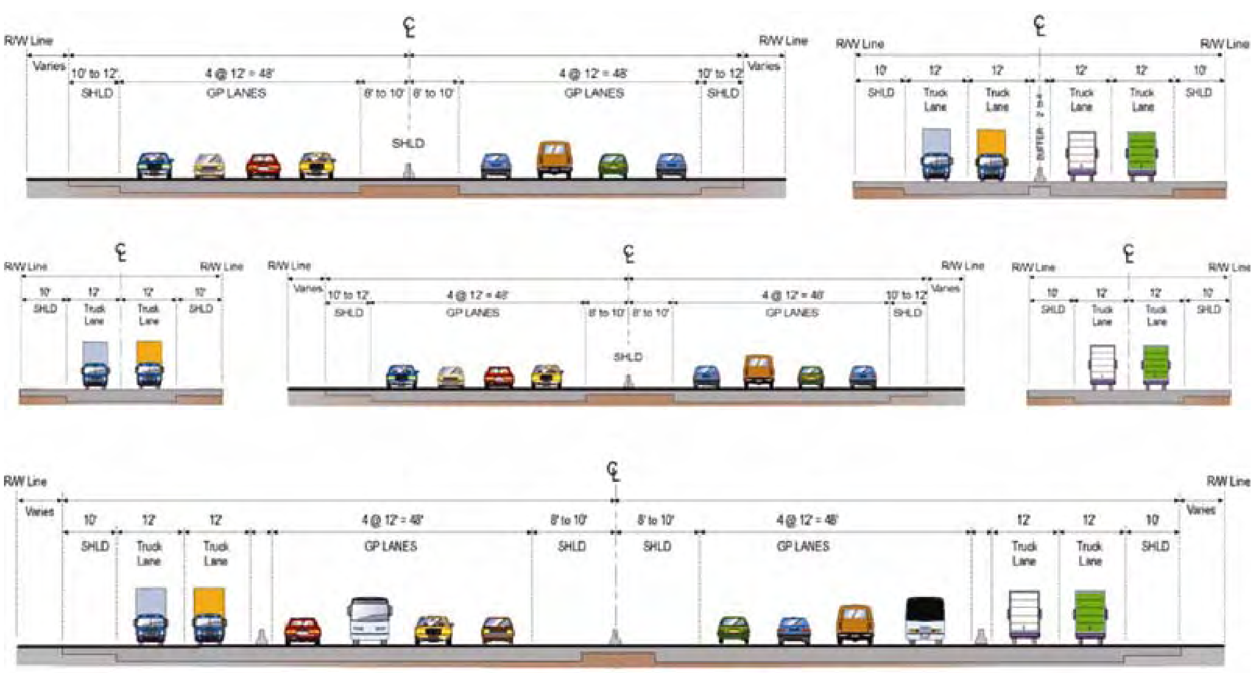


3.2.4 Alternative 4 – Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)

Alternative 4 represents the first of two alternatives to consider the provision of dedicated truck lanes with the I-15 study corridor. Under Alternative 4, two dedicated truck lanes would be provided in each direction of the I-15 corridor between Glen Helen Parkway and US-395. The purpose of the dedicated truck lanes is to separate typically slower truck traffic (and possibly recreational vehicle traffic) from automobile traffic on I-15, thereby reducing the potential for vehicle conflicts. Under this alternative, the dedicated truck lanes would be physically separated from the existing general-purpose lanes on I-15 and could alternatively be positioned in the median or along the shoulders of the existing freeway, or on entirely new alignments as physical conditions within the corridor necessitate. The truck lanes could also potentially require the use of aerial structures or tunnels to accomplish, particularly through this physically constrained section of the study corridor. The dedicated truck lanes would be provided with ingress and egress to the general-purpose lanes at strategic locations to facilitate access to interchanges with major intersecting truck routes. Alternatively, direct connectors could be provided between the truck lanes and intersection routes at locations with the highest volumes of truck movements.

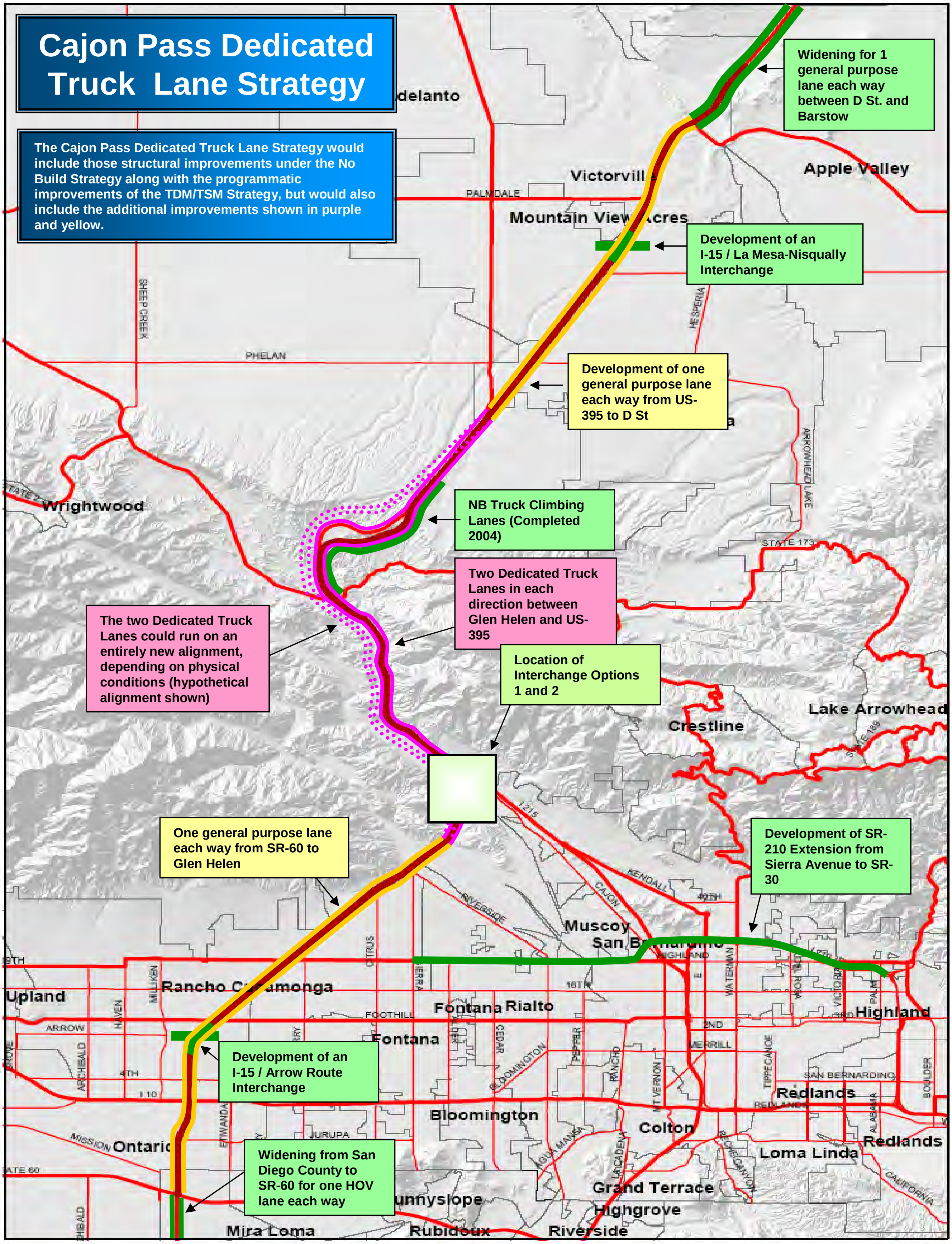
Under Alternative 4, one additional general-purpose lane would be provided in each direction along I-15 south of Glen Helen to SR-60 and north of US-395 to D Street to facilitate the transition of trucks between the general-purpose lanes on I-15 and the dedicated truck lanes through the Cajon Pass. **Figure 3-5** compares two possible typical cross-sections for I-15 Corridor Dedicated Truck Lanes. **Figure 3-6** illustrates the elements of Alternative 4 within the overall study corridor.

Figure 3-5 I-15 Freeway Typical Cross-Sections – Dedicated Truck Lanes



Alternative 4 - Cajon Grade Dedicated Truck Lanes
(Glen Helen to US-395)

Figure 3-6 Alternative 4 – Cajon Pass Dedicated Truck Lanes



3.2.5 *Alternative 5 – Full Corridor Dedicated Truck Lanes (SR-60 to D Street)*

Alternative 5 considers the development of dedicated truck lanes for the full extents of the I-15 study corridor from SR-60 to D Street effectively extending the parameters of Alternative 4. Like Alternative 4, Alternative 5 would propose the addition of two dedicated truck lanes in each direction of the I-15 corridor with the truck lanes being physically separated from the general-purpose lanes of the freeway. Ingress and egress to the truck lanes would be provided at strategic intervals to facilitate movement between the truck lanes and the adjacent freeway or intersection truck routes.

The typical cross-section for Alternative 5 would be the same as those illustrated in **Figure 3-5**. The various elements of Alternative 5 are presented in **Figure 3-8**.

3.2.6 *Alternative 6 – Single General-Purpose Lane (SR-60 to D Street)*

Alternative 6 considers the addition of one general-purpose lane in each direction of I-5 from SR-60 to D Street. Under Alternative 6, the additional general-purpose lane would generally result in a total of five lanes in each direction of the freeway south of US-395 and four lanes in each direction north of US-395. Exceptions would include those locations where additional auxiliary lanes or the designated truck climbing lane would continue to be provided to serve specific traffic operations needs. Under Alternative 6, a designated truck descent lane would also be provided in addition to the proposed single general-purpose lane on southbound I-15 from the Cajon Summit to SR-138 to facilitate the separation of slower moving trucks from general-purpose traffic.

Figure 3-7 illustrates the typical cross-section for I-15 Corridor under Alternative 6. **Figure 3-9** illustrates the elements of Alternative 6 within the overall study corridor.

Figure 3-7 I-15 Freeway Typical Cross-Section – Single General-Purpose Lane Alternative

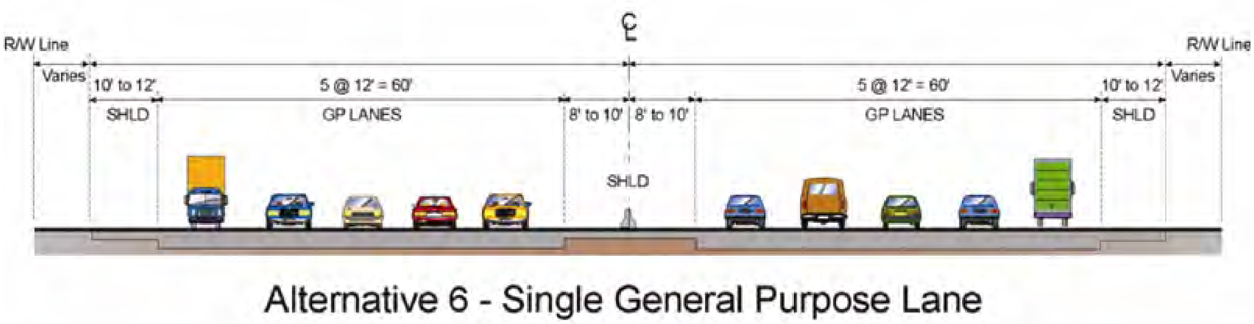


Figure 3-8 Alternative 5 – Full Corridor Dedicated Truck Lanes (SR-60 to D Street)

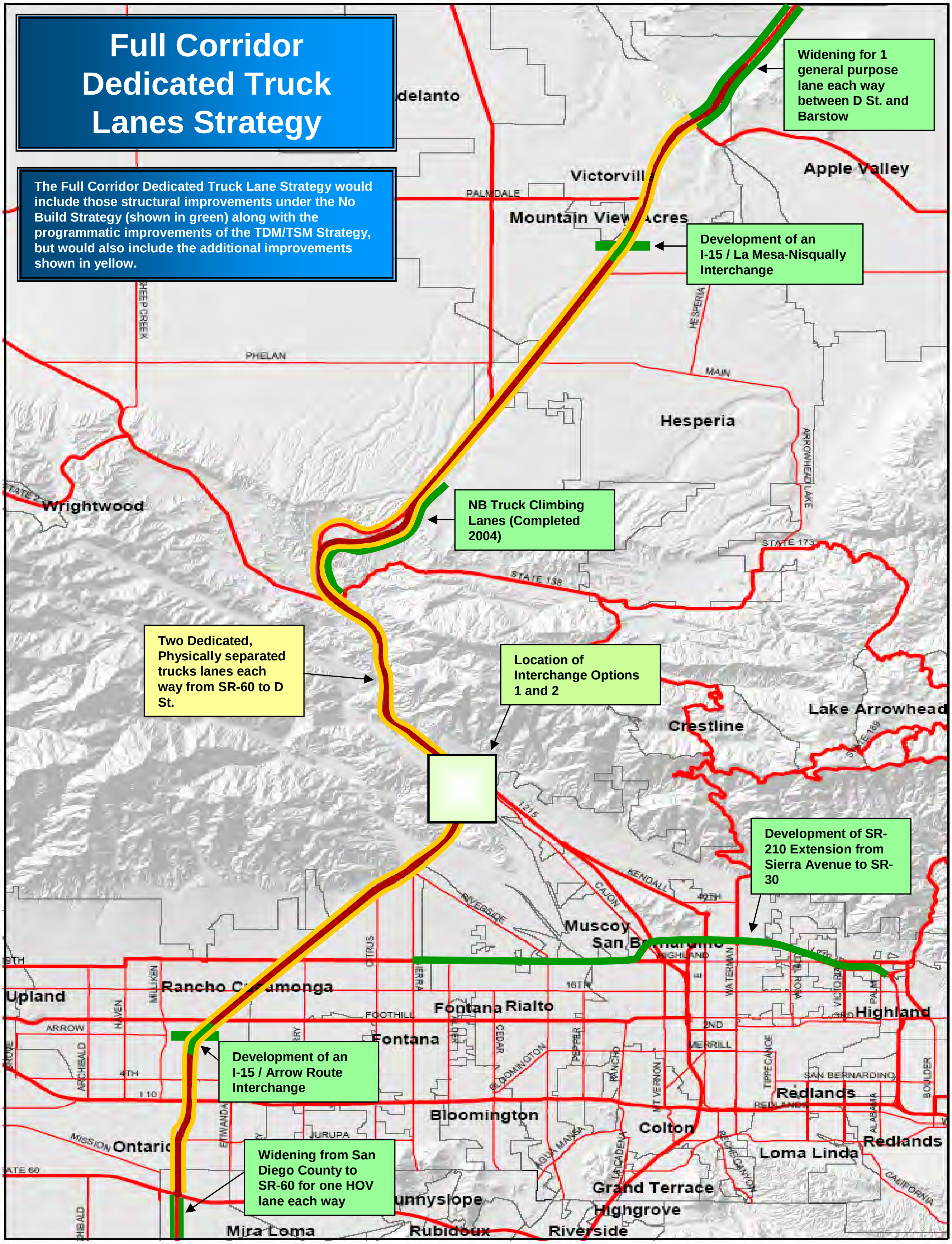
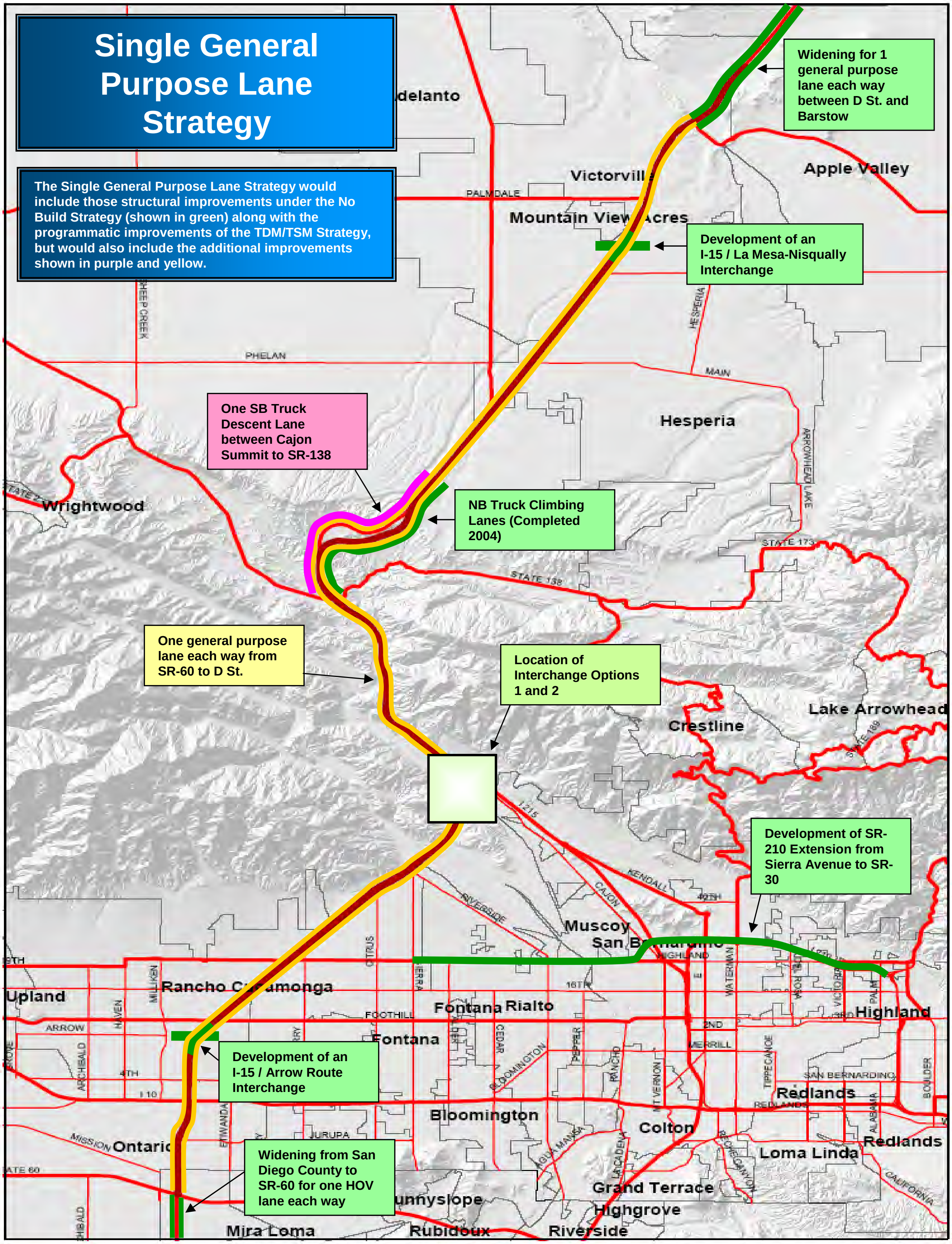


Figure 3-9 Alternative 6 – Single General-Purpose Lane (SR-60 to D Street)



3.2.7 Alternative 7 – Multiple General-Purpose/Express Lanes (SR-60 to D Street)

Building upon Alternative 6, Alternative 7 considers the addition of two general-purpose lanes in each direction of I-15 from SR-60 to D Street. Like Alternative 6, Alternative 7 would include a designated truck descent lane in addition to the proposed general-purpose lanes on southbound I-15 from the Cajon Summit to SR-138. The proposed additional general-purpose lanes under Alternative 7 would typically result in six lanes in each direction being provided south of US-395 and 5 lanes in each direction being provided north of US-395. Due to potential performance limitations resulting from excessive weaving across six general-purpose lanes, the additional two general-purpose lanes in each direction would typically be provided as 'express lanes' being physically separated with limited access from the remaining 'local access' lanes.

Figure 3-10 illustrates the typical cross-section for I-15 Corridor following the addition of two additional general-purpose lanes. **Figure 3-11** illustrates the specific elements of Alternative 7 within the study corridor.

Figure 3-10 I-15 Freeway Typical Cross-Section – Multiple General-Purpose/Express Lanes

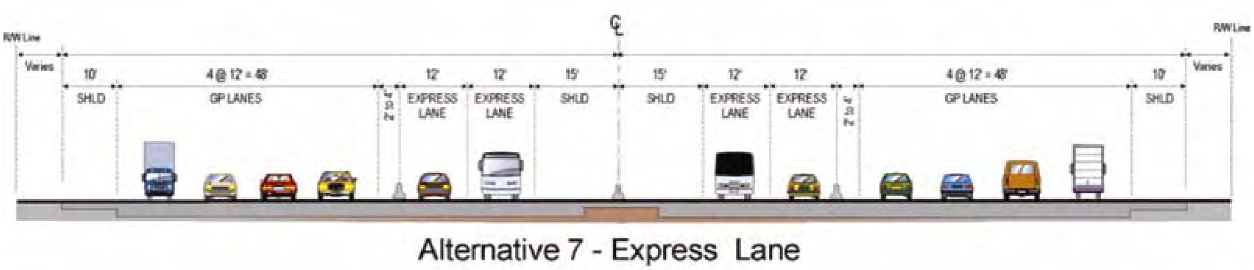
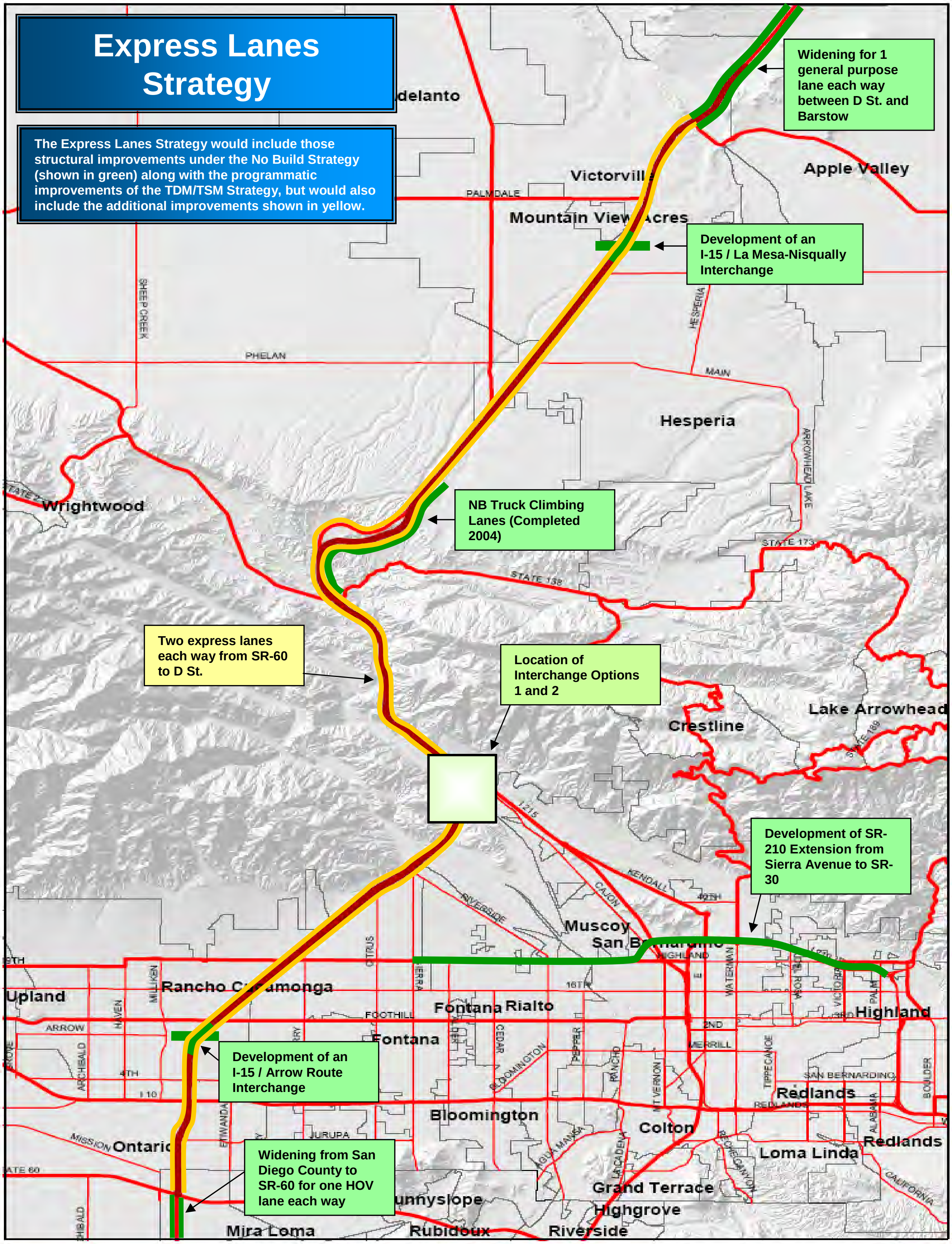


Figure 3-11 Alternative 7 – Multiple General-Purpose/Express Lanes (SR-60 to D Street)



3.2.8 Alternative 8 – Reversible Managed Lanes (SR-210 to US-395)

Reflecting the typically strong directional traffic flows through the central portion of the I-15 corridor, Alternative 8 proposes the utilization of reversible managed lanes to provide additional peak directional capacity along I-15 between SR-210 and US-395. Under Alternative 8, two (or possibly three) managed lanes would be constructed within the I-15 corridor between SR-210 and US-395, with the lanes being physically separated from the existing general-purpose lanes on the freeway. The managed lanes would be provided with limited ingress and egress to major interchange locations (possibly SR-210, I-215, SR-138 and US-395 only) and would typically serve peak trips with the flow of the lanes reversible to reflect the variable directional travel demand in the corridor during different times of the day and days of the week. The demand for the lanes could be managed with the application of one of several different operation policies, such as specific use by High-Occupancy Vehicles (HOV), combined High-Occupancy and Toll users (HOT), exclusively for toll paying customers or exclusively for trucks and other heavy vehicle traffic. Alternatively, the lanes could simply be offered to all freeway users as additional capacity on a directional basis without specifically attempting to manage the demand.

Typically, reversible managed lanes are provided within the median of an existing freeway corridor, as is the case with the I-15 Managed Lanes in San Diego County. However, physical limitations within the study corridor may necessitate consideration of managed lanes running parallel along the shoulder to one side of the existing freeway or completely separated from the existing freeway.

At the south end of the managed lanes, the terminus would be integrated with the SR-210 freeway interchange to provide options for traffic to disperse to SR-210 or to continue in the I-15 general-purpose lanes. On additional general-purpose lane would be provided on I-15 south of SR-210 to SR-60 to facilitate the transition to and from the managed lanes. Similarly, at the northern terminus, managed lanes traffic would be provided with the option to disperse to US-395 or to continue on I-15. One additional general-purpose lane would be provided north of US-395 to D Street under Alternative 8, while improvements to US-395 would also be proposed to accommodate addition future traffic.

Figure 3-12 illustrates the typical cross-section for the I-15 Corridor reversible managed lanes alternative. **Figure 3-13** illustrates the specific elements of Alternative 8 within the overall study corridor.

Figure 3-12 I-15 Freeway Typical Cross-Section – Reversible Managed Lanes

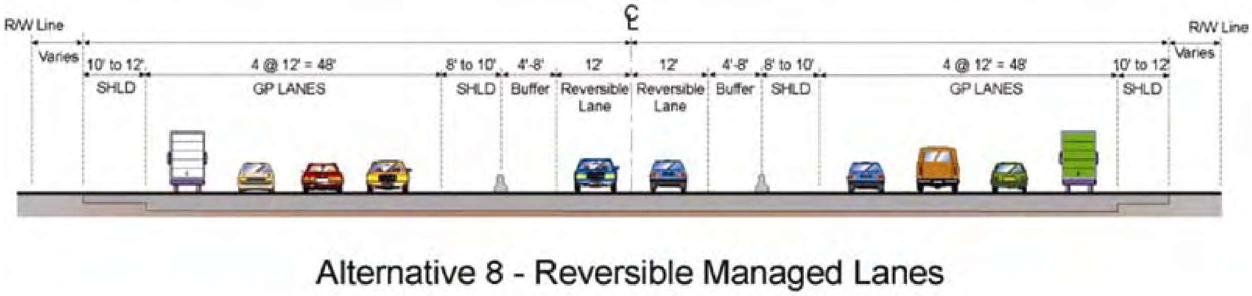
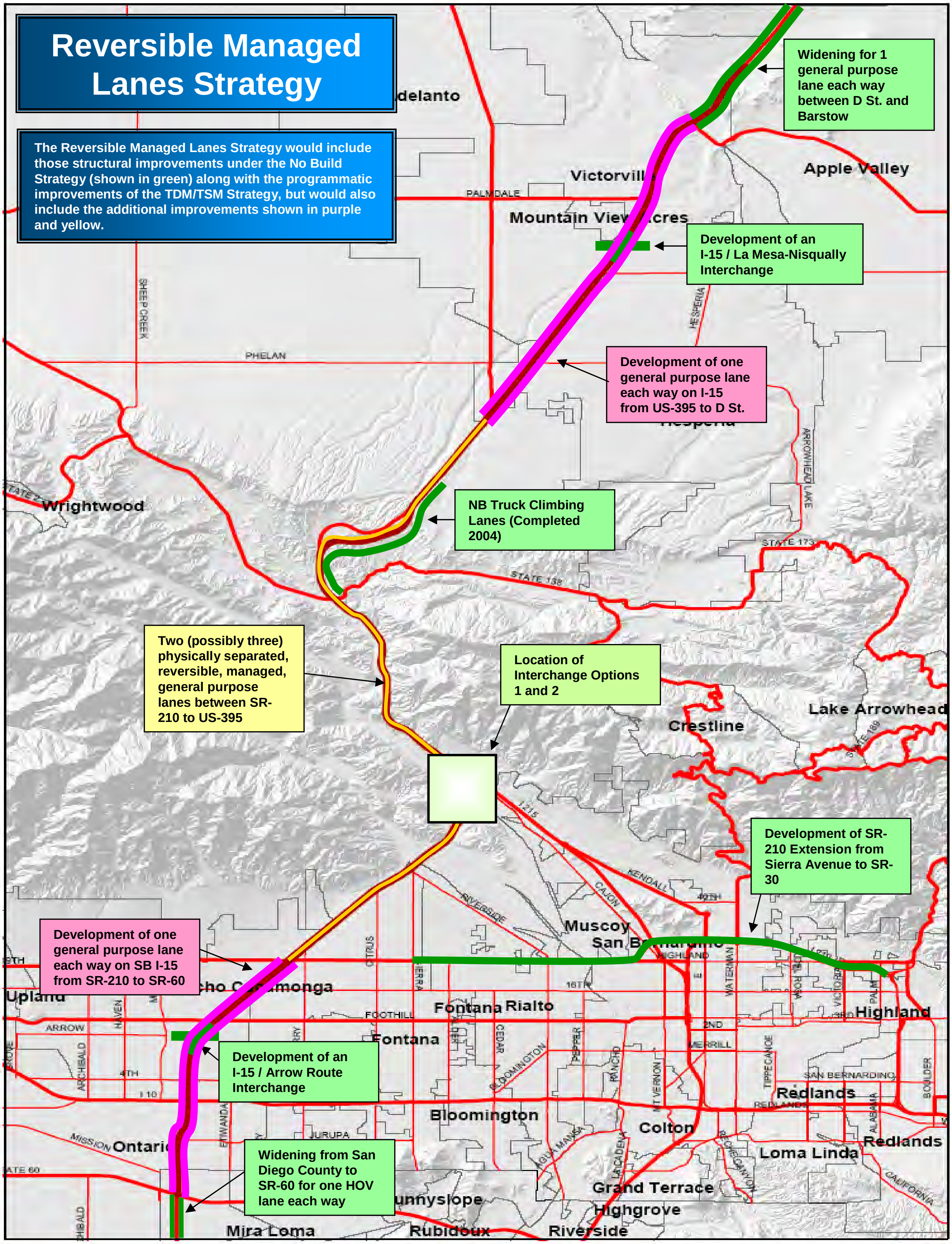


Figure 3-13 Alternative 8 – Reversible Managed Lanes (SR-210 to US-395)



3.2.9 Alternative 9 – Commuter Rail Service (San Bernardino to Victorville)

Alternative 9 is intended to evaluate the effectiveness of introducing commuter rail transit service between San Bernardino and Victorville. Under the Alternatives, demand for commuter rail service through this corridor will be evaluated in the context of opportunities and constraints for providing such a service. Existing commuter rail services in the Southern California region have typically involved Metrolink utilization of existing freight rail corridors to provide transit services to commuters. Under Alternative 9, the potential for operating limited peak hour Metrolink commuter rail service along the existing Burlington Northern Santa Fe (BNSF) or Union Pacific rail lines through Cajon Pass will be considered.

3.2.10 I-15/I-215 Interchange Improvement Alternatives

Improvements to the I-15/I-215 interchange at Devore are considered to be integral to any locally preferred alternative strategy for the I-15 study corridor. The I-15/I-215 interchange represents the most significant constraint to traffic operations within the study corridor, and as such improvements to the interchange will be considered independent of the various corridor alternatives previously described. Proposed options for improving the I-15/I-215 interchange are each considered to have independent value to the various corridor alternatives and could be applied to each alternative interchangeably. The proposed I-15/I-215 interchange options to be considered are described in the following sections.

I-15/I-215 Interchange Option 1 – Reconfiguration and Lane Additions

The fundamental improvement needs for the I-15/I-215 interchange are two-fold. Firstly, reverse the current lane configuration to allow I-15 traffic to continue along I-15 without requiring a lane shift. Secondly, eliminate the reduction in the number of lanes on I-15 as it passes through the interchange. Option 1 will evaluate a reconfiguration of the interchange that provides intuitive lane configuration for I-15 users allowing those continuing through the interchange on I-15 to remain in their lane without necessitating a lane shift to merge or diverge as is currently the situation. Under this Option, traffic to and from I-215 would utilize more traditional freeway-to-freeway connector ramps at the right of the I-15 through lanes thereby reducing unnecessary weaving and minimizing driver confusion.

The reconfiguration of the interchange will also allow for the number of lanes on I-15 to remain consistent with the number of lanes on each of the approaches to the interchange. Under present conditions, the northbound lanes on I-15 are reduced from four to two as traffic proceeds through the interchange before resuming as four lanes north of the interchange merge with I-215. Similarly, in the southbound direction the number of lanes is reduced from four to three through the interchange before continuing as four lanes south of Glen Helen Parkway. Under Option 1, the number of through lanes on I-15 would remain consistent with the number of lanes provided north of Kenwood Road and south of Glen Helen Parkway.

I-15/I-215 Interchange Option 2 – Reconfiguration with Truck Bypass Lanes

Under Option 2, the I-15/I-215 interchange would be reconfigured similar to Option 1 to reverse the current lane configuration and to provide for I-15 traffic to retain through lanes. However, the reconfiguration of the interchange would necessitate I-215 traffic to merge and diverge to and from I-15 to traditional connector ramps thereby requiring automobiles to continue to weave across lanes typically occupied by trucks and recreational vehicles. In similar situations, truck bypass lanes have been provided to allow trucks (and other heavy vehicles) to circumvent an interchange without the impact of weaving automobile traffic. Examples of this type of treatment include the I-5/SR-99 interchange south of Bakersfield, the I-5/SR-14/SR-210 confluence in Los Angeles County and the I-5/I-405 interchange (commonly referred to as the El Toro Y) in Irvine. Under Option 2, the interchange reconfiguration will consider the integration of dual truck bypass lanes in each direction parallel to I-15 to allow trucks to avoid unnecessary conflict with weaving automobile traffic at the interchange.

3.3 SCREENING METHODOLOGY

Screening of the initial set of alternatives represents the first step in the MIS process for narrowing the range of options. Screening provides a mechanism to identify those alternatives that should be retained for detailed consideration and those that can be dropped before the detailed analysis begins. Screening should identify any alternative that, among other considerations:

- Has fatal flaws that would make the implementation of the alternative impossible in practical terms.
- Is clearly inferior to other alternatives and may therefore have little chance of selection as the preferred design concept and scope.
- Is different from other alternatives only in terms of design details that can be deferred until preliminary engineering.

The screening methodology described in this section was developed to this end. **Section 3.3.1** identifies screening criteria that relate the evaluation process to the Purpose and Need Statement developed earlier in the study. **Section 3.3.2** presents the instrument (screening matrix) developed to help organize and summarize the screening process. **Section 3.3.3** identifies and describes the different categories and criteria used in the evaluation.

3.3.1 Identification of Screening Evaluation Criteria

The screening methodology was guided by the stated project objectives as discussed in the Purpose and Need Statement. The Purpose and Need Statement identified six major problem areas and associated study objectives as follows:

- Traffic Congestion
  - Improve Levels of Service on I-15
  - Provide Sufficient Capacity to Meet Demand
  - Improve Travel Times
  - Reduce Operational Conflict between Auto, Recreational and Truck Traffic
- Goods Movement
  - Improve the Efficiency and Reliability of Goods Movement
  - Reduce Operational Conflict between Trucks and General-Purpose Traffic
- Transit
  - Provide Enhanced Access to Transit Services
  - Provide Reliable Transit Travel Times
  - Increase Commuter Use of Transit and HOV (Carpooling)
- Safety
  - Reduce the Frequency, Severity, and Consequences of Crashes on I-15 by Minimizing Contributing Factors such as Travel Speeds, Vehicle Performance Conflicts, and Freeway Design Deficiencies
- Design Improvements
  - Eliminate Non-Standard or Inadequate Design Features on I-15
- Cost-Effectiveness
  - Pursue Cost-Effective Transportation Solutions
  - Pursue Timely, Viable, and Feasible Transportation Solutions
  - Pursue Innovative and Self Sustaining Funding Mechanisms

Consistent with the above problem areas and key objectives, screening categories and criteria were defined. A total of six (6) screening categories and ten (10) criteria were developed to represent key aspects of the study objectives. These evaluation categories and criteria (which are described in detail below) include:

A Future General-Purpose Capacity
- A1 AM Peak Hour (Southbound)
- A2 PM Peak Hour (Northbound)

B Future HOV Capacity
- B1 AM
- B2 PM

C Future Truck Capacity
- C1 AM
- C2 PM

D Safety
- D1 Truck/Auto Traffic Separation

E Environment
- E1 Biological, Cultural, Geology, and Hydrology
- E2 Noise

F Cost
- F1 Cost/Fundability

3.3.2 Screening Evaluation Matrix

The initial screening process was organized around the screening evaluation matrix shown in **Figure 3-14** (Blank Screening Evaluation Matrix). The matrix lists the different alternatives as rows in the first column. The various criteria are represented as columns in the matrix. Each of the alternatives were evaluated against the different criteria based on a comparison with Alternative 1 – No-Build, and rated using a five-grade scale ranging from Least Effective to Most Effective. The rating indicates the effectiveness of each alternative in addressing the problems and issues under each criterion. The ratings were developed after a careful comparative assessment of the preliminary qualitative and quantitative information available for each alternative.

Figure 3-14 Blank Initial Screening Evaluation Matrix

I-15 COMPREHENSIVE CORRIDOR STUDY
INITIAL SCREENING EVALUATION MATRIX

Most Effective ←→ *Least Effective*

		A: Future General-Purpose Capacity						B: Future HOV Capacity		C: Future Truck Capacity		D: Safety	E: Environment		F: Cost
		A1			A2			B1	B2	C1	C2	D1	E1	E2	F1
		AM Peak Hour (southbound)			PM Peak Hour (northbound)			AM	PM	AM	PM	Truck/Auto Traffic Separation	Biological, Cultural, Geology and Hydrology	Noise	Cost/Fundability
	Alternative	SR-60 to I-215	I-215 to US-395	US-395 to D St.	SR-60 to I-215	I-215 to US-395	US-395 to D St.	I-215 to US-395	I-215 to US-395	I-215 to US-395	I-215 to US-395				
1	No-Build														
2	TSM/TDM														
3	HOV Lane (SR-60 to D St) with Express Bus														
4	Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)														
5	Full Corridor Dedicated Truck Lanes (SR-60 to D St)														
6	Single General-Purpose Lane (SR-60 to D St)														
7	Express Lanes (SR-60 to D St)														
8	Reversible Managed Lanes (SR-210 to US-395)														
9	Commuter Rail Service (San Bernardino to Victorville)														

As shown in Figure 3-14, the alternatives were grouped into five sets during the screening. The first set includes Alternatives 1 (No-Build) and 2 (TSM/TDM). Alternative 1 represents the No-Build scenario that will be analyzed as the baseline condition and as such establishes the parameters against which each of the remaining alternatives is compared. Alternative 2 (TSM/TDM) represents the low-cost short-term improvements that could be implemented regardless of the selected "build" alternative.

The second set consists only of Alternative 3 (HOV). This alternative represents the only alternative developed exclusively to evaluate the effectiveness of establishing HOV lanes as a means of addressing capacity constraints within the study corridor.

The third set includes Alternatives 4 (Cajon Pass Dedicated Truck Lanes) and 5 (Full Corridor Dedicated Truck Lanes). The alternatives for this set were developed primarily for purposes of comparing the effectiveness of dedicated truck lanes to address capacity and safety issues within the study corridor.

The fourth set includes Alternatives 6 (Single General-Purpose Lane), 7 (Multiple General-Purpose Lanes), and 8 (Reversible Managed Lanes). These alternatives compare differing strategies for using general-purpose capacity additions within the corridor to address the defined study objectives.

The fifth set consists of only Alternative 9 (Commuter Rail Service). Alternative 9 specifically addresses the ability of rail transit service to address travel demand in the study corridor.

3.3.3 Description of Screening Evaluation Criteria

A Future General-Purpose Capacity

The future general-purpose capacity category aims to resolve the issue of the congestion experienced by all drivers along the I-15 corridor. This category was evaluated using two quantitative criteria, each representing the extent to which a given alternative alleviates future capacity deficits caused by directional and temporal peaking.

A1 AM Peak Capacity (Southbound)

This criterion represents the ability of each alternative to accommodate future AM peak hour southbound traffic traveling on general-purpose lanes. The criterion was evaluated in terms of the volume-to-capacity (V/C) ratio for southbound traffic on I-15 general-purpose lanes during the future AM peak hour.

A2 PM Peak Capacity (Northbound)

This criterion represents the ability of each alternative to accommodate future PM peak hour northbound traffic traveling on general-purpose lanes. The criterion was evaluated in terms of the V/C ratio for northbound traffic on I-15 general-purpose lanes.

B Future HOV Capacity

The future HOV capacity category considers a deficit of carpool lanes along the I-15 corridor. This category was evaluated using two quantitative criteria, each representing the extent to which a given alternative is able to accommodate future high-occupancy vehicle demand within the study corridor. These measures are directly applicable only to Alternative 3 (HOV), which proposes the addition of HOV lanes within the study corridor.

B1 AM Peak HOV Capacity

This criterion represents the ability of the alternative to accommodate future AM peak hour southbound HOV traffic traveling in HOV lanes. The criterion was evaluated in terms of the V/C ratio of southbound traffic that can travel on I-15 HOV lanes during the AM peak.

B2 PM Peak HOV Capacity

This criterion represents the ability of the alternative to accommodate future PM peak hour northbound HOV traffic traveling on HOV lanes. The criterion was evaluated in terms of the V/C ratio of northbound traffic that can travel on I-15 HOV lanes during the PM peak.

C Future Truck Capacity

The future truck capacity category considers a deficit of truck capacity along the I-15 corridor. This category was evaluated using two quantitative criteria, each representing the extent to which a given alternative adds capacity to specifically accommodate future truck traffic volumes. These measures are directly applicable only to Alternatives 4 and 5, which both provide the addition of designated truck lanes to address future truck traffic demand in the study corridor.

C1 AM Peak Truck Capacity

This criterion represents the ability of each alternative to accommodate future AM peak hour southbound truck traffic. The criterion was evaluated in terms of the V/C ratio of southbound truck traffic that can travel on I-15 truck lanes during the AM peak hour.

C2 PM Peak Truck Capacity

This criterion represents the ability of each alternative to accommodate future PM peak hour northbound truck traffic. The criterion was evaluated in terms of the V/C ratio of northbound truck traffic that can travel on I-15 truck lanes during the PM peak.

D Safety

The traffic safety category indicates a given alternative's potential ability to reduce conflicts between automobiles, recreational vehicles and trucks. This category was evaluated using one qualitative criterion, an alternative's ability to separate automobiles and heavier truck (and recreational vehicle) traffic.

D1 Automobile/Truck Separation

This criterion relates to the ability of different alternatives to reduce automobile conflicts with heavier and slower truck and recreational vehicle traffic. This criterion was evaluated in terms of the physical design and length of I-15 corridor improvements offering the potential for separation between automobile and truck traffic.

E Environment

The environment category considers a given alternative's impact on environmental resources. This category was evaluated using two qualitative criteria, each representing the extent to which a given alternative minimizes its impact on environmental resources.

E1 Biological, Cultural, Geology, and Hydrology

This criterion represents the ability of different alternatives to preserve biological, cultural, geological, and hydrological resources. This criterion was evaluated in terms of a given alternatives potential to require right-of-way acquisition thereby impacting adjacent environmental and cultural constraints.

E2 Noise

This criterion represents an alternative's ability to minimize noise impacts on surrounding populated areas. This criterion was evaluated in terms of the potential for each alternative to impact adjacent residential development due to the physical design, proximity or operation of the proposed corridor treatment.

F Cost

The cost category considers the relative feasibility of various alternatives in terms of their cost and fundability. This category was evaluated qualitatively using one criterion, which represents the anticipated magnitude of cost associated with the alternatives' implementation.

F1 Cost/Fundability

This criterion represents an estimated order of magnitude of the specific alternative's cost for implementation. This criterion was evaluated in terms of the anticipated amount of funding needed for implementation in light of the competitive and limited availability of traditional transportation funding resources.

3.4 Screening Evaluation

Figure 3-14 (Blank Screening Evaluation Matrix), described previously, was completed based on the analysis summarized in this section. The basis for rating the initial alternatives according to the 10 screening evaluation criteria defined in **Section 3.3** is presented in the subsections below. Each subsection discusses the rating or scoring of the initial alternatives for a given criterion category. The completed screening evaluation matrix which summarizes all of the criteria for each of the initial alternatives is presented in the following section, **Section 3.5**.

3.4.1 Criterion Category A: Future General-Purpose Capacity

This criterion category represents the ability of each alternative to accommodate future peak hour traffic on the I-15 general-purpose lanes. The category was evaluated in terms of the future directional V/C ratio on I-15 during the respective peak hours. For this category (and all capacity measures described under categories A, B and C), the estimated V/C is quantified and graded in terms of the anticipated level of service (LOS) under the given alternative. The LOS and corresponding performance grade summarized for each capacity measure is outlined in **Table 3-2**. **Tables 3-3** and **3-4** detail the results of the V/C ratio calculation for the various alternatives considered.

Table 3-2 Capacity Screening Measures Level of Service and Performance Grade

Rating	Grade	V/C Ratio	LOS
Most Effective	●	< 0.50	A
↑	◕	0.50 – 0.65	B
↕	◑	0.66 – 0.80	C
↓	◔	0.81 – 0.90	D
Least Effective	○	> 0.90	E/F

Generally, all of the I-15 'Build' Alternatives provided a general-purpose traffic level-of-service improvement over the No-Build and TDM/TSM Alternatives. These improvements were highlighted under the future AM peak hour conditions with estimated peak hour level of service improving from E in the No-Build to at least D or better in each of the highway build alternatives.

Table 3-3 AM Peak Hour Volume-to-Capacity Ratios

I-15 COMPREHENSIVE CORRIDOR STUDY

SCREENING OF PROPOSED INITIAL ALTERNATIVES

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE								
				1	2	3	4	5	6	7	8	9
Forecast AM Peak Volume to Capacity Ratio	AM Peak Hour (Southbound) Volume to Capacity GENERAL-PURPOSE TRAFFIC	SR-60 to I-10	0.45	0.75	0.75	0.66	0.60	0.66	0.60	0.50	0.60	0.75
		I-10 to I-210	0.76	1.26	1.26	1.09	1.01	1.10	1.01	0.84	1.01	1.26
		I-210 to I-215	0.58	0.97	0.97	0.84	0.77	0.85	0.77	0.64	0.64	0.97
		I-215 to SR-138	0.67	1.10	1.10	0.95	1.00	1.00	0.88	0.74	0.74	1.10
		SR-138 to US-395	0.42	0.70	0.70	0.61	0.61	0.61	0.49	0.47	0.47	0.70
		US-395 to Bear Valley Road	0.55	0.91	0.91	0.79	0.69	0.79	0.69	0.55	0.69	0.91
		Bear Valley Road to Mojave River	0.56	0.93	0.93	0.81	0.70	0.81	0.70	0.56	0.70	0.93
	AM Peak Hour (Southbound) Volume to Capacity HOV TRAFFIC	SR-60 to I-10	-	-	-	0.46	-	-	-	-	-	-
		I-10 to I-210	-	-	-	0.87	-	-	-	-	-	-
		I-210 to I-215	-	-	-	0.63	-	-	-	-	-	-
		I-215 to SR-138	-	-	-	0.80	-	-	-	-	-	-
		SR-138 to US-395	-	-	-	0.48	-	-	-	-	-	-
		US-395 to Bear Valley Road	-	-	-	0.46	-	-	-	-	-	-
		Bear Valley Road to Mojave River	-	-	-	0.48	-	-	-	-	-	-
	AM Peak Hour (Southbound) Volume to Capacity HEAVY DUTY TRUCK TRAFFIC	SR-60 to I-10	-	-	-	-	-	0.34	-	-	-	-
		I-10 to I-210	-	-	-	-	-	0.64	-	-	-	-
		I-210 to I-215	-	-	-	-	-	0.48	-	-	-	-
		I-215 to SR-138	-	-	-	-	0.43	0.43	-	-	-	-
		SR-138 to US-395	-	-	-	-	0.36	0.36	0.36	-	-	-
		US-395 to Bear Valley Road	-	-	-	-	-	0.36	-	-	-	-
		Bear Valley Road to Mojave River	-	-	-	-	-	0.36	-	-	-	-

Alternative 1 - No-Build
Alternative 2 - TDM/TSM
Alternative 3 - HOV Lane (SR-60 to D St) with Express Bus
Alternative 4 - Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)
Alternative 5 - Full Corridor Dedicated Truck Lanes (SR-60 to D St)
Alternative 6 - Single General-Purpose Lane (SR-60 to D St)
Alternative 7 - Express Lanes (SR-60 to D St)
Alternative 8 - Reversible Managed Lanes (SR-210 to US-395)
Alternative 9 - Commuter Rail Service (San Bernardino to Victorville)

As might be expected, those build alternatives proposing additional general-purpose lanes showed the most substantial improvement in general-purpose LOS over the No-Build conditions. Alternative 7 (Express Lanes) which proposes the addition of two general-purpose 'express' traffic lanes in each direction for the full length of the study corridor showed the most notable improvements in LOS achieving LOS A or B from I-215 to D Street under both AM and PM peak hour conditions. Similarly, Alternatives 6 (Single General-Purpose Lane) and 8 (Reversible Managed Lanes) showed improvements to LOS C or better for all study segments under both peak hours, despite the lesser magnitude of improvements proposed.

Table 3-4 PM Peak Hour Volume-to-Capacity Ratios

I-15 COMPREHENSIVE CORRIDOR STUDY

SCREENING OF PROPOSED INITIAL ALTERNATIVES

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE								
				1	2	3	4	5	6	7	8	9
Forecast PM Peak Volume to Capacity Ratio	PM Peak Hour (Northbound) Volume to Capacity GENERAL-PURPOSE TRAFFIC	SR-60 to I-10	0.55	0.85	0.85	0.71	0.68	0.74	0.68	0.56	0.68	0.85
		I-10 to I-210	0.79	1.22	1.22	1.02	0.97	1.07	0.97	0.81	0.97	1.22
		I-210 to I-215	0.58	0.91	0.91	0.77	0.73	0.79	0.73	0.60	0.60	0.91
		I-215 to SR-138	0.63	0.97	0.97	0.81	0.86	0.86	0.78	0.65	0.65	0.97
		SR-138 to US-395	0.41	0.55	0.55	0.39	0.55	0.55	0.44	0.36	0.36	0.55
		US-395 to Bear Valley Road	0.55	0.85	0.85	0.71	0.64	0.73	0.64	0.51	0.64	0.85
		Bear Valley Road to Mojave River	0.36	0.57	0.57	0.47	0.43	0.46	0.43	0.34	0.43	0.57
	PM Peak Hour (Northbound) Volume to Capacity HOV TRAFFIC	SR-60 to I-10	-	-	-	0.71	-	-	-	-	-	-
		I-10 to I-210	-	-	-	1.02	-	-	-	-	-	-
		I-210 to I-215	-	-	-	0.71	-	-	-	-	-	-
		I-215 to SR-138	-	-	-	0.82	-	-	-	-	-	-
		SR-138 to US-395	-	-	-	0.52	-	-	-	-	-	-
		US-395 to Bear Valley Road	-	-	-	0.52	-	-	-	-	-	-
		Bear Valley Road to Mojave River	-	-	-	0.37	-	-	-	-	-	-
	PM Peak Hour (Northbound) Volume to Capacity HEAVY DUTY TRUCK TRAFFIC	SR-60 to I-10	-	-	-	-	-	0.41	-	-	-	-
		I-10 to I-210	-	-	-	-	-	0.59	-	-	-	-
		I-210 to I-215	-	-	-	-	-	0.49	-	-	-	-
		I-215 to SR-138	-	-	-	-	0.45	0.45	-	-	-	-
		SR-138 to US-395	0.36	0.73	0.73	0.73	0.36	0.36	0.73	0.73	0.73	0.73
		US-395 to Bear Valley Road	-	-	-	-	-	0.36	-	-	-	-
		Bear Valley Road to Mojave River	-	-	-	-	-	0.31	-	-	-	-

Alternative 1 - No-Build
Alternative 2 - TDM/TSM
Alternative 3 - HOV Lane (SR-60 to D St) with Express Bus
Alternative 4 - Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)
Alternative 5 - Full Corridor Dedicated Truck Lanes (SR-60 to D St)
Alternative 6 - Single General-Purpose Lane (SR-60 to D St)
Alternative 7 - Express Lanes (SR-60 to D St)
Alternative 8 - Reversible Managed Lanes (SR-210 to US-395)
Alternative 9 - Commuter Rail Service (San Bernardino to Victorville)

3.4.2 Criterion Category B: Future HOV Capacity

This category relates to the ability of the different alternatives to specifically accommodate high-occupancy vehicles traveling within the study corridor. Alternative 3 – HOV is the only proposed alternative to evaluate the effectiveness of providing additional capacity in the corridor specifically for HOV. Due to the relatively robust HOV volumes forecast to utilize the corridor under future conditions, this alternative was effective in providing improved LOS for HOV users in the corridor, while also providing at least a moderate improvement in general-purpose LOS. The most notable improvement in general-purpose LOS associated with Alternative 3 was observed through the segment of the study corridor from I-215 to US-395 with LOS C observed in the general-purpose lanes during the AM peak hour and LOS B observed in the general-purpose lanes during the PM peak hour.

3.4.3 Criterion Category C: Future Truck Capacity

This category relates to the ability of the different alternatives to specifically accommodate truck traffic traveling within the I-15 study corridor while also providing relief for general-purpose traffic by separating through truck traffic (and other heavy vehicle traffic) from the general-purpose lanes. The Cajon Pass Dedicated Truck Lanes (Alternative 4) and Full Corridor Dedicated Truck Lanes (Alternative 5) are the two alternatives offering additional truck lane capacity. Both alternatives were very effective in providing improved LOS for truck traffic with LOS A observed in the truck lanes during both the AM and PM peak hours.

The provision of dedicated truck lanes also provides LOS improvement within the general-purpose lanes. The most notable general-purpose lane LOS improvement is observed in Alternative 4 where additional general-purpose lanes are recommended in the transition north and south of the Cajon Pass dedicated truck lanes segment. Similarly, general-purpose LOS improvements are also observed through the Cajon Pass segment where the dedicated truck lanes would be considered most effective at separating slower truck traffic from the flow of general-purpose traffic.

3.4.4 Criterion Category D: Safety

This criterion provides a qualitative evaluation of the ability of each alternative to achieve the safety objectives of the I-15 Comprehensive Corridor Study. The safety criterion is measured based on the relative effectiveness of the various alternatives to provide separation of truck traffic (and other heavy vehicle traffic) from automobile traffic.

The Full Corridor Dedicated Truck Lanes (Alternative 5) are considered to be most effective at providing separation between truck and automobile traffic due to the physical separation provided by the truck lanes for the full length of the study corridor. Similarly, the Cajon Pass Dedicated Truck Lanes (Alternative 4) and the Express Lanes (Alternative 7) are also relatively effective at separating truck and automobile traffic through the study corridor. The remaining alternatives achieved only modest success in improving corridor safety from the perspective of separating different types of vehicle traffic.

3.4.5 *Criterion Category E: Environmental*

This category relates to each alternative's ability to minimize adverse environmental impacts on biological, cultural, geological, and hydrological resources, as well as to reduce impacts to adjacent communities in general. This category was evaluated qualitatively based on an assessment of various environmental measures summarized in two screening evaluation criteria. These criteria include a combined measure for biological, cultural, geological, and hydrological impacts, and a separate measure for the potential noise impacts of the various alternatives. **Table 3-5** details the various environmental elements assessed as part of the alternatives screening.

The alternatives generally requiring the least amount of potential right-of-way were considered to be the most effective at minimizing impacts on the biological, cultural, geological and hydrological environment. The HOV (3), Single General-Purpose Lane (6), Reversible Managed Lanes (8), and Commuter Rail Service (9) alternatives were considered the least intrusive of all of the build alternatives by requiring potentially the least amount of additional right-of-way. In addition, these alternatives generally propose improvements that would occur along the existing freeway and railroad corridors minimizing environmental impacts on areas beyond the existing facilities. In contrast, the Dedicated Truck Lanes (4 and 5) and Express Lanes (7) alternatives potentially require significant right-of-way acquisitions and the use of alternate facility alignments to accomplish necessary improvements. As a result, these alternatives were considered to be less effective in terms of the impact on biological, cultural, geological and hydrological resources.

Noise impacts were evaluated in the context of potential noise impacts on adjacent residential communities due to the proximity of traffic (in particular heavy vehicle traffic) and the potential for increased travel speeds. Most notably, the Dedicated Truck Lanes (4 and 5), the Express Lanes (7) and the Reversible Managed Lanes (8) alternatives were considered to be the least effective in terms of noise with potentially higher speed traffic within the corridor as a result of the improved level of service provided by the improvements associated with the alternatives. Additionally, these alternatives potentially concentrate heavy vehicle traffic in closer proximity to residences due to the consideration of alternate alignments to accommodate specific vehicle types.

3.4.6 *Criterion Category F: Cost*

The Cost/Fundability criterion reflects the relative magnitude of the cost of each alternative and therefore the feasibility of funding and constructing the associated improvements. The relative cost for each alternative was measured based on a qualitative comparison of the extents and magnitude of the various improvements associated with each alternative. Quantitative estimates of cost will be developed as part of the conceptual engineering completed to support the detailed evaluation of alternatives.

Table 3-5 Initial Screening Environmental Criteria Analysis Summary

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Strategy Description	*The No-Build Alternative consists of the existing lane configuration for I-15 plus those transportation projects that are currently under construction, or are planned and committed for completion prior to 2030, the planning horizon year for the I-15 Comprehensive Corridor Study.* *Consequently, the No-Build Alternative represents <u>given</u> future travel conditions in the I-15 Study Area and it is the baseline against which the candidate future build alternatives for the I-15 corridor will be assessed. It includes:* • 1 NB truck lane from SR-138 to Cajon Summit • 1 General-Purpose lane each direction from D Street to Barstow • New interchanges on I-15 at Arrow Road and La Mesa/Nisqualli • New HOV lanes from SR-60 to north of D Street per SCAG 2004 RTP	*The TDM/TSM Alternative consists largely of operational investments, policies, and actions aimed at improving auto travel, transit service and goods movement through the study corridor as well as reducing environmental impacts by transportation facilities and operations.* *The following summarizes the specific elements considered part of the TDM/TSM Alternative:* • Additional ramp metering at interchanges. • Improved freeway directional signage. • Increased traffic enforcement. • Expanded truck emission reduction programs. • Coordination with major truck trip generators to maximize off-peak truck usage of the corridor. • Increased 'Express Bus' service. • Enhanced local bus service. • Expanded Intelligent Transportation Systems (ITS) in the corridor. • Emphasize ITS connectivity and dissemination of information. • Enhanced Freeway Service Patrol during peak travel periods. • Coordination with major intermittent event trip generators (such as Glen Helen Pavilion, California Speedway) to minimize impacts during peak travel periods.	• Includes all Strategy #1 and 2 improvements • One HOV lane in each direction from SR-60 to D Street • Increased bus service on HOV lanes	• Includes all Strategy #1 and 2 improvements • Two dedicated truck lanes each way between Glen Helen and US-395 (can be within existing ROW or require new ROW) • One general-purpose lane each way from SR-60 to Glen Helen • One general-purpose lane each way from north of US-395 to D Street	• Includes all Strategy #1 and 2 improvements • Two dedicated, physically separated truck lanes each way between SR-60 and D Street	• Includes all Strategy #1 and 2 improvements • One general-purpose lane in each direction from SR-60 to D Street • One SB truck descent lane between Cajon Summit to SR-138	• Includes all Strategy #1 and 2 improvements • Two general-purpose lanes in each direction from SR-60 to D Street • One SB truck descent lane between Cajon Summit to SR-138	• Includes all Strategy #1 and 2 improvements • Two (possibly three) physically separated, managed lanes within the I-15 corridor between SR-210 and US-395 (potentially running along one shoulder) • One additional general-purpose lane on I-15 south of SR-210 to SR-60 • One additional general-purpose lane on I-15 north of US-395 to D Street	• Includes all Strategy #1 and 2 improvements • Introducing commuter rail service between San Bernardino and Victorville by running a Metrolink commuter rail service along existing BNSF or UP rail lines through the Cajon Pass.

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Aesthetics	No impact	No impact	Temporary impacts may include construction related activities (staging areas, grading, nighttime illumination, and large equipment). If additional right-of-way is needed for the HOV lanes, permanent impacts may include full or partial acquisition of homes or businesses and removal of vegetation.	Construction related impacts may be more significant than Alt. 3, if elevated structures or tunneling are implemented. The proposed truck lanes could have major impacts related to elevated structures, tunnels, or acquisition of additional right-of-way.	Same construction related impacts as Alt. 3. Same permanent impacts as Alt. 3 related to the dedicated truck lanes.	Construction related impacts may be more significant than Alt. 3, but less than Alt. 4, related to the designated truck descent lane. Similar permanent impacts as Alt. 3 and 5 with the exception of the designated truck descent lane, which could have more significant impacts related to right-of-way acquisition and removal of vegetation.	Same construction impacts as Alt. 6. Similar permanent impacts as Alt. 6 with the exception that multiple general-purpose lanes would require more right-of-way and therefore could have more acquisition and vegetation impacts.	Construction related impacts may be more significant than Alt. 3 or 4 because of the physically separated lanes, which may require larger staging areas and more extensive grading activities. Permanent impacts would be greater than Alts. 3, 5, and 6 because of the amount of right-of-way needed to accommodate physically separated lanes. Particularly within areas that are physically constrained and may require parallel running lanes or lanes completely separate from the freeway. These impacts would be spread over a greater distance as compared to Alt. 4; however Alt. 4 may have greater localized impacts as a result of tunneling or elevated structures.	No Impact
Agricultural Resources	No impact	No impact	Impacts on prime/unique farmlands may include potential acquisition of additional right-of-way along the I-15 Corridor, primarily in the segment between SR-60 to north of the SR-210, including land within the Cities of Rancho Cucamonga, Fontana and Ontario.	Same impacts as Alt. 3.	Impacts under this alternative would be the similar to Alt. 3 and 4 only with increased right-of-way requirements.	Same impacts as Alt. 3 and 4.	Same impacts as Alt. 5.	Same impacts as Alt. 3 and 4.	The proposed project may have an impact on prime/unique farmlands on the north portion of the proposed railroad option, within the City of Victorville.
Air Quality	The air quality in the proposed project area may deteriorate under the No-Build Alternative due to potential deterioration of traffic conditions.	The air quality in the proposed project area may deteriorate under the TSM/TDM Alternative due to the potential deterioration of traffic conditions.	The proposed project is expected to improve traffic flow and, consequently, improve future air quality in the area. Temporary air quality impacts during construction are expected.						
Biological Resources	No impact	No impact	Federally listed, threatened, or endangered species or their critical or sensitive habitat has been identified within the corridor area. Impacts from potential acquisition of additional right-of-way along the I-15 Corridor may occur.	Same impacts as Alt. 3 with additional impacts related to the dedicated truck lanes through the Cajon Pass.	This alternative would affect the same federally listed, threatened, or endangered species as Alt. 3; however those impacts could potentially be greater because of the need for additional right-of-way related to two additional, physically separated truck lanes. These impacts may also be greater than Alt. 4 because the impacts are spread over a larger area.	Same impacts as identified under Alt. 3.	This alternative would affect the same federally listed, threatened, or endangered species as Alt. 3; however those impacts could potentially be greater because of the need for additional right-of-way related to two additional general-purpose lanes.	Same impacts as Alt. 3 with additional impacts related to the two (possibly three) physically separated, managed lanes within the I-15 corridor between SR-210 and US-395.	Federally listed, threatened, or endangered species or their critical or sensitive habitat has been identified within the corridor area. Potential impacts from increased rail service/activities may occur.
			These alternatives would have to comply with Executive Order on Invasive Species, E.O. 13112, and subsequent guidance from FHWA. The landscaping and erosion control included in the project will not use species listed as noxious weeds. In areas of particular sensitivity, extra precautions will be taken if invasive species are found in or adjacent to the construction areas. These measures are anticipated to reduce any impacts related to invasive weeds.						No impacts related to the introduction of invasive weeds would occur under this alternative.

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Cultural Resources	No impact	No impact	This alternative may affect the following cultural resources: Sycamore Grove, Santa FE & Salt Lake Trail Monument, and Stoddard-Waite Monument (State Landmarks near the I-15 alignment), Desert View Memorial Park (near Victorville), the Old Lytle Creek Power Plant (currently being considered by SHPO for State historic preservation status), and two archaeological/prehistoric sites (I-15 and Sierra Avenue in Rialto).	Same impacts as Alt. 3 with additional impacts related to the dedicated truck lanes through the Cajon Pass.	This alternative would affect the same cultural resources as Alt. 3; however those impacts could potentially be greater because of the need for additional right-of-way related to two additional, physically separated truck lanes. These impacts may also be greater than Alt. 4 because the impacts are spread over a larger area.	Same impacts as identified under Alt. 3.	This alternative would affect the same cultural resources as Alt. 3; however those impacts would be greater because of the need for more right-of-way related to an additional, general-purpose lane.	Same impacts as Alt. 7 only slightly less because it has the potential to affect one less cultural resource (Desert View Memorial Park).	No cultural resources have been identified within the study area for these alternatives. Therefore no impacts are anticipated.
Geology and Soils	No impact	No impact	Several soil associations are crossed by the proposed alternative with the potential for a variety of construction and seismic related impacts, such as erosion or liquefaction. The proposed project alignment is located in a seismically active region and crosses the following faults: Cleghorn, Sqaw Peak, Cajon Valley, San Andreas, Glen Helen,Lyttle Creek, San Jacinto,Cucamonga, and Rialto Colton Faults. The proposed project, as with other roadways in the area, would be exposed to potential ground shaking hazards associated with earthquake events in the region. The proposed alternative would be constructed to meet all applicable standards for seismic forces and would follow Best Management Practices (BMPs) to reduce construction related impacts. Therefore, impacts related to earthquake events and construction activities are anticipated to be minor.	Same potential impacts as Alt. 3, however the dedicated truck lanes would increase potential impacts over Alt. 3 as a result of possible new alignments, aerial structures or tunneling.	Same potential impacts as Alt. 3, with slightly greater impacts related to construction activities as the result of the additional right-of-way grading.	Same potential impacts as Alt. 3 with slightly greater impacts related to seismic and construction activities as a result of the additional truck descent lane within the Cajon Pass. These impacts may be less than under Alt. 4 or 5.	Same potential impacts as Alt. 6 with slightly greater impacts related to construction activities as the result of the additional right-of-way grading.	Similar potential impacts as Alt. 4 only slightly less because this alternative does not consider a new alignment, aerial structures, or tunneling.	No impacts
Hazards and Hazardous Materials	No impact	No impact	Approximately 121 hazardous waste sites, including underground storage tanks, have been identified within the study corridor. This proposed alternative has the potential to affect these sites.	Same potential impacts as Alt. 3 only slightly greater as a result of the dedicated truck lanes, which may require a new alignment, aerial structures (deep footings), or tunneling.	Same potential impacts as Alt. 3 and 4 only slightly greater as a result of the need for acquisition of additional right-of-way over a greater area.	Same potential impacts as Alt. 3, but slightly greater as a result of the additional right-of-way required for the truck descent lane. Impacts are anticipated to be less than for Alts. 4 and 5.	Same potential impacts as Alt. 5, but slightly less as the general-purpose lanes would not need to be physically separated from existing lanes requiring slightly less right-of-way.	Same potential impacts as Alts. 5 and 7 only slightly less because the need for acquisition of additional right-of-way would be over a smaller area.	No impacts

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Hydrology and Water Quality	No impact	No impact	Alt 3. alignment crosses the following water resources; Day Creek, Etiwanda Wash, Cajon Creek Wash, Lytle Creek Wash, East Kimbark Canyon, Pitman Canyon, Cleghorn Canyon, Crowder Canyon, California Aqueduct, Oro Grande Wash, and the Mojave River. The proposed project is not within a designated sole source aquifer. The proposed project is not within the State Coastal Zone (located about 37 miles from the coastal area). There are no wild and scenic rivers located in or adjacent to the study area according to the Wild and Scenic River System list that is maintained by the National Park Service. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) 06071C8641F, 06071C7895F, 06071C7912F, 06071C7920F, 06071C7910F, 06071C5820F, show that the proposed project would potentially be located within multiple FEMA designated 100-year floodplains. Potential project related impacts include affects on water resources and FEMA designated 100-year floodplains.	Same potential impacts as Alt. 3 with possibly greater impacts from the dedicated truck lanes.	Greater potential impacts than Alt. 3 or 4 because more area would be affected by the additional lane.	Same potential impacts as Alt. 4 only much less because this alternative does not propose a new alignment, aerial structures, or tunneling and the truck climbing lanes affects a smaller area.	Same potential impacts as Alt. 5 only slightly less because the additional lanes would not have to be physically separated.	Same potential impacts as Alt. 4	No impacts
Land Use and Planning	No impact	No impact	Potential impacts associated with acquisition of additional right-of-way may affect residences and businesses located along the proposed alignment. Potential disruption of an established community may occur as a result of property acquisition, as well as impacts to low income or minority groups. The proposed project is not anticipated to induce new or unplanned growth.	Same potential impacts as Alt. 3	Same potential impacts as Alt. 3 only greater because of the need for more right-of-way to accommodate two, physically separated truck lanes.	Same potential impacts as Alt. 3	Same potential impacts as Alt. 5 only slightly less because the general-purpose lanes do not have to be physically separated, theoretically requiring less right-of-way.	Same potential impacts as Alt. 3	Introduction of commuter rail services may require construction of new stations/railroad facilities. If new facilities are included in Alt. 9, ridences and businesses along the proposed alignment may be affected by potential impacts associated with right of way acquisition, depending on the location of the construction site. Property acquisition may impact low income/minority groups or established communities. The proposed project is not anticipated to induce new or unplanned growth.

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Population and Housing	No impact	No impact	Population densities along the proposed project alignment vary. The southern segment crosses more heavily populated cities (Ontario, Rancho Cucamonga, Fontana, and Rialto). The middle segment is within San Bernardino National Forest (the lowest population). The northern segment crosses Hesperia and Victorville, less densely populated communities. Impacts associated with Alt. 3 relate to the potential for acquisition of residential properties. The proposed project is not anticipated to result in increased growth in population or housing.	Same potential impacts as Alt. 3	Greater potential impacts than Alt. 3 because of the acquisition of additional right-of-way needed to accommodate two, physically separated truck lanes.	Same potential impacts as Alt. 3	Same potential impacts as Alt. 5 only slightly less because the general-purpose lanes do not have to be physically separated, theoretically requiring less right-of-way.	Same potential impacts as Alt. 3	No impacts
Public Services, Utilities, and Service Systems	No impact	No impact	Alt. 3 is not anticipated to require additional public services, utilities, or service systems other than those already available. However, the potential for additional public services, such as fire response, police, traffic management, and maintenance following completion of the proposed project will be further evaluated during preparation of the environmental document. The proposed project crosses several high tension power line easements and parallels a pipeline easement. Construction under Alt. 3 may require relocation of existing utilities including both above and below ground facilities.	Greater potential impacts than Alt. 3 because of the dedicated truck lanes, which would be located in an area that has several high tension power line easements and a pipeline easement.	Greater potential impacts than Alt 3 or 4 because of the additional right-of-way needed for two truck lanes along the entire alignment.	Slightly greater potential impacts than Alt. 3 because of the truck descent lane, which would be located in a n area that has several high tension power line easements and a pipeline easement. These impacts are anticipated to be less than under Alt. 4.	Same potential impacts as Alt. 5 only slightly less because the general-purpose lanes do not have to be physically separated, theoretically requiring less right-of-way.	Same potential impacts as Alt. 4	No impacts
Recreation	No impact	No impact	The proposed project crosses the San Bernardino National Forest. The following parks are also located within the proposed project area; Adults Sports Park south of Route 66/Foothill Blvd, Glen Helen Regional Park between Lytle Creek Wash and I-215, Datura Park in Hesperia, and Desert View Memorial Park, Victorville Municipal Golf Course, San Bernardino County Fairgrounds, Avalon Park, and Eva Dell Park in Victorville.	Same impacts as Alt. 3, however those impacts could potentially be greater on San Bernardino National Forest and Glen Helen Regional Park because of the two dedicated truck lanes each way between Glen Helen and US-395.	This alternative would affect the same parks and recreation areas as Alt. 3, however those impacts could potentially be greater for all those parks because of the need for additional right-of-way related to two additional, physically separated truck lanes along the I-15 corridor.	Same potential impacts as Alt. 3	This alternative would affect the same parks and recreation areas as Alt. 3, however those impacts could potentially be greater for all those parks because of the need for additional right-of-way related to general-purpose lanes. This alternative would have less impacts than Alt. 5 because the lanes do not have to be physically separated, theoretically requiring less right-of-way	Same impacts as Alt. 3, however those impacts could potentially be greater on San Bernardino National Forest and Glen Helen Regional Park because of the two (possibly three) physically separated, managed lanes within the I-15 corridor between SR-210 and US-395.	The proposed project crosses the San Bernardino National Forest, located on both sides of I-15 through the Cajon Pass. In addition, the following parks are located within the proposed project area; Forrest Park, Mohave Narrows National Park in the City of Victorville, Lime Street Park in the City of Hesperia and Glen Helen Regional Park.

Strategy	#1: No-Build	#2: TDS/TSM	#3: HOV Lane	#4: Cajon Pass Dedicated Truck Lanes	#5: Full Corridor Dedicated Truck Lanes	#6: Single General-Purpose Lane	#7: Multi General-Purpose Lanes	#8: Reversible Managed Lanes	#9: Commuter Rail Service
Noise	No impact	No impact	Addition of traffic capacity under this alternative is likely to result in increase of traffic volume and improve traffic flow. Increase in traffic volume and speed may result in noise impacts to noise-sensitive uses, such as residential areas. Depending on the final distance between the new ROW and sensitive land uses, traffic noise impacts may occur. Traffic noise studies would be necessary to determine the degree of impact and whether mitigation would be necessary.	Greater potential impacts than Alt. 3 because this alternative would add more traffic capacity to the I-15 than Alt. 3. In addition, an elevated facility would have greater impact than similar at-level facilities. However, the degree of noise impact would also be related to the distance of the ROW from sensitive uses. If there are no sensitive uses near the truck lanes, impacts may be similar to Alt. 3.	Greater potential impacts than Alts. 3 and 4 because this alternative would add more traffic capacity to the I-15 than Alts. 3 and 4. Moreover, the two additional truck lanes in each direction would likely bring the I-15 ROW closer to sensitive uses near urbanized areas.	Slightly greater potential impacts than Alt. 3, since two general-purpose lanes and the truck descent lanes may create slightly greater traffic capacity to the I-15 than two HOV lanes.	Greater potential impacts than Alts. 3, 4, and 6 because this alternative would add more traffic capacity to the I-15 than Alts. 3 and 6 and because it adds more capacity than Alt. 4 near urbanized areas. Similar or slightly less potential noise impacts than Alt. 5.	Similar potential noise impacts as Alt. 4.	Potential noise impacts due to the increase in frequency of trains traveling the rail lines. A Noise Study would be necessary to determine the degree of impact and whether mitigation would be necessary.

As the No-Build (1) and TSM/TDM (2) alternatives include limited infrastructure improvements, both alternatives are considered very effective in terms of overall magnitude of cost (although by comparison the level of service benefits associated with these alternatives are least effective). The HOV (3) and Single General-Purpose Lane (6) alternatives represent a moderate comparative cost and therefore are considered more effective in terms of total cost and expected fundability. In contrast, the Full Corridor Dedicated Truck Lanes (5) and Express Lanes (7) alternatives represent potentially the highest magnitude of cost and therefore the least effective alternatives in terms of fundability. Additionally, the level of service benefits of these alternatives are not commensurate with the greater magnitude of cost compared to other alternatives further highlighting the diminished cost effectiveness of these highest cost alternatives.

3.5 SUMMARY OF SCREENING EVALUATION RESULTS

The screening evaluation matrix discussed previously was completed based on the analysis of the screening evaluation criteria discussed in **Section 3.4.** The completed matrix is shown in **Figure 3-15.** The matrix aided in identifying which of the initial alternatives to carry into the detailed evaluation portion of the study.

3.6 ALTERNATIVES SELECTED FOR DETAILED EVALUATION

Based on the review of the screening evaluation matrix results and consideration by the I-15 Comprehensive Corridor Study Technical Advisory Committee (at the August 9, 2004 meeting) and the SANBAG Plans and Programs Committee (at the August 18, 2004 meeting), the following alternatives were recommended for further evaluation as part of the I-15 Comprehensive Corridor Major Investment Study:

- Alternative 1 – No-Build Alternative
- Alternative 2 – TDM/TSM Alternative
- Alternative 3 – HOV Lane Alternative
- Alternative 5 – Full Corridor Dedicated Truck Lanes Alternative
- Alternative 8 – Reversible Managed Lanes Alternative

Consistent with established Major Investment Study guidelines, both a No-Build and a TSM/TDM alternative were considered for further evaluation as part of the I-15 Comprehensive Corridor Study. The No-Build alternative represented the baseline against which each of the remaining alternatives were evaluated. As the name implies, the No-Build alternative includes only those improvements currently programmed for implementation within the study corridor. The TDM/TSM alternative incorporates low cost, short-term infrastructure and programmatic improvements within the study corridor. Due to their relatively low cost and ease of implementation, improvements associated with the TDM/TSM alternative were considered as given components of the longer term future build alternatives, although the benefits of the TDM/TSM alternative improvements are often limited.

Figure 3-15 Completed Initial Screening Evaluation Matrix

I-15 COMPREHENSIVE CORRIDOR STUDY
INITIAL SCREENING EVALUATION MATRIX

● ◕ ◑ ◔ ○

Most Effective ⟷ *Least Effective*

	Alternative	A: Future General-Purpose Capacity						B: Future HOV Capacity		C: Future Truck Capacity		D: Safety	E: Environment		F: Cost
		A1			A2			B1	B2	C1	C2	D1	E1	E2	F1
		AM Peak Hour (southbound)			PM Peak Hour (northbound)			AM	PM	AM	PM	Truck/Auto Traffic Separation	Biological, Cultural, Geology and Hydrology	Noise	Cost/Fundability
		SR-60 to I-215	I-215 to US-395	US-395 to D St.	SR-60 to I-215	I-215 to US-395	US-395 to D St.	I-215 to US-395	I-215 to US-395	I-215 to US-395	I-215 to US-395				
1	No-Build	○	○	○	○	◑	◑					○	●	●	●
2	TSM/TDM	○	○	○	○	◑	◑					○	●	●	●
3	HOV Lane (SR-60 to D St) with Express Bus	◔	◑	◔	◔	◕	◕	◕	◑			◔	◕	◑	◕
4	Cajon Pass Dedicated Truck Lanes (Glen Helen to US-395)	◑	◔	◑	◑	◑	◕			●	●	◕	◑	◑	◔
5	Full Corridor Dedicated Truck Lanes (SR-60 to D St)	◔	◔	◔	◔	◑	◕			●	●	●	○	○	○
6	Single General-Purpose Lane (SR-60 to D St)	◑	◑	◑	◑	◕	◕					◔	◕	◕	◕
7	Express Lanes (SR-60 to D St)	◑	◕	◕	◑	◕	●					◕	◔	◔	○
8	Reversible Managed Lanes (SR-210 to US-395)	◑	◕	◑	◑	◕	◕					◑	◕	◑	◔
9	Commuter Rail Service (San Bernardino to Victorville)	○	○	○	○	◑	◑					○	◕	◑	◑

The three future build alternatives encompass a range of potential transportation benefits and costs. While each of the future build alternatives provide apparent benefits as indicated by the initial screening evaluation, the recommendation of the three future build alternatives also includes considerations for evaluating elements consistent with other build alternatives. For example, the HOV alternative has been recommended to be considered for further detailed evaluation, despite being slightly less effective overall when compared to the Single General-Purpose Lane alternative. Since the physical characteristics of the HOV Lane alternative are very similar to those of the Single-General-Purpose Lane alternative, it will be possible to equate many of the impacts and benefits of the HOV Lane to the Single General-Purpose Lane. Should the benefits of the HOV Lane in terms of corridor traffic level of service be found to be marginal, the evaluation results could be considered in the context of a Single General-Purpose Lane.

Similarly, the evaluation of the Full Corridor Dedicated Truck Lanes allows the consideration of elements consistent with the Cajon Pass Dedicated Truck Lanes for the truck lane segment from Glen Helen to US-395 which is common to both alternatives. Should the relative benefits of the truck lanes be found to be marginal north of US-395 and/or south of Glen Helen, the applicable results of the Full Corridor Truck Lanes alternative could be considered in the context of the Cajon Pass Truck Lanes alternative.

The further consideration of the Reversible Managed Lanes alternative reflects the comparative impacts and benefits of the reversible managed lanes when compared to the considerably more intrusive and yet only slightly more beneficial Express Lanes alternative. Based in the results of the initial alternatives screening, the Reversible Managed Lanes alternative is able provide sufficient flexibility to accommodate the directional peak traffic flows within the study corridor whilst minimizing the overall impacts of implementing improvements associated with the Express Lanes alternative.

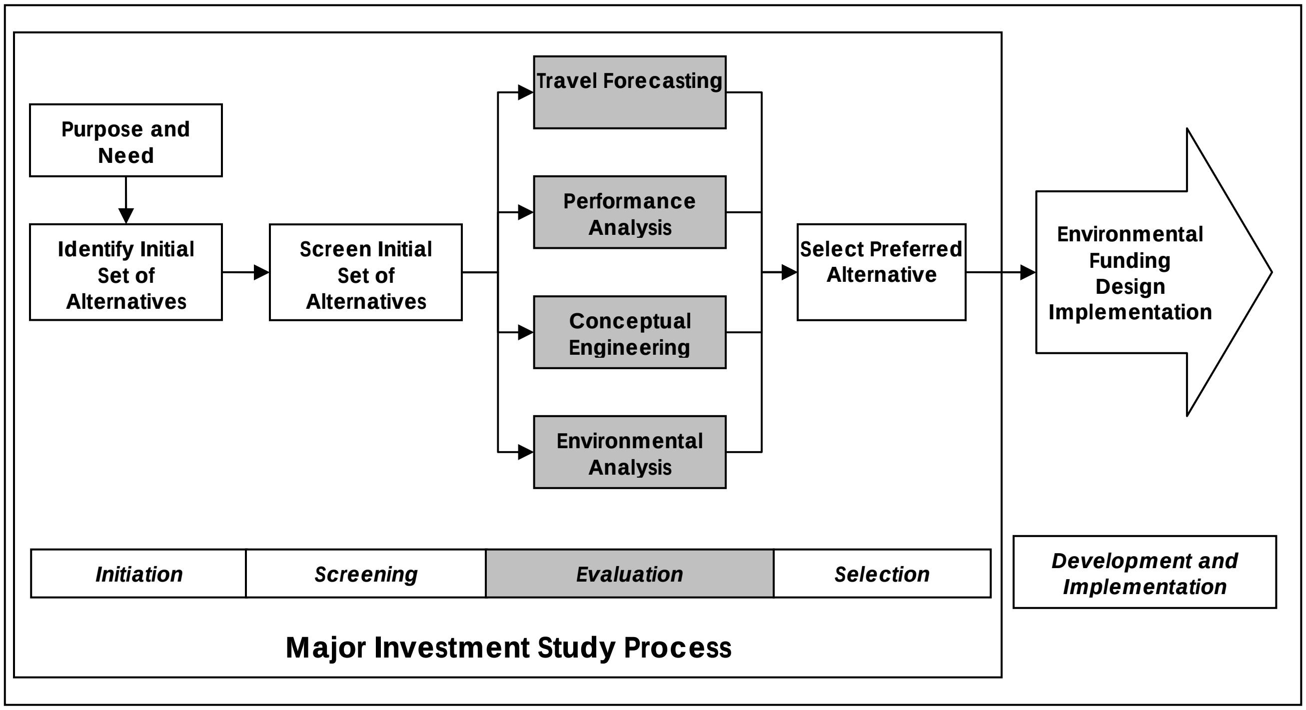
In conjunction with detailed evaluation of the five recommended alternatives selected for further study, the two I-15/I-215 interchange improvement options were also considered. The elimination of this primary bottleneck in the corridor is a high priority for the I-15 Comprehensive Corridor Study.

The alternatives carried into detailed evaluation were selected considering that the final recommendations of the I-15 Comprehensive Corridor Study could be a hybrid alternative incorporating a combination of elements from the alternatives evaluated based on the results of the analysis. Consistent with this approach, the final recommendation included, at a minimum, elements of the No-Build alternative, the TDM/TSM alternative and an I-15/I-215 interchange option in addition to elements of a future build alternative for the corridor.

SECTION 4 DETAILED EVALUATION OF SELECTED ALTERNATIVES

The fundamental intent of the Major Investment Study (MIS), like any major transportation planning effort, is to narrow the range of potential options to resolve a particular transportation problem ultimately leading to the selection of a specific strategy for implementation. To facilitate the process, the MIS is structured so that the options being considered are periodically refined as outlined previously in **Figure 2-3** and below in **Figure 4-1**.

Figure 4-1 Major Phases of the MIS Process



This section relates to the "Evaluation" phase of the MIS process which is shaded above in **Figure 4-1**. It follows from the "Screening" phase of the MIS process in which an initial set of alternatives was reduced to a smaller set to be evaluated in greater detail. As described in **Section 3**, five of the nine initial alternatives were selected to be studied in more detail based on the screening level analysis. These five alternatives were renamed and are referred to as follows in the remainder of this document:

- Strategy A: No-Build (previously called Alternative 1)
- Strategy B: TDM/TSM (previously called Alternative 2)
- Strategy C: HOV Lanes (previously called Alternative 3)
- Strategy D: Full Corridor Dedicated Truck Lanes (previously called Alternative 5)
- Strategy E: Reversible Managed Lanes (previously called Alternative 8)

In addition to the five selected strategies, the two I-15/I-215 interchange improvement options were also considered during the detailed evaluation. The elimination of this primary bottleneck in the corridor is a high priority for the I-15 Comprehensive Corridor Study.

Section 4 documents the detailed evaluation of the five selected strategies and is organized into the following three subsections:

- Detailed Evaluation Methodology (**Section 4.1**)
- Detailed Evaluation Travel Demand Forecasts (**Section 4.2**)
- Detailed Evaluation Results (**Section 4.3**)

4.1 DETAILED EVALUATION METHODOLOGY

The detailed evaluation methodology was designed to enable decision makers to judge the comparative ability of the five strategies to achieve the stated project goals and objectives as discussed in the Purpose and Need Statement. The Purpose and Need Statement identified six major problem areas and associated study objectives as follows:

- Traffic Congestion
    - Improve Levels of Service on I-15
    - Provide Sufficient Capacity to Meet Demand
    - Improve Travel Times
    - Reduce Operational Conflict between Auto, Recreational and Truck Traffic
- Goods Movement
    - Improve the Efficiency and Reliability of Goods Movement
    - Reduce Operational Conflict between Trucks and General-Purpose Traffic
- Transit
    - Provide Enhanced Access to Transit Services
    - Provide Reliable Transit Travel Times
    - Increase Commuter Use of Transit and HOV (Carpooling)
- Safety
    - Reduce the Frequency, Severity, and Consequences of Crashes on I-15 by Minimizing Contributing Factors such as Travel Speeds, Vehicle Performance Conflicts, and Freeway Design Deficiencies
- Design Improvements
    - Eliminate Non-Standard or Inadequate Design Features on I-15
- Cost-Effectiveness
    - Pursue Cost-Effective Transportation Solutions
    - Pursue Timely, Viable, and Feasible Transportation Solutions
    - Pursue Innovative and Self Sustaining Funding Mechanisms

The first stage of the detailed evaluation involved calculation of a broad range of measures of effectiveness (MOEs) that could help determine the comparative ability of the five strategies to achieve the above goals and objectives. The analysis focused on "order of magnitude" comparisons of Strategies B through D to Strategy A (No-Build) and amongst each other.

As was discussed previously, Strategies A through E were selected considering that the final recommendation could be a combination of the five strategies for a variety of reasons such as differing characteristics along the length of the study corridor and financial considerations. To enable this analytical perspective, the study corridor was broken down into seven study segments. The majority of the MOEs were calculated at the segment level. However, corridor level analysis was more appropriate for some. **Section 4.1.1** defines the seven study segments, while **Section 4.1.2** identifies and defines the MOEs.

The MOEs were summarized in a set of tables and charts to facilitate the analysis of given segments, comparison amongst segments, and analysis of the corridor as a whole. A set of segment-specific tables containing the full range of MOEs enabled a detailed evaluation of given segments. A subset of key MOEs was gathered into a Summary Table to facilitate comparison across segments and strategies. To further facilitate analytical comparisons across segments and strategies, selected MOEs were illustrated in a set of bar charts. **Section 4.1.3** describes the segment-specific tables, the Summary Table, and the set of MOE bar charts.

The analysis was further compressed into a Grading Matrix to facilitate comparison and decision-making. The Grading Matrix, described in **Section 4.1.4**, was used in conjunction with the other tables and charts by decision-makers while comparing the five strategies. The Grading Matrix summarizes the potential of the five strategies to achieve each of the stated project goals on a corridor-wide basis, rather than segment level basis.

4.1.1 Definition of the Seven Study Segments

The alternatives carried into detailed evaluation were selected considering that the final recommendations of the I-15 Comprehensive Corridor Study could be a hybrid alternative incorporating a combination of elements from the strategies evaluated. To enable identification of a potential hybrid alternative, the detailed evaluation was conducted at a segment level. Some MOEs not suited to segment level analysis were calculated at the corridor level.

The I-15 study corridor was broken down into analysis segments that acknowledged the differences along the over 45-mile long corridor, recognized that "one size does not fit all", and provided a better understanding of both the regional and more localized transportation impacts of the five strategies. The corridor was ultimately broken down into the seven segments defined below. The seven study segments were numbered consecutively from north to south, with Segment 1 being the northern-most segment for both the northbound and southbound directions of travel.

SEGMENT 1 – Mojave River to Bear Valley Road

Segment 1 extends between the Mojave River crossing and Bear Valley Road. This approximately 7 mile long portion of the corridor is contained in San Bernardino County and traverses the City of Victorville. The segment's northern endpoint at the Mojave River crossing is near the border of Victorville and Apple Valley and its southern endpoint is at the border of Hesperia and Victorville.

SEGMENT 2 – Bear Valley Road to US-395

Segment 2 extends from Bear Valley Road to US-395. This approximately 7 mile long portion of the corridor is contained in San Bernardino County. It runs along the border of Victorville and Hesperia at its northern end and then passes through the City of Hesperia until its southern endpoint at US-395 and the border of Hesperia and unincorporated San Bernardino County.

SEGMENT 3 – US-395 to SR-138

Segment 3 runs from US-395 to SR-138. This segment is approximately 8 miles long and is contained in San Bernardino County. Its northern end runs through unincorporated San Bernardino County from its border with the City of Hesperia. Its southern end runs through the San Bernardino National Forest and includes steep grades through mountainous terrain.

SEGMENT 4 – SR-138 to I-215

Segment 4 runs between SR-138 and I-215. This segment is approximately 7 miles long and contained in San Bernardino County. Its northern end passes through the San Bernardino National Forest and includes steep grades through mountainous terrain. It ends at the I-15/I-215 junction located in the community of Devore.

SEGMENT 5 – I-215 to SR-210

Segment 5 extends between I-215 and SR-210. The northern end of this approximately 8 mile long segment begins in the community of Devore, passes through the Glen Helen Regional Park and the San Bernardino National Forest, and then runs along the border of unincorporated San Bernardino County and the City of Rialto. It then runs along the border of unincorporated San Bernardino County and the City of Fontana, through the City of Fontana, and briefly along the border of Fontana and Rancho Cucamonga before reaching its southern endpoint at SR-210. It is contained in San Bernardino County.

SEGMENT 6 – SR-210 to I-10

Segment 6 extends between SR-210 and I-10. The northern end of this approximately 8 mile long segment runs along the border of Fontana and Rancho Cucamonga, through the City of Rancho Cucamonga, and then through the City of Ontario before reaching its southern endpoint at I-10. It is contained in San Bernardino County.

SEGMENT 7 – I-10 to SR-60

Segment 7 extends between I-10 and SR-60. The northern end of this approximately 2 mile long segment runs through the City of Ontario, crosses the border of San Bernardino and Riverside Counties, and then runs through unincorporated Riverside County before reaching its southern endpoint at SR-60. It is contained in San Bernardino and Riverside Counties. The segment is characterized by heavy urban traffic conditions as it is sandwiched between two closely spaced interchanges with major freeways (I-10 and SR-60).

4.1.2 Detailed Evaluation Measures of Effectiveness

Measures of effectiveness were computed to help assess the comparative ability of the five strategies to address the problem areas and key objectives defined in the Purpose and Need Statement and summarized previously. The MOEs were grouped into categories as follows:

- Category 1: Transportation System Performance
  - Sub-Category 1A: Transportation Supply
  - Sub-Category 1B: Travel Demand and Patronage
  - Sub-Category 1C: Traffic Congestion Relief
  - Sub-Category 1D: Operations and Safety
- Category 2: Environmental Impacts
- Category 3: Cost-Effectiveness and Feasibility

Category 1, Transportation System Performance, addressed the first five of the six project goals identified earlier. Category 1 was broken up into four sub-categories as shown above. The MOEs for Sub-Category 1A, Transportation Supply, reflect the availability of transportation services. The Transportation Demand and Patronage measures reflect the amount of transportation services desired and being used. The Traffic Congestion Relief measures fuse the previous two sub-categories, reflecting the ability of the transportation supply to satisfy the demand. The Operations and Safety sub-category focuses on the interaction of trucks and passenger cars, a major operational and safety issue affecting travelers on the I-15.

The remaining two categories of MOEs, Categories 2 and 3, addressed the sixth project goal and the overall desirability of each strategy. In particular, Category 3, Cost-Effectiveness and Feasibility, related directly to the sixth goal. Environmental impacts, the subject of Category 2, were not called out specifically in the project goals and objectives, but were analyzed given their relevance to the overall desirability of any option, as well as their relation to the sixth project goal, cost-effectiveness and feasibility.

The MOEs computed are listed below. **Table 4-1** summarizes the methodologies used to compute each of them.

- <u>Category 1: Transportation System Performance</u>

  - <u>Sub-Category 1A: Transportation Supply</u>
    - *Vehicle Capacity of I-15*
      - General-Purpose Lanes Only
      - High Occupancy Vehicle (HOV) Lanes Only
      - Truck Lanes Only
      - Managed Lanes Only
      - Total

- *Peak Period Transit Service Frequency*
    - I-15 Express Bus Services - AM Peak Period
    - I-15 Express Bus Services - PM Peak Period
    - Parallel Rail Service

▪ Sub-Category 1B: Travel Demand and Patronage

- *Average Daily Traffic on I-15*
    - Single Occupant Vehicles (SOV) Only
    - HOV Only
    - Trucks Only
    - Total
- *Average Daily Person-Trips on I-15*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *AM Peak Period (6-9 AM) Traffic – Northbound Only*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *AM Peak Period (6-9 AM) Traffic – Southbound Only*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *PM Peak Period (3-7 PM) Traffic - Northbound Only*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *PM Peak Period (3-7 PM) Traffic - Southbound Only*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *Average Daily Traffic Directional Split (% Southbound)*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total
- *AM Peak Period (6-9 AM) Directional Split (% Southbound)*
    - SOV Only
    - HOV Only
    - Trucks Only
    - Total

- *PM Peak Period (3-7 PM) Directional Split (% Southbound)*
  - SOV Only
  - HOV Only
  - Trucks Only
  - Total
- *Percent Heavy Trucks (ADT)*
  - % Light-Heavy
  - % Medium-Heavy
  - % Heavy-Heavy
  - Total % Trucks
- *Percent Heavy Trucks (Peak Periods)*
  - AM Peak Period - Northbound
  - AM Peak Period - Southbound
  - PM Peak Period - Northbound
  - PM Peak Period - Southbound

▪ Sub-Category 1C: Traffic Congestion Relief
- V/C Ratio: AM Peak Period (6-9 AM) on Northbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- V/C Ratio: AM Peak Period (6-9 AM) on Southbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- V/C Ratio: PM Peak Period (3-7 PM) on Northbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- V/C Ratio: PM Peak Period (3-7 PM) on Southbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- Travel Time: AM Peak Period (6-9 AM) on Northbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- Travel Time: AM Peak Period (6-9 AM) on Southbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only

- Travel Time: PM Peak Period (3-7 PM) on Northbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only
- Travel Time: PM Peak Period (3-7 PM) on Southbound I-15
  - General-Purpose Lanes Only
  - HOV Lanes Only
  - Truck Lanes Only
  - Managed Lanes Only

▪ <u>Sub-Category 1D: Operations and Safety</u>

- Degree of Improvement to Operations and Safety
  - Factor 1: Reduced number of trucks in GP Lanes
  - Factor 2: Reduced congestion in GP Lanes
  - Factor 3: TSM/TDM Strategies
  - Overall Degree of Improvement

♦ <u>Category 2: Environmental Impacts</u>

- Right of Way (acres)
- Land Use Type Affected (acres)
  - Residential
  - Commercial/Industrial
  - Parks/Recreation
  - Public Services/Utilities
  - Local Roadway
  - Other (Vacant, Vineyards, Undeveloped, Open Space)
- Special Resources Affected
  - Biological (# of sensitive species)
  - Biological (acres of CNDDB habitat)
  - Historic (# of resources)
  - Water (# of waterways)
  - Farmland (acres)
- Environmental Justice
- Noise
- Air Quality

♦ <u>Category 3: Cost-Effectiveness and Feasibility</u>

- Estimated Cost

Table 4-1 Detailed Evaluation Measures

MEASURE NAME	METHODOLOGY DESCRIPTION
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE	
SUB-CATEGORY 1A: TRANSPORTATION SUPPLY	
◆ **Vehicle Capacity of I-15 (passenger cars per hour)** * General Purpose Lanes Only * HOV Lanes Only * Managed Lanes Only * Total	Capacity for the sum of the northbound and southbound directions is given in passenger cars per hour. A capacity of 2,100 passenger cars per hour per lane (pcphpl) was assumed, consistent with the forecast model assumptions for daytime periods. The capacities shown do not account for capacity improvements due to TSM/TDM or operational improvements such as separation of trucks and passenger cars.
◆ **Peak Period Transit Service** * I-15 Express Bus Services - AM Peak Period * I-15 Express Bus Services - PM Peak Period * Parallel Rail Service	The number or frequency of buses or trains providing service along the I-15 study corridor in either direction is given. Under current conditions, limited service is available and the total number of buses or trains running during the entire period is more meaningful than the frequency. In contrast, future improvements to service are provided as frequency, buses per hour.
SUB-CATEGORY 1B: TRAVEL DEMAND AND PATRONAGE	
◆ **Average Daily Traffic on I-15 (vehicles per day)** * SOV Only * HOV Only * Trucks Only * Total	The sum of northbound and southbound vehicles is given in vehicles per day for each vehicle type: single occupant vehicle (SOV), high occupancy vehicle (HOV), truck, and total. An HOV is defined as a vehicle containing two or more persons, commonly known as carpools, vanpools, or buses. For Strategies C and E, the HOV and managed lane strategies, the sum of HOV in the HOV lanes, managed lanes and general purpose lanes is given. All three categories of trucks (light, medium, and heavy) are included. For Strategy D, the truck lane alternative, the sum of trucks in the truck lanes and general purpose lanes is given.
◆ **Average Daily Person-Trips on I-15 (people per day)** * SOV Only * HOV Only * Trucks Only * Total	The number of people traveling in each vehicle type (SOV, HOV, or Truck) is given in people per day for the sum of northbound and southbound travel by multiplying the ADT by an assumed average vehicle occupancy (AVO) factor. The AVO's assumed per vehicle type are as follows: SOV: It was assumed that 1 person is traveling in each SOV. HOV: Two categories of HOV are included in the forecasts: 2-person HOV and 3-or-more person HOV. It is assumed that 2 people travel in each 2-person HOV and that 3.5 people travel in each 3-or-more person HOV. TRUCK: It is assumed that 1 person travels in each truck.
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY** * SOV Only * HOV Only * Trucks Only * Total	Same as "Average Daily Traffic on I-15", except only vehicles traveling northbound during the AM Peak Period (6-9 AM) are included. The breakdown into SOV, HOV, and trucks is provided, in addition to the total AM Peak Period traffic.
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY** * SOV Only * HOV Only * Trucks Only * Total	Same as "Average Daily Traffic on I-15", except only vehicles traveling southbound during the AM Peak Period (6-9 AM) are included. The breakdown into SOV, HOV, and trucks is provided, in addition to the total AM Peak Period traffic.
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY** * SOV Only * HOV Only * Trucks Only * Total	Same as "Average Daily Traffic on I-15", except only vehicles traveling northbound during the PM Peak Period (3-7 PM) are included. The breakdown into SOV, HOV, and trucks is provided, in addition to the total AM Peak Period traffic.
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY** * SOV Only * HOV Only * Trucks Only * Total	Same as "Average Daily Traffic on I-15", except only vehicles traveling southbound during the PM Peak Period (3-7 PM) are included. The breakdown into SOV, HOV, and trucks is provided, in addition to the total AM Peak Period traffic.
◆ **Average Daily Traffic Directional Split- (% Southbound)** * SOV Only * HOV Only * Trucks Only * Total	The number of southbound vehicles is divided by the sum of northbound and southbound vehicles to get the percent of vehicles traveling in the southbound direction on I-15 during the given time period. The "% Southbound" is given by vehicle type: single occupant vehicle (SOV), high occupancy vehicle (HOV), truck, and for the total of all vehicle types. See the discussion of average daily traffic above for a detailed explanation of vehicle types.

Table 4-1 Detailed Evaluation Measures (Continued)

MEASURE NAME	METHODOLOGY DESCRIPTION
◆ **AM Peak Period Directional Split- (% Southbound)** * SOV Only * HOV Only * Trucks Only * Total	Same as above.
◆ **PM Peak Period Directional Split- (% Southbound)** * SOV Only * HOV Only * Trucks Only * Total	Same as above.
◆ **Percent Heavy Trucks (ADT)** * % Light-Heavy * % Medium-Heavy * % Heavy-Heavy * Total % Trucks	The number of average daily trucks is divided by the total average daily traffic to get the percent trucks. The percent trucks is computed for three heavy truck types: light-heavy, medium-heavy, and heavy-heavy, and for the total of all three heavy truck types. SCAG's Heavy Duty Truck Model defines these three heavy truck types based on gross vehicle weight (GVW) as follows: light-heavy (8,500 to 14,000 pounds GVW), medium-heavy (14,000 - 33,00 pounds GVW), and heavy-heavy (over 33,000 pounds GVW).
◆ **Percent Heavy Trucks (Peak Periods)** * AM Peak Period - Northbound * AM Peak Period - Southbound * PM Peak Period - Northbound * PM Peak Period - Southbound	Same as above for the time periods indicated and for the total of all three heavy truck types (light-heavy, medium-heavy, and heavy-heavy).
SUB-CATEGORY 1C: TRAFFIC CONGESTION RELIEF	
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	The volume/capacity ratio is calculated in two steps. First the number of peak period vehicles is converted to passenger cars by using passenger-car-equivalency (PCE) factors. Different factors are used for light, medium, and heavy vehicles, as well as for normal and steep grades. Specifically, the PCE factors are as follows: light/normal=1.2, medium/normal=1.5, heavy/normal=2.4, light/steep=2.2, medium/steep=2.8, heavy/steep=4.6. Second, the total peak period volume in PCE's is divided by the peak period capacity. Capacity is assumed to be 2,100 passenger cars per hour per lane for all lane types.
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.
◆ **Travel Time: AM Peak Period (6-9 AM) on NB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	The average time needed to travel the full length of a segment is given in minutes for the given peak period and direction. Travel times were estimated by multiplying the length of a given segment by the average speed on the segment. Average speeds were estimated based on volume-to-capacity ratios on the segment.
◆ **Travel Time: AM Peak Period (6-9 AM) on SB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.
◆ **Travel Time: PM Peak Period (3-7 PM) on NB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.
◆ **Travel Time: PM Peak Period (3-7 PM) on SB I-15** * General Purpose Lanes Only * HOV Lanes Only * Truck Lanes Only * Managed Lanes Only	Same as above.

Table 4-1 Detailed Evaluation Measures (Continued)

MEASURE NAME	METHODOLOGY DESCRIPTION
SUB-CATEGORY 1D: OPERATIONS AND SAFETY	
◆ **Degree of Improvement to Operations and Safety**	The overall degree of improvement to operations and safety was assessed qualitatively for each strategy. Each strategies overall degree of improvement was ranked as either low, medium, or high dependent on three factors. If the strategy achieved all three factors it was ranked high, if it achieved two of the three it was ranked medium, and if it only achieved one factor it was ranked low. The three factors were: (1) reduced number of trucks in the general purpose lanes, (2) reduced congestion in the general purpose lanes, and (3) inclusion of TSM/TDM strategies.
CATEGORY 2: ENVIRONMENTAL IMPACTS	
◆ **Right-of-Way (acres)**	The acreage of additional right-of-way needed to accommodate the transportation capital investment proposed in each strategy. The right-of way determination was based on a conceptual freeway "footprint" identified for each strategy. It did not include areas needed for access during construction or construction staging.
◆ **Land Use Type Affected** * Residential * Commercial/Industrial * Parks/Recreation * Public Services/Utilities * Local Roadways * Other (Vacant, Vineyards, Undeveloped, Open Space)	The acreage of each land use type that would be affected was determined for each strategy. Existing land uses were determined using data obtained from SCAG (2000), aerials, and windshield surveys conducted October-December 2004, which documented the existing land uses. Land uses were considered affected if they were within the conceptual project footprint where additional right-of-way would be required. Additional right-of-way that could be entirely accommodated between the freeway and frontage roads was not included as an impact to land use types affected. Acreage calculated for roadways is also included under acreage for the adjacent land use (e.g. if the adjacent use to a roadway that would be realigned as part of the right-of-way needs was commercial, the acreage for that roadway was also included under the acreage for commercial). The Public Services/Utilities land use category included such things as police and fire station, electrical or gas lines, libraries, and hospitals.
◆ **Special Resources Affected** * Biological (# of sensitive species) * Biological (CNDDB habitat) * Historic (# of resources) * Water (# of waterways) * Farmland (acres)	Special resources include biological (sensitive, threatened, and endangered species and California Natural Diversity Database [CNDDB] habitat), historic (resources and districts), water (waterways, floodplains, wetlands, and water quality), and farmlands (prime, unique, local and statewide importance). In determining impacts for these resources a ¼ mile buffer was used for biological and historic resources and the conceptual project footprint was used for water resources. The number of species and acreage of habitat affected for each strategy, the number of historic resources affected by each strategy, the number of waterways each strategy crosses, and the acreage of important farmland soils within the corridor were determined. <u>Biological Resources</u> Potential impacts on biological resources were evaluated for each strategy using a ¼ mile buffer. For strategies that required more than 3 meters of additional ROW widening within any segment, the additional amount of ROW widening required was added to the ¼ buffer making the potential impact area greater than ¼ mile. For strategies that required less than 3 meters of additional ROW, the impact was considered negligible and the ¼ mile buffer was assumed as the impact area. When considering impacts to biological species and habitat, the total number of species and area of habitat was included in the area of impact. For example, if a portion of an area with significant widening was identified as containing sensitive species or habitat fell within the ¼ mile buffer, all of the identified species and the total area of habitat were considered impacted. For sensitive species, the number of species affected is shown. Impacts to CNDDB habitat include the entire acreage shown as habitat for each species as opposed to just the amount of acreage within the ¼ mile buffer. Therefore, the total acreage impacted in this category could be higher than the ¼ mile buffer. <u>Farmland</u> According to the Natural Resources Conservation Service (NRCS) the criteria of farmland impact is based on the amount of impact to important farmland soils. The types of important farmland soils identified include: prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance. Farmland soils of the I-15 corridor study area were identified using the 2002 California Department of Conservation, Farmland Mapping and Monitoring Program (FMMP).

Table 4-1 Detailed Evaluation Measures (Continued)

MEASURE NAME	METHODOLOGY DESCRIPTION
◆ **Environmental Justice (acres)**	The evaluation of environmental justice considers potential impacts to areas that are primarily characterized by minority and/or low income households (i.e., census tracts with higher percentages of minority and/or low-income households compared to City and County levels). These areas were identified using 2000 census data and compared to locations where the proposed project would require additional right-of-way. The acreage of minority and low-income neighborhoods located within the conceptual freeway footprint, in areas where additional right-of-way would be required and thus result in Environmental Justice issues were determined.
◆ **Noise**	Noise measurements taken at the proposed project site showed the existing noise level ranging from a low of 70 dBA to a high of 72 dBA. Because the existing noise level within the study area already approaches or exceeds the noise abatement criteria (NAC) noise level, any proposed improvements would require a detailed noise study. For purposes of evaluating the screening strategies, impacts were determined based on the expected change in existing traffic noise level for the length of freeway frontage (for sensitive receptors) that would be affected. For example, if the existing noise level increased by 2 to 3 dBA and several miles of frontage were affected, the impact would be considered high. Noise impacts were rated as high, moderate or low.
◆ **Air Quality** * Reactive Organic Compounds/Gases (ROC/ROG) * CO * NOx * PM10	Pollutants that can be traced principally to motor vehicles and are thus relevant to the evaluation of the project impacts, include CO, ROG, NOx, and PM10/2.5. EPA has indicated that PM10/2.5 are local and regional pollutants of concern for mobile source projects. As per guidance from SCAQMD, approximately 97% of PM10 is considered to be PM2.5. Due to this, the trends demonstrated for PM10 are expected to be similar for PM2.5. For this analysis, only the project's impact on a regional level were examined. The relative regional or "mesoscale" air quality impacts are directly related to how the project affects overall air quality levels in the entire study area. This regional or "mesoscale" procedure utilizes vehicle miles traveled (VMT) and associated speed projections as estimated in the traffic analysis. Emission burdens are then determined using average daily VMT data and vehicular emission rates for each alternative. Emission factors were calculated using the California Air Resources Board (CARB) on road emission factor program, EMFAC2002 (April, 2003). An average vehicle mix for San Bernardino, as programmed into the EMFAC2002 model, was used to determine emission factors for the appropriate speeds. For the HOV alternative only Light Duty Autos and Light Duty Trucks were assumed to use the HOV lanes. For the Truck alternative only Medium and Heavy Duty Trucks were assumed to use the truck lanes. For the Reversible lane alternative only Light Duty Autos and Light Duty Trucks were assumed to use the reversible lanes. Specific criteria for determining whether the potential air quality impacts of a project would be significant are set forth in the California Environmental Quality Act (CEQA). The criteria include emissions thresholds, compliance with state and national air quality standards, and conformity with the existing SIP or consistency with the current air quality management plan (AQMP). The daily operational regional emissions "significance" thresholds are as follows: • 55 pounds (25 kilograms) per day of ROC/ROG (precursors to ozone) • 55 pounds (25 kilograms) per day of NOx • 550 pounds (250 kilograms) per day of CO • 150 pounds (70 kilograms) per day of PM10
CATEGORY 3: COST-EFFECTIVENESS AND FEASIBILITY	
◆ **Estimated Cost**	Preliminary cost estimates for each conceptual design alternative were prepared based on the conceptual design drawings. The estimates followed the format defined in the Caltrans Project Development Procedures Manual (1995 or later edition) and addressed all major capital cost items such as roadway, structures, retaining/sound walls, major utility relocation, right-of-way, railroad impacts, etc. Estimated cost ranges were established by reducing the calculated cost estimate 10% for the low cost and increasing 30% for the high cost.

4.1.3 Detailed Evaluation Tables and Charts

The MOEs were summarized in a set of tables and charts to facilitate analysis of given segments, comparisons amongst segments, and analysis of the corridor as a whole. Three types of tables and charts were developed for this purpose and are discussed below:

- a set of seven segment-specific tables,
- a Summary Table, and
- a set of bar charts.

The completed segment-specific tables, Summary Table, and bar charts are presented in **Section 4.3** which discusses the Detailed Evaluation Results**.**

<u>Set of Seven Segment-Specific Tables</u>
The broad range of MOEs calculated at the segment level was summarized in a set of segment-specific tables. **Figure 4-2** illustrates a blank segment level table. Each table contains data pertaining to one of the seven study segments.

As can be seen in **Figure 4-2**, the strategies are listed along the table's x-axis from left to right, while the MOEs are listed along the table's y-axis from top to bottom. The MOEs are grouped into the three categories previously outlined: (1) Transportation System Performance (and its four sub-categories), (2) Environmental Impacts, and (3) Cost-Effectiveness and Feasibility. The change between a given strategy and Strategy A (No-Build) is included where applicable.

<u>Summary Table</u>
A subset of key MOEs was gathered into a Summary Table to facilitate comparison across segments and strategies. The five-page long Summary Table is presented in **Section 4.3,** Detailed Evaluation Results.

The Summary Table contains a mix of segment-level and corridor-level measures in order to provide a both brief and meaningful summary of the data. Namely, the following MOEs are contained in the table:

- Category 1: Transportation System Performance (BY SEGMENT)
  - Sub-Category 1B: Travel Demand and Patronage
    - Average Daily Traffic on I-15
      - SOV Only
      - HOV Only
      - Trucks Only
      - Total
  - Sub-Category 1C: Traffic Congestion Relief
    - V/C Ratio: AM Peak Period (6-9 AM) on Southbound I-15
      - General-Purpose Lanes Only
      - HOV, Truck, or Managed Lanes Only

- V/C Ratio: PM Peak Period (3-7 PM) on Northbound I-15
  - General-Purpose Lanes Only
  - HOV, Truck, or Managed Lanes Only
- V/C Ratio: AM Peak Period (6-9 AM) on Southbound I-15 (SENSITIVITY TEST)
  - General-Purpose Lanes Only
  - HOV, Truck, or Managed Lanes Only
- V/C Ratio: PM Peak Period (3-7 PM) on Northbound I-15 (SENSITIVITY TEST)
  - General-Purpose Lanes Only
  - HOV, Truck, or Managed Lanes Only

▪ Sub-Category 1D: Operations and Safety
- Overall Degree of Improvement to Operations and Safety

♦ Category 2: Environmental Impacts (CORRIDOR LEVEL)
- Right of Way (acres)
- Land Use Type Affected (acres)
  - Residential
  - Commercial/Industrial
  - Parks/Recreation
  - Public Services/Utilities
  - Local Roadway
  - Other (Vacant, Vineyards, Undeveloped, Open Space)
- Special Resources Affected
  - Biological (# of sensitive species)
  - Biological (acres of CNDDB habitat)
  - Historic (# of resources)
  - Water (# of waterways)
  - Farmland (acres)
- Environmental Justice
- Noise
- Air Quality

♦ Category 3: Cost-Effectiveness and Feasibility (CORRIDOR & SEGMENT LEVEL)
- Estimated Cost

Similar to the segment-specific tables, the strategies are listed along the Summary Table's X- (horizontal) axis from left to right, while the segments and MOEs are listed along the table's Y- (vertical) axis from top to bottom.

As is shown in the list of MOEs above, two sets of volume-to-capacity ratios are contained in the Summary Table: one based on the main travel demand forecasts and the second based on a secondary set of travel demand forecasts referred to as the "Sensitivity Test". As the name implies, the "Sensitivity Test" illustrates the sensitivity of the analysis results to different travel demand assumptions. Unless noted, the analysis is based on the main set of travel demand forecasts, rather than the "Sensitivity Test". The development of the travel demand forecasts is discussed in detail in **Section 4.2**.

Figure 4-2 Blank Detailed Evaluation Segment Level Table

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only										
HOV Lanes Only										
Truck Lanes Only										
Managed Lanes Only										
Total										
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period										
I-15 Express Bus Services - PM Peak Period										
Parallel Rail Service										
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	ADT	ADT	ADT	Change from No Build	ADT	Change from No Build	ADT	Change from No Build	ADT	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	Daily People	Daily People	Daily People	Change from No Build	Daily People	Change from No Build	Daily People	Change from No Build	Daily People	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	Vehicles	Vehicles	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	Vehicles	Vehicles	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	Vehicles	Vehicles	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	Vehicles	Vehicles	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build	Vehicles	Change from No Build
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										

Figure 4-2 Blank Detailed Evaluation Segment Level Table (Continued)

	2000	STRATEGY A	STRATEGY B		STRATEGY C		STRATEGY D		STRATEGY E	
	TRAVEL MODEL	NO-BUILD	TSM/TDM		HOV LANES		DEDICATED TRUCK LANES		REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only										
HOV Only (2+ carpools, vanpools, buses)										
Trucks Only										
Total										
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks										
% Medium-Heavy Trucks										
% Heavy-Heavy Trucks										
Total % Trucks										
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound										
AM Peak Period - Southbound										
PM Peak Period - Northbound										
PM Peak Period - Southbound										
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only										
HOV Lanes Only										
Truck Lanes Only										
Managed Lanes Only										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only										
HOV Lanes Only										
Truck Lanes Only										
Managed Lanes Only										
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only										
HOV Lanes Only										
Truck Lanes Only										
Managed Lanes Only										
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only										
HOV Lanes Only										
Truck Lanes Only										
Managed Lanes Only										
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only										
Specialized Lanes Only (HOV, Truck, or Managed)										
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only										
Specialized Lanes Only (HOV, Truck, or Managed)										

Figure 4-2 Blank Detailed Evaluation Segment Level Table (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only										
Specialized Lanes Only (HOV, Truck, or Managed)										
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only										
Specialized Lanes Only (HOV, Truck, or Managed)										
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes										
Factor 2: Reduced congestion in GP lanes										
Factor 3: TSM/TDM Strategies										
Overall Degree of Improvement (low - moderate - high)										
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**										
◆ **Land Use Type Affected (acres)**										
Residential										
Commercial/Industrial										
Parks/Recreation										
Public Services/Utilities										
Local Roadway										
Other (Vacant, Vineyards, Undeveloped, Open Space)										
◆ **Special Resources Affected**										
Biological (# of sensitive species)										
Biological (CNDDB habitat) - acres										
Historic (# of resources)										
Water (# of waterways)										
Farmland (acres)										
◆ **Environmental Justice (acres)**										
◆ **Noise**										
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG										
CO										
NOx										
PM10										
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**										

Set of Bar Charts

In addition to the set of seven segment-specific tables and the Summary Table, a set of bar charts were developed to assist in the analysis and comparison of MOEs across segments and strategies.

The following four bar charts enabled comparison of average daily traffic across segments and strategies. Each chart displays either the total ADT or the ADT for a specific vehicle type (SOV, HOV, truck). Each chart displays volume along the Y-axis. The study segments are listed north to south, from left to right on the X-axis. There is a bundle of bars for each study segment containing one bar per Strategies A through E.

- Average Daily Traffic (all vehicles)
- Average Daily Traffic (SOV Only)
- Average Daily Traffic (HOV 2+ Only)
- Average Daily Traffic (Trucks Only)

Each of the following charts enables the comparison of ADT across strategies and vehicle types on a given segment. Each chart displays volume along the Y-axis. Strategies A through E are listed along the X-axis. There is a stacked bar corresponding to each strategy. The stacked bars show the breakdown of ADT into the three vehicle types: SOV, HOV, and Truck.

- Average Daily Traffic on Segment 1
- Average Daily Traffic on Segment 2
- Average Daily Traffic on Segment 3
- Average Daily Traffic on Segment 4
- Average Daily Traffic on Segment 5
- Average Daily Traffic on Segment 6
- Average Daily Traffic on Segment 7

The following set of bar charts enables the comparison of volume-to-capacity (V/C) ratios across segments and strategies. Each chart displays V/C ratios along the y-axis. Thus, a higher bar corresponds to a higher V/C ratio and a higher level of traffic congestion. The study segments are listed north to south, from left to right on the x-axis. There is a bundle of bars for each study segment containing one bar per Strategies A through E. Each of the charts listed below corresponds to either the AM or PM peak periods, either the northbound or southbound direction of travel, and either the general-purpose or non-general-purpose (i.e. HOV, truck, or managed) lanes.

- AM Peak Period V/C Ratios – NB General-Purpose Lanes
- AM Peak Period V/C Ratios – SB General-Purpose Lanes
- PM Peak Period V/C Ratios – NB General-Purpose Lanes
- PM Peak Period V/C Ratios – SB General-Purpose Lanes
- AM Peak Period V/C Ratios – NB HOV, Truck, or Managed Lanes
- AM Peak Period V/C Ratios – SB HOV, Truck, or Managed Lanes
- PM Peak Period V/C Ratios – NB HOV, Truck, or Managed Lanes
- PM Peak Period V/C Ratios – SB HOV, Truck, or Managed Lanes

A second set of V/C charts illustrates the Sensitivity Test. As was mentioned above and is discussed in detail in **Section 4.2**, two sets of volume-to-capacity ratios were developed: one based on the main travel demand forecasts and the second based on a secondary set of travel demand forecasts referred to as the "Sensitivity Test". As the name implies, the "Sensitivity Test" illustrates the sensitivity of the analysis results to different travel demand assumptions.

- AM Peak Period V/C Ratios – SB General-Purpose Lanes (Sensitivity Test)
- PM Peak Period V/C Ratios – NB General-Purpose Lanes (Sensitivity Test)

4.1.4 Detailed Evaluation Grading Matrix

The analysis was further compressed into a Grading Matrix to facilitate comparison and decision-making. The Grading Matrix did not supersede the tables and charts, but rather was used in conjunction with them by decision-makers to comparatively evaluate the five strategies. The following features of the Grading Matrix made it a useful and unique addition to the summary tools available to decision-makers:

- It tied the detailed evaluation directly to the stated project goals by summarizing the potential of the five strategies to achieve each of the stated project goals.
- It consolidated the segment level analysis to a corridor level.
- It consolidated the broad range of MOEs.
- It incorporated qualitative observations. For example, some strategies had relevant and inherent characteristics, such as improved travel time reliability, that were not reflected directly in the MOEs.

A "total" grade was not developed so as to allow decision makers to objectively weight the stated project goals according to their individual judgment during discussion and development of a recommended alternative. By linking the detailed evaluation back to the stated project goals, the matrix reveals the trade-offs amongst strategies allowing decision-makers to more easily do this.

A blank version of the Grading Matrix is illustrated in **Figure 4-3**. The five strategies are listed along the X-axis from left to right, while the six stated project goals are listed on the Y-axis from top to bottom. Goals 1 and 6 were broken down into three parts to better represent their breadth. In contrast, Goals 4 and 5 were consolidated given their interrelationships.

Each cell in the matrix reflects the ability of a given strategy to achieve a given project goal. Each cell contains a circle whose color and degree of fill reflects the effectiveness of the given strategy at achieving the given goal. Effectiveness was graded on a five-point scale, with five being the most effective. The correspondence between this five point scale and the circle symbols is illustrated in the upper left-hand corner of **Figure 4-3.** There are five levels of circle fill ranging from hollow to solid and correspondingly from least to most effective. The circles are one of the three colors in a traffic signal: red (stop), yellow (maybe), or green (proceed). A hollow or one quarter filled circle is colored red to indicate a less desirable level of effectiveness. A half-filled circle is colored yellow indicating an intermediate level of effectiveness. A three quarters or fully filled circle is colored green, representative of a high level of effectiveness

While the majority of goals are graded using the five point scale and circle symbols, the sixth goal, Cost-Effectiveness and Feasibility, also contains a line showing the estimated cost range. Showing the numerical range, rather than a grade, was found to be more meaningful in this case.

Table 4-2 summarizes the grading methodology for each goal. In general, strategies were graded relative to other strategies. However, for some goals none of the strategies receives a score lower than 2 or higher than 4, recognizing that none of the strategies analyzed offers the worst or highest degree of achievement for that particular goal.

Figure 4-3 Blank Detailed Evaluation Grading Matrix

Most Effective ← → *Least Effective*		Strategy A	Strategy B	Strategy C	Strategy D	Strategy E
		No Build	TSM/TDM	HOV Lanes	Truck Lanes	Managed Lanes
	Goal Description	Existing Conditions plus Funded and Reasonably Anticipated Improvements	Transportation System Management and Demand Management Measures plus Strategy A (No Build)	One Full Corridor HOV Lane per Direction plus Strategy B (TSM/TDM)	Two Full Corridor Exclusive Truck Lanes per Direction plus Strategy B (TSM/TDM)	Two Reversible Managed Lanes (US-395 to I-210) plus One General Purpose Lane per Direction (Mojave River to US-395 & I-210 to SR-60) plus Strategy B (TSM/TDM)
Goal 1 Reduce Congestion	Weekday Peak Periods - General Purpose Lanes					
	Weekday Peak Periods - HOV, Truck, or Managed Lanes					
	Weekend Peak Periods					
Goal 2	Improve Goods Movement					
Goal 3	Improve Transit Service					
Goals 4&5	Improve Safety and Operations					
Goal 6 Cost-Effective	Cost/Benefit (based on travel time savings)					
	Feasibility (based on ROW and Environmental Impact)					
	Estimated Cost Range (in millions)					

Table 4-2 Detailed Evaluation Grading Matrix Methodology

GOAL DESCRIPTION	GRADING METHODOLOGY
Goal 1: Reduce Congestion	FOR WEEKDAY: Grading was based on the difference between travel time under a given strategy and free flow travel time. The weighted average of the 4 combinations of peak period (AM, PM) and direction (NB, SB) was calculated by weighting each of the four travel time differences by the number of vehicle trips in the given period and direction on Segment 4 (138 - 215), the segment on which most travel time loss occurs. FOR WEEKEND: Weekend congestion reduction was assessed qualitatively. Considering the higher level of HOV travel and lower level of truck travel characterizing a typical weekend day relative to a weekday, the effectiveness of Strategies C and D deteriorates on weekends. In contrast, the ability to provide two lanes of capacity in the peak direction makes Strategy E an effective weekend strategy.
Goal 2: Improve Goods Movement	This goal was graded using a methodology similar to the Goal 1 Weekday methodology applied from the truck traveler's perspective. For Strategy D (Truck Lanes), the grade was based on conditions in the truck lanes. For all of the other strategies, grading was based on conditions in the general purpose lanes, the only lane option available to trucks under these strategies. One point was subtracted from the grade for all strategies except Strategy D to account for Strategy D offering better travel time reliability for truck travelers.
Goal 3: Improve Transit Service	Improvement to transit service was assessed by consideration of the following factors. Strategy A (No Build) set a base grade of 1 because no improvements to transit were part of this strategy. For Strategies B through E, 1 point was added to the base grade of 1 to account for the slight improvement to transit frequency these strategies offer as part of the TSM/TDM package they include. For strategies C and E, 2 additional points were added to account for the improved travel time and improved reliability these strategies offer to express bus service and other HOV.
Goals 4 & 5: Improve Safety & Operations	Improvement to safety and operations was assessed qualitatively. Strategy A (No build) set a base grade of 1. Strategies B through E were all assigned an additional point for the TSM/TDM measures included in these strategies. Strategies C and E (HOV and Managed Lanes) received one additional point, for a total of 3, due to the reduced levels of congestion and resultantly reduced need for interaction between trucks and cars under these strategies. Strategy D (Truck Lanes) was allotted two additional points, for a total of 4, due to the reduced congestion and reduced number of trucks in the GP lanes. Strategy D (Truck Lanes) did not receive the maximum 5-point grade because a significant number of trucks would still opt for the general purpose lanes under this strategy.
Goal 6: Cost-Effective and Feasible	COST/BENEFIT: The cost/benefit grade was based on the ratio of the median cost to the weighted average travel time savings relative to Strategy A (No Build) weekday peak period conditions. Travel time savings were weighted and averaged across the 4 peak period (AM, PM) and direction (NB, SB) combinations by weighting each of the four travel time savings values by the number of vehicle trips on Segment 4 (138 - 215) during that peak period and direction combination. Segment 4 volumes were used for the weighting because it was the segment on which most travel time loss was forecasted to occur. FEASIBILITY: The feasibility grade was based on a qualitative assessment of environmental impacts. Strategy D (Truck Lanes) was assigned the lowest grade of 1 due to the large amount of right-of-way (ROW) consumed and the numerous "biological" resources affected. Strategy E (Managed Lanes) received a grade of 4, less than the max of 5 because it would consume a significant amount of "biological" resources. It was scored higher than Strategy D, however, to highlight the huge difference in ROW requirements. Strategy C (HOV Lanes) received a grade of 3, a little lower than Strategy E to highlight the higher ROW requirements of Strategy C and also to highlight that several environmental categories not impacted by Strategy E are impacted by Strategy C. ESTIMATED COST RANGE: The actual estimated cost range for applying the given strategy to the entire study corridor is shown in millions of dollars. Showing the actual numerical range was found more meaningful than assigning a grade in this particular case.

4.2 DETAILED EVALUATION TRAVEL DEMAND FORECASTS

During the initial screening of alternatives, five strategies were identified for detailed evaluation:

- Strategy A: No Build
- Strategy B: TDM/TSM
- Strategy C: HOV Lanes
- Strategy D: Full Corridor Dedicated Truck Lanes
- Strategy E: Reversible Managed Lanes

Travel demand forecasts were developed for these five strategies as part of the detailed evaluation using the 2004 Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP) model. Forecasts were conducted for Year 2030 conditions for a three hour AM peak period, four hour PM peak period, and daily conditions. In order to make analysis manageable, the corridor was divided into the seven segments described earlier, and forecast results were summarized for typical locations for each segment.

4.2.1 SCAG Travel Analysis Model

SCAG has been updating their regional model and the modeling software platform; however the updated version of the SCAG model was not released in time to be used for this study. As a result, it was decided that the Unix-based TRANPLAN version of the model used for the 2004 SCAG RTP be used for this study. This model has a base year of 2000 and a forecast horizon year of 2030.

The SCAG region includes Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties. However, the SCAG regional travel analysis model includes the highway and transit networks of only Los Angeles, Orange, and Ventura Counties, and the urbanized sections of Riverside and San Bernardino Counties. The regional model area also includes the Victor Valley and Barstow areas, the Morongo Valley, the Coachella Valley, and the Idyllwild area.

There are 3,191 Traffic Analysis Zones (TAZ) and 26 external stations in the model. The distribution of TAZs amongst counties in the SCAG region is shown in **Table 4-3**.

Table 4-3 Distribution of TAZ's in SCAG 2004 RTP Model

Model Area	No. of Census Tracts	No. of Modeling Zones
Los Angeles County	1,640	1,721
Orange County	480	549
West Riverside	93	263
San Bernardino Valley	128	283
Ventura County	73	199
Extended Modeling Area		
Coachella/Idyllwild	25	84
Victor Valley/Barstow/Morongo	19	92
Total	**2,458**	**3,191**

In Year 2000, the SCAG model coverage area had a population of about 16.4 million, employment of about 7.4 million, and about 5.3 million households. Distribution of workers, households, school enrollment and employment amongst the counties in the SCAG region is shown in **Table 4-4**.

Table 4-4 Distribution of Population and Employment in SCAG Region (2000)

	Population and Workers		School Enrollment		
County	**Total Population**	**Workers**	**K – 12**	**College and University**	**Total Employment**
Los Angeles	9,576,497	4,078,807	2,060,618	730,310	4,470,258
Orange	2,864,196	1,381,714	571,973	230,750	1,514,549
Riverside*	1,525,325	614,725	355,958	86,097	503,449
San Bernardino*	1,696,904	675,488	419,874	108,261	591,322
Ventura	758,096	359,207	163,433	48,445	337,244
Total	**16,421,018**	**7,109,941**	**3,571,856**	**1,203,863**	**7,416,822**

* County totals are for the part of the County in the SCAG modeling area only.
Source: SCAG Staff from2004 Regional Transportation Plan Forecasts

4.2.2 Modeling Specifics of the Five Strategies

The study team coordinated with SCAG modeling staff to develop Year 2030 forecasts for the five detailed evaluation strategies, A through E. The study team coded the highway and transit networks while SCAG staff ran the model, and the study team then analyzed and post-processed the model output. The next few subsections briefly describe modeling assumptions defining each of the five strategies, A through E.

4.2.2.1 Strategy A – No Build

Highway and transit networks were developed for Strategy A, No Build, by modifying the 2030 Base highway networks provided by SCAG to include or exclude various planned improvements. The revised networks were used in conjunction with 2004 RTP Plan socioeconomic forecasts and with 2004 RTP baseline levels of transportation demand management to develop Year 2030 forecasts for Strategy A.

Transportation improvements included in Strategy A, No Build, consisted of funded projects plus projects reasonably anticipated by 2030. They included RTIP, Measure A, and Measure I projects. Specific key transportation improvements included in Strategy A, No Build, are summarized below:

- New Corridors:
  - SR-210 from I-15 to I-215/SR-30 (four general-purpose lanes and two HOV lanes);
  - New four-lane (two in each direction) arterial/expressway facility in the High Desert Corridor from US-395 to SR-18 via the reconstructed Dale Evans Parkway interchange with I-15; and
  - No truck lane corridors assumed on I-710, SR-60, or I-15.
- New Interchanges:
  - On I-15 at La Mesa/Nisqualli in Victorville;
  - On I-15 at Eucalyptus in Hesperia;
  - On I-15 at Ranchero in Hesperia;
  - On I-15 at Galena in Mira Loma;
  - On I-15 at Schleismann in Mira Loma;
  - On I-15 at Arrow Route in Rancho Cucamonga;
  - On I-15 at Duncan Canyon in Rancho Cucamonga; and
  - New northbound off- and southbound on-ramps at I-15/Joshua interchange in Hesperia.
- New HOV lanes:
  - I-15: SR-60 to San Diego County line;
  - I-215: I-10 to SR-60 to San Bernardino County line;
  - SR-71: SR-91 to San Bernardino County line;
  - I-10: I-15 to Riverside County line; and
  - New HOV connector from NB I-15 to WB SR-91.
- New General Purpose Lanes:
  - SR-71: SR-91 to San Bernardino County line (under construction);
  - SR-91: (One in each direction) from Pierce in Riverside to Orange County line;
  - US-395: One additional lane in each direction from I-15 to SR-18; and
  - SR-138: One additional lane in each direction from I-15 to SR-18.

4.2.2.2 Strategy B – TDM/TSM

Strategy B, TDM/TSM, builds upon Strategy A, No Build, in that all of the improvements listed above for Strategy A were also assumed to be part of Strategy B. In addition, Strategy B consists of operational investments, policies, and actions that are aimed at improving automobile travel, transit service and goods movement through the study corridor in addition to reducing the environmental impacts of transportation facilities and operations. The following list provides an overview of the specific elements considered as part of Strategy B. These elements, in addition to the elements of Strategy A, were also included in the three "build" strategies, Strategies C through E.

- Increased 'Express Bus' Service – More express bus service (20-minute headways) was added between Victorville and Ontario, and between Victorville and San Bernardino. Service was provided southbound in the morning and northbound in the afternoon. The routes would serve employment centers and Metrolink stations in Ontario and San Bernardino.
- Enhanced Local Bus Service (Local Circulators) – Improvements were made to local circulators routed through employment centers in Ontario and San Bernardino, connecting with express bus and Metrolink.

4.2.2.3 Strategy C – HOV Lanes

Strategy C, HOV Lanes, built upon Strategies A and B in that Strategy C included all elements of both those strategies. In addition, Strategy C included the addition of one HOV lane in each direction for the full length of the I-15 study corridor, between SR 60 in Riverside County and D Street in Victorville. Elements of Strategy C are summarized below. Conceptual engineering layouts for Strategy C are included in **Appendix A**.

- All elements of Strategy A, No Build.
- All elements of Strategy B: Increased 'express bus' service and enhanced local bus service (local circulators).
- Headways of existing express bus services were improved relative to Strategy B. Specifically, express bus service between Victorville and Ontario, and between Victorville and San Bernardino, was increased southbound in the morning and northbound in the afternoon.
- Enhanced local bus service (local circulators) around Ontario and San Bernardino area also were included in the HOV alternative. Improvements were made to 20 local circulators serving employment centers in Ontario and San Bernardino, and providing connections to the express bus and Metrolink .

4.2.2.4 Strategy D – Truck Lanes

Strategy D, Truck Lanes, built upon Strategies A and B in that Strategy D included all elements of both those strategies. In addition, Strategy D included the addition of two dedicated truck lanes in each direction for the full length of the I-15 study corridor. Several on-ramps and off-ramps were included to facilitate access from and to the truck lanes. Elements of Strategy D are summarized below. Conceptual engineering layouts for Strategy D are included in **Appendix A**.

- All elements of Strategy A, No Build.
- All elements of Strategy B: Increased 'express bus' service and enhanced local bus service (local circulators).

- The model's external truck trip tables (truck trips into/out of the SCAG region) were modified upward to reflect projected commodity flow levels increasing at approximately 2.5 percent annually, consistent with ITMS and FAF data.
- Trucks were not restricted to the exclusive truck facility to ensure that truck and mixed-flow volumes were balanced along the Cajon Pass.
- The truck lanes were non-tolled.

The SCAG Regional Transportation Plan has previously identified truck lanes on I-15 as part of a broader system of dedicated truck lane facilities linking with lanes on I-710 and SR-60 extending from the Ports of Long Beach and Los Angeles. For the purposes of evaluating Strategy D as part of this study, the proposed truck lanes on I-710 and SR-60 were not included in the model network in order to enable a fair comparison of strategies specific to I-15 only. Since the I-710 and SR-60 truck lanes fall outside of the study area and are presently unfunded, it was determined to be most appropriate to evaluate the independent utility of the I-15 truck lanes within the study area therefore making evaluation of Strategy D consistent with the evaluation of the other strategies.

By the nature of the SCAG travel demand forecast model and the I-15 corridor, the demand for trucks to use the I-15 corridor is determined primarily by the origin and destination trip ends. There is generally no alternative to I-15 for trips if they move between the Los Angeles basin and Inland Empire, and the Victor Valley and beyond. For this reason, truck demand (and travel demand in general) for I-15 remains basically unchanged regardless of whether truck lanes are provided along I-710 and SR-60. The notable exception to this is observed on the segment of I-15 from SR-60 to I-10 where some diversion in truck trips would occur as a result of more trucks shifting to SR-60 from I-10 (and I-210/SR-210) to utilize the truck lanes. However, this shift does not affect the overall demand for trucks using the corridor and therefore the feasibility of the truck lanes strategy.

4.2.2.5 Strategy E – Reversible Managed Lanes

Strategy E, Reversible Managed Lanes, built upon Strategies A and B in that Strategy E included all elements of both those strategies. In addition, Strategy E also included two reversible managed lanes in the central portion of the I-15 study corridor, between US-395 and SR-210. Both lanes were assumed to operate southbound during the AM peak period and northbound during the PM peak period. Access and egress locations from the reversible managed lanes were assumed at these major interchanges: SR-210, I-215, SR-138 and US-395. One general purpose lane was added per direction north of US-395 and south of SR-210 to transition with the termini of the reversible managed lanes.

Conceptual engineering layouts for Strategy E are included in **Appendix A**.

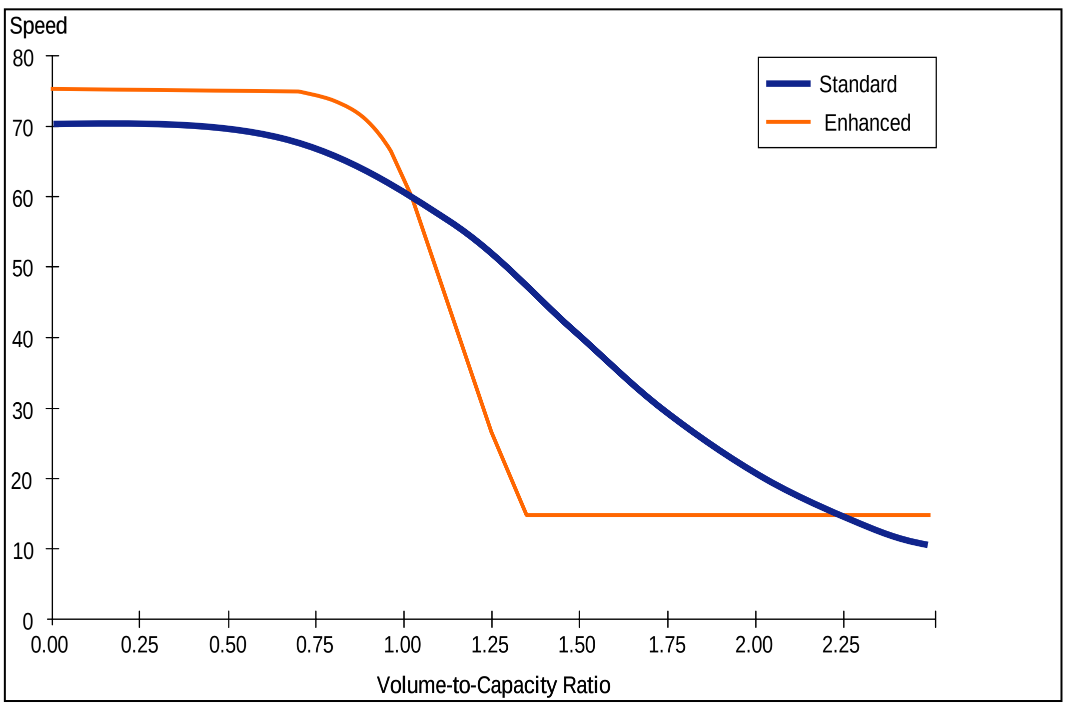
4.2.3 Post Processing of Model Output

The SCAG model covers an extensive geographic area, and as such it is unreasonable to expect model results to match traffic counts "out of the box" in the I-15 corridor. While different methodologies could be used to compensate for the differences between model volumes and traffic counts, the study team chose to modify the model volumes to better reflect current conditions and to use model growth for understanding the future year alternatives. Put another way, traffic count data was used to represent base year conditions and the growth of model volumes from 2000 to 2030 was added to base year traffic counts to represent future conditions.

Other modifications to the model output included moderating the conversions of truck passenger-car-equivalents (PCEs) from an average of 5.6 as is assumed in the SCAG model to an average of 3.5 to be more consistent with HCM 2000 guidelines. The modified PCE factors were used in the volume to capacity calculations. Also, manual volume adjustments were made to move some trucks off truck-only lanes on the Cajon Grade and onto general-purpose lanes, so truck and general-purpose lane speeds would be better balanced.

Speed and travel time estimates were based on the post-processed volume forecasts, volume-to-capacity ratios, and an enhanced speed-flow curve. The SCAG model uses the Standard Bureau of Public Roads (BPR) curve. The enhanced speed-flow curve assumes a modified BPR curve function and a speed “floor” of 15 miles per hour (mph). The purpose of these changes was to ensure that future year travel times were more realistic than would otherwise be obtained using the standard BPR curve without a speed floor[2]. **Figure 4-4** presents a graph comparing the standard and enhanced BPR curves.

Figure 4-4 Speed Flow Curve Comparison



[2] This post-processing methodology is commonly employed in corridor studies to obtain more realistic congested speeds. A study that successfully used this methodology: California Department of Transportation District 10, *I-5 Corridor Study Final Report*, Stockton, CA, 2002.

4.3 DETAILED EVALUATION RESULTS

The detailed evaluation was performed by combining the methodology described in **Section 4.1** with the travel demand forecasts described in **Section 4.2**. This section presents and analyzes the results. It begins by taking a detailed look at each of the seven study segments, and then proceeds to draw comparisons across segments and across strategies for the corridor as a whole. In particular, the discussion is broken down into the following sub-sections:

- **Sections 4.3.1** through **4.3.7** discuss the segment-specific results for Segments 1 through 7, respectively.
- **Section 4.3.8** discusses the MOEs calculated for the I-15/I-215 interchange improvement options separately.
- **Section 4.3.9** synthesizes the segment-specific results by drawing comparisons across segments and across strategies for the corridor as a whole.
- **Section 4.3.10** presents the Detailed Evaluation Grading Matrix which links the analysis directly to the stated project goals from a corridor perspective.

A number of tables and charts, as described previously, summarize the analysis results. **Tables 4-5** through **4-11** show the MOEs for Segments 1 through 7, respectively. **Table 4-12** shows results specific to the I-15/I-215 interchange, for applicable MOEs. **Table 4-13,** the Detailed Evaluation Summary Table, shows the results across segments and strategies for a selected subset of MOEs. **Figures 4-5** through **4-25** illustrate selected MOEs in bar chart format. **Figure 4-26** is the Detailed Evaluation Grading Matrix which links the analysis directly back to the stated project goals and objectives.

As was described previously, a range of MOEs facilitated the detailed evaluation. They were grouped into the categories shown below. Both the tables and discussion of segment-specific results are grouped into these categories so that they are easier to follow.

- Category 1: Transportation System Performance
  - Sub-Category 1A: Transportation Supply
  - Sub-Category 1B: Travel Demand and Patronage
  - Sub-Category 1C: Traffic Congestion Relief
  - Sub-Category 1D: Operations and Safety
- Category 2: Environmental Impacts
- Category 3: Cost-Effectiveness and Feasibility

Table 4-5 Detailed Evaluation Table for Segment 1
(Mojave River Crossing to Bear Valley Road)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	12,600	12,600	12,600		12,600		12,600		16,800	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		0	
Total	12,600	12,600	12,600		16,800		21,000		16,800	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	42,361	72,933	73,156	0%	74,361	2%	78,164	7%	81,052	11%
HOV Only (2+ carpools, vanpools, buses)	18,080	30,200	30,317	0%	34,624	15%	31,929	6%	32,280	7%
Trucks Only	12,881	34,749	34,777	0%	34,835	0%	35,237	1%	34,755	0%
Total	73,321	137,881	138,249	0%	143,820	4%	145,330	5%	148,087	7%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	19,934	72,933	73,156	0%	74,361	2%	78,164	7%	81,052	11%
HOV Only (2+ carpools, vanpools, buses)	44,690	74,649	74,898	0%	85,464	14%	78,857	6%	80,307	8%
Trucks Only	7,785	34,749	34,777	0%	34,835	0%	35,237	1%	34,755	0%
Total	72,409	182,331	182,831	0%	194,659	7%	192,258	5%	196,114	8%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	4,105	9,509	9,661	2%	9,911	4%	9,989	5%	10,127	6%
HOV Only (2+ carpools, vanpools, buses)	1,379	2,623	2,619	0%	2,877	10%	2,737	4%	2,728	4%
Trucks Only	676	1,655	1,657	0%	1,664	1%	1,710	3%	1,652	0%
Total	6,159	13,787	13,937	1%	14,451	5%	14,436	5%	14,507	5%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	7,064	7,716	7,756	1%	7,804	1%	7,892	2%	8,315	8%
HOV Only (2+ carpools, vanpools, buses)	1,879	3,009	3,044	1%	3,154	5%	3,093	3%	3,192	6%
Trucks Only	1,103	2,933	2,938	0%	2,944	0%	2,952	1%	2,951	1%
Total	10,046	13,658	13,738	1%	13,902	2%	13,937	2%	14,458	6%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	5,403	10,065	10,038	0%	10,464	4%	10,841	8%	10,340	3%
HOV Only (2+ carpools, vanpools, buses)	1,876	3,810	3,841	1%	4,191	10%	4,117	8%	3,910	3%
Trucks Only	1,212	2,773	2,773	0%	2,795	1%	2,843	3%	2,771	0%
Total	8,491	16,648	16,652	0%	17,450	5%	17,801	7%	17,021	2%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	4,712	10,505	10,610	1%	10,958	4%	12,879	23%	10,885	4%
HOV Only (2+ carpools, vanpools, buses)	2,112	3,472	3,529	2%	4,874	40%	4,177	20%	3,579	3%
Trucks Only	1,162	3,209	3,232	1%	3,249	1%	3,339	4%	3,204	0%
Total	7,986	17,186	17,371	1%	19,081	11%	20,396	19%	17,667	3%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	47%	46%	46%		46%		47%		46%	
HOV Only (2+ carpools, vanpools, buses)	54%	53%	54%		57%		54%		53%	
Trucks Only	60%	63%	63%		63%		63%		63%	
Total	51%	52%	52%		53%		53%		52%	

Table 4-5 Detailed Evaluation Table for Segment 1 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	63%	45%	45%		44%		44%		45%	
HOV Only (2+ carpools, vanpools, buses)	58%	53%	54%		52%		53%		54%	
Trucks Only	62%	64%	64%		64%		63%		64%	
Total	62%	50%	50%		49%		49%		50%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	47%	51%	51%		51%		54%		51%	
HOV Only (2+ carpools, vanpools, buses)	53%	48%	48%		54%		50%		48%	
Trucks Only	49%	54%	54%		54%		54%		54%	
Total	48%	51%	51%		52%		53%		51%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	1%	2%	2%		2%		2%		2%	
% Medium-Heavy Trucks	2%	3%	3%		3%		3%		3%	
% Heavy-Heavy Trucks	14%	20%	20%		20%		20%		19%	
Total % Trucks	17%	25%	25%		25%		25%		24%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	11%	12%	12%		12%		12%		11%	
AM Peak Period - Southbound	11%	21%	21%		21%		21%		20%	
PM Peak Period - Northbound	14%	17%	17%		16%		16%		16%	
PM Peak Period - Southbound	15%	19%	19%		17%		16%		18%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.37	0.83	0.84	0.01	0.75	-0.08	0.69	-0.14	0.65	-0.18
HOV Lanes Only	not applicable	not applicable	na	na	0.34	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.26	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.60	0.90	0.91	0.01	0.87	-0.03	0.65	-0.25	0.71	-0.19
HOV Lanes Only	not applicable	not applicable	na	na	0.14	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.41	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.39	0.79	0.79	0.00	0.69	-0.10	0.62	-0.17	0.60	-0.19
HOV Lanes Only	not applicable	not applicable	na	na	0.40	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.32	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.37	0.83	0.84	0.01	0.76	-0.07	0.71	-0.12	0.64	-0.19
HOV Lanes Only	not applicable	not applicable	na	na	0.47	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.38	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.7	5.7	0.0	5.6	-0.1	5.5	-0.2	5.5	-0.2
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	5.5	-0.2	5.9	0.2	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.9	5.9	0.0	5.8	-0.1	5.5	-0.4	5.5	-0.4
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	5.5	-0.4	5.9	0.0	na	na

Table 4-5 Detailed Evaluation Table for Segment 1 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.6	5.6	0.0	5.5	-0.1	5.5	-0.1	5.5	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	5.5	-0.1	5.9	0.3	na	na
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.7	5.7	0.0	5.6	-0.1	5.5	-0.2	5.5	-0.2
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	5.5	-0.2	5.9	0.2	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		8.8		55.9		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		1.6		7.5		0	
Commercial/Industrial	not applicable	0	0		>0.1		16.3		0	
Parks/Recreation	not applicable	0	0		0.3		0.7		0	
Public Services/Utilities	not applicable	0	0		0.2		2.2		0	
Local Roadway	not applicable	0	0		0		37.4		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		3.7		19.4		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		8		8		8	
Biological (CNDDB habitat) - acres	not applicable	0	0		3092.9		3092.9		3092.9	
Historic (# of resources)	not applicable	0	0		0		0		0	
Water (# of waterways)	not applicable	0	0		2		2		0	
Farmland (acres)	not applicable	0	0		0		0		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		6.8		36.6		0	
◆ **Noise**	not applicable	none	none		moderate		high		moderate	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$56 - $81		$453 - $1045		$22 - $32	

Table 4-6 Detailed Evaluation Table for Segment 2
(Bear Valley Road to US-395)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	12,600	12,600	12,600		12,600		12,600		16,800	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		0	
Total	12,600	12,600	12,600		16,800		21,000		16,800	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	56,089	73,002	73,398	1%	74,583	2%	78,252	7%	81,460	12%
HOV Only (2+ carpools, vanpools, buses)	18,968	25,238	25,306	0%	28,757	14%	27,152	8%	27,327	8%
Trucks Only	14,799	42,047	42,004	0%	42,167	0%	43,079	2%	42,013	0%
Total	89,856	140,286	140,707	0%	145,507	4%	148,482	6%	150,799	7%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	28,745	73,002	73,398	1%	74,583	2%	78,252	7%	81,460	12%
HOV Only (2+ carpools, vanpools, buses)	47,656	63,394	63,572	0%	72,125	14%	68,156	8%	69,127	9%
Trucks Only	7,785	42,047	42,004	0%	42,167	0%	43,079	2%	42,013	0%
Total	84,187	178,442	178,973	0%	188,875	6%	189,487	6%	192,600	8%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	3,690	8,075	8,288	3%	8,340	3%	8,507	5%	8,750	8%
HOV Only (2+ carpools, vanpools, buses)	1,119	2,295	2,365	3%	2,476	8%	2,444	6%	2,471	8%
Trucks Only	826	2,211	2,212	0%	2,229	1%	2,285	3%	2,216	0%
Total	5,635	12,581	12,865	2%	13,045	4%	13,236	5%	13,437	7%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	6,918	5,359	5,305	-1%	5,314	-1%	5,590	4%	5,879	10%
HOV Only (2+ carpools, vanpools, buses)	1,834	1,403	1,388	-1%	1,581	13%	1,483	6%	1,535	9%
Trucks Only	1,093	3,023	3,003	-1%	3,002	-1%	3,054	1%	3,024	0%
Total	9,846	9,785	9,696	-1%	9,897	1%	10,127	3%	10,438	7%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	8,725	9,868	9,938	1%	10,191	3%	10,779	9%	10,379	5%
HOV Only (2+ carpools, vanpools, buses)	2,620	3,365	3,302	-2%	3,696	10%	3,685	10%	3,417	2%
Trucks Only	1,396	3,356	3,337	-1%	3,407	2%	3,506	4%	3,351	0%
Total	12,741	16,589	16,577	0%	17,294	4%	17,970	8%	17,147	3%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	5,877	10,405	10,445	0%	10,666	3%	12,124	17%	10,643	2%
HOV Only (2+ carpools, vanpools, buses)	2,112	3,098	3,112	0%	4,271	38%	3,678	19%	3,161	2%
Trucks Only	1,162	3,391	3,391	0%	3,423	1%	3,710	9%	3,361	-1%
Total	9,150	16,893	16,947	0%	18,359	9%	19,512	15%	17,165	2%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	51%	49%	49%		49%		50%		49%	
HOV Only (2+ carpools, vanpools, buses)	52%	49%	49%		53%		50%		49%	
Trucks Only	53%	54%	54%		54%		54%		54%	
Total	52%	50%	50%		51%		51%		50%	

Table 4-6 Detailed Evaluation Table for Segment 2 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	65%	40%	39%		39%		40%		40%	
HOV Only (2+ carpools, vanpools, buses)	62%	38%	37%		39%		38%		38%	
Trucks Only	57%	58%	58%		57%		57%		58%	
Total	64%	44%	43%		43%		43%		44%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	40%	51%	51%		51%		53%		51%	
HOV Only (2+ carpools, vanpools, buses)	45%	48%	49%		54%		50%		48%	
Trucks Only	45%	50%	50%		50%		51%		50%	
Total	42%	50%	51%		51%		52%		50%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	1%	2%	2%		2%		2%		2%	
% Medium-Heavy Trucks	2%	3%	3%		3%		3%		3%	
% Heavy-Heavy Trucks	13%	24%	24%		24%		24%		23%	
Total % Trucks	16%	29%	29%		29%		29%		28%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	15%	18%	17%		17%		17%		16%	
AM Peak Period - Southbound	11%	31%	31%		30%		30%		29%	
PM Peak Period - Northbound	11%	20%	20%		20%		20%		20%	
PM Peak Period - Southbound	13%	20%	20%		19%		19%		20%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.35	0.80	0.82	0.02	0.73	-0.07	0.69	-0.11	0.64	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.28	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.22	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.59	0.70	0.70	0.00	0.64	-0.06	0.45	-0.25	0.55	-0.15
HOV Lanes Only	not applicable	not applicable	na	na	0.20	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.41	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.57	0.81	0.81	0.00	0.73	-0.08	0.58	-0.23	0.63	-0.18
HOV Lanes Only	not applicable	not applicable	na	na	0.35	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.44	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.42	0.83	0.83	0.00	0.75	-0.08	0.65	-0.18	0.63	-0.20
HOV Lanes Only	not applicable	not applicable	na	na	0.43	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.45	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.0	5.0	0.0	5.0	0.0	4.9	-0.1	4.9	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.1	5.3	0.3	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	4.9	4.9	0.0	4.9	0.0	4.9	0.0	4.9	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	0.0	5.3	0.4	na	na

Table 4-6 Detailed Evaluation Table for Segment 2 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only	not applicable	5.0	5.0	0.0	5.0	0.0	4.9	-0.1	4.9	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.1	5.3	0.3	na	na
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only	not applicable	5.1	5.1	0.0	5.0	-0.1	4.9	-0.2	4.9	-0.2
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.2	5.3	0.2	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		5.3		55.4		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		0.1		0	
Commercial/Industrial	not applicable	0	0		0.5		7.3		0	
Parks/Recreation	not applicable	0	0		0		1.6		0	
Public Services/Utilities	not applicable	0	0		0.2		3.1		0	
Local Roadway	not applicable	0	0		0		40		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		1.1		43.2		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		3		3		3	
Biological (CNDDB habitat) - acres	not applicable	0	0		85.2		87.4		85.2	
Historic (# of resources)	not applicable	0	0		0		0		0	
Water (# of waterways)	not applicable	0	0		0		0		0	
Farmland (acres)	not applicable	0	0		0		0		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		0		0		0	
◆ **Noise**	not applicable	none	none		moderate		high		moderate	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$38 - $55		$187 - $271		$33 - $48	

Table 4-7 Detailed Evaluation Table for Segment 3 *(US-395 to SR-138)*

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	18,900	18,900	18,900		18,900		18,900		18,900	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		4,200	
Total	18,900	18,900	18,900		23,100		27,300		23,100	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	55,482	77,600	76,592	-1%	77,033	-1%	80,276	3%	74,852	-4%
HOV Only (2+ carpools, vanpools, buses)	18,615	24,008	23,822	-1%	25,067	4%	25,053	4%	23,449	-2%
Trucks Only	14,854	48,330	48,268	0%	48,464	0%	48,664	1%	48,120	0%
Total	88,951	149,938	148,682	-1%	150,564	0%	153,993	3%	146,421	-2%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	28,573	77,600	76,592	-1%	77,033	-1%	80,276	3%	74,852	-4%
HOV Only (2+ carpools, vanpools, buses)	47,423	61,161	60,720	-1%	63,805	4%	63,924	5%	59,785	-2%
Trucks Only	7,830	48,330	48,268	0%	48,464	0%	48,664	1%	48,120	0%
Total	83,825	187,091	185,580	-1%	189,302	1%	192,864	3%	182,757	-2%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	3,542	8,524	8,468	-1%	8,350	-2%	8,457	-1%	8,466	-1%
HOV Only (2+ carpools, vanpools, buses)	1,020	2,158	2,186	1%	2,208	2%	2,218	3%	2,186	1%
Trucks Only	824	2,511	2,518	0%	2,532	1%	2,538	1%	2,514	0%
Total	5,386	13,192	13,171	0%	13,089	-1%	13,213	0%	13,166	0%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	7,064	5,369	5,110	-5%	5,116	-5%	5,351	0%	5,329	-1%
HOV Only (2+ carpools, vanpools, buses)	1,879	1,539	1,486	-3%	1,627	6%	1,580	3%	1,542	0%
Trucks Only	1,103	3,592	3,580	0%	3,580	0%	3,596	0%	3,590	0%
Total	10,046	10,500	10,176	-3%	10,323	-2%	10,527	0%	10,461	0%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	8,747	15,882	15,535	-2%	15,666	-1%	16,448	4%	14,468	-9%
HOV Only (2+ carpools, vanpools, buses)	2,620	4,895	4,787	-2%	5,164	5%	5,119	5%	4,561	-7%
Trucks Only	1,407	4,374	4,358	0%	4,400	1%	4,433	1%	4,327	-1%
Total	12,774	25,151	24,680	-2%	25,230	0%	26,000	3%	23,356	-7%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	5,704	12,992	12,703	-2%	13,063	1%	14,096	8%	11,766	-9%
HOV Only (2+ carpools, vanpools, buses)	2,049	3,265	3,187	-2%	3,533	8%	3,573	9%	3,009	-8%
Trucks Only	1,162	4,079	4,046	-1%	4,102	1%	4,125	1%	3,923	-4%
Total	8,915	20,336	19,936	-2%	20,698	2%	21,794	7%	18,699	-8%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	51%	51%	50%		51%		51%		50%	
HOV Only (2+ carpools, vanpools, buses)	52%	51%	51%		52%		52%		51%	
Trucks Only	53%	55%	55%		55%		55%		55%	
Total	52%	52%	52%		52%		52%		52%	

Table 4-7 Detailed Evaluation Table for Segment 3 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	67%	39%	38%		38%		39%		39%	
HOV Only (2+ carpools, vanpools, buses)	65%	42%	40%		42%		42%		41%	
Trucks Only	57%	59%	59%		59%		59%		59%	
Total	65%	44%	44%		44%		44%		44%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	39%	45%	45%		45%		46%		45%	
HOV Only (2+ carpools, vanpools, buses)	44%	40%	40%		41%		41%		40%	
Trucks Only	45%	48%	48%		48%		48%		48%	
Total	41%	45%	45%		45%		46%		44%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	1%	3%	3%		3%		3%		3%	
% Medium-Heavy Trucks	2%	4%	4%		4%		4%		4%	
% Heavy-Heavy Trucks	13%	25%	26%		25%		25%		26%	
Total % Trucks	16%	32%	33%		32%		32%		33%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	15%	19%	19%		19%		19%		19%	
AM Peak Period - Southbound	11%	34%	35%		35%		34%		34%	
PM Peak Period - Northbound	11%	17%	18%		17%		17%		19%	
PM Peak Period - Southbound	13%	20%	20%		20%		19%		21%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.25	0.66	0.66	0.00	0.60	-0.06	0.52	-0.14	0.66	0.00
HOV Lanes Only	not applicable	not applicable	na	na	0.29	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.36	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.53	0.85	0.84	-0.01	0.78	-0.07	0.61	-0.24	0.68	-0.17
HOV Lanes Only	not applicable	not applicable	na	na	0.24	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.49	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.34	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.41	0.92	0.91	-0.01	0.80	-0.12	0.75	-0.17	0.69	-0.23
HOV Lanes Only	not applicable	not applicable	na	na	0.59	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.47	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.46	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.37	0.98	0.96	-0.02	0.89	-0.09	0.82	-0.16	0.92	-0.06
HOV Lanes Only	not applicable	not applicable	na	na	0.39	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.42	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	9.0	9.0	0.0	9.0	0.0	9.0	0.0	9.0	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	8.9	-0.1	13.9	4.9	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	9.3	9.2	-0.1	9.1	-0.2	9.0	-0.3	9.0	-0.3
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	8.9	-0.4	9.6	0.3	8.9	-0.4

Table 4-7 Detailed Evaluation Table for Segment 3 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	9.7	9.6	-0.1	9.1	-0.6	9.1	-0.6	9.0	-0.7
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	9.0	-0.7	13.9	4.2	8.9	-0.8
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	10.4	10.2	-0.2	9.5	-0.9	9.2	-1.2	9.7	-0.7
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	8.9	-1.5	9.6	-0.8	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		2.7		39		6.2	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		0.1		0	
Commercial/Industrial	not applicable	0	0		0		1.2		0	
Parks/Recreation	not applicable	0	0		0		4		0	
Public Services/Utilities	not applicable	0	0		0		0.7		0	
Local Roadway	not applicable	0	0		0		24.2		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		0		20.5		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		2		3		3	
Biological (CNDDB habitat) - acres	not applicable	0	0		284.6		1232.4		1262.1	
Historic (# of resources)	not applicable	0	0		0		1		0	
Water (# of waterways)	not applicable	0	0		0		1		0	
Farmland (acres)	not applicable	0	0		0		0		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		0		0		0	
◆ **Noise**	not applicable	none	none		none		none		none	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$43 - $62		$168 - $243		$109 - $158	

Table 4-8 Detailed Evaluation Table for Segment 4
(SR-138 to I-215)

	2000	STRATEGY A	STRATEGY B		STRATEGY C		STRATEGY D		STRATEGY E	
	TRAVEL MODEL	NO-BUILD	TSM/TDM		HOV LANES		DEDICATED TRUCK LANES		REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	16,800	16,800	16,800		16,800		16,800		16,800	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		4,200	
Total	16,800	16,800	16,800		21,000		25,200		21,000	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	78,734	107,571	106,904	-1%	107,273	0%	111,489	4%	107,637	0%
HOV Only (2+ carpools, vanpools, buses)	26,535	34,749	34,681	0%	35,649	3%	36,109	4%	34,937	1%
Trucks Only	16,334	49,575	49,547	0%	49,920	1%	50,161	1%	49,663	0%
Total	121,603	191,895	191,132	0%	192,841	0%	197,759	3%	192,236	0%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	40,610	107,571	106,904	-1%	107,273	0%	111,489	4%	107,637	0%
HOV Only (2+ carpools, vanpools, buses)	67,508	88,405	88,292	0%	90,677	3%	91,950	4%	88,940	1%
Trucks Only	8,451	49,575	49,547	0%	49,920	1%	50,161	1%	49,663	0%
Total	116,569	245,551	244,742	0%	247,870	1%	253,600	3%	246,239	0%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	4,396	7,540	7,555	0%	7,594	1%	7,783	3%	7,556	0%
HOV Only (2+ carpools, vanpools, buses)	1,269	2,160	2,192	1%	2,215	3%	2,266	5%	2,188	1%
Trucks Only	1,060	2,989	2,989	0%	3,012	1%	3,030	1%	2,985	0%
Total	6,725	12,689	12,736	0%	12,822	1%	13,079	3%	12,729	0%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	11,509	12,642	12,410	-2%	12,358	-2%	13,056	3%	12,615	0%
HOV Only (2+ carpools, vanpools, buses)	3,169	3,144	3,108	-1%	3,302	5%	3,253	3%	3,177	1%
Trucks Only	1,299	3,994	3,991	0%	4,000	0%	4,027	1%	4,016	1%
Total	15,977	19,780	19,509	-1%	19,660	-1%	20,336	3%	19,808	0%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	13,757	21,086	20,879	-1%	20,959	-1%	21,914	4%	21,375	1%
HOV Only (2+ carpools, vanpools, buses)	4,097	6,289	6,234	-1%	6,572	4%	6,524	4%	6,430	2%
Trucks Only	1,750	4,775	4,772	0%	4,811	1%	4,895	3%	4,861	2%
Total	19,604	32,150	31,885	-1%	32,342	1%	33,333	4%	32,666	2%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	7,421	13,784	13,818	0%	14,190	3%	14,722	7%	13,841	0%
HOV Only (2+ carpools, vanpools, buses)	2,726	3,995	4,003	0%	4,151	4%	4,315	8%	4,008	0%
Trucks Only	1,554	4,465	4,445	0%	4,642	4%	4,637	4%	4,451	0%
Total	11,701	22,245	22,267	0%	22,983	3%	23,674	6%	22,299	0%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	52%	52%	52%		52%		52%		52%	
HOV Only (2+ carpools, vanpools, buses)	53%	52%	52%		52%		52%		52%	
Trucks Only	52%	53%	53%		54%		53%		53%	
Total	52%	52%	52%		52%		52%		52%	

Table 4-8 Detailed Evaluation Table for Segment 4 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	72%	63%	62%		62%		63%		63%	
HOV Only (2+ carpools, vanpools, buses)	71%	59%	59%		60%		59%		59%	
Trucks Only	55%	57%	57%		57%		57%		57%	
Total	70%	61%	61%		61%		61%		61%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	35%	40%	40%		40%		40%		39%	
HOV Only (2+ carpools, vanpools, buses)	40%	39%	39%		39%		40%		38%	
Trucks Only	47%	48%	48%		49%		49%		48%	
Total	37%	41%	41%		42%		42%		41%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	1%	2%	2%		2%		2%		2%	
% Medium-Heavy Trucks	2%	3%	3%		3%		3%		3%	
% Heavy-Heavy Trucks	11%	20%	20%		20%		20%		20%	
Total % Trucks	14%	25%	25%		25%		25%		25%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	16%	24%	23%		23%		23%		23%	
AM Peak Period - Southbound	8%	20%	20%		20%		20%		20%	
PM Peak Period - Northbound	9%	15%	15%		15%		15%		15%	
PM Peak Period - Southbound	13%	20%	20%		20%		20%		20%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.39	0.86	0.86	0.00	0.78	-0.08	0.67	-0.19	0.86	0.00
HOV Lanes Only	not applicable	not applicable	na	na	0.35	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.42	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.79	1.26	1.25	-0.01	1.13	-0.13	1.01	-0.25	0.94	-0.32
HOV Lanes Only	not applicable	not applicable	na	na	0.50	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.55	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.64	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.74	1.39	1.38	-0.01	1.20	-0.19	1.17	-0.22	1.01	-0.38
HOV Lanes Only	not applicable	not applicable	na	na	0.78	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.53	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.81	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.49	1.07	1.07	0.00	0.99	-0.08	0.89	-0.18	1.07	0.00
HOV Lanes Only	not applicable	not applicable	na	na	0.49	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.47	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	4.5	4.5	0.0	4.4	-0.1	4.3	-0.2	4.5	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.3	-0.2	6.7	2.2	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	13.1	12.3	-0.8	7.2	-5.9	5.3	-7.8	4.8	-8.3
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.3	-8.8	4.6	-8.5	4.3	-8.8

Table 4-8 Detailed Evaluation Table for Segment 4 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	20.0	20.0	0.0	9.7	-10.3	8.4	-11.6	5.2	-14.8
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.4	-15.6	6.7	-13.3	4.4	-15.6
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	6.0	5.9	-0.1	5.0	-1.0	4.6	-1.4	6.0	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.3	-1.7	4.6	-1.4	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		0		15.6		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		0		0	
Commercial/Industrial	not applicable	0	0		0		0		0	
Parks/Recreation	not applicable	0	0		0		16		0	
Public Services/Utilities	not applicable	0	0		0		0		0	
Local Roadway	not applicable	0	0		0		18.1		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		0		2.1		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		2		2		2	
Biological (CNDDB habitat) - acres	not applicable	0	0		428		581		428	
Historic (# of resources)	not applicable	0	0		0		2		0	
Water (# of waterways)	not applicable	0	0		0		2		0	
Farmland (acres)	not applicable	0	0		0		0		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		0		0		0	
◆ **Noise**	not applicable	none	none		none		none		none	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$119 - $172		$200 - $357		$141 - $204	

Table 4-9 Detailed Evaluation Table for Segment 5 *(I-215 to SR-210)*

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	16,800	16,800	16,800		16,800		16,800		16,800	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		4,200	
Total	16,800	16,800	16,800		21,000		25,200		21,000	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	72,129	73,140	72,961	0%	74,948	2%	78,950	8%	75,074	3%
HOV Only (2+ carpools, vanpools, buses)	24,834	23,375	23,372	0%	25,765	10%	25,262	8%	23,960	3%
Trucks Only	13,343	39,559	39,532	0%	39,885	1%	40,316	2%	39,681	0%
Total	110,306	136,074	135,865	0%	140,599	3%	144,529	6%	138,716	2%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	35,826	73,140	72,961	0%	74,948	2%	78,950	8%	75,074	3%
HOV Only (2+ carpools, vanpools, buses)	62,045	58,400	58,482	0%	64,362	10%	63,176	8%	59,925	3%
Trucks Only	6,374	39,559	39,532	0%	39,885	1%	40,316	2%	39,681	0%
Total	104,245	171,099	170,975	0%	179,195	5%	182,442	7%	174,680	2%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	4,229	5,973	6,110	2%	6,290	5%	6,416	7%	6,110	2%
HOV Only (2+ carpools, vanpools, buses)	1,808	1,611	1,617	0%	1,692	5%	1,711	6%	1,620	1%
Trucks Only	706	2,080	2,080	0%	2,112	2%	2,135	3%	2,076	0%
Total	6,743	9,664	9,807	1%	10,094	4%	10,262	6%	9,805	1%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	9,910	6,808	6,707	-1%	6,914	2%	7,756	14%	7,437	9%
HOV Only (2+ carpools, vanpools, buses)	2,491	2,130	2,135	0%	2,403	13%	2,351	10%	2,290	7%
Trucks Only	1,464	4,337	4,334	0%	4,349	0%	4,429	2%	4,366	1%
Total	13,865	13,275	13,176	-1%	13,666	3%	14,536	10%	14,092	6%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	12,709	12,904	12,800	-1%	13,307	3%	14,063	9%	13,961	8%
HOV Only (2+ carpools, vanpools, buses)	3,567	3,945	3,921	-1%	4,534	15%	4,224	7%	4,267	8%
Trucks Only	1,892	4,301	4,296	0%	4,364	1%	4,504	5%	4,413	3%
Total	18,168	21,150	21,017	-1%	22,205	5%	22,791	8%	22,641	7%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	7,232	10,041	10,036	0%	10,873	8%	12,195	21%	10,046	0%
HOV Only (2+ carpools, vanpools, buses)	2,676	2,354	2,347	0%	3,066	30%	3,198	36%	2,392	2%
Trucks Only	1,256	3,764	3,748	0%	3,841	2%	3,914	4%	3,752	0%
Total	11,164	16,159	16,131	0%	17,781	10%	19,307	19%	16,190	0%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	50%	51%	51%		51%		52%		51%	
HOV Only (2+ carpools, vanpools, buses)	51%	50%	50%		52%		52%		50%	
Trucks Only	48%	50%	50%		50%		50%		50%	
Total	50%	50%	50%		51%		51%		50%	

Table 4-9 Detailed Evaluation Table for Segment 5 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	70%	53%	52%		52%		55%		55%	
HOV Only (2+ carpools, vanpools, buses)	58%	57%	57%		59%		58%		59%	
Trucks Only	67%	68%	68%		67%		67%		68%	
Total	67%	58%	57%		58%		59%		59%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	36%	44%	44%		45%		46%		42%	
HOV Only (2+ carpools, vanpools, buses)	43%	37%	37%		40%		43%		36%	
Trucks Only	40%	47%	47%		47%		46%		46%	
Total	38%	43%	43%		44%		46%		42%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	1%	2%	2%		2%		2%		2%	
% Medium-Heavy Trucks	1%	3%	3%		3%		3%		3%	
% Heavy-Heavy Trucks	10%	24%	24%		23%		22%		23%	
Total % Trucks	12%	29%	29%		28%		27%		28%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	10%	22%	21%		21%		21%		21%	
AM Peak Period - Southbound	11%	33%	33%		32%		30%		31%	
PM Peak Period - Northbound	10%	20%	20%		20%		20%		19%	
PM Peak Period - Southbound	11%	23%	23%		22%		20%		23%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.30	0.48	0.48	0.00	0.43	-0.05	0.34	-0.14	0.48	0.00
HOV Lanes Only	not applicable	not applicable	na	na	0.25	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.33	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.62	0.73	0.72	-0.01	0.68	-0.05	0.48	-0.25	0.57	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.24	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.59	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.37	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.61	0.78	0.78	0.00	0.68	-0.10	0.56	-0.22	0.55	-0.23
HOV Lanes Only	not applicable	not applicable	na	na	0.52	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.55	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	0.56	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.38	0.61	0.61	0.00	0.59	-0.02	0.51	-0.10	0.61	0.00
HOV Lanes Only	not applicable	not applicable	na	na	0.31	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.40	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	7.1	7.1	0.0	7.1	0.0	7.1	0.0	7.1	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	7.1	0.0	7.6	0.5	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	7.2	7.2	0.0	7.1	-0.1	7.1	-0.1	7.1	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	7.1	-0.1	7.7	0.5	7.1	-0.1

Table 4-9 Detailed Evaluation Table for Segment 5 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	7.2	7.2	0.0	7.1	-0.1	7.1	-0.1	7.1	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	7.1	-0.1	7.6	0.4	7.1	-0.1
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	7.1	7.1	0.0	7.1	0.0	7.1	0.0	7.1	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	7.1	0.0	7.6	0.5	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		0		33.2		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		0		0	
Commercial/Industrial	not applicable	0	0		0		0		0	
Parks/Recreation	not applicable	0	0		0		4		0	
Public Services/Utilities	not applicable	0	0		0		0.3		0	
Local Roadway	not applicable	0	0		0		16.4		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		0		28.8		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		0		9		0	
Biological (CNDDB habitat) - acres	not applicable	0	0		0		2046.2		0	
Historic (# of resources)	not applicable	0	0		0		0		0	
Water (# of waterways)	not applicable	0	0		0		2		0	
Farmland (acres)	not applicable	0	0		0		0.9		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		0		29.1		0	
◆ **Noise**	not applicable	none	none		moderate		high		moderate	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$71 - $103		$276 - $398		$109 - $158	

Table 4-10 Detailed Evaluation Table for Segment 6 *(SR-210 to I-10)*

	2000	STRATEGY A	STRATEGY B		STRATEGY C		STRATEGY D		STRATEGY E	
	TRAVEL MODEL	NO-BUILD	TSM/TDM		HOV LANES		DEDICATED TRUCK LANES		REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	16,800	16,800	16,800		16,800		16,800		21,000	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		0	
Total	16,800	16,800	16,800		21,000		25,200		21,000	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	105,893	123,804	123,537	0%	127,322	3%	130,136	5%	131,860	7%
HOV Only (2+ carpools, vanpools, buses)	37,246	39,992	39,963	0%	48,004	20%	43,416	9%	42,011	5%
Trucks Only	15,053	27,704	27,521	-1%	30,172	9%	32,319	17%	27,717	0%
Total	158,192	191,501	191,022	0%	205,499	7%	205,871	8%	201,588	5%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	53,215	123,804	123,537	0%	127,322	3%	130,136	5%	131,860	7%
HOV Only (2+ carpools, vanpools, buses)	91,552	98,304	98,254	0%	117,922	20%	106,723	9%	103,897	6%
Trucks Only	7,078	27,704	27,521	-1%	30,172	9%	32,319	17%	27,717	0%
Total	151,846	249,813	249,312	0%	275,416	10%	269,178	8%	263,475	5%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	5,529	9,259	9,306	1%	9,541	3%	9,730	5%	9,712	5%
HOV Only (2+ carpools, vanpools, buses)	1,937	2,934	2,948	0%	3,493	19%	3,187	9%	3,015	3%
Trucks Only	736	1,607	1,613	0%	1,708	6%	1,848	15%	1,532	-5%
Total	8,202	13,801	13,868	0%	14,742	7%	14,766	7%	14,259	3%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	12,771	11,605	11,492	-1%	11,935	3%	12,688	9%	11,969	3%
HOV Only (2+ carpools, vanpools, buses)	3,437	3,200	3,206	0%	4,156	30%	3,786	18%	3,321	4%
Trucks Only	1,952	3,739	3,739	0%	3,946	6%	4,636	24%	3,787	1%
Total	18,160	18,544	18,437	-1%	20,037	8%	21,109	14%	19,077	3%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	17,082	19,295	19,246	0%	19,916	3%	20,665	7%	19,837	3%
HOV Only (2+ carpools, vanpools, buses)	5,087	4,834	4,861	1%	6,124	27%	5,421	12%	5,032	4%
Trucks Only	2,303	3,314	3,326	0%	3,376	2%	4,150	25%	3,396	2%
Total	24,472	27,443	27,433	0%	29,416	7%	30,236	10%	28,265	3%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	11,707	18,087	18,089	0%	19,118	6%	19,718	9%	18,542	3%
HOV Only (2+ carpools, vanpools, buses)	4,218	4,991	4,975	0%	6,692	34%	5,961	19%	5,059	1%
Trucks Only	1,585	3,161	3,026	-4%	3,556	12%	3,918	24%	3,185	1%
Total	17,509	26,239	26,090	-1%	29,366	12%	29,597	13%	26,787	2%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	50%	51%	51%		51%		51%		51%	
HOV Only (2+ carpools, vanpools, buses)	52%	53%	53%		54%		54%		52%	
Trucks Only	47%	48%	48%		49%		46%		48%	
Total	50%	51%	51%		52%		51%		51%	

Table 4-10 Detailed Evaluation Table for Segment 6 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	70%	56%	55%		56%		57%		55%	
HOV Only (2+ carpools, vanpools, buses)	64%	52%	52%		54%		54%		52%	
Trucks Only	73%	70%	70%		70%		71%		71%	
Total	69%	57%	57%		58%		59%		57%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	41%	48%	48%		49%		49%		48%	
HOV Only (2+ carpools, vanpools, buses)	45%	51%	51%		52%		52%		50%	
Trucks Only	41%	49%	48%		51%		49%		48%	
Total	42%	49%	49%		50%		49%		49%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	2%	2%	2%		2%		2%		2%	
% Medium-Heavy Trucks	1%	2%	2%		2%		2%		2%	
% Heavy-Heavy Trucks	6%	10%	10%		10%		11%		9%	
Total % Trucks	9%	14%	14%		14%		15%		13%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	9%	12%	12%		12%		13%		11%	
AM Peak Period - Southbound	11%	20%	20%		20%		22%		20%	
PM Peak Period - Northbound	9%	12%	12%		11%		14%		12%	
PM Peak Period - Southbound	9%	12%	12%		12%		13%		12%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.35	0.61	0.61	0.00	0.54	-0.07	0.52	-0.09	0.50	-0.11
HOV Lanes Only	not applicable	not applicable	na	na	0.42	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.28	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.80	0.89	0.88	-0.01	0.84	-0.05	0.70	-0.19	0.73	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.47	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.66	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.80	0.92	0.92	0.00	0.81	-0.11	0.78	-0.14	0.76	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.66	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.50	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	**V/C Ratio**	**V/C Ratio**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**	**V/C Ratio**	**Change from No Build**
General Purpose Lanes Only	0.57	0.88	0.87	-0.01	0.84	-0.04	0.79	-0.09	0.72	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.58	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.43	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	4.9	4.9	0.0	4.9	0.0	4.9	0.0	4.9	0.0
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	0.0	5.3	0.4	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.2	5.2	0.0	5.1	-0.1	4.9	-0.3	4.9	-0.3
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.3	5.3	0.1	na	na

Table 4-10 Detailed Evaluation Table for Segment 6 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.3	5.3	0.0	5.0	-0.3	5.0	-0.3	4.9	-0.4
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.4	5.3	0.0	na	na
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	5.2	5.1	-0.1	5.1	-0.1	5.0	-0.2	4.9	-0.3
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	4.9	-0.3	5.3	0.1	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		1.8		54.7		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		1.2		0	
Commercial/Industrial	not applicable	0	0		0.8		19.6		0	
Parks/Recreation	not applicable	0	0		0		0		0	
Public Services/Utilities	not applicable	0	0		0		0		0	
Local Roadway	not applicable	0	0		0		6		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		0.9		33.9		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		2		3		2	
Biological (CNDDB habitat) - acres	not applicable	0	0		458.4		875.4		458.4	
Historic (# of resources)	not applicable	0	0		0		0		0	
Water (# of waterways)	not applicable	0	0		4		4		0	
Farmland (acres)	not applicable	0	0		0.3		14.1		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		1.7		47		0	
◆ **Noise**	not applicable	none	none		moderate		high		moderate	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$68 - $98		$461 - $666		$64 - $93	

Table 4-11 Detailed Evaluation Table for Segment 7
(I-10 to SR-60)

	2000	STRATEGY A	STRATEGY B		STRATEGY C		STRATEGY D		STRATEGY E	
	TRAVEL MODEL	NO-BUILD	TSM/TDM		HOV LANES		DEDICATED TRUCK LANES		REVERSIBLE MANAGED LANES	
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE										
Sub-Category 1A: Transportation Supply										
◆ **Vehicle Capacity of I-15 (passenger cars per hour)**										
General Purpose Lanes Only	16,800	16,800	16,800		16,800		16,800		21,000	
HOV Lanes Only	0	0	0		4,200		0		0	
Truck Lanes Only	0	0	0		0		8,400		0	
Managed Lanes Only	0	0	0		0		0		0	
Total	16,800	16,800	16,800		21,000		25,200		21,000	
◆ **Peak Period Transit Service**										
I-15 Express Bus Services - AM Peak Period	2 NB / 2 SB buses	2 NB / 2 SB buses	2 NB buses / 4/hour SB		2 NB buses / 8/hour SB		2 NB buses / 4/hour SB		2 NB buses / 4/hour SB	
I-15 Express Bus Services - PM Peak Period	4 NB / 2 SB buses	4 NB / 2 SB buses	4/hour NB / 2 SB buses		8/hour NB / 2 SB buses		4/hour NB / 2 SB buses		4/hour NB / 2 SB buses	
Parallel Rail Service	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train	1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train		1 SB AM/1 NB PM train	
Sub-Category 1B: Travel Demand and Patronage										
◆ **Average Daily Traffic - I-15 NB & SB TOTAL (vehicles per day)**	**ADT**	**ADT**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**	**ADT**	**Change from No Build**
SOV Only	130,605	168,232	169,195	1%	175,936	5%	183,252	9%	177,206	5%
HOV Only (2+ carpools, vanpools, buses)	45,840	55,628	55,800	0%	69,399	25%	60,761	9%	57,556	3%
Trucks Only	18,645	42,250	42,422	0%	46,071	9%	56,828	35%	42,477	1%
Total	195,090	266,110	267,417	0%	291,406	10%	300,841	13%	277,239	4%
◆ **Average Daily Person-Trips - I-15 NB & SB TOTAL (people per day)**	**Daily People**	**Daily People**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**	**Daily People**	**Change from No Build**
SOV Only	61,334	168,232	169,195	1%	175,936	5%	183,252	9%	177,206	5%
HOV Only (2+ carpools, vanpools, buses)	113,005	137,136	137,504	0%	170,632	24%	149,767	9%	142,475	4%
Trucks Only	8,158	42,250	42,422	0%	46,071	9%	56,828	35%	42,477	1%
Total	182,498	347,618	349,121	0%	392,639	13%	389,847	12%	362,159	4%
◆ **AM Peak Period (6-9 AM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	10,294	16,812	17,038	1%	17,613	5%	18,848	12%	17,484	4%
HOV Only (2+ carpools, vanpools, buses)	3,606	5,077	5,032	-1%	6,485	28%	5,645	11%	5,059	0%
Trucks Only	1,371	3,221	3,247	1%	3,484	8%	4,106	27%	3,257	1%
Total	15,272	25,111	25,318	1%	27,583	10%	28,600	14%	25,800	3%
◆ **AM Peak Period (6-9 AM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	12,515	12,676	12,571	-1%	13,251	5%	14,175	12%	13,027	3%
HOV Only (2+ carpools, vanpools, buses)	2,938	2,715	2,728	0%	3,679	35%	3,214	18%	2,826	4%
Trucks Only	1,669	3,976	3,941	-1%	4,167	5%	5,338	34%	3,998	1%
Total	17,122	19,367	19,240	-1%	21,097	9%	22,727	17%	19,851	2%
◆ **PM Peak Period (3-7 PM) Traffic - NORTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	19,046	21,603	21,593	0%	23,188	7%	24,195	12%	22,009	2%
HOV Only (2+ carpools, vanpools, buses)	5,672	6,340	6,351	0%	8,197	29%	6,965	10%	6,496	2%
Trucks Only	2,568	5,996	5,931	-1%	6,491	8%	7,731	29%	5,977	0%
Total	27,286	33,939	33,875	0%	37,876	12%	38,891	15%	34,482	2%
◆ **PM Peak Period (3-7 PM) Traffic - SOUTHBOUND ONLY**	**Vehicles**	**Vehicles**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**	**Vehicles**	**Change from No Build**
SOV Only	13,899	20,797	21,109	2%	22,757	9%	24,130	16%	21,296	2%
HOV Only (2+ carpools, vanpools, buses)	5,008	6,289	6,428	2%	8,972	43%	7,397	18%	6,353	1%
Trucks Only	1,882	4,507	4,506	0%	5,124	14%	6,611	47%	4,448	-1%
Total	20,789	31,594	32,044	1%	36,854	17%	38,139	21%	32,097	2%
◆ **Average Daily Traffic Directional Split (% Southbound)**										
SOV Only	47%	48%	48%		47%		48%		48%	
HOV Only (2+ carpools, vanpools, buses)	49%	48%	49%		50%		50%		49%	
Trucks Only	44%	50%	50%		50%		52%		50%	
Total	47%	48%	48%		48%		49%		48%	

Table 4-11 Detailed Evaluation Table for Segment 7 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **AM Peak Period (6-9 AM) Directional Split (% Southbound)**										
SOV Only	55%	43%	42%		43%		43%		43%	
HOV Only (2+ carpools, vanpools, buses)	45%	35%	35%		36%		36%		36%	
Trucks Only	55%	55%	55%		54%		57%		55%	
Total	53%	44%	43%		43%		44%		43%	
◆ **PM Peak Period (3-7 PM) Directional Split (% Southbound)**										
SOV Only	42%	49%	49%		50%		50%		49%	
HOV Only (2+ carpools, vanpools, buses)	47%	50%	50%		52%		52%		49%	
Trucks Only	42%	43%	43%		44%		46%		43%	
Total	43%	48%	49%		49%		50%		48%	
◆ **Percent Heavy Trucks (ADT)**										
% Light-Heavy Trucks	3%	6%	6%		6%		7%		5%	
% Medium-Heavy Trucks	3%	5%	5%		5%		6%		5%	
% Heavy-Heavy Trucks	3%	5%	5%		5%		6%		5%	
Total % Trucks	9%	16%	16%		16%		19%		15%	
◆ **Percent Heavy Trucks (Peak Periods)**										
AM Peak Period - Northbound	9%	13%	13%		13%		14%		13%	
AM Peak Period - Southbound	10%	21%	20%		20%		23%		20%	
PM Peak Period - Northbound	9%	18%	18%		17%		20%		17%	
PM Peak Period - Southbound	9%	14%	14%		14%		17%		14%	
Sub-Category 1C: Traffic Congestion Relief										
◆ **V/C Ratio: AM Peak Period (6-9 AM) on NB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only	0.64	1.07	1.08	0.01	1.01	-0.06	1.01	-0.06	0.88	-0.19
HOV Lanes Only	not applicable	not applicable	na	na	0.64	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.43	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: AM Peak Period (6-9 AM) on SB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only	0.72	0.87	0.87	0.00	0.82	-0.05	0.80	-0.07	0.71	-0.16
HOV Lanes Only	not applicable	not applicable	na	na	0.51	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.48	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on NB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only	0.86	1.12	1.12	0.00	1.09	-0.03	1.09	-0.03	0.91	-0.21
HOV Lanes Only	not applicable	not applicable	na	na	0.66	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.44	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **V/C Ratio: PM Peak Period (3-7 PM) on SB I-15 (1)**	V/C Ratio	V/C Ratio	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build	V/C Ratio	Change from No Build
General Purpose Lanes Only	0.66	1.03	1.05	0.02	0.98	-0.05	1.01	-0.02	0.84	-0.19
HOV Lanes Only	not applicable	not applicable	na	na	0.90	na	na	na	na	na
Truck Lanes Only	not applicable	not applicable	na	na	na	na	0.52	na	na	na
Managed Lanes Only	not applicable	not applicable	na	na	na	na	na	na	na	na
◆ **Travel Time: AM Peak Period on NB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only	not applicable	3.8	3.9	0.1	3.4	-0.4	3.4	-0.4	2.9	-0.9
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	2.7	-1.1	3.0	-0.8	na	na
◆ **Travel Time: AM Peak Period on SB I-15 (minutes)**	Travel Time	Travel Time	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build	Travel Time	Change from No Build
General Purpose Lanes Only	not applicable	2.9	2.9	0.0	2.8	-0.1	2.8	-0.1	2.8	-0.1
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	2.7	-0.2	3.0	0.1	na	na

Table 4-11 Detailed Evaluation Table for Segment 7 (Continued)

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD	STRATEGY B TSM/TDM		STRATEGY C HOV LANES		STRATEGY D DEDICATED TRUCK LANES		STRATEGY E REVERSIBLE MANAGED LANES	
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	4.5	4.5	0.0	4.0	-0.5	4.0	-0.5	3.0	-1.5
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	2.8	-1.7	3.0	-1.5	na	na
◆ **Travel Time: PM Peak Period on NB I-15 (minutes)**	**Travel Time**	**Travel Time**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**	**Travel Time**	**Change from No Build**
General Purpose Lanes Only	not applicable	3.5	3.6	0.1	3.2	-0.3	3.3	-0.2	2.8	-0.7
Specialized Lanes Only (HOV, Truck, or Managed)	not applicable	not applicable	na	na	2.9	-0.6	3.0	-0.5	na	na
Sub-Category 1D: Operations & Safety										
◆ **Degree of Improvement to Operations and Safety**										
Factor 1: Reduced number of trucks in GP lanes	not applicable	not applicable	no		no		yes		no	
Factor 2: Reduced congestion in GP lanes	not applicable	not applicable	no		yes		yes		yes	
Factor 3: TSM/TDM Strategies	not applicable	not applicable	yes		yes		yes		yes	
Overall Degree of Improvement (low - moderate - high)	not applicable	not applicable	low		moderate		high		moderate	
CATEGORY 2: ENVIRONMENTAL IMPACTS										
◆ **Right of Way (Acres)**	not applicable	0	0		0.6		16.9		0	
◆ **Land Use Type Affected (acres)**										
Residential	not applicable	0	0		0		0		0	
Commercial/Industrial	not applicable	0	0		<0.1		8.4		0	
Parks/Recreation	not applicable	0	0		0		0		0	
Public Services/Utilities	not applicable	0	0		0		0.4		0	
Local Roadway	not applicable	0	0		0		16.9		0	
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0		0		8.1		0	
◆ **Special Resources Affected**										
Biological (# of sensitive species)	not applicable	0	0		0		1		0	
Biological (CNDDB habitat) - acres	not applicable	0	0		0		<0.1		0	
Historic (# of resources)	not applicable	0	0		0		0		0	
Water (# of waterways)	not applicable	0	0		0		0		0	
Farmland (acres)	not applicable	0	0		0		0		0	
◆ **Environmental Justice (acres)**	not applicable	0	0		0.6		16.9		0	
◆ **Noise**	not applicable	none	none		none		none		none	
◆ **Air Quality (regional impact of entire corridor)**										
ROC/ROG	not applicable	not significant	not significant		not significant		not significant		not significant	
CO	not applicable	not significant	not significant		not significant		significant		significant	
NOx	not applicable	not significant	not significant		not significant		significant		significant	
PM10	not applicable	not significant	not significant		not significant		not significant		not significant	
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY										
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable		$42 - $61		$205 - $296		$27 - $39	

Table 4-12 Detailed Evaluation Table for I-15/I-215 Interchange

	2000 TRAVEL MODEL	STRATEGY A NO-BUILD (NO INTERCHANGE IMPROVEMENT)	STRATEGY B TSM/TDM (NO INTERCHANGE IMPROVEMENT)	STRATEGY C HOV LANES (INTERCHANGE OPTION 1 - RECONFIGURATION)	STRATEGY D DEDICATED TRUCK LANES (INTERCHANGE OPTION 2 - RECONFIGURATION & TRUCK BYPASS LANES)	STRATEGY E REVERSIBLE MANAGED LANES (INTERCHANGE OPTION 1 - RECONFIGURATION)
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE						
NOT APPLICABLE						
CATEGORY 2: ENVIRONMENTAL IMPACTS						
◆ **Right of Way (Acres)**	not applicable	0	0	3.5	4.4	3.4
◆ **Land Use Type Affected (acres)**						
Residential	not applicable	0	0	0	0	0
Commercial/Industrial	not applicable	0	0	0	0	0
Parks/Recreation	not applicable	0	0	0	0	0
Public Services/Utilities	not applicable	0	0	0	0	0
Local Roadway	not applicable	0	0	0	0	0
Other (Vacant, Vineyards, Undeveloped, Open Space)	not applicable	0	0	3.5	4.3	3.4
◆ **Special Resources Affected**						
Biological (# of sensitive species)	not applicable	0	0	7	7	7
Biological (CNDDB habitat) - acres	not applicable	0	0	894.9	894.9	894.9
Historic (# of resources)	not applicable	0	0	0	0	0
Water (# of waterways)	not applicable	0	0	0	0	0
Farmland (acres)	not applicable	0	0	0	0	0
◆ **Environmental Justice (acres)**	not applicable	0	0	3.5	3.4	4.3
◆ **Noise**	not applicable	0	0	low	low	low
◆ **Air Quality (regional impact of entire corridor)**						
ROC/ROG	not applicable	not significant	not significant	not significant	not significant	not significant
CO	not applicable	not significant	not significant	not significant	significant	significant
NOx	not applicable	not significant	not significant	not significant	significant	significant
PM10	not applicable	not significant	not significant	not significant	not significant	not significant
CATEGORY 3: COST EFFECTIVENESS AND FEASIBILITY						
◆ **Cost Estimate Range (millions of dollars)**	not applicable	not applicable	not applicable	\$60 - \$87	\$95 - \$272	\$68 - \$98

Table 4-13 Detailed Evaluation Summary Table

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE A No Build	B TSM/TDM	C HOV Lanes	D Truck Lanes	E Managed Lanes
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE ***SUB-CATEGORY 1B: TRAVEL DEMAND AND PATRONAGE***	**ADT** *(Single-Occupant Vehicles Only)*	1	42,361	72,933	73,156	74,361	78,164	81,052
		2	56,089	73,002	73,398	74,583	78,252	81,460
		3	55,482	77,600	76,592	77,033	80,276	74,852
		4	78,734	107,571	106,904	107,273	111,489	107,637
		5	72,129	73,140	72,961	74,948	78,950	75,074
		6	105,893	123,804	123,537	127,322	130,136	131,860
		7	130,605	168,232	169,195	175,936	183,252	177,206
	ADT *(HOV 2+ Only)*	1	18,080	30,200	30,317	34,624	31,929	32,280
		2	18,968	25,238	25,306	28,757	27,152	27,327
		3	18,615	24,008	23,822	25,067	25,053	23,449
		4	26,535	34,749	34,681	35,649	36,109	34,937
		5	24,834	23,375	23,372	25,765	25,262	23,960
		6	37,246	39,992	39,963	48,004	43,416	42,011
		7	45,840	55,628	55,800	69,399	60,761	57,556
	ADT *(Trucks Only)*	1	12,881	34,749	34,777	34,835	35,237	34,755
		2	14,799	42,047	42,004	42,167	43,079	42,013
		3	14,854	48,330	48,268	48,464	48,664	48,120
		4	16,334	49,575	49,547	49,920	50,161	49,663
		5	13,343	39,559	39,532	39,885	40,316	39,681
		6	15,053	27,704	27,521	30,172	32,319	27,717
		7	18,645	42,250	42,422	46,071	56,828	42,477
	Total ADT *(Total of All Vehicles)*	1	73,321	137,881	138,249	143,820	145,330	148,087
		2	89,856	140,286	140,707	145,507	148,482	150,799
		3	88,951	149,938	148,682	150,564	153,993	146,421
		4	121,603	191,895	191,132	192,841	197,759	192,236
		5	110,306	136,074	135,865	140,599	144,529	138,716
		6	158,192	191,501	191,022	205,499	205,871	201,588
		7	195,090	266,110	267,417	291,406	300,841	277,239

Segment 1 - Mojave River Crossing to Bear Valley Road
Segment 2 - Bear Valley Road to US-395
Segment 3 - US-395 to SR-138
Segment 4 - SR-138 to I-215
Segment 5 - I-215 to I-210
Segment 6 - I-210 to I-10
Segment 7 - I-10 to SR-60

Table 4-13 Detailed Evaluation Summary Table (Continued)

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE				
				A No Build	B TSM/TDM	C HOV Lanes	D Truck Lanes	E Managed Lanes
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE *SUB-CATEGORY 1C: TRAFFIC CONGESTION RELIEF*	**AM Peak Period Demand V/C Ratios** Southbound *(General Purpose Lanes)*	1	0.60	0.90	0.91	0.87	0.65	0.71
		2	0.59	0.70	0.70	0.64	0.45	0.55
		3	0.53	0.85	0.84	0.78	0.61	0.68
		4	0.79	**1.26**	**1.25**	**1.13**	**1.01**	0.94
		5	0.62	0.73	0.72	0.68	0.48	0.57
		6	0.80	0.89	0.88	0.84	0.70	0.73
		7	0.72	0.87	0.87	0.82	0.80	0.71
	AM Peak Period Demand V/C Ratios Southbound *(HOV, Truck, or Managed Lanes)*	1	na	na	na	0.14	0.41	not applicable
		2	na	na	na	0.20	0.41	not applicable
		3	na	na	na	0.24	0.49	0.34
		4	na	na	na	0.50	0.55	0.64
		5	na	na	na	0.24	0.59	0.37
		6	na	na	na	0.47	0.66	not applicable
		7	na	na	na	0.51	0.48	not applicable
	PM Peak Period Demand V/C Ratios Northbound *(General Purpose Lanes)*	1	0.39	0.79	0.79	0.69	0.62	0.60
		2	0.57	0.81	0.81	0.73	0.58	0.63
		3	0.41	0.92	0.91	0.80	0.75	0.69
		4	0.74	**1.39**	**1.38**	**1.20**	**1.17**	**1.01**
		5	0.61	0.78	0.78	0.68	0.56	0.55
		6	0.80	0.92	0.92	0.81	0.78	0.76
		7	0.86	**1.12**	**1.12**	**1.09**	**1.09**	0.91
	PM Peak Period Demand V/C Ratios Northbound *(HOV, Truck, or Managed Lanes)*	1	na	na	na	0.40	0.32	not applicable
		2	na	na	na	0.35	0.44	not applicable
		3	na	na	na	0.59	0.47	0.46
		4	na	na	na	0.78	0.53	0.81
		5	na	na	na	0.52	0.55	0.56
		6	na	na	na	0.66	0.50	not applicable
		7	na	na	na	0.66	0.44	not applicable

Segment 1 - Mojave River Crossing to Bear Valley Road
Segment 2 - Bear Valley Road to US-395
Segment 3 - US-395 to SR-138
Segment 4 - SR-138 to I-215
Segment 5 - I-215 to I-210
Segment 6 - I-210 to I-10
Segment 7 - I-10 to SR-60

Table 4-13 Detailed Evaluation Summary Table (Continued)

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE A No Build	B TSM/TDM	C HOV Lanes	D Truck Lanes	E Managed Lanes
CATEGORY 1: TRANSPORTATION SYSTEM PERFORMANCE ***SUB-CATEGORY 1C: TRAFFIC CONGESTION RELIEF*** **(Sensitivity Test)**	**AM Peak Period Demand V/C Ratios** Southbound *(General Purpose Lanes)*	1	0.60	**1.26**	**1.26**	**1.21**	**1.00**	0.96
		2	0.59	**1.16**	**1.15**	**1.02**	0.90	0.87
		3	0.64	**1.62**	**1.61**	**1.47**	**1.12**	**1.18**
		4	0.91	**2.17**	**2.16**	**1.92**	**1.56**	**1.58**
		5	0.62	**1.16**	**1.15**	**1.07**	0.91	0.79
		6	0.80	**1.14**	**1.13**	**1.05**	0.95	0.91
		7	0.72	**1.09**	**1.08**	0.99	**1.02**	0.87
	AM Peak Period Demand V/C Ratios Southbound *(HOV, Truck, or Managed Lanes)*	1	na	na	na	0.17	0.41	na
		2	na	na	na	0.42	0.41	na
		3	na	na	na	0.56	**1.00**	0.89
		4	na	na	na	0.99	**1.29**	**1.19**
		5	na	na	na	0.42	0.59	0.80
		6	na	na	na	0.61	0.66	na
		7	na	na	na	0.68	0.44	na
	PM Peak Period Demand V/C Ratios Northbound *(General Purpose Lanes)*	1	0.39	0.80	0.80	0.71	0.64	0.60
		2	0.57	**1.08**	**1.08**	0.95	0.85	0.81
		3	0.49	**1.21**	**1.20**	**1.09**	0.97	0.96
		4	0.86	**1.97**	**1.96**	**1.73**	**1.41**	**1.48**
		5	0.61	**1.05**	**1.05**	0.91	0.83	0.68
		6	0.80	**1.06**	**1.06**	0.90	0.92	0.86
		7	0.86	**1.29**	**1.28**	**1.22**	**1.18**	**1.03**
	PM Peak Period Demand V/C Ratios Northbound *(HOV, Truck, or Managed Lanes)*	1	na	na	na	0.38	0.32	na
		2	na	na	na	0.46	0.44	na
		3	na	na	na	0.63	0.67	0.51
		4	na	na	na	1.00	**1.23**	**1.05**
		5	na	na	na	0.72	0.55	0.84
		6	na	na	na	0.86	0.50	na
		7	na	na	na	0.77	0.55	na

Segment 1 - Mojave River Crossing to Bear Valley Road
Segment 2 - Bear Valley Road to US-395
Segment 3 - US-395 to SR-138
Segment 4 - SR-138 to I-215
Segment 5 - I-215 to I-210
Segment 6 - I-210 to I-10
Segment 7 - I-10 to SR-60

Table 4-13 Detailed Evaluation Summary Table (Continued)

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE A No Build	B TSM/TDM	C HOV Lanes	D Truck Lanes	E Managed Lanes
CATEGORY 1 SUB-CATEGORY 1D: OPERATIONS & SAFETY	Degree of Improvement (low - moderate - high)	1	na	na	low	moderate	high	moderate
		2	na	na	low	moderate	high	moderate
		3	na	na	low	moderate	high	moderate
		4	na	na	low	moderate	high	moderate
		5	na	na	low	moderate	high	moderate
		6	na	na	low	moderate	high	moderate
		7	na	na	low	moderate	high	moderate
CATEGORY 2: ENVIRONMENTAL IMPACTS	**Right of Way (acres)**		na	0	0	22.4	275.1	9.6
	Lane Use Type Affected (acres							
	Residential		na	0	0	1.6	8.7	0
	Commercial/Industrial		na	0	0	1.3	52.8	0
	Parks/Recreation		na	0	0	0.3	26.3	0
	Public Services/Utilities		na	0	0	0.4	6.7	0
	Local Roadway		na	0	0	0	159.0	0
	Other (Vacant, Vineyards, Undeveloped, Open Space)		na	0	0	5.7	160.3	3.4
	Special Resources Affected							
	Biological (# of sensitive species)		na	0	0	21	32	21
	Biological (CNDDB habitat - acres)		na	0	0	5,244.1	8,810.2	6,221.6
	Historic (# of resources)		na	0	0	0	2	0
	Water (# of waterways)		na	0	0	3	10	0
	Farmland (acres)		na	0	0	0.3	14.9	0.0
	Environmental Justice (acres)		na	0	0	12.6	132.9	4.3
	Noise		na	low	low	moderate	high	moderate
	Air Quality							
	ROC/ROG		na	not significant	not significant	not significant	not significant	not significant
	CO		na	not significant	not significant	not significant	significant	significant
	NOx		na	not significant	not significant	not significant	significant	significant
	PM10		na	not significant	not significant	not significant	not significant	not significant

Segment 1 - Mojave River Crossing to Bear Valley Road
Segment 2 - Bear Valley Road to US-395
Segment 3 - US-395 to SR-138
Segment 4 - SR-138 to I-215
Segment 5 - I-215 to I-210
Segment 6 - I-210 to I-10
Segment 7 - I-10 to SR-60

Table 4-13 Detailed Evaluation Summary Table (Continued)

EVALUATION CRITERION	MEASURE	SEGMENT	EXISTING CONDITION	FUTURE ALTERNATIVE				
				A No Build	B TSM/TDM	C HOV Lanes	D Truck Lanes	E Managed Lanes
CATEGORY 3: COST-EFFECTIVENESS & FEASIBILITY	Cost Estimate Range (Millions of Dollars)	1	na	na	na	\$56 - \$81	\$453 - \$1045	\$22 - \$32
		2	na	na	na	\$38 - \$55	\$187 - \$271	\$33 - \$48
		3	na	na	na	\$43 - \$62	\$168 - \$243	\$109 - \$158
		4	na	na	na	\$119 - \$172	\$200 - \$357	\$141 - \$204
		5	na	na	na	\$71 - \$103	\$276 - \$398	\$109 - \$158
		6	na	na	na	\$68 - \$98	\$461 - \$666	\$64 - \$93
		7	na	na	na	\$42 - \$61	\$205 - \$296	\$27 - \$39
		I-15/I-215 Interchange	na	na	na	\$60 - \$87	\$95 - \$272	\$68 - \$98
		TOTAL	na	na	\$10 - \$25	\$497 - \$719	\$2045 - \$3548	\$573 - \$830

Segment 1 - Mojave River Crossing to Bear Valley Road
Segment 2 - Bear Valley Road to US-395
Segment 3 - US-395 to SR-138
Segment 4 - SR-138 to I-215
Segment 5 - I-215 to I-210
Segment 6 - I-210 to I-10
Segment 7 - I-10 to SR-60

Figure 4-5 Average Daily Traffic on I-15 (All Vehicles)

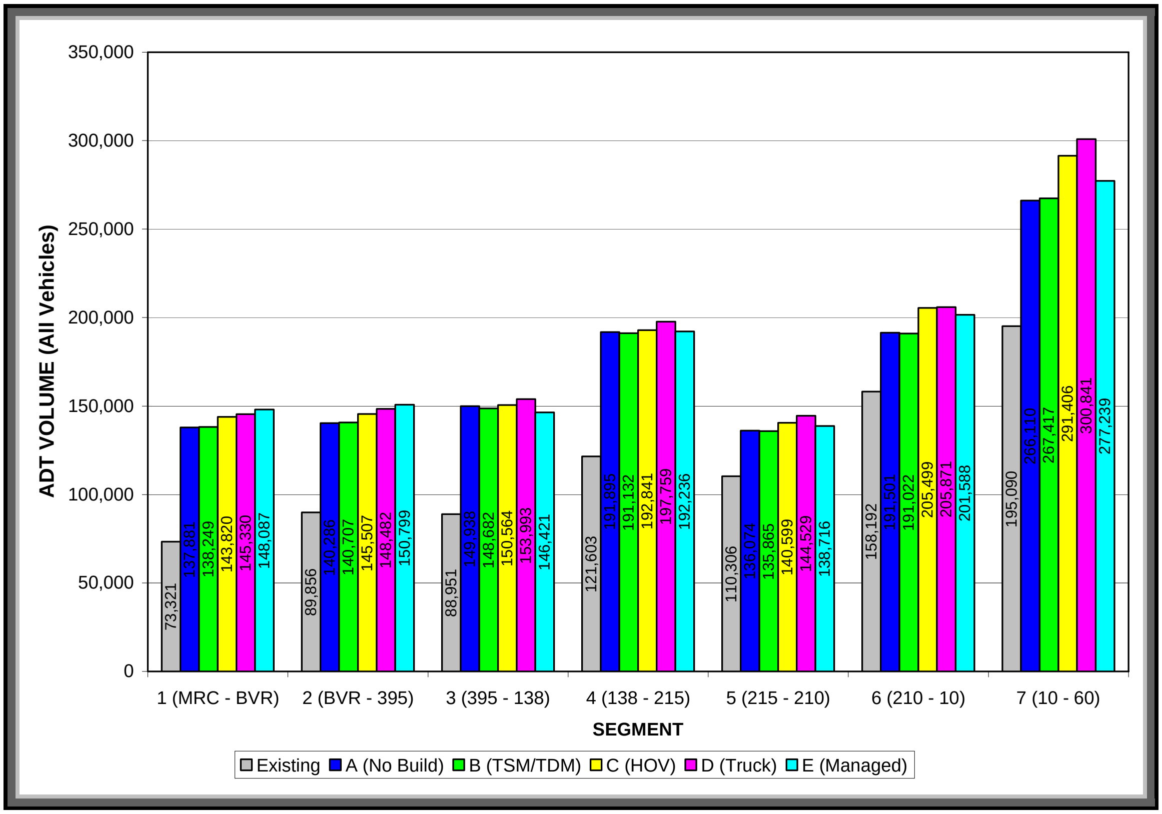


Figure 4-6 Average Daily Traffic on I-15 (SOV Only)

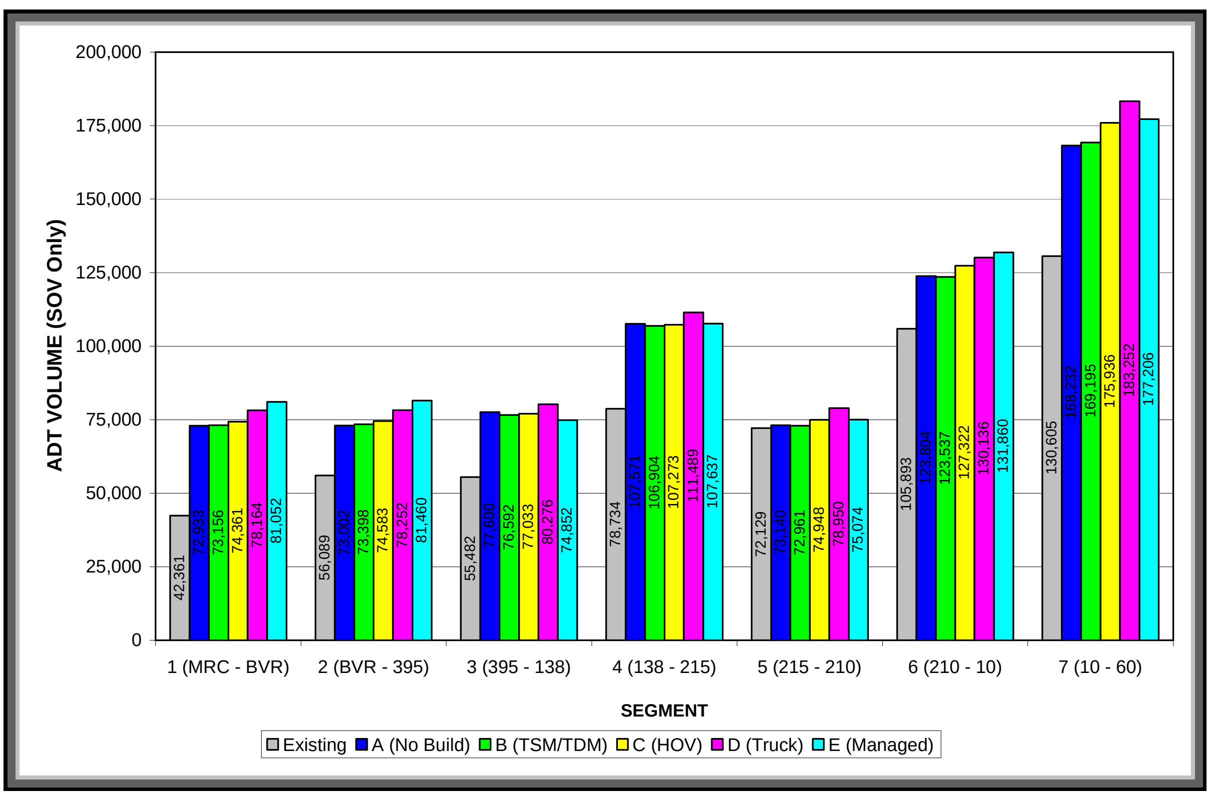


Figure 4-7 Average Daily Traffic on I-15 (HOV Only)

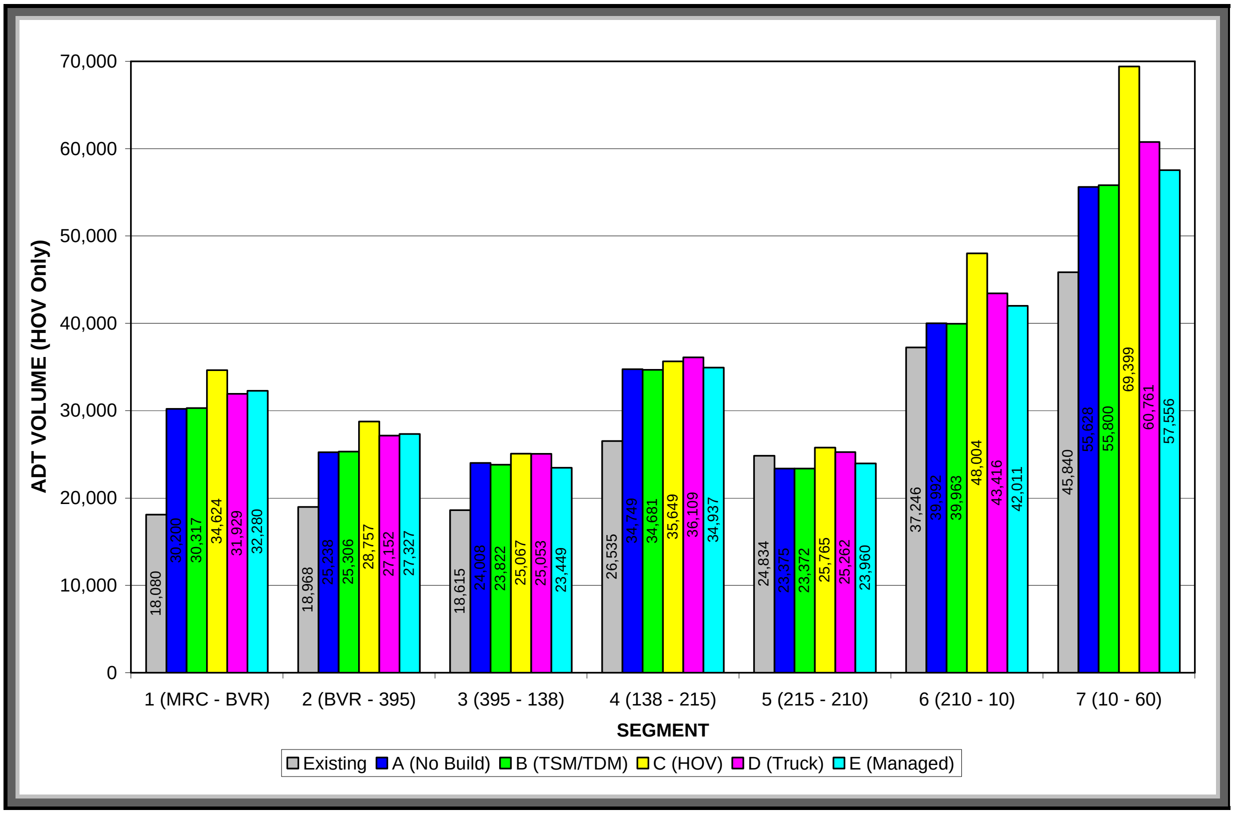


Figure 4-8 Average Daily Traffic on I-15 (Trucks Only)

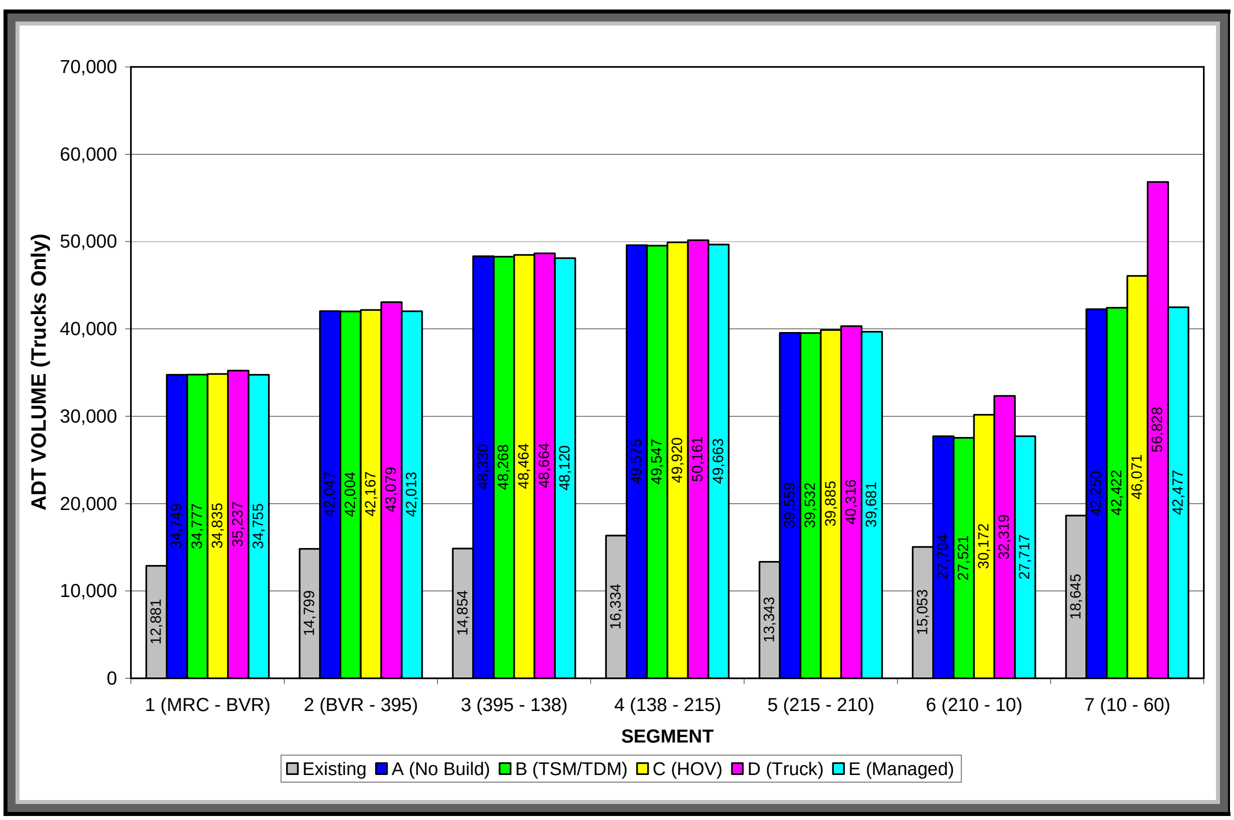
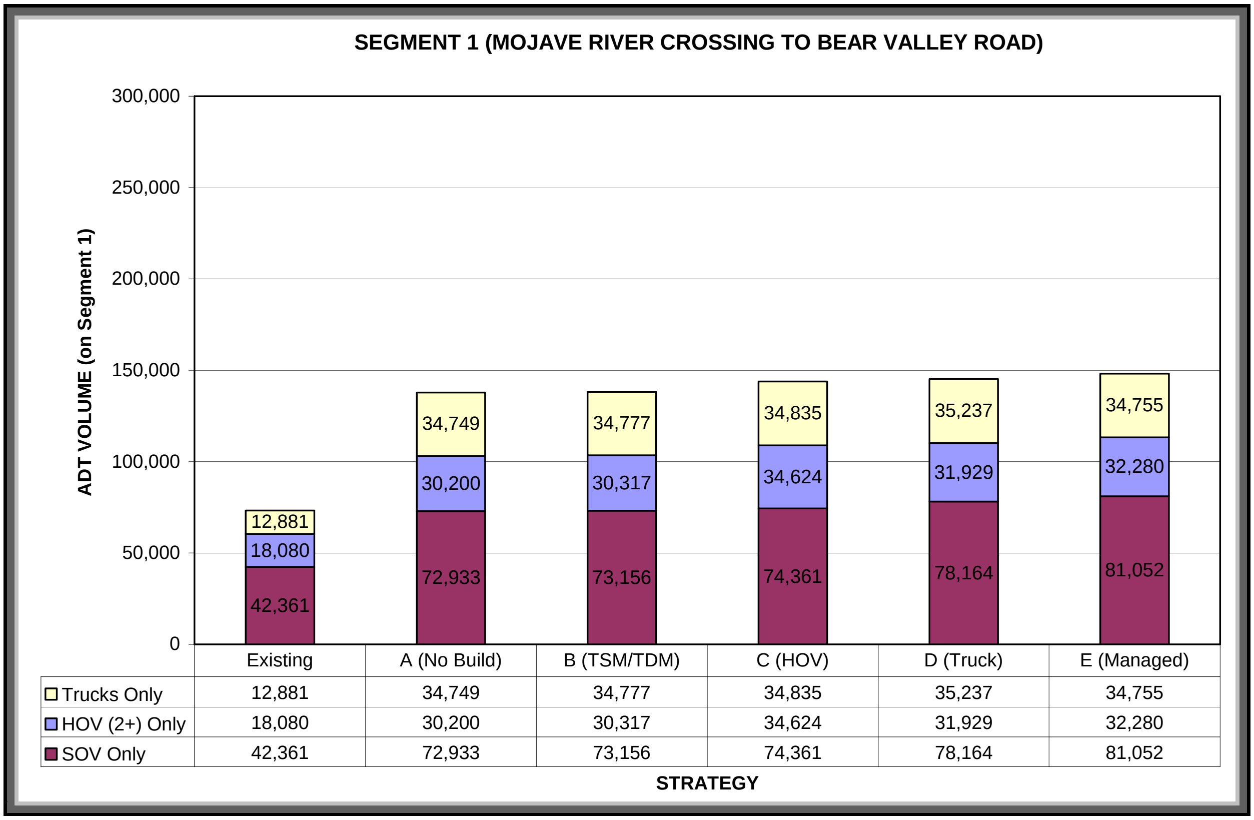
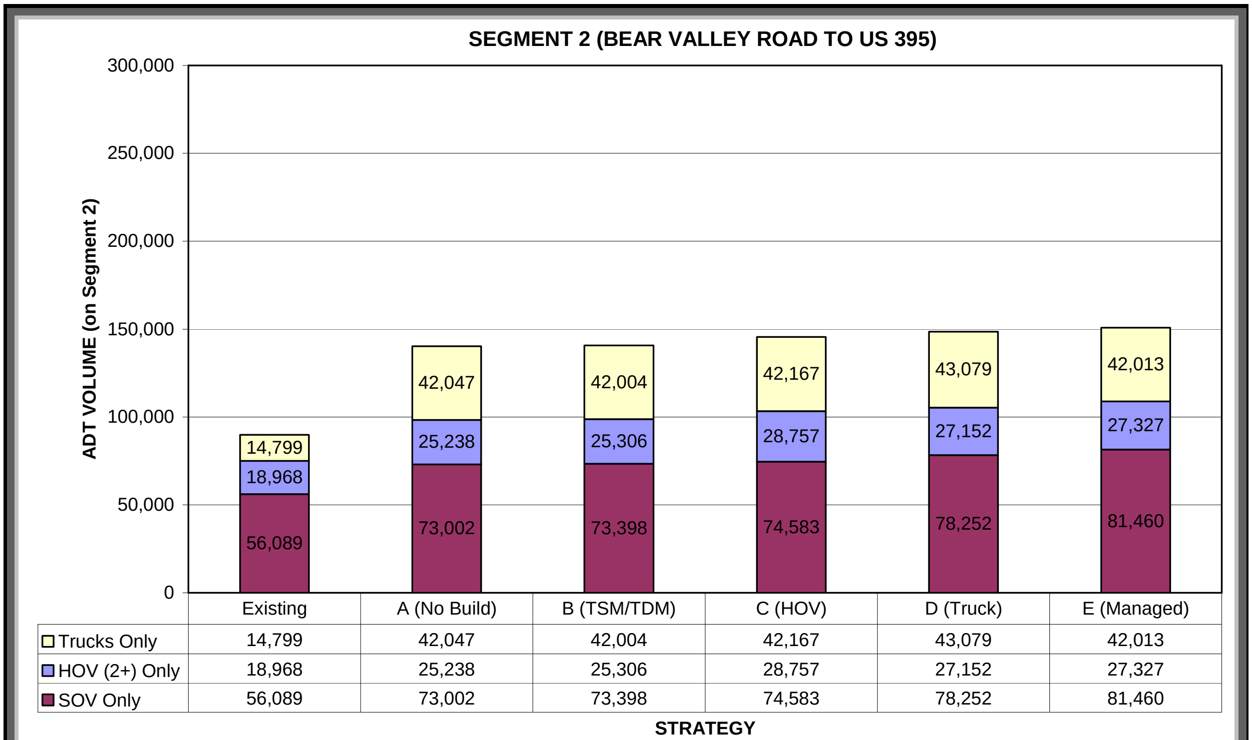


Figure 4-9 Average Daily Traffic on I-15 (Segment 1 Only)



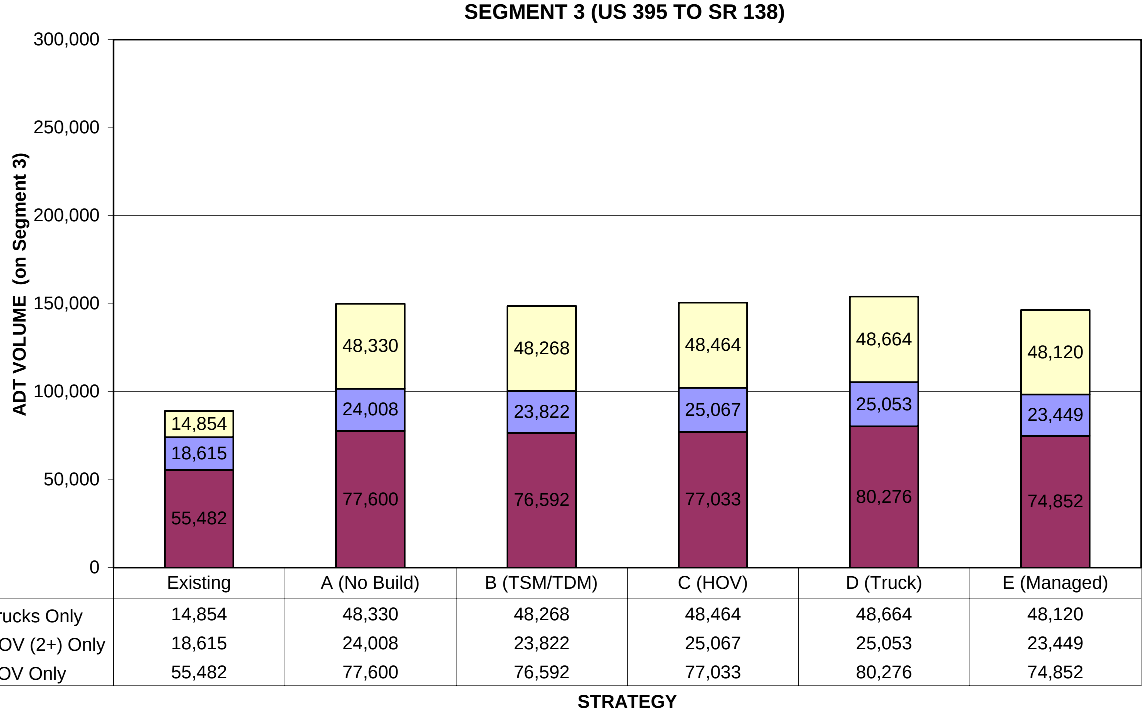
	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	12,881	34,749	34,777	34,835	35,237	34,755
HOV (2+) Only	18,080	30,200	30,317	34,624	31,929	32,280
SOV Only	42,361	72,933	73,156	74,361	78,164	81,052

Figure 4-10 Average Daily Traffic on I-15 (Segment 2 Only)



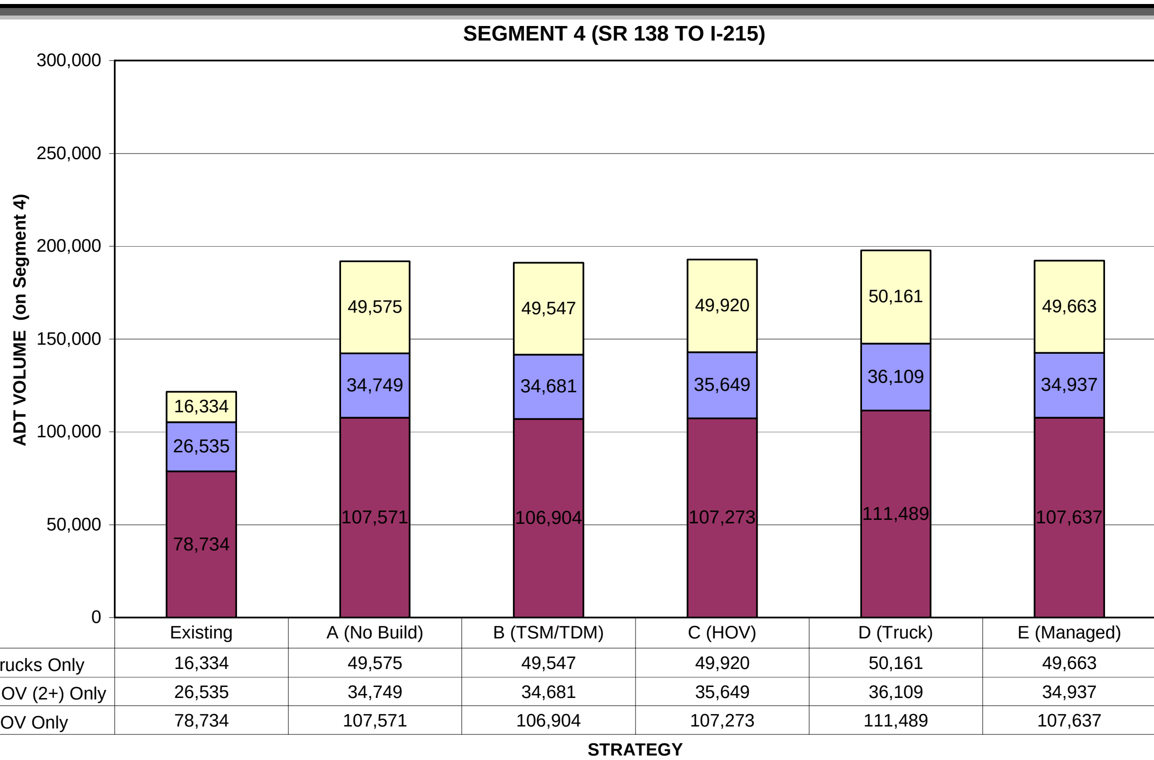
	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	14,799	42,047	42,004	42,167	43,079	42,013
HOV (2+) Only	18,968	25,238	25,306	28,757	27,152	27,327
SOV Only	56,089	73,002	73,398	74,583	78,252	81,460

Figure 4-11 Average Daily Traffic on I-15 (Segment 3 Only)



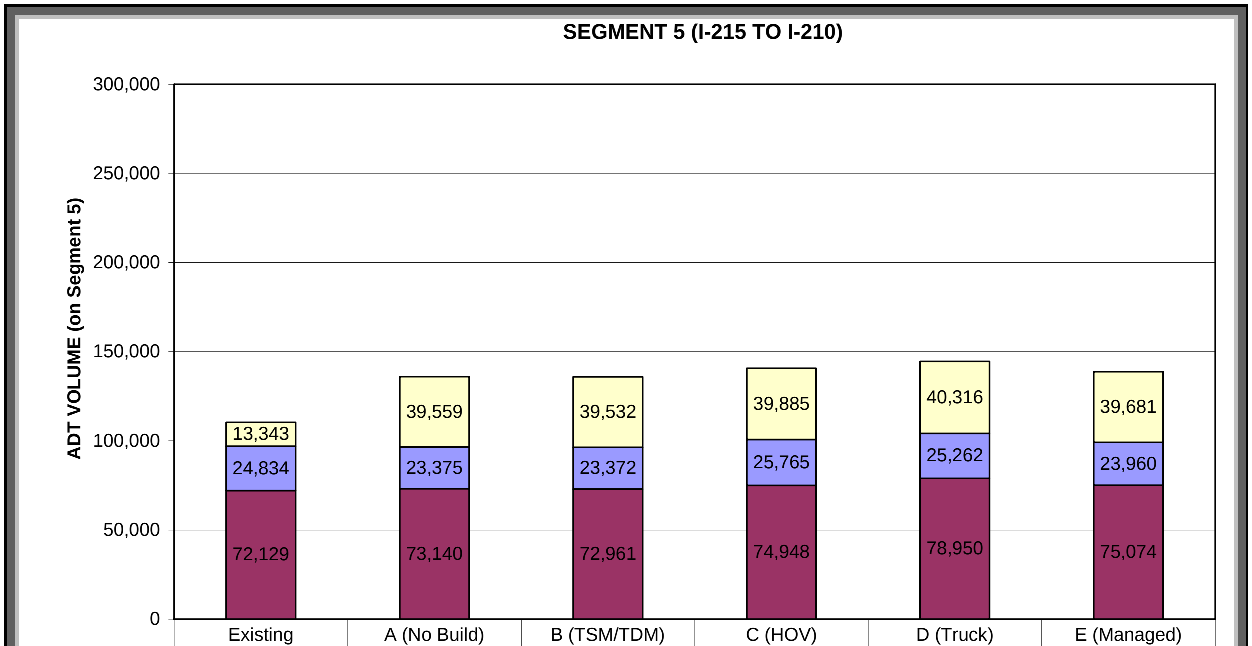
	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	14,854	48,330	48,268	48,464	48,664	48,120
HOV (2+) Only	18,615	24,008	23,822	25,067	25,053	23,449
SOV Only	55,482	77,600	76,592	77,033	80,276	74,852

Figure 4-12 Average Daily Traffic on I-15 (Segment 4 Only)



	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	16,334	49,575	49,547	49,920	50,161	49,663
HOV (2+) Only	26,535	34,749	34,681	35,649	36,109	34,937
SOV Only	78,734	107,571	106,904	107,273	111,489	107,637

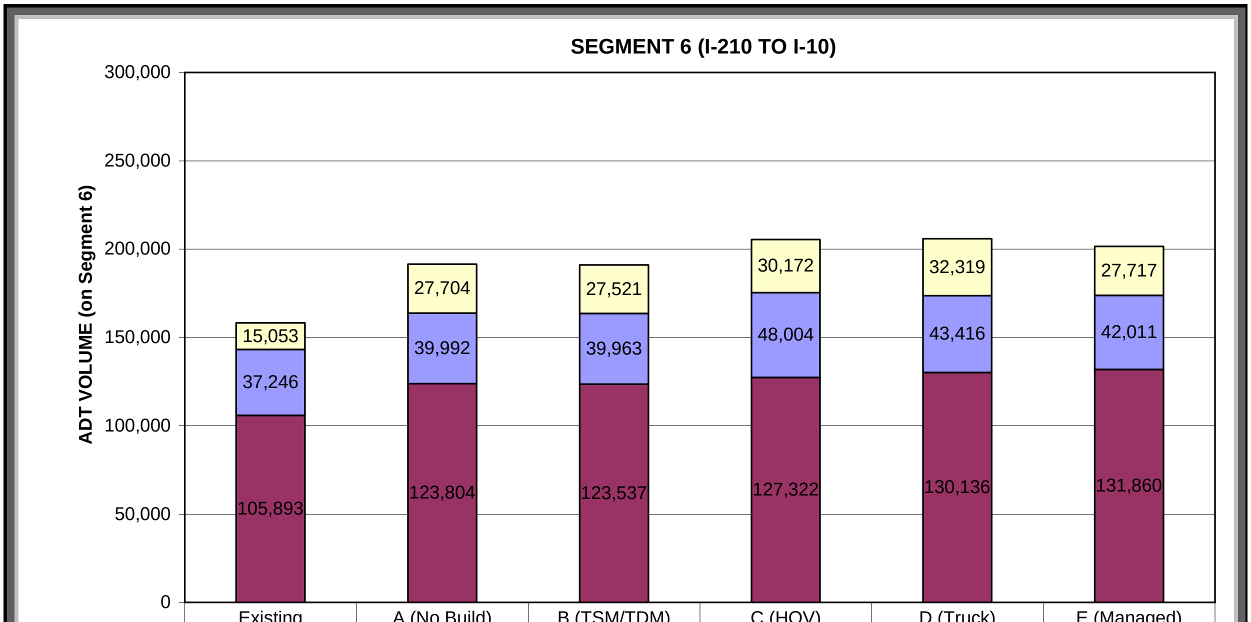
Figure 4-13 Average Daily Traffic on I-15 (Segment 5 Only)



	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	13,343	39,559	39,532	39,885	40,316	39,681
HOV (2+) Only	24,834	23,375	23,372	25,765	25,262	23,960
SOV Only	72,129	73,140	72,961	74,948	78,950	75,074

STRATEGY

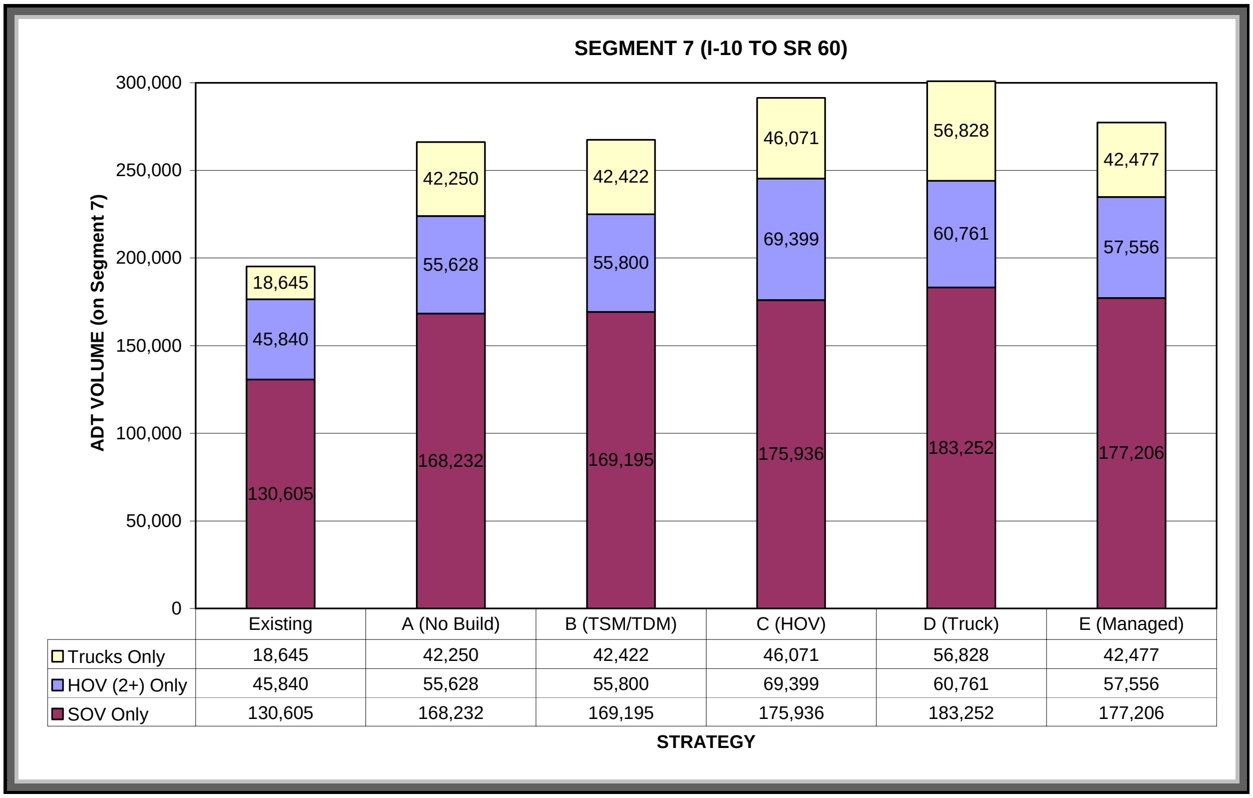
Figure 4-14 Average Daily Traffic on I-15 (Segment 6 Only)



	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	15,053	27,704	27,521	30,172	32,319	27,717
HOV (2+) Only	37,246	39,992	39,963	48,004	43,416	42,011
SOV Only	105,893	123,804	123,537	127,322	130,136	131,860

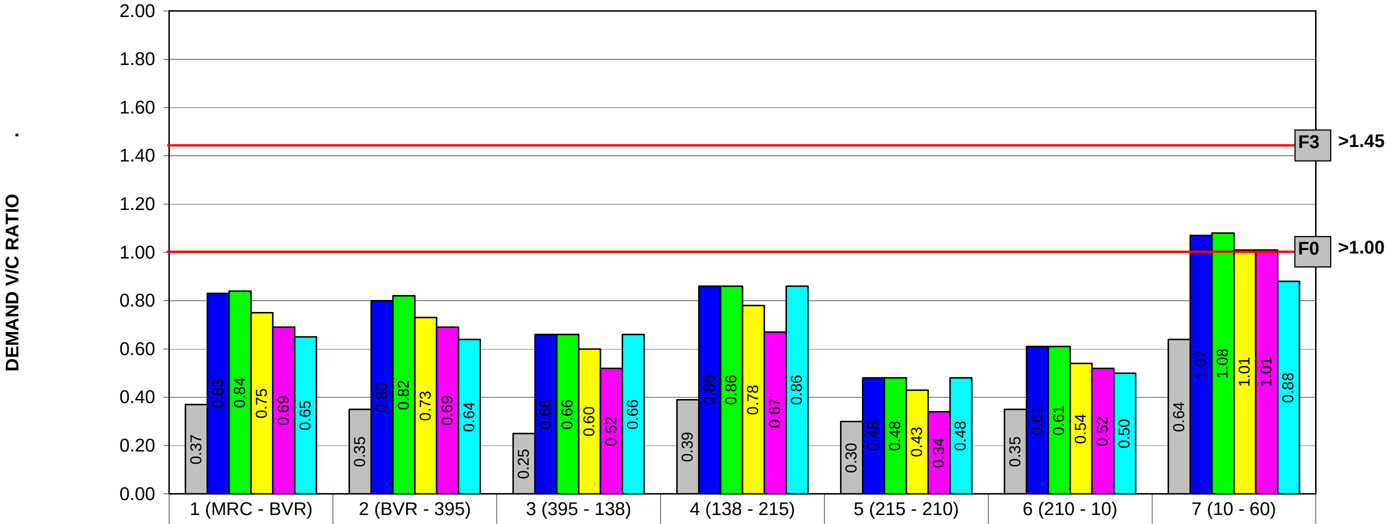
STRATEGY

Figure 4-15 Average Daily Traffic on I-15 (Segment 7 Only)



	Existing	A (No Build)	B (TSM/TDM)	C (HOV)	D (Truck)	E (Managed)
Trucks Only	18,645	42,250	42,422	46,071	56,828	42,477
HOV (2+) Only	45,840	55,628	55,800	69,399	60,761	57,556
SOV Only	130,605	168,232	169,195	175,936	183,252	177,206

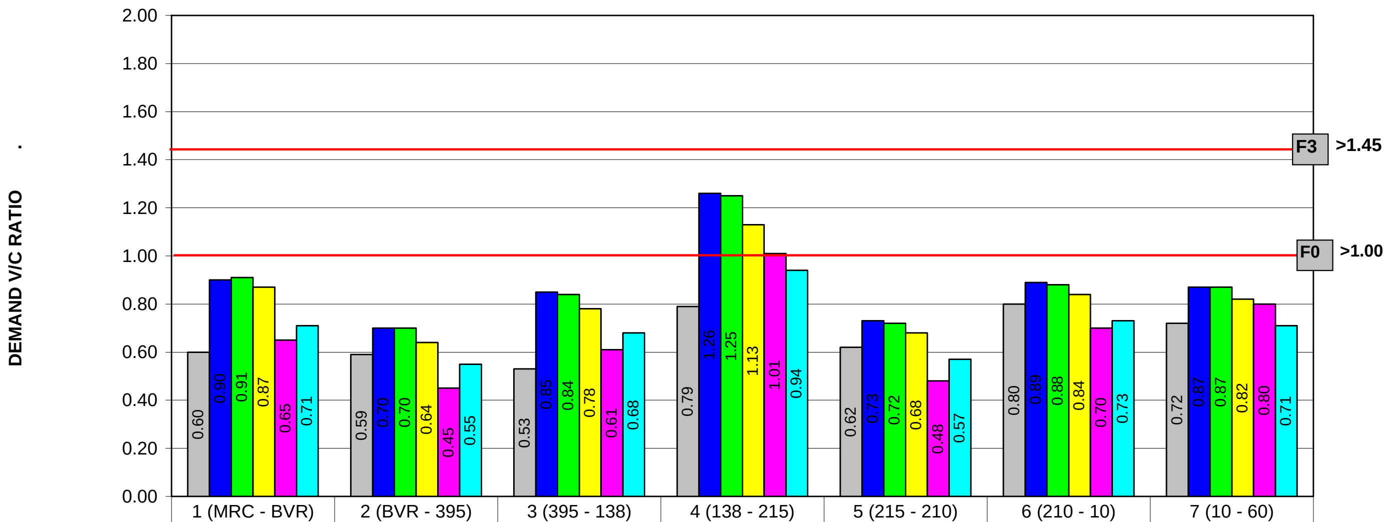
Figure 4-16 Demand V/C Ratios – AM Peak Period – NB GP Lanes



SEGMENT	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.37	0.35	0.25	0.39	0.30	0.35	0.64
A (No Build)	0.83	0.80	0.66	0.86	0.48	0.61	1.07
B (TSM/TDM)	0.84	0.82	0.66	0.86	0.48	0.61	1.08
C (HOV)	0.75	0.73	0.60	0.78	0.43	0.54	1.01
D (Truck)	0.69	0.69	0.52	0.67	0.34	0.52	1.01
E (Managed)	0.65	0.64	0.66	0.86	0.48	0.50	0.88

SEGMENT

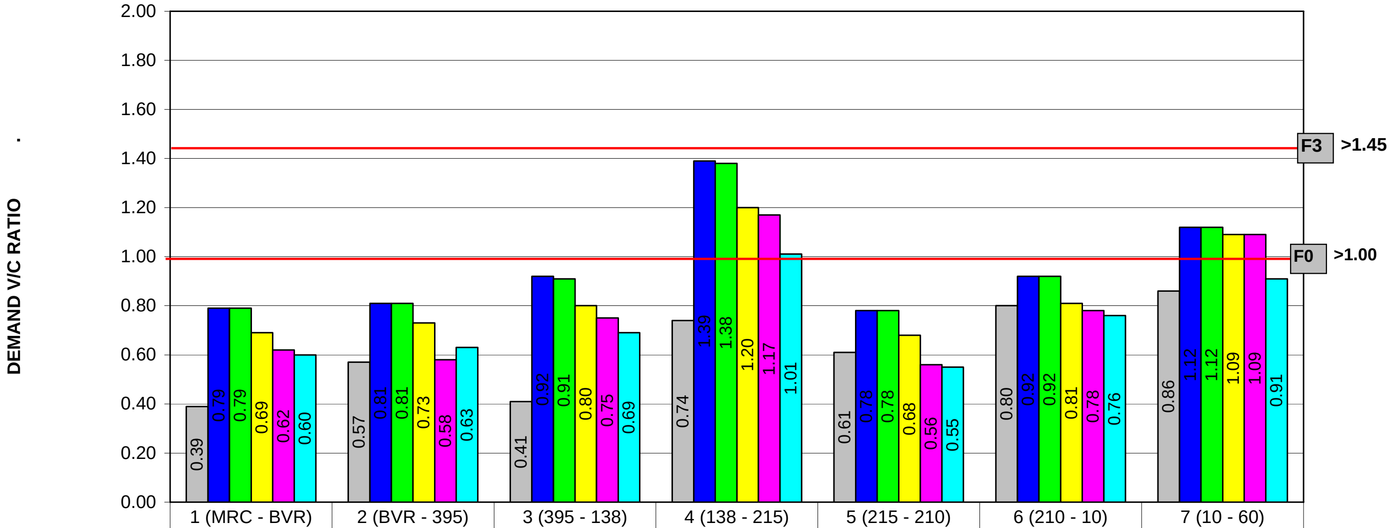
Figure 4-17 Demand V/C Ratios – AM Peak Period – SB GP Lanes



SEGMENT	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.60	0.59	0.53	0.79	0.62	0.80	0.72
A (No Build)	0.90	0.70	0.85	1.26	0.73	0.89	0.87
B (TSM/TDM)	0.91	0.70	0.84	1.25	0.72	0.88	0.87
C (HOV)	0.87	0.64	0.78	1.13	0.68	0.84	0.82
D (Truck)	0.65	0.45	0.61	1.01	0.48	0.70	0.80
E (Managed)	0.71	0.55	0.68	0.94	0.57	0.73	0.71

SEGMENT

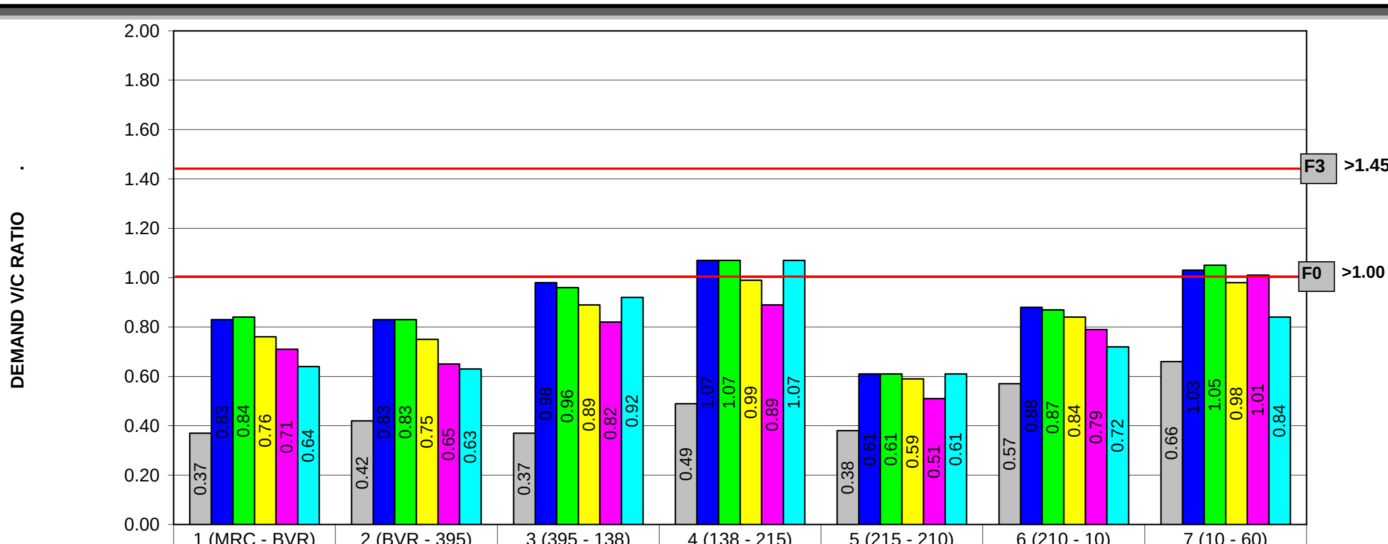
Figure 4-18 Demand V/C Ratios – PM Peak Period – NB GP Lanes



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.39	0.57	0.41	0.74	0.61	0.80	0.86
A (No Build)	0.79	0.81	0.92	1.39	0.78	0.92	1.12
B (TSM/TDM)	0.79	0.81	0.91	1.38	0.78	0.92	1.12
C (HOV)	0.69	0.73	0.80	1.20	0.68	0.81	1.09
D (Truck)	0.62	0.58	0.75	1.17	0.56	0.78	1.09
E (Managed)	0.60	0.63	0.69	1.01	0.55	0.76	0.91

SEGMENT

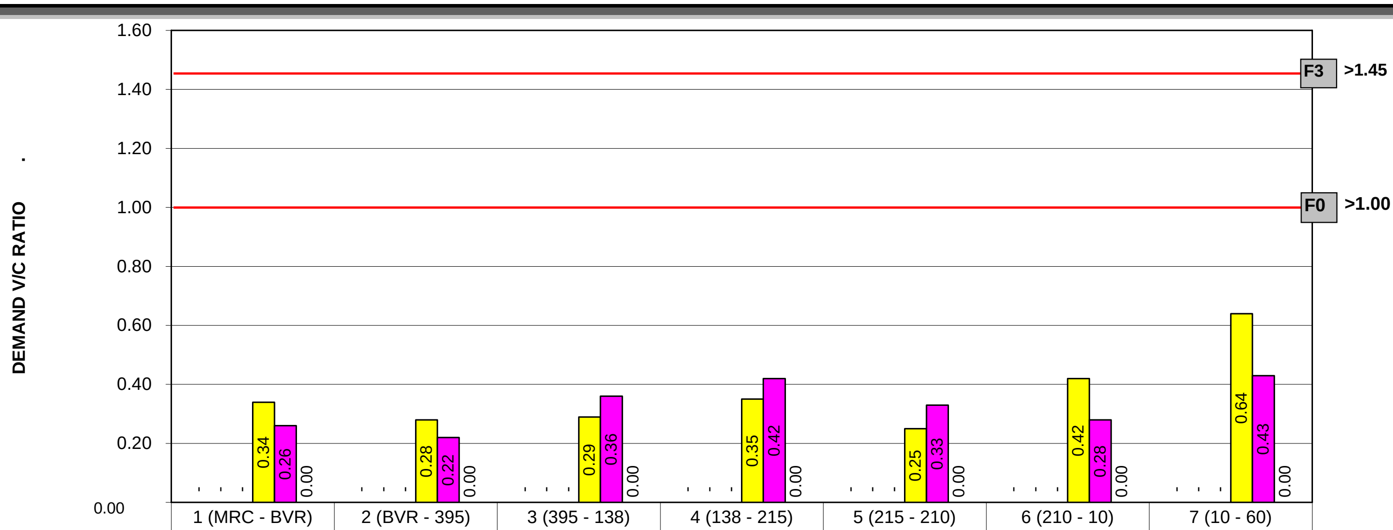
Figure 4-19 Demand V/C Ratios – PM Peak Period – SB GP Lanes



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.37	0.42	0.37	0.49	0.38	0.57	0.66
A (No Build)	0.83	0.83	0.98	1.07	0.61	0.88	1.03
B (TSM/TDM)	0.84	0.83	0.96	1.07	0.61	0.87	1.05
C (HOV)	0.76	0.75	0.89	0.99	0.59	0.84	0.98
D (Truck)	0.71	0.65	0.82	0.89	0.51	0.79	1.01
E (Managed)	0.64	0.63	0.92	1.07	0.61	0.72	0.84

SEGMENT

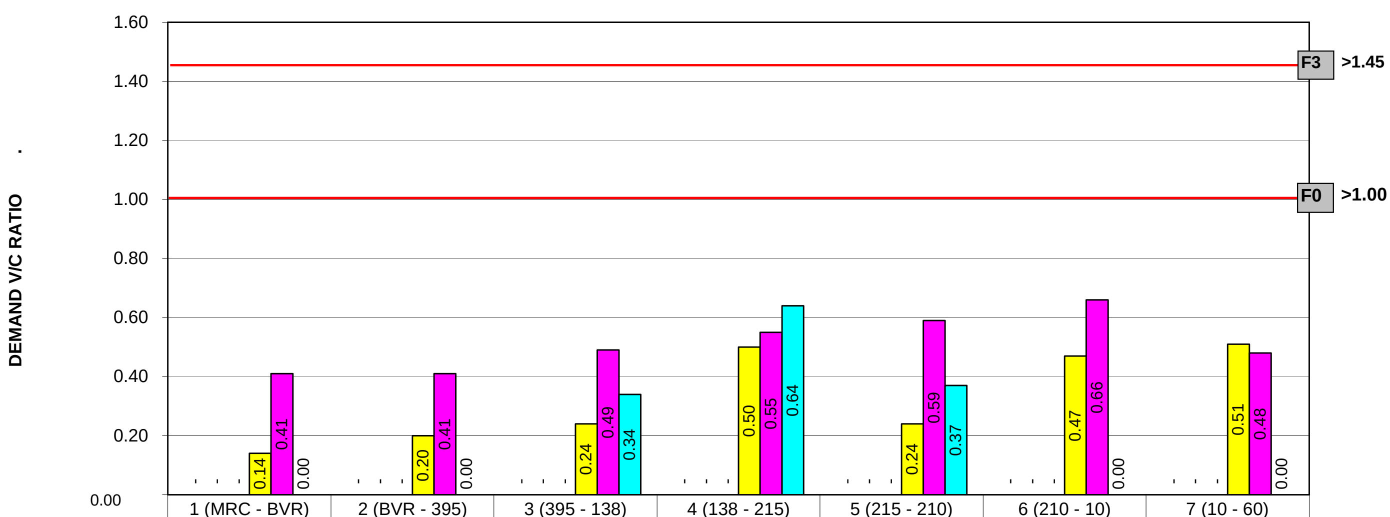
Figure 4-20 Demand V/C Ratios – AM Peak Period – NB Non-GP Lanes



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	-	-	-	-	-	-	-
A (No Build)	-	-	-	-	-	-	-
B (TSM/TDM)	-	-	-	-	-	-	-
C (HOV)	0.34	0.28	0.29	0.35	0.25	0.42	0.64
D (Truck)	0.26	0.22	0.36	0.42	0.33	0.28	0.43
E (Managed)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SEGMENT

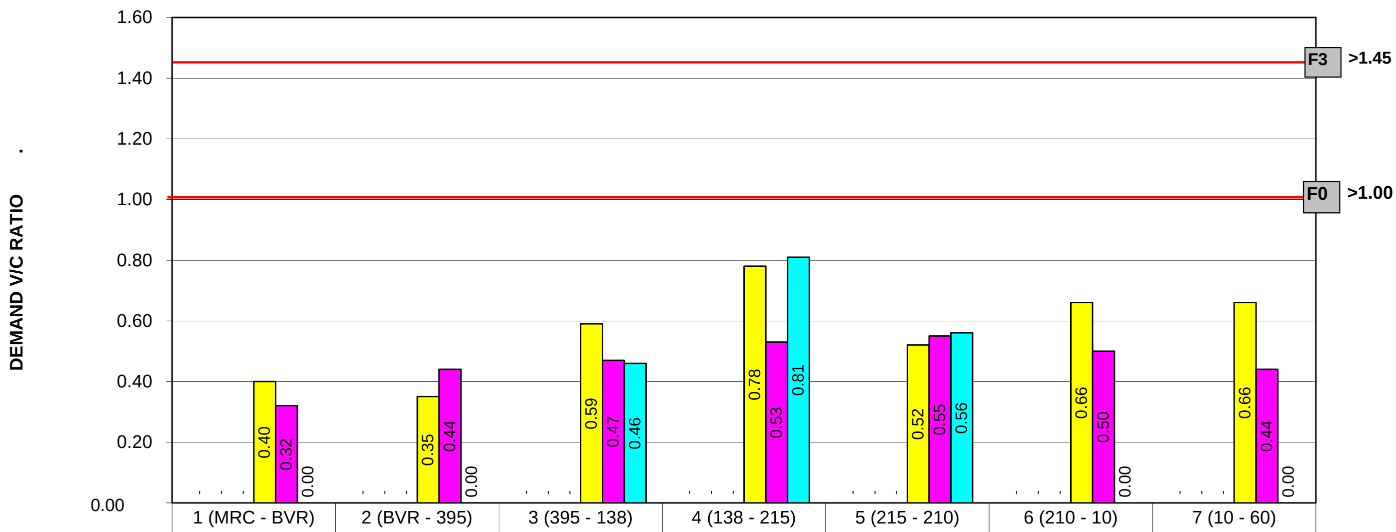
Figure 4-21 Demand V/C Ratios – AM Peak Period – SB Non-GP Lanes



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	-	-	-	-	-	-	-
A (No Build)	-	-	-	-	-	-	-
B (TSM/TDM)	-	-	-	-	-	-	-
C (HOV)	0.14	0.20	0.24	0.50	0.24	0.47	0.51
D (Truck)	0.41	0.41	0.49	0.55	0.59	0.66	0.48
E (Managed)	0.00	0.00	0.34	0.64	0.37	0.00	0.00

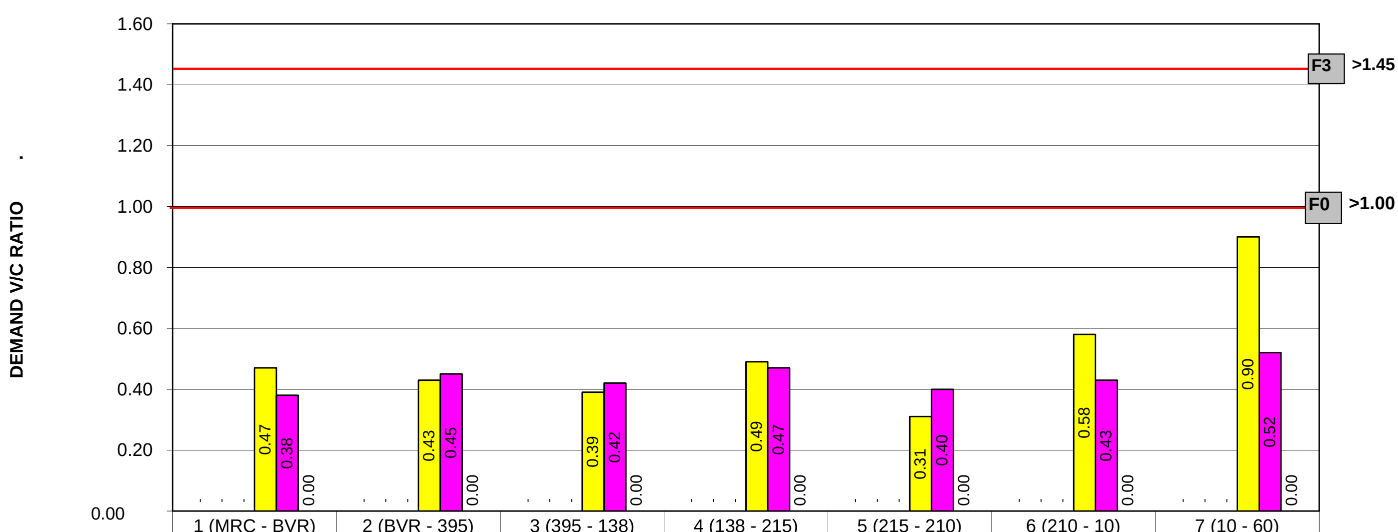
SEGMENT

Figure 4-22 Demand V/C Ratios – PM Peak Period – NB Non-GP Lanes



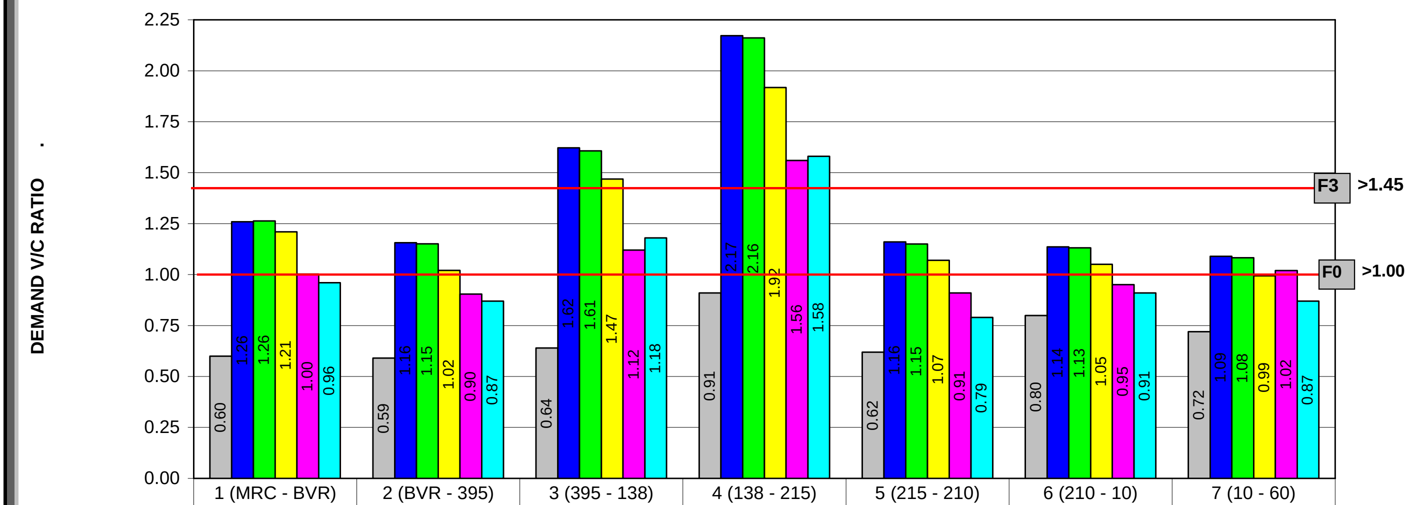
	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	-	-	-	-	-	-	-
A (No Build)	-	-	-	-	-	-	-
B (TSM/TDM)	-	-	-	-	-	-	-
C (HOV)	0.40	0.35	0.59	0.78	0.52	0.66	0.66
D (Truck)	0.32	0.44	0.47	0.53	0.55	0.50	0.44
E (Managed)	0.00	0.00	0.46	0.81	0.56	0.00	0.00

Figure 4-23 Demand V/C Ratios – PM Peak Period – SB Non-GP Lanes



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	-	-	-	-	-	-	-
A (No Build)	-	-	-	-	-	-	-
B (TSM/TDM)	-	-	-	-	-	-	-
C (HOV)	0.47	0.43	0.39	0.49	0.31	0.58	0.90
D (Truck)	0.38	0.45	0.42	0.47	0.40	0.43	0.52
E (Managed)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

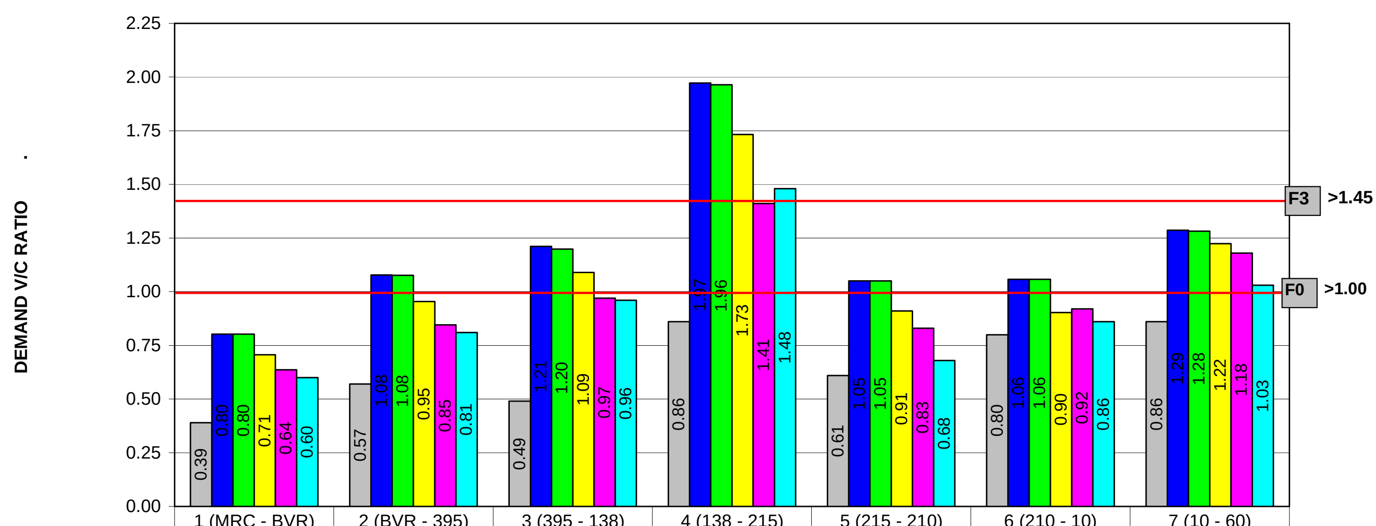
Figure 4-24 Demand V/C Ratios – AM Peak Period – SB GP Lanes (SENSITIVITY TEST)



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.60	0.59	0.64	0.91	0.62	0.80	0.72
A (No Build)	1.26	1.16	1.62	2.17	1.16	1.14	1.09
B (TSM/TDM)	1.26	1.15	1.61	2.16	1.15	1.13	1.08
C (HOV)	1.21	1.02	1.47	1.92	1.07	1.05	0.99
D (Truck)	1.00	0.90	1.12	1.56	0.91	0.95	1.02
E (Managed)	0.96	0.87	1.18	1.58	0.79	0.91	0.87

SEGMENT

Figure 4-25 Demand V/C Ratios – PM Peak Period – NB GP Lanes (SENSITIVITY TEST)



	1 (MRC - BVR)	2 (BVR - 395)	3 (395 - 138)	4 (138 - 215)	5 (215 - 210)	6 (210 - 10)	7 (10 - 60)
Existing	0.39	0.57	0.49	0.86	0.61	0.80	0.86
A (No Build)	0.80	1.08	1.21	1.97	1.05	1.06	1.29
B (TSM/TDM)	0.80	1.08	1.20	1.96	1.05	1.06	1.28
C (HOV)	0.71	0.95	1.09	1.73	0.91	0.90	1.22
D (Truck)	0.64	0.85	0.97	1.41	0.83	0.92	1.18
E (Managed)	0.60	0.81	0.96	1.48	0.68	0.86	1.03

SEGMENT

Figure 4-26 Detailed Evaluation Grading Matrix

● ◕ ◑ ◔ ○

Most Effective ⟵⟶ *Least Effective*

Goal	Goal Description	Strategy A No Build Existing Conditions plus Funded and Reasonably Anticipated Improvements	Strategy B TSM/TDM Transportation System Management and Demand Management Measures plus Strategy A (No Build)	Strategy C HOV Lanes One Full Corridor HOV Lane per Direction plus Strategy B (TSM/TDM)	Strategy D Truck Lanes Two Full Corridor Exclusive Truck Lanes per Direction plus Strategy B (TSM/TDM)	Strategy E Managed Lanes Two Reversible Managed Lanes (US-395 to I-210) plus One General Purpose Lane per Direction (Mojave River to US-395 & I-210 to SR-60) plus Strategy B (TSM/TDM)
Goal 1 Reduce Congestion	Weekday Peak Periods - General Purpose Lanes	◔	◔	◕	◕	◕
	Weekday Peak Periods - HOV, Truck, or Managed Lanes			●	●	●
	Weekend Peak Periods	○	○	◕	◑	●
Goal 2	Improve Goods Movement	○	○	◑	●	◑
Goal 3	Improve Transit Service	○	◔	◕	◔	◕
Goals 4&5	Improve Safety and Operations	○	◔	◑	◕	◑
Goal 6 Cost-Effective	Cost/Benefit (based on travel time savings)		◕	◕	○	◕
	Feasibility (based on ROW and Environmental Impact)	●	●	◑	○	◕
	Estimated Cost Range (in millions)	$0	$10 - $25	$497 - $719	$2045 - $3548	$573 - $830

The purpose of the detailed evaluation was to determine the comparative ability of the five strategies to achieve the stated project goals and objectives. Thus, the analysis focused on "order of magnitude" comparisons of Strategies B through D relative to Strategy A (No-Build) and relative to each other.

4.3.1 Segment 1(Mojave River Crossing to Bear Valley Road)

The MOEs for Segment 1, Mojave River Crossing to Bear Valley Road, are summarized in **Table 4-5** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity
- Peak Period Transit Service

Vehicle Capacity

Total vehicle capacity on Segment 1 would range from 12,600 passenger cars per hour (pcph) under Strategies A and B, to 16,800 pcph under Strategies C and E, to 21,000 pcph under Strategy D. Note that Strategies A and B are shown to have exactly the same vehicle capacity because the methodology accounted only for the addition of physical capacity (i.e. lanes) and did not account for the impacts of the TSM/TDM measures common to Strategies B through E which would improve vehicle flow and therefore capacity, but minimally compared to the addition of lanes.

The variation in vehicle capacity amongst the 5 strategies illustrates two primary points of distinction between the strategies. Strategy B would add no additional lanes relative to Strategy A, while Strategies C and E would add two lanes, and Strategy D would add 4 lanes. The additional lanes under each strategy would serve different user groups: Strategy C – HOV, Strategy D – truck, Strategy E – general-purpose traffic. Note that on this segment Strategy E would involve the addition of general-purpose lanes, rather than reversible managed lanes.

Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 1 would contain an equal number of lanes in both directions under all strategies.

Peak Period Transit Service

Two types of peak period transit service are available within the I-15 study corridor: express bus and rail. Rail service would remain the same for all strategies, primarily continuing to serve as a connection between the south end of the study corridor and the greater Los Angeles metropolitan basin. Express bus service would vary amongst strategies with transit service frequency, reliability and performance along the corridor commensurate with the implementation of physical improvements that facilitate express bus service. The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:

- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

The above measures highlight several characteristics of travel demand that are of particular interest because they impact the overall performance of the transportation system. Namely, given that overall transportation system performance is highly dependent on the ability of the available capacity to service the demand, the following characteristics of demand are relevant and are highlighted by the measures above:

- Change in demand relative to Strategy A (No-Build)
- Distribution of daily demand by time of day (peak periods, off-peak periods)
- Distribution of demand by direction of travel (northbound, southbound)
- Distribution of demand amongst vehicle groups (SOV, HOV, truck)

The ideal set of demand characteristics enables the transportation system to maximize its quality of service, as well as its through-put of people and freight. The ability to maximize service quality and through-put depends on the interaction of demand and capacity. For example, in terms of maximizing daily service quality and through-put on a corridor with equal northbound and southbound capacity, the preferred directional distribution of traffic would be 50% northbound and 50% southbound throughout the day. This interaction of demand and capacity is reflected in the Sub-Category 1C, Traffic Congestion Relief, measures which are discussed late. The following discussion focuses solely on the characteristics of Travel Demand and Patronage.

Average Daily Traffic

Average daily traffic (ADT) would increase negligibly under Strategy B relative to Strategy A. Strategies C through E would moderately increase ADT, with growth ranging from 4% to 7% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 50% SOV, 25% HOV, and 25% truck for all strategies. Growth in ADT relative to Strategy A would vary amongst these three vehicle groups (SOV, HOV, truck). Truck ADT would grow negligibly on Segment 1, with a maximum of 1% for Strategy D. SOV ADT would grow minimally under Strategy C (2%), and moderately under Strategies D and E (7% and 11%). As could be expected, Strategy C would result in the largest HOV growth (15%) on Segment 1, while Strategies D and E would also show moderate HOV growth (6% and 7%).

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 1 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 40% SOV, 40% HOV, and 20% trucks, as opposed to 50% SOV, 25% HOV, and 25% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Traffic growth would be minimal under Strategy B relative to Strategy A for all peak periods and directions, with a maximum of 1%.

For the remaining three strategies, C through E, the AM peak period northbound, AM peak period southbound, and PM peak period northbound would exhibit growth trends similar to ADT. However, the PM peak period southbound traffic would show a unique pattern.

PM peak period southbound traffic growth would range from 3% for Strategy E, to 11% for Strategy C, to 19% for Strategy D relative to Strategy A. A large growth in HOV traffic (40%) would account for most of the growth under Strategy C. Significant growth in both SOV (23%) and HOV (20%) traffic would account for the majority of growth under Strategy D.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-5,** there would be a rough 50/50 split between northbound and southbound traffic during all three time periods, specifically ranging from 49% to 53% southbound amongst different time periods and strategies. Note that while a 50/50 split is common for daily traffic, it is often not the case for peak period traffic. Also, note that none of the strategies would cause a substantial shift in directional split relative to Strategy A.

The directional split was also computed for each vehicle group (SOV, HOV, truck). SOV and HOV traffic would range from 44% to 54% southbound in most cases, except for 57% of HOV traffic traveling southbound on a daily basis under Strategy C. Truck traffic would be markedly higher in the southbound direction (63% to 64% southbound) on a daily basis and during the AM peak period. During the PM peak period, truck traffic would also be higher in the southbound direction, but not as markedly, with 54% of trucks traveling southbound under all strategies.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. About 24% to 25% of daily traffic would be heavy trucks, under all strategies. The percentages during the peak periods would be lower, ranging from 11-12% for northbound AM peak period traffic, to 16-19% for PM peak period northbound or southbound traffic, to 20-21% for southbound AM peak period traffic.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 19-20% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 2% and 3%, respectively, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories, results in 24-25% heavy trucks total. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity (V/C) ratio is a primary measure for estimating traffic congestion, and is also one of the most significant measures within the entire Transportation System Performance analysis category. The difference between V/C under a given strategy and Strategy A (No-Build) was used to estimate the amount of congestion relief offered by that strategy. V/C ratio is a widely used measure whose interpretation and calculation are relatively standardized. This measure was computed by direction, time period, and lane type (general-purpose, HOV, truck, managed).

Travel time was derived from the V/C ratio as described previously in the methodology section. It was computed by direction, time period, and lane type as were the V/C ratios. Note that the travel time forecasting methodology did not account for poor conditions on neighboring segments that could cause queues to extend into a given segment and thereby increase the actual travel time on that segment.

The V/C ratios and derived travel times reflect the ability of the available transportation supply to service the forecasted travel demand. Each of these two components, supply and demand, have been discussed individually within Sub-Categories 1A (Transportation Supply) and 1B (Travel Demand and Patronage). However, this current discussion focuses on the interaction of these two elements, the key to traffic congestion relief.

Volume-to-Capacity Ratio

V/C ratios on Segment 1 would range from 0.79 to 0.90 under Strategy A for the various time period and direction combinations. V/C ratios under Strategy B would be the same or slightly worse due to the slight increase in travel demand relative to Strategy A. The remaining three strategies, C through E, would all reduce the V/C ratios relative to Strategy A. Strategies D and E would reduce them the most, with V/C ratios ranging from 0.60 to 0.71 in the general-purpose lanes. Strategy C would reduce them to a lesser degree, with V/C ratios ranging from 0.69 to 0.87 in the general-purpose lanes.

V/C ratios in the HOV and truck lanes of Strategies C and D, respectively, would be very low indicating that these lanes would not be as well used as the general-purpose lanes probably due to the good level of service available in the general-purpose lanes. V/C ratios would range from 0.14 to 0.47.

Travel Time

Travel times would vary negligibly amongst strategies given the good V/C ratios and generally good quality of service discussed above. Travel times for Segment 1 ranged from 5.5 to 5.9 minutes for all strategies.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-5,** the overall degree of improvement to operations and safety on Segment 1 would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition

There would be no right-of-way impacts under Strategies A, B, and E within this segment. Strategies C and D would result in approximately nine acres and 56 acres respectively of right-of-way acquisition.

Land Use

Residential – Strategies A, B, and E would not result in acquisition of additional right-of-way within residential areas. Strategies C and D would result in approximately two and eight acres of acquisition within residential areas, respectively. The greatest impact to residential areas for both strategies C and D would occur in this segment, where residential uses are adjacent to the freeway.

Commercial/Industrial – Strategies A, B, and E would not result in acquisition of additional right-of-way within commercial and industrial areas. Strategy C would result in less than one acre of impact and Strategy D would result in approximately 16 acres of impact within commercial/industrial areas.

Parks/Recreation – Strategies A and B would not affect parks or recreational areas as they would not require additional right-of-way. Strategy E would not affect parks or recreational areas because it would not need additional right-of-way adjacent to those resources. Strategies C and D would result in less than one acre of impacts to parks and recreational areas.

Public Services/Utilities – Strategies A and B would not affect public services and utilities as they would not require any additional right-of-way. Strategy E would not affect public services and utilities because it would not need additional right-of-way adjacent to public service facilities/utilities. Strategy C would result in less than one acre of impact to public services and utilities and Strategy D would result in approximately two acres of impact.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 37 acres of impact to local roadways since Mariposa Road, Amargosa Road, and Valley Center Drive will need to be realigned.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategy E would not affect any land uses defined as other because it would not need additional right-of-way adjacent to those resources. Strategy C would affect approximately 4 acres of land uses defined as other. Strategy D would affect approximately 20 acres of land uses defined as other.

<u>Special Resources</u>
Biological – Within this segment the sensitive species include California red-legged frog (*Rana aurora draytonii*), Cooper's hawk (*Accipiter cooperii*), Le Conte's thrasher (*Toxostoma lecontei*), Mohave ground squirrel (*Spermophilus mohavensis*), Mohave river vole (*Microtus californicus mohavensis*), and Victorville shoulderband (*Helminthoglypta mohaveana*). Plants identified within the CNDDB habitat areas include Booth's evening-primrose (*Camissonia boothii ssp. Boothii*) and Southern skullcap (*Scutellaria bolanderi ssp. austromontana*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C, D, and E would have right-of-way impacts to both sensitive species and CNDDB habitat areas. Under all three strategies, potential impacts to biological resources include approximately 3,000 acres of habitat and eight species.

Historic – There would be no impacts to historic resources within this segment under any of the strategies.

Water – Strategies A, B, and E would have no impacts on water resources within this segment. Strategies C and D would require additional right-of-way within this segment and may potentially impact hydrology and water quality for waterways located between Bear Valley Road and the Mojave River. Bridge/culvert widening as part of these two strategies may affect the Mojave River and Oro Grande Wash, which cross the freeway in this segment. A 100-year floodplain is associated with the Mojave River. Potential impacts may include hydrology, water quality, and floodplain issues. Strategy

D requires more right-of-way than Strategy C and therefore would have more potential impacts than Strategy C.

Farmlands – There would be no impacts to farmlands under any of the strategies because there are no farmlands within this segment of the I-15 corridor.

Environmental Justice

Strategies A and B would not disproportionately affect minority or low-income households as they would not require any additional right-of-way. Strategy E would not affect minority and/or low-income neighborhoods in areas where additional right-of-way would be required. Strategy C would require approximately seven acres of additional right-of-way located within an area identified with minority and/or low-income neighborhoods.

Strategy D would affect minority and/or low-income residential areas located in Victorville, between Roy Rogers Drive and D Street. This strategy would require approximately 37 acres of additional right-of-way within these areas.

Noise

Strategy A is not anticipated to result in noise related impacts because all of the projects planned and committed for 2025 are anticipated to have their own noise studies and mitigation in place. Strategy B includes TDM/TSM improvements that would have no impact on existing noise levels.

Located east and west of I-15 between Bear Valley Road and the Mojave River are residences and mobile homes. The addition of HOV lanes under Strategy C and general-purpose lanes under Strategy E would affect these noise sensitive receivers by increasing the existing noise level 1 to 2 dBA. The increase in noise levels would be considered moderate.

The same noise sensitive areas affected by Strategies C and E would also be affected by Strategy D. The addition of truck lanes under Strategy D would increase existing noise levels by 2 to 3 dBA, which is considered a high impact.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-5** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Cost estimate ranges for each strategy and each segment were established based on a single cost estimate calculated in accordance with the Caltrans Project Development Procedures Manual (1995 or later edition). For Strategy D (Dedicated Truck Lanes) four alternative cost scenarios were calculated based on differences in the type of improvements proposed including the use of elevated structures for the truck lanes through the Victor Valley and the utilization of the existing Cajon Boulevard alignment to accommodate the truck lanes between I-215 and SR-138. The cost estimate ranges were subsequently determined by applying a reduction of 10% from the calculated value to establish the low and an increase of 30% to establish the high[3].

Table 4-5 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 1 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 1 would vary widely. Strategies C and E would be substantially less costly than Strategy D. Their cost ranges would be $56-$81 and $22-$32 million, respectively. In contrast, the cost for Strategy D would range from $453-$1045, several "orders of magnitude" higher than the costs of the other two strategies. This vast difference would largely be due to the high cost of right-of-way along this segment. Specifically, Strategy D would involve the addition of 4 lanes, rather than 2 lanes as in Strategies C and E, along this segment. The additional lanes of Strategy D would require either acquiring expensive right-of-way, or alternatively building an elevated structure for this segment.

4.3.2 Segment 2 (Bear Valley Road to US-395)

The MOEs for Segment 2, Bear Valley Road to US-395, are summarized in **Table 4-6** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity
- Peak Period Transit Service

[3] For Strategy D, a 10% reduction was taken from the lowest of the alternate segment cost values and a 30% increase was applied to the highest of the alternate segment values to establish the maximum potential cost estimate range

Vehicle Capacity

Total vehicle capacity on Segment 2 would range from 12,600 passenger cars per hour (pcph) under Strategies A and B, to 16,800 pcph under Strategies C and E, to 21,000 pcph under Strategy D. Note that on this segment Strategy E would involve the addition of general-purpose lanes, rather than reversible managed lanes.

Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 2 would contain an equal number of lanes in both directions under all strategies.

Peak Period Transit Service

Like segment 1, the TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:

- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic

Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. Strategies C through E would moderately increase ADT, with growth ranging from 4% to 7% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 50% SOV, 20% HOV, and 30% truck for all strategies. Growth in ADT relative to Strategy A would vary amongst these three vehicle groups (SOV, HOV, truck). Truck ADT would grow negligibly on Segment 2, with a maximum of 2% for Strategy D. SOV ADT would grow minimally under Strategy C (2%), and moderately under Strategies D and E (7% and 12%). As could be expected, Strategy C would result in the largest HOV growth (14%) on Segment 2, while Strategies D and E would also show moderate HOV growth (8%).

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 2 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 40% SOV, 35% HOV, and 25% trucks, as opposed to 50% SOV, 20% HOV, and 30% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Traffic growth would be minimal under Strategy B relative to Strategy A for all peak periods and directions, with a maximum of 2%.

For the remaining three strategies, C through E, the AM peak period northbound, AM peak period southbound, and PM peak period northbound would exhibit growth trends similar to those shown by ADT. However, the PM peak period southbound traffic would show a unique pattern.

PM peak period southbound traffic growth would range from 2% for Strategy E, to 9% for Strategy C, to 15% for Strategy D relative to Strategy A. A large growth in HOV traffic (38%) would account for most of the growth under Strategy C. Significant growth in SOV (17%), HOV (19%), and truck (9%) traffic would account for the growth under Strategy D.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-6,** there would be a rough 50/50 split between northbound and southbound traffic on a daily basis and during the PM peak period, specifically ranging from 50 to 52% southbound amongst the strategies. During the AM peak period, only 43-44% of traffic would travel southbound. Note that while a 50/50 split is common for daily traffic, it is often not the case for peak period traffic. Also, note that none of the strategies would cause a substantial shift in directional split relative to Strategy A.

The directional split was also computed for each vehicle group (SOV, HOV, truck). As was the case for all vehicle groups, the individual vehicle groups would also be split roughly 50/50 between the northbound and southbound directions on a daily basis and during the PM peak period, specifically ranging from 48% to 54% southbound.

During the AM peak period, however, the three vehicle groups would have different directional splits. SOV and HOV traffic would be heaviest in the northbound direction with only 38-40% traveling southbound. In contrast, truck traffic would be heaviest in the southbound direction with 57-58% of trucks traveling southbound during the AM peak period.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. About 28-31% of daily and AM peak period southbound traffic would be heavy trucks, under all strategies. The percentages during the AM peak period northbound, PM peak period northbound, and PM peak period southbound would be lower, ranging from 16-20%.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 23-24% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 2% and 3%, respectively, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories, results in 28-29% heavy trucks total. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

V/C ratios on Segment 2 would range from 0.70 to 0.83 under Strategy A for the various time period and direction combinations. V/C ratios under Strategy B would be the same or slightly worse due to the slight increase in travel demand relative to Strategy A. The remaining three strategies, C through E, would all reduce the V/C ratios relative to Strategy A. Strategies D and E would reduce them the most, with V/C ratios ranging from 0.45 to 0.69 in the general-purpose lanes. Strategy C would reduce them to a lesser degree, with V/C ratios ranging from 0.64 to 0.75 in the general-purpose lanes.

V/C ratios in the HOV and truck lanes of Strategies C and D, respectively, would be very low indicating that these lanes would not be as well used as the general-purpose lanes probably due to the good level of service available in the general-purpose lanes. V/C ratios would range from 0.20 to 0.45.

Travel Time

Travel times would vary negligibly amongst strategies given the good V/C ratios and generally good quality of service discussed above. Travel times for Segment 2 ranged from 4.9 to 5.3 minutes for all strategies.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-6,** the overall degree of improvement to operations and safety on Segment 2 would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition

There would be no right-of-way impacts under Strategies A, B, and E within this segment. Strategies C and D would result in approximately five acres and 55 acres respectively of right-of-way acquisition.

Land Use

Residential – Strategies A, B, C, and E would not result in acquisition of additional right-of-way within residential areas. Strategy D would result in less than one acre of acquisition within residential areas.

Commercial/Industrial – Strategies A, B, and E would not result in acquisition of additional right-of-way within commercial and industrial areas. Strategy C would result in less than one acre of impact and Strategy D would result in approximately seven acres of impact within commercial/industrial areas.

Parks/Recreation – Strategies A and B would not affect parks or recreational areas as they would not require additional right-of-way. Strategies C and E would not affect parks or recreational areas because they would not need additional right-of-way adjacent to those resources. Strategy D would result in approximately two acres of impact to parks and recreational areas.

Public Services/Utilities – Strategies A and B would not affect public services and utilities as they would not require any additional right-of-way. Strategy E would not affect public services and utilities because it would not need additional right-of-way adjacent to public service facilities/utilities. Strategy C would result in less than one acre of impact to public services and utilities and Strategy D would result in approximately three acres of impact.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 40 acres of impact to local roadways due to the realignment of Mariposa Road and Amargosa Road.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategy E would not affect any land uses defined as other because it would not need additional right-of-way adjacent to those resources. Strategy C would affect approximately one acre of land uses defined as other. Strategy D would affect approximately 43 acres of land uses defined as other.

Special Resources

Biological – Within this segment the sensitive species include San Diego horned lizard (*phrynosoma coronatum blainvillei*) and Burrowing owl (*Athene cunicularia*). Plants identified within the CNDDB habitat areas include Short-joint beavertail (*Opuntia basilaris var. brachyclada*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C, D, and E would have right-of-way impacts to both sensitive species and CNDDB habitat areas. Potential impacts to biological resources include approximately 85 acres (Strategies C and E) and 87 acres (Strategy D) of habitat and three species (Strategies C, D, and E).

Historic – There would be no impacts to historic resources within this segment under any of the strategies.

Water – There would be no impacts to water resources within this segment under any of the strategies.

Farmlands – There would be no impacts to farmlands under any of the strategies because there are no farmlands within this segment of the I-15 corridor.

Environmental Justice

There would be no impacts to environmental justice under any of the strategies because there are no low-income or minority neighborhoods within this segment of the I-15 corridor.

Noise

Strategy A is not anticipated to result in noise related impacts because all of the projects planned and committed for 2025 are anticipated to have their own noise studies and mitigation in place. Strategy B includes TDM/TSM improvements that would have no impact on existing noise levels.

Residential areas located east of I-15 from just south of Avenal Street to Bear Valley Road would be affected by the addition of HOV lanes under Strategy C and general-purpose lanes under Strategy E. The additional freeway lanes would increase the existing noise level by 1 to 2 dBA, which is considered a moderate impact.

The same noise sensitive areas affected by Strategies C and E would also be affected by Strategy D. The addition of truck lanes under Strategy D would increase existing noise levels by 2 to 3 dBA, which is considered a high impact.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-6** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Table 4-6 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 2 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 2 would vary widely. Strategies C and E would be substantially less costly than Strategy D. Their cost ranges would be $38-55 and $33-$48 million, respectively. In contrast, the cost for Strategy D would range from $187-$271, several "orders of magnitude" higher than the costs of the other two strategies. This vast difference is largely attributable to the 4 additional lanes of Strategy D versus the 2 additional lanes of Strategies C and E which could be accommodated largely within existing right-of-way.

4.3.3 Segment 3 (US-395 to SR-138)

The MOEs for Segment 3, US-395 to SR-138, are summarized in **Table 4-7** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity
- Peak Period Transit Service

Vehicle Capacity

Total vehicle capacity on Segment 3 would range from 18,900 passenger cars per hour (pcph) under Strategies A and B, to 23,100 pcph under Strategies C and E, to 27,300 pcph under Strategy D. Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 3 would contain an unequal number of lanes in each direction under all strategies. The No-Build condition, Strategy A, includes four northbound and four southbound general-purpose lanes plus an additional northbound truck climbing lane. The reversible managed lanes further contribute to the imbalance under Strategy E.

Peak Period Transit Service

The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:

- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic

Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. Strategies C through E would also have a minimal impact on ADT, with growth ranging from -2% to 3% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 50% SOV, 15% HOV, and 35% truck for all strategies. Change in ADT relative to Strategy A would be minimal for all three vehicle groups, ranging from -4% to 4%.

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 3 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 40% SOV, 35% HOV, and 25% trucks, as opposed to 50% SOV, 15% HOV, and 35% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Traffic would change minimally under Strategy B relative to Strategy A for all peak periods and directions, ranging from -3% to 0%.

For the remaining three strategies, C through E, traffic change would also be minimal during the AM peak period in both directions, ranging from -2% to 0%. Traffic changes would be a little more pronounced during the PM peak period, ranging from -8% to 7%.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-7,** there would be a 48%/52% split between northbound and southbound traffic on a daily basis. In contrast, during the AM and PM peak periods there would be a northbound bias, with only 44-46% of traffic traveling southbound. None of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods.

The directional split was also computed for each vehicle group (SOV, HOV, truck). As was the case for all vehicle groups, the individual vehicle groups would also be split roughly 50/50 between the northbound and southbound directions on a daily basis, ranging from 50% to 52% southbound for SOV and HOV and with a slightly higher percentage, 55%, southbound for trucks.

During the AM peak period, however, the three vehicle groups would have different directional splits. SOV and HOV traffic would be heaviest in the northbound direction with only 38-42% traveling southbound. In contrast, truck traffic would be heaviest in the southbound direction with 59% of trucks traveling southbound during the AM peak period.

During the PM peak period, there is some variation amongst the three vehicle groups, although all three exhibit some northbound bias. HOVs exhibit the most northbound bias with only 40-41% traveling southbound, followed by SOVs with 45-46% southbound, and lastly by trucks with 48% southbound.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. About 32-33% of daily and AM peak period southbound traffic would be heavy trucks, under all strategies. The percentages during the AM peak period northbound, PM peak period northbound, and PM peak period southbound would be lower, ranging from 17-21%.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 25-26% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 3% and 4%, respectively, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories, results in 32-33% heavy trucks total. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

V/C ratios on Segment 3 would range from 0.66 to 0.98 under Strategy A for the various time period and direction combinations. Strategies B through E would all maintain or reduce the V/C ratios relative to Strategy A. The V/C reductions range from 0 to 0.24 in the general-purpose lanes. The worst V/C ratios occur during the PM peak period in the southbound direction for all strategies, when they range from 0.82 to 0.98.

V/C ratios in the HOV, truck, and managed lanes of Strategies C through E, respectively, would be low generally indicating that these lanes would not be as well used as the general-purpose lanes probably due to the good level of service available in the general-purpose lanes. V/C ratios would range from 0.24 to 0.49 except for the northbound HOV lane during the PM peak period which would have a more substantial V/C ratio of 0.59.

Travel Time

Travel times would vary minimally amongst strategies given the good V/C ratios and generally good quality of service discussed above, with one exception. Due to the slower nature of heavy trucks on steep grades, travel times in the exclusive truck lanes of Strategy D would be higher despite the low V/C ratios and good quality of service in these lanes. Specifically, travel times for Segment 3 ranged from 8.9 to 10.4 minutes for all strategies and all lanes except the truck lanes of Strategy D. Travel times in the truck lanes of Strategy D ranged from 9.6 to 13.9 minutes.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-7,** the overall degree of improvement to operations and safety on Segment 3 would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition

There would be no right-of-way impacts under Strategies A and B within this segment. Strategy C would result in approximately three acres of right-of-way acquisition. Strategy D would result in approximately 39 acres and Strategy E would result in approximately six acres of right-of-way acquisition.

Land Use

Residential – Strategies A, B, C, and E would not result in acquisition of additional right-of-way within residential areas. Strategy D would result in less than one acre of acquisition within residential areas.

Commercial/Industrial – Strategies A, B, C, and E would not result in acquisition of additional right-of-way within commercial and industrial areas. Strategy D would result in approximately one acre of impact within commercial/industrial areas.

Parks/Recreation – Strategies A and B would not affect parks or recreational areas as they would not require additional right-of-way. Strategies C and E would not affect parks or recreational areas because they would not need additional right-of-way adjacent to those resources. Strategy D would result in approximately 4 acres of impact to parks and recreational areas.

Public Services/Utilities – Strategies A and B would not affect public services and utilities as they would not require any additional right-of-way. Strategies C and E would not affect public services and utilities because they would not need additional right-of-way adjacent to public service facilities/utilities. Strategy D would result in less than one acre of impact.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 24 acres of impact to local roadways due to the realignment of Mariposa Road, Caliente Road, and a dirt road that connects to the Santa Fe Fire Road.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategies C and E would not affect any land uses defined as other because they would not need additional right-of-way adjacent to those resources. Strategy D would affect approximately 21 acres of land uses defined as other.

Special Resources

Biological – Within this segment the sensitive species include the San Diego horned lizard (*phrynosoma coronatum blainvillei*). Plants identified within the CNDDB habitat areas include Short-joint beavertail (*Opuntia basilaris var. brachyclada*) and Plummer's mariposa lily (*Calochortus plummerae*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategy C would impact two sensitive species (the San Diego horned lizard and Plummer's mariposa lily) and approximately 285 acres of habitat within this segment. Strategy D would impact all three sensitive species and approximately 1,232 acres of habitat. Strategy E would result in impacts to all three sensitive species and approximately 1,262 acres of habitat.

Historic –The Crowder Canyon Archaeological District is within this segment. There would be no impacts to these resources under Strategies A, B, C, and E because the I-15 footprint would not change within this segment for these strategies. Strategy D would require approximately one acre of additional right-of-way that could impact the identified resources as a result of right-of-way acquisition, grading or excavation activities. Right-of-way acquisitions and grading activities may also affect, as yet, unidentified resources within this segment. Construction activities associated with Strategy D may also result in indirect impacts on these identified historic resources, which may include short-term noise and visual impacts.

Water – Strategies A, B, C, and E would have no impact to water resources within this segment. Strategy D could potentially impact hydrology and water quality within this segment. According to USGS maps an un-named stream crosses under I-15 north of SR-138 within this segment. Bridge widening could affect this resource.

Farmlands – There would be no impacts to farmlands under any of the strategies because there are no farmlands within this segment of the I-15 corridor.

<u>Environmental Justice</u>
There would be no impacts to environmental justice under any of the strategies because there are no low-income or minority household areas within this segment of the I-15 corridor.

<u>Noise</u>
There would be no impacts to sensitive receivers under any of the strategies because there are no sensitive receivers located within this segment.

<u>Air Quality</u>
Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-7** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

<u>Category 3: Cost-Effectiveness and Feasibility</u>

<u>Cost Estimate Range</u>
Table 4-7 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 3 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 3 would vary widely. Strategy C would be substantially less costly than Strategies D and E. Strategy C would range from $43-$62 million for Segment 3. Strategy E would be two to three times as costly as Strategy C, ranging from $109 to $158 million. Strategy D would be about four times as costly as Strategy C, ranging from $168 to $243 million.

4.3.4 Segment 4 (SR-138 to I-215)

The MOEs for Segment 4, SR-138 to I-215, are summarized in **Table 4-8** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:
- ♦ Vehicle Capacity
- ♦ Peak Period Transit Service

Vehicle Capacity
Total vehicle capacity on Segment 4 would range from 16,800 passenger cars per hour (pcph) under Strategies A and B, to 21,000 pcph under Strategies C and E, to 25,200 pcph under Strategy D. Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 4 would contain an equal number of lanes in both directions under all strategies, with the exception of Strategy E. Note that on this segment Strategy E would involve the addition of two reversible managed lanes, both of which were assumed to run southbound during the AM peak period and northbound during the PM peak period.

Peak Period Transit Service
The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:
- ♦ Average Daily Traffic
- ♦ Average Daily Person Trips
- ♦ Peak Period Traffic
- ♦ (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- ♦ Directional Split - % Southbound
- ♦ (Average Daily Traffic, AM Peak Period, PM Peak Period)
- ♦ Percent Heavy Trucks
- ♦ (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic
Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. Strategies C through E would also have a minimal impact on ADT, with growth ranging from 0% to 3% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 55% SOV, 20% HOV, and 25% truck for all strategies. Change in ADT relative to Strategy A would be minimal for all three vehicle groups, ranging from -1% to 4%.

Average Daily Person Trips
Average daily person trips would exhibit trends similar to ADT on Segment 4 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 45% SOV, 35% HOV, and 20% trucks, as opposed to 55% SOV, 20% HOV, and 25% truck for ADT.

Peak Period Traffic
AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Traffic would change minimally under Strategy B relative to Strategy A for all peak periods and directions, ranging from -1% to 0%.

For the remaining three strategies, C through E, traffic change would also be minimal during the AM peak period in both directions, ranging from -1% to 3%. Traffic changes would be a little more pronounced during the PM peak period, ranging from 0% to 6% relative to Strategy A.

Directional Split (% Southbound)
Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-8,** there would be a 48%/52% split between northbound and southbound traffic on a daily basis. In contrast, during the AM peak period there would be a southbound bias, with 61% of traffic traveling southbound under all strategies. During the PM peak period there would be a northbound bias, with only 41%-42% of traffic traveling southbound under all strategies. Thus, none of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods.

The directional split was also computed for each vehicle group (SOV, HOV, truck). As was the case for all vehicle groups, the individual vehicle groups would also be split 48/52 between the northbound and southbound directions on a daily basis, with a slightly higher percentage, 53% - 54%, southbound for trucks.

There would also be little variation amongst the vehicle groups during the AM peak period. SOV, HOV, and truck traffic would all be heaviest in the southbound direction with 57-63% traveling southbound.

During the PM peak period, there would be some variation amongst the three vehicle groups. Truck traffic would be relatively balanced directionally, with 48% to 49% traveling southbound. SOV and HOV traffic would exhibit a more pronounced northbound bias, with only 38% to 40% traveling southbound.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. Overall, the percentage of total traffic that is heavy trucks would range from 15% to 25% amongst the various time periods and strategies. The highest percentage of trucks would be seen on a daily basis and during the AM peak period in the northbound direction, ranging from 23% to 25% under all strategies. The percentage during the AM and PM peak period in the southbound direction would be slightly less at 20%. The percentage would drop further during the PM peak period in the northbound direction with 15% of traffic being heavy trucks.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 20% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 2% and 3%, respectively, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories results in 25% total heavy trucks. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

Demand would exceed capacity on Segment 4, ranging from 1.07 to 1.39, in both directions during the PM peak period, and in the southbound direction during the AM peak period under Strategy A. In contrast, the northbound direction during the AM peak period has a V/C ratio of 0.86 under Strategy A.

Strategy B does little to improve the poor V/C ratios of Strategy A. Strategies C through E offer varied levels of improvement, ranging from no improvement to an 0.38 reduction. None of the strategies reduces V/C ratios below the 1.0 level, or the point above which demand exceeds capacity, for all time periods and directions. Strategy E offers the best range of V/C ratios, with the maximum of 1.07 occurring during the PM peak period in the southbound direction.

V/C ratios in the HOV, truck, and managed lanes of Strategies C through E, respectively, would be better than those in the general-purpose lanes. V/C ratios would range from 0.35 to 0.64, with two exceptions. The northbound HOV and managed lanes have V/C ratios of 0.78 and 0.81, respectively, during the PM peak period. A V/C ratio of 0.78 is on the threshold of acceptable versus unacceptable level of service for a single-lane HOV facility. Thus it is seen that the poor level of service in the northbound general-purpose lanes during the PM peak period would result in heavy use of the HOV and managed lanes.

Travel Time

Travel times would vary substantially amongst strategies and time periods given the range of V/C ratios discussed above. Specifically, travel times on Segment 4 would range from 4.3 to 9.7 minutes, with two outliers. Strategies A and B would have travel times of 20 minutes in the northbound general-purpose lanes during the PM peak period.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-8,** the overall degree of improvement to operations and safety on Segment 4 would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition

There would be no right-of-way impacts under Strategies A, B, C, and E within this segment. Strategy D would result in approximately 16 acres of right-of-way acquisition.

Land Use

Residential – There would be no impacts to residential land uses under any of the strategies, because additional right-of-way would not be required adjacent to residential land uses within this segment.

Commercial/Industrial – There would be no impacts to commercial/industrial land uses under any of the strategies, because additional right-of-way would not be required adjacent to commercial/industrial land uses within this segment.

Parks/Recreation – Strategies A and B would not affect parks or recreational areas as they would not require additional right-of-way. Strategies C and E would not affect parks or recreational areas because they would not need additional right-of-way adjacent to those resources. Strategy D would result in approximately 16 acres of impact to parks and recreational areas.

Public Services/Utilities – There would be no impacts to public services/utilities under any of the strategies, because additional right-of-way would not be required adjacent to public services/utilities located within this segment.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 18 acres of impact to local roadways due to the realignment of North Cajon Boulevard.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategies C and E would not affect any land uses defined as other because they would not need additional right-of-way adjacent to those resources. Strategy D would affect approximately 2 acres of land uses defined as other.

<u>Special Resources</u>
Biological – Within this segment the sensitive species include the Two-striped garter snake (*Thamnophis hammondii*). The plant identified within the CNDDB habitat areas is the Short-joint beavertail (*Opuntia basilaris var. brachyclada*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C, D, and E would all affect two sensitive species. Strategies C and E would both impact approximately 428 acres of habitat within this segment. Strategy D would impact approximately 581 acres of habitat.

Historic – Within this segment is the Crowder Canyon Archaeological District and within 200 feet of the proposed project is the Santa Fe and Salt Lake Trail Monument in this segment. There would be no impacts to these resources under Strategies A and B, because the I-15 footprint would not change within this segment for these strategies. Strategy C and E is not expected to be widened outside of existing right-of-way; therefore, would have minimal short term impacts due to construction on these resources. Strategy D would require approximately two acres of additional right-of-way that could impact the identified resources as a result of right-of-way acquisition, grading or excavation activities. Right-of-way acquisitions and grading activities may also affect, as yet, unidentified resources within this segment. Construction activities associated with Strategy D may also result in indirect impacts on these identified historic resources, which may include short-term noise and visual impacts.

Water – Strategies A, B, C, and E would have minimal impacts to water resources within this segment. Additional right-of-way required for Strategy D may include potential bridge widening over two waterways, Crowder Canyon and Cleghorn Canyon, which cross under the I-15 Freeway within this segment. Potential impacts may include hydrology and water quality.

Farmlands – There would be no impacts to farmlands under any of the strategies because there are no farmlands within this segment of the I-15 corridor.

Environmental Justice

There would be no impacts to environmental justice under any of the strategies because there are no minority or low-income neighborhoods within this segment of the I-15 corridor.

Noise

There would be no impacts to sensitive receivers under any of the strategies because there are no sensitive receivers located within this segment. Noise impacts associated with the I-15/I-215 interchange within Segment 4 are discussed under **Section 4.3.8**.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-8** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Table 4-8 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 4 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 4 range from about $120 to $360 million. Strategy C would be about half as costly as Strategy D. Strategy E would fall between the two.

4.3.5 Segment 5 (I-215 to SR-210)

The MOEs for Segment 5, I-215 to SR-210, are summarized in **Table 4-9** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity

- Peak Period Transit Service

Vehicle Capacity
Total vehicle capacity on Segment 5 would range from 16,800 passenger cars per hour (pcph) under Strategies A and B, to 21,000 pcph under Strategies C and E, to 25,200 pcph under Strategy D. Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 5 would contain an equal number of lanes in both directions under all strategies, with the exception of Strategy E. Note that on this segment Strategy E would involve the addition of two reversible managed lanes, both of which were assumed to run southbound during the AM peak period and northbound during the PM peak period.

Peak Period Transit Service
The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:
- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic
Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. ADT under Strategies C through E would increase by 2% to 6% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 55% SOV, 15% HOV, and 30% truck for all strategies. Change in ADT relative to Strategy A would be minimal except for HOV growth under Strategies C of 10%, as well as SOV and HOV growth under Strategy D of 8%.

Average Daily Person Trips
Average daily person trips would exhibit trends similar to ADT on Segment 5 with one notable exception. The breakdown of average daily person trips by vehicle group

would be roughly 40% SOV, 35% HOV, and 25% trucks, as opposed to 55% SOV, 15% HOV, and 30% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Strategy B would change peak period traffic minimally relative to Strategy A for all peak periods and directions, ranging from -1% to 0%.

For the remaining three strategies, C through E, traffic change would vary substantially amongst the time periods, directions, and strategies. Total traffic would increase from 0% to 7% relative to Strategy A, with a few exceptions. Strategy C would increase total southbound traffic by 10% during the PM peak period. Strategy D would increase total southbound traffic by 10% and 19% during the AM and PM peak periods, respectively.

Growth per each of the three vehicle groups (SOV, HOV, truck) also would vary substantially under Strategies C through E. Truck traffic growth would range from 0% to 5% amongst the time periods and directions. SOV and HOV traffic growth would range from 0-9% and 1-15%, respectively, with a few exceptions. Southbound SOV traffic would grow 14% and 21% during the AM and PM peak periods, respectively, under Strategy D. PM peak period HOV traffic in the southbound direction would grow 30% and 36% under Strategies C and D, respectively.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-9,** daily traffic would be split about 50/50 between the northbound and southbound directions, while AM peak period traffic would have a southbound bias and PM peak period traffic would have a northbound bias.

Specifically, about 50-52% of daily traffic would travel in the southbound direction. This holds true for total traffic, as well as for the three vehicle groups (SOV, HOV, truck) individually. During the AM peak period 57-58% of traffic would travel southbound overall, while 52-59% of SOV and HOV traffic and 67-68% of truck traffic would. During the PM peak period, only 42-46% of total traffic, as well as SOV and truck traffic individually, would travel southbound. Even less HOV traffic would be traveling southbound, 36-43%, during the PM peak period.

None of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods, with the exception of HOV traffic during the PM peak period.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. Overall, the percentage of total traffic that is heavy trucks would range from 19% to 33% amongst the various time periods and strategies. The highest percentage of trucks would be seen on a daily basis and during the AM peak period in the southbound direction, ranging from 27% to 33% under all strategies. The percentage during the AM and PM peak period in the northbound direction and during the PM peak period in the southbound direction would be less ranging from 19% to 23%.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 22-24% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 2% and 3%, respectively, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories results in 27-29% total heavy trucks. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

Volume-to-capacity ratios on Segment 5 would range from 0.48 to 0.78 under Strategy A (No-Build) conditions during the peak periods. Strategy B would change V/C ratios negligibly relative to Strategy A. Strategies C through E would reduce V/C ratios by 0.00 to 0.25 relative to Strategy A. The HOV, truck, and reversible managed lanes of Strategies C through E would have V/C ratios ranging from 0.24 to 0.52.

Travel Time

Travel times would vary minimally amongst the strategies and time periods given the V/C ratios and generally good quality of service on Segment 5 as discussed above. Specifically, travel times on Segment 5 would range from 7.1 to 7.7 minutes.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-9,** the overall degree of improvement to operations and safety on Segment 5 would range from “low” for Strategy B, to “moderate” for Strategies C and E, to “high” for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition
There would be no right-of-way impacts under Strategies A, B, C, and E. Strategy D would result in approximately 33 acres of right-of-way acquisition.

Land Use
Residential – There would be no impacts to residential land uses under any of the strategies, because additional right-of-way would not be required adjacent to residential land uses within this segment.

Commercial/Industrial – There would be no impacts to commercial/industrial land uses under any of the strategies, because additional right-of-way would not be required adjacent to commercial/industrial land uses within this segment.

Parks/Recreation – Strategies A and B would not affect parks or recreational areas as they would not require additional right-of-way. Strategies C and E would not affect parks or recreational areas because they would not need additional right-of-way adjacent to those resources. Strategy D would result in approximately 4 acres of impact to the San Bernardino National Forest area.

Public Services/Utilities – Strategies A and B would not affect public services and utilities as they would not require any additional right-of-way. Strategies C and E would not affect public services and utilities because they would not need additional right-of-way adjacent to public services facilities/utilities. Strategy D would result in less than one acre of impact.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 16 acres of impact to local roadways due to the realignment of East Frontage Road and Lytle Creek Road.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategies C and E would not affect any land uses defined as other because they would not need additional right-of-way adjacent to those resources. Strategy D would affect approximately 29 acres of land uses defined as other.

Special Resources
Biological – Within this segment the sensitive species include Bell's sage sparrow (*Amphispiza belli belli*), San Bernardino kangaroo rat (*Dipodomys merriami parvus*), and San Diego horned lizard (*phrynosoma coronatum blainvillei*). Plants identified within the CNDDB habitat areas include the Parish's desert-thorn (*Lycium parishii*), Salt marsh bird's-beak (*Cordylanthus maritimus ssp. maritimus*), Parry's spineflower (*Chorizanthe parryi var. parryi*), Slender-horned spineflower (*Dodecahema leptoceras*), White-bracted spineflower (*Chorizanthe xanti var. leucotheca*), and Mesa horkelia (*Horkelia cuneata ssp. Puberula*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C and E would not affect biological resources since they do not require additional right-of-way adjacent to those resources. Strategy D would impact nine sensitive species and approximately 2,046 acres of habitat.

Historic – There would be no impacts to historic resources within this segment under any of the strategies.

Water – Strategies A, B, C, and E would have no impacts to water resources within this segment. Additional right-of-way required for Strategy D may include potential bridge widening over two waterways, Lytle Creek Wash and Cajon Creek Wash, which cross under the I-15 Freeway within this segment. A 100-year floodplain is associated with both washes. Potential impacts may include hydrology, water quality, and floodplain issues.

Farmlands – Strategies A and B would not affect farmlands because they would not require additional right-of-way. Strategies C and E would not affect farmlands since they do not require additional right-of-way adjacent to those resources. Strategy D would result in less than one acre of impact to farmlands.

<u>Environmental Justice</u>

Strategies A and B would not result in environmental justice impacts because they would not require additional right-of-way. Strategies C and E would not affect environmental justice since they do not require additional right-of-way adjacent to areas identified as predominately minority or low-income neighborhoods. Strategy D would result in acquisition of approximately 29 acres of right-of-way within areas identified as having low-income and minority households.

<u>Noise</u>

Strategy A is not anticipated to result in noise related impacts because all of the projects planned and committed for 2025 are anticipated to have their own noise studies and mitigation in place. Strategy B includes TDM/TSM improvements that would have no impact on existing noise levels.

Residential areas located east and west of I-15 near Summit Avenue would be affected by the addition of HOV Lanes under Strategy C and general-purpose lanes under Strategy E. The additional freeway lanes would increase the existing noise level by 1 to 2 dBA, which is considered a moderate impact.

The same noise sensitive areas affected by Strategies C and E would also be affected by Strategy D. The addition of truck lanes under Strategy D would increase existing noise levels by 2 to 3 dBA, which is considered a high impact.

Additional noise impacts associated with the I-15/I-215 interchange within Segment 5 are discussed under **Section 4.3.8**.

Air Quality
Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-9** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range
Table 4-9 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 5 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 5 range from about $70 to $400 million. Strategies C and E would be several orders of magnitude less costly than Strategy D, ranging from $71-158 million. Strategy D would range from $276 to $398 million.

4.3.6 Segment 6 (SR-210 to I-10)

The MOEs for Segment 6, SR-210 to I-10, are summarized in **Table 4-10** and are discussed below.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:
- Vehicle Capacity
- Peak Period Transit Service

Vehicle Capacity
Total vehicle capacity on Segment 6 would range from 16,800 passenger cars per hour (pcph) under Strategies A and B, to 21,000 pcph under Strategies C and E, to 25,200 pcph under Strategy D. Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 6 would contain an equal number of lanes in both directions under all strategies. Note that on this segment Strategy E

would involve the addition of one general-purpose lane in each direction, rather than two reversible managed lanes.

Peak Period Transit Service

The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:

- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic

Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. ADT under Strategies C through E would increase by 5% to 8% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 65% SOV, 20% HOV, and 15% truck for all strategies. ADT growth for each vehicle category (SOV, HOV, truck) would range from 3% to 9% under Strategies C through E, with two exceptions. HOV ADT would grow by 20% under Strategy C and truck ADT would grow by 17% under Strategy D.

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 6 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 50% SOV, 40% HOV, and 10% trucks, as opposed to 65% SOV, 20% HOV, and 15% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Strategy B would change peak period traffic minimally relative to Strategy A for all peak periods and directions, ranging from -1% to 0%.

For the remaining three strategies, C through E, traffic change would range from 2-14% amongst the time periods, directions, and strategies. Growth per each of the three vehicle groups (SOV, HOV, truck) would have a broader spread, ranging from 3-9% for SOV, 1-34% for HOV, and 1-25% for truck.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-10,** daily and PM peak period traffic would be split about 50/50 between the northbound and southbound directions, while AM peak period traffic would have a southbound bias.

Specifically, about 51-52% of daily traffic would travel in the southbound direction. The three vehicle groups (SOV, HOV, truck) individually would range from 46-54% southbound on a daily basis. Total traffic, as well as the three vehicle groups individually, would range from 48-52% southbound during the PM peak period. During the AM peak period 57-59% of traffic would travel southbound overall, while 52-57% of SOV and HOV traffic and 70-71% of truck traffic would.

None of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. Overall, the percentage of total traffic that is heavy trucks would range from 11% to 22% amongst the various time periods and strategies. The highest percentage of trucks would be seen during the AM peak period in the southbound direction, ranging from 20% to 22% under all strategies. The percentages during the remaining periods and directions and would be less, ranging from 11% to 15%.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 9-11% of daily traffic would be heavy-heavy trucks. Light-heavy and medium-heavy trucks would comprise only 2% each, of total traffic. Summing the heavy-heavy, medium-heavy, and light-heavy categories results in 13-15% total heavy trucks. Thus, it can be seen that heavy-heavy trucks would account for the vast majority of the total heavy truck component.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio
Volume-to-capacity ratios on Segment 6 would range from 0.61 to 0.92 under Strategy A (No-Build) conditions during the peak periods. Strategy B would change V/C ratios negligibly relative to Strategy A. Strategies C through E would reduce V/C ratios by 0.04 to 0.19 relative to Strategy A, resulting in V/C ratios ranging from 0.50 to 0.84 in the general-purpose lanes. The HOV, truck, and reversible managed lanes of Strategies C through E would have V/C ratios ranging from 0.28 to 0.66.

Travel Time
Travel times would vary minimally amongst the strategies and time periods given the V/C ratios and generally good quality of service on Segment 6 as discussed above. Specifically, travel times on Segment 6 would range from 4.9 to 5.3 minutes.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety
The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-10,** the overall degree of improvement to operations and safety on Segment 6 would range from “low” for Strategy B, to “moderate” for Strategies C and E, to “high” for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition
There would be no right-of-way impacts under Strategies A, B, and E within this segment. Strategies C and D would result in approximately two acres and 55 acres respectively of right-of-way acquisition.

Land Use
Residential – Strategies A, B, C, and E would not result in acquisition of additional right-of-way within residential areas. Strategy D would result in approximately one acre of acquisition within residential areas.

Commercial/Industrial – Strategies A, B, and E would not result in acquisition of additional right-of-way within commercial and industrial areas. Strategy C would result in less than one acre of impact and Strategy D would result in approximately 20 acres of impact to commercial/industrial land uses. The greatest impact for both strategies C and D would occur in this segment where there are the most commercial uses adjacent to the freeway.

Parks/Recreation – There would be no impacts to parks and recreational land uses under any of the strategies because there are no parks or recreational facilities located within this segment.

Public Services/Utilities – There would be no impacts to public services and utilities under any of the strategies because there are no public services or utilities located within this segment.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since additional right-of-way adjacent to frontage roads could be accommodated within the median between the frontage road and the freeway. Strategy D would result in approximately 6 acres of impact to local roadways. Strategy D may affect the south end of Hyssop Drive and the intersection of North Rochester Avenue and Ontario Mills Parkway.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategy E would not affect any land uses defined as other because they would not need additional right-of-way adjacent to those resources. Strategy C would impact less than one acre and Strategy D would affect approximately 34 acres of land uses defined as other.

<u>Special Resources</u>

Biological – Within this segment the sensitive species include San Diego horned lizard (*phrynosoma coronatum blainvillei*) and San Diego desert woodrat (*Neotoma lepida intermedia*). The only plant identified within the CNDDB habitat area includes the Mesa horkelia (*Horkelia cuneata ssp. Puberula*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C and E would both affect two sensitive species (San Diego horned lizard and San Diego desert woodrat) and approximately 458 acres of habitat. Strategy D would impact three sensitive species and approximately 875 acres of habitat.

Historic – There would be no impacts to historic resources within this segment under any of the strategies.

Water – Strategies A, B, and E would have no impacts to water resources within this segment. Additional right-of-way required for Strategy C and Strategy D may include potential bridge widening over four waterways, Day Creek, East Etiwanda Creek, the San Sevaine Channel, and a blue-line stream at Summit Avenue, which cross under the I-15 Freeway within this segment. Potential impacts may include hydrology and water quality. Strategy D requires more right-of-way than Strategy C and therefore would have more potential impact than Strategy C.

Farmlands – Strategies A and B would not affect farmlands because they would not require additional right-of-way. Strategy E would not affect farmlands since it does not require additional right-of-way adjacent to those resources. Strategy C would result in less than one acre of impact and Strategy D would result in approximately 14 acres of impact to farmlands.

Environmental Justice

Strategies A and B would not affect environmental justice because they would not require additional right-of-way. Strategy E would not affect environmental justice since it does not require additional right-of-way adjacent to areas identified as predominately minority and/or low-income neighborhoods. Strategies C and D would result in acquisition of approximately two and 47 acres respectively of right-of-way within areas identified as having minority and/or low-income households.

Noise

Strategy A is not anticipated to result in noise related impacts because all of the projects planned and committed for 2025 are anticipated to have their own noise studies and mitigation in place. Strategy B includes TDM/TSM improvements that would have no impact on existing noise levels.

Residential areas located east of I-15 between Foothill Boulevard and Victoria Street would be affected by the addition of an HOV Lanes under Strategy C and general-purpose lanes under Strategy E. The additional freeway lanes would increase the existing noise level by 1 to 2 dBA, which is considered a moderate impact.

The same noise sensitive areas affected by Strategies C and E would also be affected by Strategy D. The addition of truck lanes under Strategy D would increase existing noise levels by 2 to 3 dBA, which is considered a high impact.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-10** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Table 4-10 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 6 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 6 range from about $60 to $670 million. Strategies C and E would be several orders of magnitude less costly than Strategy D, ranging from $64-98 million. Strategy D would range from $461 to $666 million. Strategy D's higher cost would result not only from the greater number of lanes being added relative to the other build strategies, but also largely from the need to acquire right-of-way and to build elevated structures not necessary for the other strategies.

4.3.7 Segment 7 (I-10 to SR-60)

The MOEs for Segment 7, I-10 to SR-60, are summarized in **Table 4-11** and are discussed below.

<u>Category 1: Transportation System Performance</u>

<u>Sub-Category 1A: Transportation Supply</u>

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity
- Peak Period Transit Service

<u>Vehicle Capacity</u>
Total vehicle capacity on Segment 7 would range from 16,800 passenger cars per hour (pcph) under Strategies A and B, to 21,000 pcph under Strategies C and E, to 25,200 pcph under Strategy D. Since this MOE reports vehicle capacity for the total of both directions of travel, it should be noted that Segment 7 would contain an equal number of lanes in both directions under all strategies. Note that on this segment Strategy E would involve the addition of one general-purpose lane in each direction, rather than two reversible managed lanes.

<u>Peak Period Transit Service</u>
The TSM/TDM measures common to Strategies B through E would increase the frequency of southbound express bus service during the AM peak period and northbound service during the PM peak period to 4 buses per hour, relative to only 2 to 4 buses during the entire peak period under Strategy A (No-Build). Strategy C would further increase the southbound AM and northbound PM peak period express bus service to 8 buses per hour. This translates into less than 8 minutes between buses on average, a significant improvement over the Strategy A (No-Build) condition of 2 to 4 buses during the entire peak period.

<u>Sub-Category 1B: Travel Demand and Patronage</u>

Several Travel Demand and Patronage MOEs were calculated:

- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)

- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic

Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A. ADT under Strategies C through E would increase by 4% to 13% relative to Strategy A.

The breakdown of ADT by vehicle group would be roughly 65% SOV, 20% HOV, and 15% truck for all strategies. ADT growth for each vehicle category (SOV, HOV, truck) would range from 1% to 9% under Strategies C through E, with two exceptions. HOV ADT would grow by 25% under Strategy C and truck ADT would grow by 35% under Strategy D.

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 7 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 50% SOV, 40% HOV, and 10% trucks, as opposed to 65% SOV, 20% HOV, and 15% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Strategy B would change peak period traffic minimally relative to Strategy A for all peak periods and directions, ranging from -1% to 1%.

For the remaining three strategies, C through E, traffic change would range from 2-21% amongst the time periods, directions, and strategies. Growth per each of the three vehicle groups (SOV, HOV, truck) would have a broader spread, ranging from 2% to 16% for SOV, 0% to 43% for HOV, and -1% to 47% for truck.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic. As can be seen in **Table 4-11,** daily and PM peak period traffic would be split about 50/50 between the northbound and southbound directions, while AM peak period traffic would have a northbound bias.

Specifically, about 48-49% of daily traffic would travel in the southbound direction. The three vehicle groups (SOV, HOV, truck) individually would range from 47-52% southbound on a daily basis. Total, SOV, and HOV traffic would range from 48-52% southbound during the PM peak period, while truck traffic would range from 43-46% southbound. During the AM peak period 43-44% of total traffic would travel southbound overall, while 42-43% of SOV, 35-36% HOV, and 54-57% of truck traffic would.

None of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. Overall, the percentage of total traffic that is heavy trucks would range from 13% to 23% amongst the various time periods and strategies. The highest percentage of trucks would be seen during the AM peak period in the southbound direction, ranging from 20% to 23% under all strategies. The percentages during the remaining periods and directions and would range from 13% to 20%.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. For all strategies, 5-7% of daily traffic would be light-heavy, medium-heavy, and heavy-heavy trucks each. Summing the heavy-heavy, medium-heavy, and light-heavy categories results in 15-19% total heavy trucks.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

Volume-to-capacity ratios on Segment 7 would range from 0.87 to 1.12 under Strategy A (No-Build) conditions during the peak periods. Strategy B would change V/C ratios negligibly relative to Strategy A. Strategies C through E would reduce V/C ratios by 0.02 to 0.21 relative to Strategy A, resulting in V/C ratios ranging from 0.71 to 1.09 in the general-purpose lanes. The HOV, truck, and reversible managed lanes of Strategies C through E would have V/C ratios ranging from 0.43 to 0.66, with one exception. The southbound HOV lane of Strategy C would have a V/C ratio of 0.90 during the PM peak period.

Travel Time

Travel times on Segment 7 would range from 2.7 to 4.5 minutes amongst the strategies and time periods.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?

- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-11,** the overall degree of improvement to operations and safety on Segment 7 would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D.

Category 2: Environmental Impacts

Right-of-Way Acquisition

There would be no right-of-way impacts under Strategies A, B, and E within this segment. Strategies C and D would result in approximately ½ acre and 17 acres respectively of right-of-way acquisition.

Land Use

Residential – There would be no impacts to residential land uses under any of the strategies because there are no residential land uses located within this segment.

Commercial/Industrial – Strategies A, B, and E would not result in acquisition of additional right-of-way within commercial and industrial areas. Strategy C would result in less than one acre of impact and Strategy D would result in approximately 8 acres of impact within commercial/industrial areas.

Parks/Recreation – There would be no impacts to parks and recreational land uses under any of the strategies because there are no parks or recreational facilities located within this segment.

Public Services/Utilities – Strategies A and B would not affect public services and utilities as they would not require any additional right-of-way. Strategies C and E would not affect public services and utilities because they would not need additional right-of-way adjacent to public service facilities/utilities. Strategy D would result in less than an acre of impact.

Local Roadways – Strategies A and B would not affect local roadways because they would not require additional right-of-way. Strategies C and E would not affect local roadways since they do not require additional right-of-way that would involve realignment of local roadways. Strategy D would result in approximately 17 acres of impact to local roadways due to the acquisition of Kettering Drive and South Rochester Avenue.

Other – Strategies A and B would not affect adjacent land uses as they would not require any additional right-of-way. Strategies C and E would not affect any land uses defined as other because they would not need additional right-of-way adjacent to those resources. Strategy D would affect approximately eight acres of land uses defined as other.

Special Resources
Biological – Within this segment the only sensitive species identified is the Burrowing owl (*Athene cunicularia*).

Strategies A and B would not impact biological resources because the I-15 footprint would not change under these strategies. Strategies C and E would not affect biological resources since they do not require additional right-of-way adjacent to those resources. Strategy D would affect the Burrowing owl and less than one acre of habitat.

Historic – There would be no impacts to historic resources under any of the strategies because there are no historic resources within this segment of the I-15 corridor.

Water – There would be no impacts to water resources within this segment under any of the strategies. Day Creek runs parallel to the I-15 approximately 800 feet at its closest point within this segment. It is not anticipated that the creek would be affected by any of the strategies.

Farmlands – There would be no impacts to farmlands under any of the strategies because there are no farmlands within this segment of the I-15 corridor.

Environmental Justice
There would be no impacts to environmental justice under any of the strategies because there are no low-income or minority household areas within this segment of the I-15 corridor.

Noise
There would be no impacts to sensitive receivers under any of the strategies because there are no sensitive receivers located within this segment.

Air Quality
Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-11** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range
Table 4-11 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-

Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for Strategy B on Segment 7 due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on Segment 7 would range from about $30 to $300 million. Strategies C and E would be several orders of magnitude less costly than Strategy D, ranging from $27-61 million. Strategy D would range from $205 to $296 million. Strategy D's higher cost would result not only from the greater number of lanes being added relative to the other build strategies, but also largely from the need to acquire right-of-way and to build elevated structures not necessary for the other strategies.

4.3.8 I-15/I-215 Interchange

Category 2 and 3 measures were analyzed for the I-15/I-215 interchange separately. Separating the interchange from the adjacent segments was not suitable for the Category 1 measures. **Table 4-12** summarizes the analysis results. As can be seen in the table, two interchange options were studied:

- Option 1: Interchange Reconfiguration
- Option 2: Interchange Reconfiguration and Truck Bypass Lanes

Strategies C and E were analyzed assuming Interchange Option 1, while Strategy D was analyzed assuming Interchange Option 2.

Category 2: Environmental Impacts

Right-of-Way Acquisition

Option 1 under Strategy C and Option 2 under Strategy D would both result in approximately four acres of right-of-way acquisition at the interchange. Option 1 under Strategy E would result in approximately three acres of right-of-way acquisition.

Land Use

Residential – There would be no impacts to residential land uses under any of the strategies, because additional right-of-way would not be required adjacent to residential land uses in the area.

Commercial/Industrial – There would be no impacts to commercial/industrial land uses, because additional right-of-way would not be required adjacent to commercial/industrial land uses in the area.

Parks/Recreation – There would be no impacts to parks and recreational land uses under any of the strategies, because additional right-of-way would not be required adjacent to these land uses in the area.

Public Services/Utilities – There would be no impacts to public services or utilities under any of the strategies, because additional right-of-way would not be required adjacent to public service facilities/utilities in the area.

Local Roadways – None of the strategies would result in impacts to local roadways, because additional right-of-way requirements would not affect local roadways located adjacent to the interchange.

Other – Option 1 under both Strategy C and E would affect approximately four acres of land uses defined as other. Option 2 under Strategy D would affect approximately 5 acres.

<u>Special Resources</u>
Biological – Both options under any of the strategies would result in impacts to federally listed, threatened, or endangered species or their critical or sensitive habitat as a result of the reconfiguration of the interchange and the addition of lanes. Option 1, under both Strategies C and E, and Option 2 under Strategy D would have impacts on sensitive species and habitat. Potential impacts to biological resources include seven species and approximately seven acres of habitat.

Historic – There would be no impacts to historic resources within this segment under any of the strategies.

Water – The Cajon Creek Wash crosses the I-15 freeway in the vicinity of this interchange. A 100-year floodplain is associated with the wash. Option 2 under Strategy D will require additional right-of-way adjacent to the Cajon Creek Wash but is not anticipated to result in impacts to hydrology, water quality, and floodplains. Option 1 under either Strategy C or E would require negligible widening compared to Option 2 and is also not anticipated to have impacts on hydrology, water quality, and floodplain.

<u>Environmental Justice</u>
Both options under any of the strategies would result in impacts to areas identified as minority and/or low-income neighborhoods. Option 1 would result in approximately four acres of acquisition and Option 2 would result in approximately three acres of acquisition.

<u>Noise</u>
Both options under any of the strategies would result in low impacts to noise sensitive receivers. Option 1 under Strategies C and E proposes to add additional traffic lanes and widen the interchange, which would increase traffic and move travel lanes closer to the Glen Helen Campground and residences located north of the interchange. These changes are anticipated to result in an increase in existing noise levels of 1 to 2 dBA, which is considered a low impact.

Option 2 under Strategy D also proposes widening the interchange and adding truck bypass lanes. Noise sensitive receivers located within this area are currently shielded from freeway noise by the natural terrain. The addition of truck by-pass lanes may result in modifications to the natural topography which may affect this natural buffer. It is anticipated that an increase in the existing noise level of 1 to 2 dBA would occur, which is considered a low impact.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-12** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Table 4-12 shows the estimated cost ranges for implementing Strategies A through E. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There is no cost range shown for the I-15/I-215 Interchange under Strategy B due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E on the I-15/I-215 Interchange would range from about $60 to $270 million. Strategies C and E would be less costly than Strategy D, ranging from $60-98 million. Strategy D would range from $95 to $272 million.

4.3.9 Analysis Across Segments and Strategies

This section synthesizes and builds upon the segment-by-segment analysis of the previous section. **Table 4-13** summarizes a subset of the evaluation measures across the seven study segments and strategies. It also contains a summary of volume-to-capacity ratios based on Sensitivity Test forecasts that were developed to investigate the impacts of varying demand forecasting assumptions. **Figures 4-5** through **4-25** illustrate several of the measures across segments and strategies using bar charts.

The discussion below is grouped into the three MOE categories, as was the segment-by-segment analysis.

Category 1: Transportation System Performance

Sub-Category 1A: Transportation Supply

Two Transportation Supply MOEs were calculated:

- Vehicle Capacity
- Peak Period Transit Service

Vehicle Capacity
Segments 1 and 2 would have the fewest general-purpose lanes of all the segments, with only 3 per direction under Strategies A through D. Segment 3 would be the only segment with an unequal number of general-purpose lanes in each direction with four running southbound and five running northbound under all strategies. Segments 4 through 7 would have four lanes in each direction under all strategies except Strategy E

Strategy E is the only strategy that involves the addition of general-purpose lanes. Under Strategy E, one general-purpose lane per direction would be added on Segments 1, 2, 6, and 7. Thus, under Strategy E, Segments 1 and 2 would have four lanes per directions and Segments 6 and 7 would have five lanes per direction.

Under Strategies A and B the I-15 study corridor would only contain general-purpose lanes, while under Strategies C through E other lane types would be added. Strategy C would add one HOV lane per direction on all segments. Strategy D would add two truck lanes per direction on all segments. Strategy E would add two reversible managed lanes on Segments 3, 4, and 5 only. As mentioned earlier, Strategy E would add general-purpose lanes on the remaining segments.

Peak Period Transit Service
Peak period transit service would run at the same frequency on all study segments under any given strategy. As mentioned earlier, there would be variation in transit frequencies amongst the strategies.

Sub-Category 1B: Travel Demand and Patronage

Several Travel Demand and Patronage MOEs were calculated:
- Average Daily Traffic
- Average Daily Person Trips
- Peak Period Traffic
- (AM Northbound, AM Southbound, PM Northbound, PM Southbound)
- Directional Split - % Southbound
- (Average Daily Traffic, AM Peak Period, PM Peak Period)
- Percent Heavy Trucks
- (ADT, AM Northbound, AM Southbound, PM Northbound, PM Southbound)

Average Daily Traffic
Average daily traffic (ADT) would change negligibly under Strategy B relative to Strategy A for all segments. ADT under Strategies C through E would change by -2% to 13% relative to Strategy A for all segments.

As can be seen in **Table 4-13** and **Figure 4-5**, ADT would be highest on Segment 7, ranging from about 265 to 270 thousand vehicles. Segments 4 and 6 would have the next highest ADT, ranging from about 190 to 205 thousand vehicles. The remaining segments, 1-3 and 5, would have the lowest ADT, ranging from 135 to 155 thousand vehicles.

The breakdown of ADT by vehicle group would vary amongst the segments. It would roughly vary as follows amongst the segments: 50-65% SOV, 15-20% HOV, and 15-35% truck. SOV ADT ranges from approximately 73 to 183 thousand amongst all segments and strategies, while HOV ADT ranges from about 23 to 69 thousand and truck ADT ranges from about 28 to 57 thousand.

As can be seen in **Figures 4-6** through **4-8**, the highest SOV and HOV ADT would occur on Segment 7, while truck ADT would be highest on Segments 3 and 4 with one exception. The highest truck ADT amongst all segments and strategies occurs on Segment 7, under Strategy D.

To confirm the relationship and impact of the I-710 and SR-60 truck lanes on I-15, model output from the SCAG RTP network forecasts (both with and without the I-710 and SR-60 truck lanes) were compared with the forecast for Strategy D. The results of this comparison confirmed there is negligible impact relating to truck demand for I-15 and the presence of truck lanes on I-710 and SR-60. Generally, forecast results for I-15 Strategy D were consistently higher that those for the SCAG RTP reflecting the results of post processing of model results to better represent observed traffic conditions within the I-15 study corridor. The notable exception was the segment of I-15 from I-10 to SR-60 where the SCAG 2030 Plan forecasts were higher reflecting the influence of truck lanes on SR-60 and the shifting of truck traffic away from parallel facilities. Similarly, despite the increased truck volumes in the segment of I-15 from I-10 to SR-60 (Segment 7), overall truck demand for the study corridor (particularly through Cajon Pass) remained consistent when compared between the SCAG 2030 Baseline scenario (without truck lanes) and the SCAG 2030 Plan scenario (including truck lanes on I-710, SR-60 and I-15).

Table 4-14 summarizes the comparison of model output results for the SCAG RTP network forecasts and the evaluation of Strategy D as part of this study.

Table 4-14 Comparison of SCAG 2004 RTP Model and I-15 Comprehensive Study Truck Forecasts Average Daily Truck Volumes on the I-15 Study Corridor

Study Segment / Forecast Scenario	Segment 1 D St to Bear Valley Rd	Segment 2 Bear Valley Rd to US-395	Segment 3 US-395 to SR-138	Segment 4 SR-138 to I-215	Segment 5 I-215 to SR-210	Segment 6 SR-210 to I-10	Segment 7 I-10 to SR-60
SCAG RTP04 Year 2030 Baseline [1]	23,871	32,195	37,366	42,363	38,029	30,105	49,411
SCAG RTP04 Year 2030 Plan [2]	24,952	33,991	38,986	45,256	40,372	30,509	69,378
I-15 Comprehensive Study Strategy D - Truck Lanes [3]	35,237	43,079	48,664	50,161	40,316	32,319	56,828

Notes:
[1] - Does not include dedicated truck lanes on any facility
[2] - Includes dedicated truck lanes on I-710 from Port of Los Angeles/Long Beach to SR-60, SR-60 from I-710 to I-15, and I-15 northerly from SR-60
[3] - Includes dedicated truck lanes on I-15 only from SR-60 to Mojave River

Average Daily Person Trips

Average daily person trips would exhibit trends similar to ADT on Segment 7 with one notable exception. The breakdown of average daily person trips by vehicle group would be roughly 40-50% SOV, 30-40% HOV, and 10-25% trucks, as opposed to 50-65% SOV, 15-20% HOV, and 15-35% truck for ADT.

Peak Period Traffic

AM and PM peak period traffic was analyzed by direction (northbound, southbound) and vehicle group (SOV, HOV, truck). Strategy B would change peak period traffic minimally relative to Strategy A for all peak periods, directions, and segments, ranging from -3% to 2%.

For the remaining three strategies, C through E, traffic change would range from -8% to 21% amongst the time periods, directions, segments, and strategies. Growth per each of the three vehicle groups (SOV, HOV, truck) would have a broader spread.

Directional Split (% Southbound)

Directional split was reported as the percent of total traffic traveling in the southbound direction. The directional split was tabulated for daily, AM peak period, and PM peak period traffic.

For a given segment, none of the strategies would cause a substantial shift in directional split relative to Strategy A on a daily basis or during the peak periods. However, directional split during a given period did vary by segment. Daily traffic would range from 48% to 53% traveling southbound. AM peak period traffic traveling southbound would range from 43% to 61%, thus having a southbound bias on some segments and a northbound bias on others. PM peak period traffic traveling southbound would range from 41% to 53%.

Percent Heavy Trucks

The percent of all traffic that would be heavy trucks was computed for daily traffic and by direction for the AM and PM peak periods. Overall, the percentage of total traffic that is heavy trucks would range from 11% to 35% amongst the various time periods, strategies, and segments.

The percent per each of the three sub-categories of heavy trucks (light-heavy, medium-heavy, and heavy-heavy) was also computed for daily traffic. Segments 1 through 6 would have a similar composition in that a small portion of trucks would be light-heavy or medium –heavy, and the majority of trucks would be heavy-heavy. Segment 7 would have a unique composition in that the light-heavy, medium-heavy, and heavy-heavy components would be about equal.

Sub-Category 1C: Traffic Congestion Relief

Two primary types of Traffic Congestion Relief MOEs were calculated for AM Northbound, AM Southbound, PM Northbound, and PM Southbound conditions:

- Volume-to-Capacity (V/C) Ratio
- Travel Time

Volume-to-Capacity Ratio

Volume-to-capacity ratios in the general-purpose lanes under Strategy A (No-Build) would range broadly from 0.48 to 1.39 amongst the various peak periods, directions, and study segments. Strategy B would change V/C ratios negligibly relative to Strategy A for all peak periods, directions, and study segments. Strategies C through E would reduce V/C ratios by varying degrees, with V/C ratios in the general-purpose lanes ranging from 0.34 to 1.20 amongst the various peak periods, directions, and study segments.

Demand in the general-purpose lanes would be less than capacity with V/C ratios less than 1.0, except on Segments 4 and 7 whose V/C ratios would exceed 1.00 during certain time period-direction combinations. Specifically, during the AM peak period, V/C ratios in the northbound general-purpose lanes would exceed 1.00 on Segment 7 under Strategies A through D. Strategy E would result in a V/C ratio 0f 0.88. In the southbound direction, on the other hand, AM peak period V/C ratios in the general-purpose lane would exceed 1.00 on Segment 4 under Strategies A through D. Strategy E would result in a V/C ratio of 0.94.

During the PM peak period, the northbound general-purpose lanes would have V/C ratios over 1.00 on Segment 4 under all strategies, and on Segment 7 under Strategies A through D only. The V/C ratio on Segment 7 under Strategy E would be 0.91. In the southbound direction, the PM peak period V/C ratios would exceed 1.00 on Segment 4 under Strategies A, B, and E and on Segment 7 under Strategies A, B, and D.

The HOV, truck, and reversible managed lanes of Strategies C through E would have V/C ratios ranging from 0.14 to 0.66, with three exceptions. The reversible managed lanes of Strategy E would have a V/C ratio of 0.81 on Segment 4 during the PM peak period. Also, the HOV lane of Strategy C would have a PM peak period V/C ratio of 0.90 during in the southbound direction on Segment 7 and a V/C ratio of 0.78 in the northbound direction on Segment 4. The V/C ratios of 0.78 and 0.90 indicate that the single lane HOV facility of Strategy C would be near and beyond the threshold of acceptable and effective operations on these segments.

Travel Time

Under free-flow conditions, it would take autos about 38 minutes to travel the full length of the corridor. Given the slower speed of trucks, it would take about 48 and 41 minutes in the northbound and southbound directions, respectively, to travel the full length of the corridor in the truck lanes. Corridor travel times under Strategies A and B would range from 2 to 19 minutes above free-flow conditions. Strategies C through E would offer some improvement with corridor travel times ranging from 0 to 7 minutes over free-flow conditions.

Strategy E would offer the lowest travel times in the general-purpose lanes during the AM peak period in both the northbound and southbound directions. During the PM peak period, Strategy E would offer the lowest general-purpose lane travel time in the northbound direction, and Strategy D would in the southbound direction. Overall, Strategy E would offer the lowest travel time in the general-purpose lanes, exceeding free-flow conditions by a maximum of 3 minutes amongst all four peak period and direction combinations.

Volume-to-Capacity Ratio – Sensitivity Test

A Sensitivity Test was performed to determine the effects of varying the demand forecasting assumptions. The higher levels of demand would cause a noticeable deterioration in volume-to-capacity ratios as can be seen in **Table 4-13**. The highest V/C ratios would still occur on Segments 4 and 7, however several of the remaining segments would also have V/C ratios over 1.0 under all or some of the strategies.

The Sensitivity Test also would result in some V/C ratios over 1.00 in the truck and reversible managed lanes of Strategies D and E, respectively, as can be seen in **Table 4-13**. As can also be seen in the table, the HOV lanes of Strategy C would be near and beyond the threshold of acceptable and effective operations on several segments under Sensitivity Test conditions.

Sub-Category 1D: Operations and Safety

Degree of Improvement to Operations and Safety

The degree of improvement to operations and safety was assessed on a low-moderate-high scale based on three contributing factors:

- Would the strategy reduce the number of trucks in the general-purpose lanes (based on travel demand distribution)?
- Would the strategy reduce congestion in the general-purpose lanes (based on V/C ratio)?
- Would the strategy incorporate TSM/TDM measures with operational and safety benefits?

As shown in **Table 4-13,** the overall degree of improvement to operations and safety would range from "low" for Strategy B, to "moderate" for Strategies C and E, to "high" for Strategy D for all segments.

Category 2: Environmental Impacts

Based on the evaluation of environmental and socioeconomic impacts discussed below, Strategy D with Option 2 would have the greatest potential impact among the proposed strategies. This strategy would require the greatest amount of additional right-of-way (approximately 275 acres), and thus have greater impacts on sensitive land uses and on biological, historic, water, and farmland resources. Strategy D would also affect the greatest number of acres of minority and low-income neighborhoods and result in higher increases in noise levels. In comparison, Strategy C with Option 1 would have the next highest level of impacts, with approximately 22 acres of additional right-of-way required, followed by Strategy E with Option 1, which would require approximately ten acres of additional right-of-way. Strategies A and B would have minimal environmental and socioeconomic impacts, since they would not change the freeway footprint and would not require additional right-of-way.

Right-of-Way Acquisition

Table 4-13 shows the total number of acres of right-of-way needed for each of the strategies. Strategy A and Strategy B would not require additional right-of-way or property acquisition. Relative to Strategy A and B, Strategies C, D, and E would each require additional right-of-way needed to accommodate the transportation capital investments. Of these, Strategy D would require the greatest number of acres, with approximately 275 acres needed, followed by Strategy C with approximately 22 acres needed, and Strategy E requiring approximately 10 acres.

Land Use

For each land use type considered, **Table 4-13** indicates the number of acres that would be affected under each strategy.

Residential – Strategies A and B would not affect residential uses within the corridor area. Strategy E with Option 1 is not expected to result in direct impacts to residential land uses. Strategy C with Option 1 would affect approximately two acres of residential areas, and Strategy D with Option 2 would affect approximately nine acres of residential areas located adjacent to I-15, where additional right-of-way would be required. The greatest impact for both strategies would occur in Segment 1 where residential uses are adjacent to the freeway.

Commercial/Industrial – Strategies A and B would not affect commercial uses within the corridor area. Strategy E with Option 1 is not expected to result in direct impacts to commercial land uses. Strategy C with Option 1 would affect a little more than one acre of commercial areas, and Strategy D with Option 2 would affect approximately 53 acres of commercial areas located adjacent to I-15, where additional right-of-way would be required.

Parks/Recreation – Based on preliminary engineering, Strategies A and B would not affect parks or recreational facilities within the corridor area. Strategy E with Option 1 is not expected to result in direct impacts to parks or recreational facilities. Strategy C with Option 1 would affect less than one acre of parks or recreational uses, and Strategy D with Option 2 would affect approximately 26 acres of parks or recreational uses located adjacent to I-15, where additional right-of-way would be required.

Public Services/Utilities – Public services and utilities may include, but are not limited to, police and fire stations, electrical or gas lines, libraries, and hospitals. Based on preliminary engineering, Strategies A, B, and E with Option 1 would not affect public services or utilities.

Strategies C with Option 1 and D with Option 2 would affect less than one acre and seven acres respectively.

Local Roadways – Based on preliminary engineering, Strategies A and B would not affect local roadways within the corridor area. Strategies C and E with Option 1 are not expected to result in impacts to local roadways because widening adjacent to frontage roads that parallel the freeway are anticipated to be accommodated within the median area between the freeway and frontage road. Strategy D with Option 2 would realign approximately 159 acres of local roadways, where additional right-of-way along I-15 would be required.

Other – Based on preliminary engineering, Strategies A and B would not affect land uses within the "other" land use category.

Strategies C and E with Option 1 and D with Option 2 would result in right-of-way acquisitions under this land use type. Strategy C would result in approximately six acres of acquisition. Strategy D would result in approximately 160 acres of impact and Strategy E would only affect three acres of "other" land use types.

Special Resources

Special resources include biological (sensitive, threatened, and endangered species and CNDDB habitat), historic (resources and districts), water (waterways, floodplains, wetlands, and water quality), and farmlands (prime, unique, local and statewide importance). **Table 4-13** indicates the number of species and acreage of habitat affected for each strategy, the number of historic resources that is affected by each strategy, the number of waterways each strategy crosses, which would also indicate potential impacts to floodplains, wetlands, and water quality, and the acreage of important farmland soils within the corridor.

Biological – Potential impacts on biological resources were evaluated for each strategy, by comparing areas where sensitive species and/or their habitat have been identified and locations where widening would be required along the I-15 corridor. Strategies A and B would not affect biological resources within the corridor because the I-15 footprint would not change. Strategies C and E with Option 1 would each potentially affect a total of 21 different sensitive species located within a quarter mile of the freeway centerline. In comparison, Strategy D with Option 2 would potentially affect a total of 32 different species within a quarter mile of the freeway. Although Strategies C and E may affect the same number of species, Strategy C may indirectly and/or directly affect approximately 5,240 acres of biological resources while Strategy E may affect approximately 6,220 acres. Overall, Strategy D would have the greatest potential impact since it may indirectly and/or directly affect approximately 8,810 acres of California Natural Diversity Database (CNDDB) habitat.

Historic – Strategies A and B would have no affect on historic resources because the I-15 footprint would not change and there would be no new construction within the corridor.

Strategies C and E with Option 1 would not require additional right-of-way near historic resources so they are not anticipated to have long-term impacts on historic resources. Construction activities associated with these two strategies may result in indirect impacts to historic resources that could include short-term noise and visual impacts. Strategy D with Option 2 would require additional right-of-way that could impact two historic resources as a result of right-of-way acquisition, grading, or excavation activities. Right-of-way acquisitions and grading may also affect as yet unidentified resources within the corridor. In addition, Strategy D could result in indirect, construction related impacts on historic resources that could include short-term noise and visual impacts due to construction.

Water – Strategies A and B would have no effect on water resources because the I-15 footprint would not change and there would be no new construction within the corridor.

Strategies C with Option 1, D with Option 2, and E with Option 1 could affect water resources with the potential to impact hydrology, water quality, and floodplains. Several waterways cross the I-15 Corridor and would be affected by proposed project improvements either as a result of construction activities or right-of-way requirements. Strategy D is anticipated to have the largest impacts on these resources due to the amount of additional right-of-way needed for this strategy. Strategy E is anticipated to have the least amount of impact because it requires only a minimal amount of additional right-of-way.

Farmlands – For important farmland soils, **Table 4-13** indicates the number of acres that would be affected under each strategy. The types of important farmland soils identified include: prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance.

Strategies A and B would have no impacts on farmlands because under A and B the I-15 footprint would not change. Strategy E is not expected to result in direct impacts to farmland resources. Strategy C would affect less than one acre of important farmland soils, and Strategy D would affect approximately 15 acres of important farmland soils located adjacent to I-15, where additional right-of-way would be required.

Environmental Justice

The evaluation of environmental justice considered potential impacts to areas that are primarily characterized by minority and/or low-income households (i.e., census tracts with higher percentages of minority and/or low-income households compared to City or County levels). These areas were identified using 2000 census data and compared to local data where the proposed project would require additional right-of-way. **Table 4-13** shows the acreage of minority and/or low-income neighborhoods located within the conceptual freeway footprint, in areas where additional right-of-way would be required and thus result in Environmental Justice issues.

Strategies A and B would not disproportionately affect minority and/or low-income households because the I-15 footprint would not change. Modest improvements to the level of service provided to minority and low-income households would occur under Strategy B.

Strategy D with Option 2 would have the greatest impact to minority and/or low-income neighborhoods, particularly those located within Segments 1, 5, and 6, due to additional right-of-way requirements, resulting in partial or full property takes. At the same time, this strategy would also provide substantial improvements to the level of service provided to residents along the project corridor, including minority and low-income households. Strategies C and E with Option 1 would have substantially less impacts to minority and/or low-income neighborhoods because the additional right-of-way requirements would be minimal near areas characterized by minority and/or low-income households; approximately 13 acres and four acres for strategies C and E respectively. Substantial improvements to the level of service provided to minority and low-income households would occur under both strategies.

Noise

Noise measurements taken along the study corridor showed the existing noise level ranging from a low of 70 dBA to a high of 72 dBA. Because the existing noise level within the study corridor already approaches or exceeds the noise abatement criteria (NAC) noise level, any proposed improvements would require a detailed noise study. For purposes of evaluating the proposed strategies, impacts were determined based on the expected change in existing traffic noise level for the length of freeway frontage (for sensitive receptors) that would be affected. For example, if the existing noise level increased by 2 to 3 dBA and several miles of frontage were affected, the impact would be considered high. An increase of 1 to 2 dBA was considered a moderate impact and an increase of less than 1 dBA was considered a low impact. The amount of frontage affected could increase a low impact (less than 1 dBA increase) to a low-moderate or moderate impact if several miles were affected. Noise impacts were rated as high, moderate or low.

Strategy A is expected to have little to no impacts on existing noise level because all of the projects planned and committed for the No-Build condition are anticipated to have their own noise studies and mitigation in place. Strategy B includes TDM/TSM improvements that would have no impact on existing noise levels with the exception of coordination to maximize off-peak truck usage. This coordination would move heavy truck traffic to off-peak hours which would result in higher noise levels in the off-peak hours and would expose the area to a higher noise level over a longer time frame. However, these higher noise levels are anticipated to be less than 1 dBA resulting in a low impact on the existing peak hour noise levels.

Strategy C with Option 1 would have moderate impacts on existing noise levels as a result of the addition of one HOV lane in each direction, which would affect noise sensitive receivers located adjacent to the I-15 corridor. The proposed HOV lanes would require widening the existing freeway, resulting in travel lanes being located in closer proximity to adjacent homes. The HOV lanes would also allow for increased traffic flow. The increase in traffic flow and proximity of travel lanes to adjacent homes is anticipated to cause traffic noise levels to increase by 1 to 2 dBA, overall a moderate impact. Strategy D with Option 2 would add two physically separated truck lanes in each direction. Addition of the truck lanes would move travel lanes closer to noise sensitive receivers located adjacent to the I-15 corridor and would allow for increased traffic flow. The increase in traffic flow and proximity of truck-travel lanes to adjacent noise sensitive receivers is anticipated to cause traffic noise levels to increase by 2 to 3 dBA, an overall high impact. Strategy E with Option 1 would add two physically separated, managed lanes or two general-purpose lanes within the I-15 corridor. The additional travel lanes are anticipated to increase existing noise levels by 1 to 2 dBA. Since a majority of the noise sensitive receivers are located away from the freeway and in some areas are protected from freeway noise by topography and vegetation, the impact associated with the increased noise level is anticipated to be moderate.

Air Quality

Air quality impacts were assessed for the corridor as a whole on a regional level rather than for each segment individually. **Table 4-13** highlights the regional significance of each alternative for each pollutant using the CEQA significance thresholds. Projects with operation-related emissions that would exceed any of the emission thresholds are considered significant.

Strategies B and C of the proposed project are predicted to reduce or not significantly increase regional emissions burdens. Strategies D and E are predicted to significantly increase regional emissions of CO and NOx. Once the strategies are further refined, a regional analysis should be conducted again to determine if the projects are regionally significant.

Category 3: Cost-Effectiveness and Feasibility

Cost Estimate Range

Table 4-13 shows the estimated cost ranges for implementing Strategies A through E on each segment and for the corridor as a whole. As can be seen in the table, there would be no cost for implementing Strategy A (No-Build) since it was assumed that any improvements contained within it will have been fully funded and built separately. There are no segment-by-segment cost ranges shown for Strategy B due to the corridor-wide nature of its TSM/TDM strategies. It was estimated to cost $10-$25 million to implement Strategy B for the entire corridor.

The costs to implement Strategies C through E would range from about $500 million to $3.5 billion. Strategies C and E would be several orders of magnitude less costly than Strategy D, ranging from $5497-830 million. Strategy D would range from $2 to $3.5 billion. Strategy D's higher cost would result not only from the greater number of lanes being added relative to the other build strategies, but also largely from the need to acquire right-of-way and to build elevated structures not necessary for the other strategies.

Comparing costs across segments reveals that certain segments contribute disproportionately to the total cost. Strategy C would cost between $38 and $103 million to implement on Segments 1-3 and 5-7, as well as on the I-15/I-215 interchange. However, it would cost slightly more to implement this strategy on Segment 4, with costs ranging from $119 to $172 million.

Similarly, Strategy E would cost $22 to $98 million to implement on Segments 1-2 and 6-7, as well as on the I-15/I-215 interchange. However, it would cost between $109 and $204 million to implement this strategy on Segments 3-5.

The largest variations in segment cost could be found under Strategy D. Segments 2-5 and 7, as well as the I-15/I-215 interchange would cost between $95 and $398 million to implement. On the other hand, the costs of Segments 1 and 6 would be $453-$1045 and $461-$666 million, respectively.

4.3.10 Detailed Evaluation Grading Matrix

The analysis was further compressed into a Grading Matrix to facilitate comparison and decision-making. The Grading Matrix was used in conjunction with the tables and charts discussed previously to comparatively evaluate the five strategies.

The Grading Matrix is illustrated in **Figure 4-26**. It ties the detailed evaluation directly to the stated project goals by summarizing the potential of the five strategies to achieve each of the stated project goals. The five strategies are listed along the x-axis from left to right, while the six stated project goals are listed on the y-axis from top to bottom. Goals 1 and 6 were broken down into three parts to better represent their breadth. In contrast, Goals 4 and 5 were consolidated given their interrelationships.

Each cell in the matrix reflects the ability of a given strategy to achieve a given project goal based on a five point scale, as discussed previously in **Section 4.1.4**. **Table 4-2**, as presented earlier in **Section 4.1.4,** summarizes the grading methodology for each goal. This section focuses on the results and conclusions of the Grading Matrix.

As can be seen in **Figure 4-26,** Strategies A and B would not effectively achieve goals 1 through 5, but obviously would be highly feasible and would have low cost. Although Strategy B would have minimal benefit, given the low cost of achieving this benefit, it is a very cost-effective strategy. The TSM/TDM measures of Strategy B have been included in Strategies C through E for this reason.

Strategies C and E perform similarly, although Strategy E slightly outperforms Strategy C on some fronts. Both strategies would have similar potential to achieve Goal 1, reducing congestion. However, Strategy E has slightly more potential than Strategy C during the weekend peak periods because the direction of flow of the managed lanes could be reversed to best meet the unique directional peaking during weekends. The two strategies were estimated to have approximately the same potential to achieve Goals 2 through 5. In regards to Goal 6, cost-effectiveness, Strategy E's feasibility would be slightly better than Strategy C, although its cost would also be slightly higher.

Strategy D has some notable differences relative to Strategies C and E. It's effectiveness at achieving Goal 1, congestion reduction, would be comparable except during the weekend peak periods. The exclusive nature of the truck lanes of Strategy D combined with generally lower truck volumes during weekend peaks would limit the effectiveness of this strategy to reduce congestion during weekend peaks. As would be expected, Strategy D would be the most effective at improving goods movement, Goal 2, but the least effective at improving transit service, Goal 3. Its ability to improve safety and operations, Goals 4 and 5, would be greater than Strategies C and E since it would be the only strategy to physically separate a substantial portion of trucks from the general-purpose traffic.

Perhaps the most marked distinction between Strategy D and Strategies C and E, relates to Goal 6, for which Strategy D received the lowest score. Strategy D would not effectively achieve Goal 6, cost-effectiveness, primarily due to its high cost ranging from about $2 to $3.5 billion. Also, its higher right-of-way requirements and environmental impacts substantially reduce its feasibility.

SECTION 5 PUBLIC OUTREACH PROGRAM

As part of the I-15 Comprehensive Corridor Study, a comprehensive Public Outreach Program was completed in order to ensure public input throughout the study process.

Strategy

The strategy for the public outreach program was as follows:

- Provide project information to key stakeholders (local residents, businesses, property owners, elected officials, major business interests, and primary community organizations) and the public at large.
- Focus public and agency input on:
  - The purpose and need for improvements
  - The near, mid- and long-term problems that need to be solved
  - The range of alternatives being considered
- Utilize clear and concise written, visual and oral information to inform the public about the study objective.

Principles

The public outreach program was based upon a set of core outreach principles:

- Provide multiple opportunities for information-sharing and public involvement
- Apply cost-effective tactics that will result in demonstrable input
- Work seamlessly with the technical analysis
- Document input and provide to technical team for consideration

Format

The public outreach program was implemented in two phases:

Phase I: Prior to the development of alternatives (April, 2004)
Phase II: During the detailed evaluation of project alternatives (March, 2005)

As part of each phase, a project fact sheet was developed, and surveys of corridor travelers were conducted. A press release announcing the survey locations and the community workshop was distributed to surrounding media.

The Phase I survey results assisted the technical team in understanding the local vision and set of expectations for the project so that the team could proceed with the development of alternatives within a community context. During Phase II of the Public Outreach Program, the public outreach efforts focused on presenting project findings about specific alternatives for review and comment to the community. The results of the Phase II survey effort assisted the project team in formulating its recommendations for the I-15 study corridor.

The remainder of this section details the methodology and results of the public outreach program and is divided into the following subsections:

- Survey Overview
- Survey Locations
- Survey Methodology

- Phase I Survey Results
- Phase II Survey Results
- Conclusions

5.1 SURVEY OVERVIEW

In order to better determine a sense of community sentiment for the project, surveys of the general public were developed and implemented. To obtain the greatest mass of survey participants, a variety of methods was used including public surveying at locations along the corridor, direct mail to adjacent property owners along the corridor, completion of the survey online at the project website, and distribution to selected groups as requested. The purpose of the survey for Phase I was to obtain commuter views and opinions about traffic on the I-15 and determine potential solutions as well. The Phase II survey presented five strategies selected for detailed evaluation by the project team and asked commuters to share their views and opinions on the strategies presented. The survey was completed in English and Spanish.

A summary of Phase I and II survey results is contained here in the body of this report. Complete survey results are available under separate cover, as part of technical memorandums documenting the Public Outreach Program.

5.2 SURVEY LOCATIONS

Phase I and II survey intercept dates, locations and number of surveys completed are summarized in **Tables 5-1** and **5-2.**

5.3 SURVEY METHODOLOGY

The surveys were designed to be completed by respondents without assistance. Through the direct mail and website methods, the surveys were completed directly by respondents. At the survey intercept locations – in an effort to generate greater participation – respondents were asked the questions and responses were noted by in-person surveyors.

Table 5-1 Phase I Survey Intercepts

Date	Location, Survey Method and Hours	Surveys Completed	Percentage
Thursday, March 11, 2004	Pilot Truck Stop I-15 at US-395 in Hesperia *Weekday targeting truckers* 11 AM – 1:30 PM	33	6%
Sunday, March 14, 2004	Pilot Truck Stop I-15 at US-395 in Hesperia *Weekend targeting recreational commuters* 12 noon – 5 PM	39	7%
Saturday and Sunday, March 20 & 21, 2004	Mall of Victor Valley Bear Valley Road in Victorville *Weekend targeting general population* 12 noon – 5 PM	94	17%
Monday, May 3,2004	Wal-Mart Foothill Boulevard in Rancho Cucamonga *Targeting general population* 4 PM – 8 PM	9	2%
Through May 3, 2004	Direct Mail 1,550+ addresses *Targeting community database* • Includes Fontana residents surveys distributed by Fontana Councilwoman Acquanetta Warren • Includes completed surveys from Environmental Justice presentation to the Latino Business Council of the Ontario Chamber of Commerce	150	27%
Through May 3, 2004	Online SANBAG website *Targeting general public*	235	42%
TOTAL SURVEYS COMPLETED		560	100%

Table 5-2 Phase II Survey Intercepts

Date	Location, Survey Method and Hours	Surveys Completed	Percentage
Thursday, March 24, 2005	Pilot Truck Stop I-15 at US-395 in Hesperia *Weekday targeting truckers* 11 AM – 2 PM	27	3%
Saturday, March 26, 2005	Victorville Swap Meet San Bernardino County Fair Grounds in Victorville *Targeting general public*	52	6%
Thursday, March 31, 2005	Etiwanda Gardens Etiwanda Avenue at I-15 in Rancho Cucamonga *Targeting general public and agency representatives*	8	1%
March 18 – April 7, 2005	Online SANBAG website *Targeting general public* Direct Mail 1,550+ addresses *Targeting community database*	728	90%
TOTAL SURVEYS COMPLETED		**815**	**100%**

5.4 PHASE I SURVEY RESULTS

The following presents the results of each survey question for Phase I. Complete survey tabulation results are available under separate cover. The survey consisted of two qualifying questions, and seven user questions as follows:

- Qualifying Question #1: Recency of Use
- Qualifying Question #2: Residency
- User Question #1: Frequency of Use
- User Question #2: User Types
- User Question #3: On Ramps/Off Ramps
- User Question #4: Traffic Issues
- User Question #5: Rating Traffic Congestion
- User Question #6: Potential Solutions
- User Question #7: Additional Information

A summary of responses to these nine questions are discussed in the subsections below.

In addition to the nine questions, surveys gave respondents the opportunity to provide contact information should they wish to be included on the project database for future mailings.

5.4.1 Qualifying Question #1: Recentness of Use

In an effort to eliminate any responses from individuals not familiar with the conditions of the I-15, respondents were first asked if they had traveled on the I-15 within the last month. Respondents who answered affirmatively continued with the survey. A total of 560 respondents indicated they traveled on the I-15 within the last month.

5.4.2 Qualifying Question #2: Residency

The majority of the respondents were from the High Desert area. A significant number of respondents (151 or 27%) were from other cities throughout the state, i.e. Duarte, El Monte, Fort Irwin, Wrightwood, Loma Linda, as well as various Orange County and South Bay cities. Of those categorized in the "In State" category, 114 respondents completed the survey on-line. **Table 5-3** shows the results of this survey question.

Table 5-3 Qualifying Question #2: Residency (Phase I Survey Results)

City of Residence	Total Responding	Percentage
Other (in State)	151	27%
Victorville	101	18%
Hesperia (including the community of Oak Hills)	93	17%
Fontana	58	10%
Apple Valley	46	8%
Out of State	24	4%
Devore	16	3%
Corona (including the community of Eastvale)	17	3%
Adelanto	10	2%
Phelan	10	2%
Rancho Cucamonga	10	2%
Ontario	8	2%
Mira Loma	6	1%
Did Not Indicate	7	1%
Las Vegas area	3	.5%

5.4.3 User Question #1: Frequency of Use

Respondents were asked to indicate their frequency of use of the I-15. The overwhelming majority of respondents (311 or 56%) indicated that they used the I-15 daily. **Table 5-4** summarizes the results of this question.

Table 5-4 User Question #1: Frequency of Use (Phase I Survey Results)

Frequency of Use	Total Responding	Percentage
Daily	311	56%
2-3 times per week	113	20%
Once a week	28	5%
Several times a month	54	10%
Monthly	33	6%
Less than once a month	21	4%

5.4.4 User Question #2: User Types

A total of 286 (51%) respondents indicated that their use of the I-15 freeway can be best described as a "long distance commuter" traveling twenty miles or more, one-way. **Table 5-5** summarizes the results of this question.

Table 5-5 User Question #2: User Types (Phase I Survey Results)

Description of Use	Total Responding	Percentage
Long distance commuter (more than 20 miles, one-way)	286	51%
Local commuter (less than 20 miles, one-way)	116	21%
Short trips (shopping, school, etc.)	59	11%
Trucker	46	8%
Recreational traveler (Las Vegas, mountains, deserts)	34	6%
Other	21	4%

Total percentage exceeds 100% as some respondents selected more than one answer.

5.4.5 User Question #3: On Ramps/Off Ramps

Respondents were asked to indicate the on ramps and off ramps most frequently used on the I-15. The majority of respondents listed ramps in the High Desert area. The total responses provided exceeded the number of survey respondents because multiple ramp names were listed by some respondents. A total of 47 of the 155 respondents included under the category of "Other", provided a ramp name of Oak Hills Road which is not an actual ramp name, but rather refers to an area located in Hesperia. **Table 5-6** summarizes the results of this question.

5.4.6 User Question #4: Traffic Issues

Respondents were asked to identify primary traffic issues on the I-15. Respondents were asked to list all traffic issues they could come up with and indicate whether they thought the issue was a major, moderate or minor traffic issue. Respondents were also asked to indicate the location of the issue. Most traffic issues identified were listed as "major" concerns by the respondents. Most respondents also indicated that the traffic issues were applicable to the entire stretch of the I-15. Due to the volume of responses, specific location details are not included in this summary, but are available under separate cover.

A total of 938 issues were identified by respondents. The issues identified can be generally categorized as being either behavioral in nature or a highway condition. **Table 5-7** summarizes some of the top responses.

Table 5-6 User Question #3: On Ramps/Off Ramps (Phase I Survey Results)

Ramp Name (North to South)	Total Responding	Percentage*
Stoddard Wells Road	6	.5%
D Street/National Trails Road	50	4%
Mojave Drive/6th Street	17	1%
Roy Rogers Drive	28	2%
Palmdale Road/Highway 18	60	4%
Bear Valley Road	142	10%
Main Street	107	8%
U.S. 395	68	5%
Highway 138/Pearblossom Highway	82	6%
Cleghorn Road	3	.3%
Kenwood Avenue	12	1%
Interstate 215	55	4%
Glen Helen Parkway	9	1%
Sierra Avenue	43	3%
Summit Avenue	25	2%
State Route 210	78	6%
Baseline Road	66	5%
Foothill Boulevard	87	6%
4th Street	67	5%
Interstate 10	66	5%
Jurupa Street	26	2%
State Route 60	42	3%
Limonite Avenue	25	2%
Sixth Street	13	1%
Second Street	3	.3%
Hidden Valley Parkway	9	1%
State Route 91	18	1.5%
Other	155	11%

**In most cases, respondents provided more than one answer, thus percentages are reflective of total responses provided, not total respondents.*

Table 5-7 User Question #4: Traffic Issues (Phase I Survey Results)

Behavioral Conditions
▪ Inadequate enforcement of highway laws or presence of law enforcement
▪ Trucks travel too slowly
▪ Poor driving skills (tailgating, excessive speeding, cutting off other drivers, unsafe lane changes)
Highway Conditions
▪ Excessive traffic/congestion (most frequently cited concern)
▪ Eliminate speed differential between truckers and motorists
▪ Construction issues (poorly planned, poorly lit at night, taking too long)
▪ Poor location for truck scales
▪ Poor maintenance of interstate (surface conditions, debris)
▪ Merging and reduction of lanes
▪ Inadequate number of lanes
▪ No carpool lane available
▪ Need truck only lane (truck climbing lane also)
▪ No alternatives when freeway is closed due to weather or accidents
▪ Off ramp traffic backs up onto freeway (ramp size too small to accommodate volume of traffic)
▪ Inadequate number of freeway on and off ramps (Cherry, Nisqualli, Hesperia and Victorville area in general, north or south of Limonite)
▪ I-15 and I-215 interchange is inadequate
▪ Soundwalls or other noise reduction measures are needed near residential areas
▪ Need more commuter transportation options (Metrolink)
▪ No parallel surface roads available
▪ Center dividers too close to freeway lanes (Victorville to Barstow)

5.4.7 User Question #5: Rating Traffic Congestion

On a scale of 1 to 5, with 1 being traffic is heavy, 3 being traffic is average, and 5 being traffic is light, respondents were asked to rate traffic congestion on the I-15. The overwhelming majority of respondents indicated that traffic congestion is heavy on the I-15. **Table 5-8** summarizes responses to this survey question.

Table 5-8 User Question #5: Rating Traffic Congestion (Phase I Survey Results)

1 Heavy	2	3 Average	4	5 Light
222	172	94	1	16

5.4.8 User Question #6: Potential Solutions

Respondents were provided a list of eight potential solutions to solving problems on the I-15 and were asked to select those that were applicable. Multiple solutions were selected by most respondents. Respondents listed adding more lanes to the freeway and rebuilding the I-15/I-215 interchange as the priority solutions. Due to the volume of responses, specific location details are available under separate cover. **Table 5-9** summarizes responses to this survey question

Table 5-9 User Question #6: Potential Solutions (Phase I Survey Results)

Solution	Total Responding	Percentage
Adding more lanes to the freeway	368	20%
Rebuilding the I-15/I-215 interchange	333	18%
Add new truck only lanes to the freeway	247	14%
Add Metrolink service to Victorville	213	12%
Upgrade existing interchanges	185	10%
Add new carpool lanes to the freeway	184	10%
Building new interchanges	169	9%
Other potential solutions*	82	4%
More bus service	44	2%

*Other potential solutions noted include the following:

- Add express toll lanes
- Move truck scales to north of the Cajon pass
- Separate carpool freeway
- Modify speed limit
- Resurface the roadway (surface markings too)
- Create alternate routes
- Add speed trains (MagLev)
- Increase highway patrol presence on the freeway
- Better control of growth to match growth of transportation in the area

5.4.9 User Question #7: Additional Information

Respondents were given an opportunity to provide any additional information not previously discussed in the survey. Most respondents tended to restate information previously provided in the survey. Comments not previously mentioned elsewhere include the following:

- Highway speed is too low on flat lands, needs to be raised to 65 mph for trucks
- Take cars off the road by license plate number, using the bus/Metrolink
- Need more rest stops
- More control of speed during snow
- Drivers need to learn how to merge and stop cutting off drivers

- Need to connect State Route 138 to more roads – Sawpit Canyon near Water Road to Silverwood extend to State Route 138
- Add more lights – hazardous
- Add emergency parking along Interstate 15 to the 215
- Have a few more off ramps with facilities – when commuters are stopped on freeway for hours due to accidents – they have no facilities in their cars – as motor homes and truckers do
- No more bonds and loans – the land is paid for through the 15 Corridor
- Trucks heading south just cresting the summit as it flattens out before the emergency gravel pit- motorists pull in front of whomever at 41 miles per hour because the truck in front of them is only doing 40 and kill someone doing 75 miles per hour. Truckers need dedicated lanes in this area and if they come out of those lanes they lose their license
- Need alternate routes when disaster strikes; maybe revamp Old Route 66 or designate the Devore Pavilion to Sheep Creek as an emergency route
- Cajon Pass: Smart road technology should be utilized to more effectively monitor road and weather conditions since there is no alternate route. Communication to the public needs to be more direct via traffic cameras and vehicle speed detectors. Enforcement of basic traffic laws and road rage behavior would help tremendously in reducing accidents; right now it's a free for all.
- Since there is no reasonable direct alternate route to Interstate 15 between Cleghorn and Oak Hill, bicyclists are allowed to use the shoulder of this portion of freeway. While freeway shoulder use by cyclists has been demonstrated to be reasonably safe, having an alternate route in the vicinity of the freeway would provide a much more pleasant riding experience for touring cyclists, as well as provide an alternate route for motorists in the event of congestion or a collision on the freeway.
- Old Route 66 needs to be re-connected with State Route 138 so that an alternate route between the high desert and San Bernardino/LA exist for the many times when the Cajon junction is closed down.

5.5 PHASE II SURVEY RESULTS

The following presents the results of each survey question for Phase II of the Public Outreach Program. Complete survey tabulation results are available under separate cover. The Phase II survey consisted of eight questions. Additionally, respondents were given the opportunity to provide contact information to be included on the project database for future mailings.

A summary of responses to these questions are discussed in the subsections below and are organized as follows:

- Questions #1 and #2: Residency and Travel Frequency
- Question #3: User Types
- Question #4: Rank the Alternatives
- Question #5 and #8: Other Improvements to I-15
- Question #6 and #7: Willingness to Pay a Toll

5.5.1 Residency and Travel Frequency (Questions #1 and #2)

The majority of the respondents were from the High Desert area (444 or 46%). A significant number of respondents (267 or 33%) were from other cities throughout the San Bernardino Valley. The remaining respondents (104 or 21%) indicated that they reside in other areas.

Respondents were asked to indicate their frequency of use of the I-15. The overwhelming majority of respondents (444 or 54%) indicated that they used the I-15 daily. **Table 5-10** summarizes responses to these questions.

Table 5-10 Residency and Frequency of Use (Phase II Survey Results)

Frequency of Use	Live in San Bernardino Valley	Live in High Desert	Live in Other Areas	Total Responding	Total Percentage
Daily	36%	73%	26%	444	54%
2-3 times per week	19%	10%	25%	122	15%
Once a week	8%	4%	8%	48	6%
Several times a month	19%	9%	14%	106	13%
Monthly	8%	3%	13%	47	6%
Less than once a month	9%	2%	14%	48	6%

5.5.2 User Types (Question #3)

A total of 481 (59%) respondents indicated that their use of the I-15 freeway can be best described as a "long distance commuter" traveling 20 miles or more, one-way. **Table 5-11** summarizes responses to this survey question.

Table 5-11 User Types (Phase II Survey Results)

Description of Use	Total Responding	Percentage
Long distance commuter (more than 20 miles, one-way)	481	59%
Local commuter (less than 20 miles, one-way)	108	13%
Recreational traveler (Las Vegas, mountains, deserts)	96	12%
Short trips (shopping, school, etc.)	67	8%
Other	36	4%
Trucker	26	3%

5.5.3 Rank the Alternatives (Question #4)

This question consisted of two parts that first asked respondents to first rank the alternatives provided from 1 (best) to 5 (worst) and then second, provide an explanation of why they selected the alterative they like the most. **Tables 5-12** and **5-13** summarize responses to this survey question.

Table 5-12 Rank the Alternatives - Score (Phase II Survey Results)

Alternative	Live In San Bernardino Valley	Live In High Desert	Live In Other Areas	All Areas
	Avg. Ranking	Avg. Ranking	Avg. Ranking	Avg. Ranking
A - No-Build	4.6	4.7	4.6	4.7
B - TSM	3.4	3.4	3.5	3.4
C - HOV	2.6	2.6	2.7	2.6
D - Exclusive Truck Lane	2.6	2.5	2.3	2.5
E - Managed Lane	2	1.8	2.1	1.9

Table 5-13 Rank the Alternatives – Supporting Comments (Phase II Survey Results)

Ranking	Alternative	Supporting Comment
1	Alternative E The "reversible lane" alternative	▪ Better for commuters/alleviates congestion/flexibility ▪ Cost effective/efficient alternative ▪ Alternative works will elsewhere/good past experience
2	Alternative D The "exclusive truck lane" alternative	▪ Trucks impede speed of traffic/cause congestion/biggest part of traffic problem ▪ Trucks need to be separate from autos
3	Alternative C The "high occupancy vehicle" alternative	▪ Encourages carpooling ▪ Personally benefits me
4	Alternative B The "transportation system management" alternative	▪ Lesser of the evils ▪ Most cost effective alternative
5	Alternative A The "No-Build" alternative	▪ Other alternatives not good enough

5.5.4 Other Improvements to I-15 (Questions #5 and #8)

Questions #5 and #8 were very similar; therefore responses from both questions have been combined and are presented here. These questions asked for comments on any other improvements to the I-15 that should be considered. The following is a list of the most frequently mentioned issues/items. **Table 5-14** summarizes responses to these survey questions.

Table 5-14 Other Improvements to I-15 (Phase II Survey Results)

Issue/Item	Percentage
Fix the I-15/I-215 interchange	20.0%
Add mass transit/commuter rail/light rail/Maglev through the pass	10.0%
Add additional general-purpose lanes to the freeway	9.2%
Restrict travel times for trucks	7.1%
More CHP	7.0%
Reopen Route 66	6.5%

Other issues/items noted include the following (not in order or importance):

- Decrease road grade through the pass
- Meter the on-ramps
- Dedicated off-ramps to the malls/build more off ramps/grade separations
- Build lanes before cities build on vacant land adjacent to freeways
- Double deck the freeway
- Create a new north/south freeway
- Improve interchanges with I-15
- Add HOV
- Increase the length of slow truck lanes
- Add truck connector/bypass at 215/15
- Add rest stops
- Create express routes to Las Vegas
- Use trains to ferry RV's and trucks
- Keep trucks in slow lane
- Decrease speed limit
- More call boxes
- Improve signage/lane stripping
- Road maintenance
- Need alternatives for accidents (i.e. turn around and exit freeway)
- Screen accidents to minimize gawking
- Combine multiple alternatives
- Get rid of "Barstow" on signage
- Add more surface streets
- Decide and get it done
- Reserve the ROW
- Quit building
- Provide additional carpooling advantages
- Tolls for peak traffic, including weekends

5.5.5 Willingness to Pay a Toll (Questions #6 and #7)

For question 6, truck drivers were given the following scenario: "if an exclusive truck lane were available that would save you 15 minutes of travel on the I-15, how much of a toll would you be willing to pay for that time savings?" Auto drivers were asked, "if toll lanes were available that would save you 15 minutes of travel on the I-15, how much of a toll would you be willing to pay for that time savings?"

Reponses from both truck drivers and auto drivers indicated that the majority would be unwilling to pay a toll for the time savings. However, of those that were willing to pay a toll, truck drivers would be willing to pay an average of $7.92, while auto drivers would be willing to pay an average of $1.70. **Table 5-15** summarizes responses to these survey questions.

Table 5-15 Willingness to Pay a Toll (Phase II Survey Results)

By Type of Driver	Percentage
Truck Driver	
Not willing to pay a toll	54%
Willing to pay a toll	46%
Average amount of those willing to pay	$7.92
Auto Driver	
Not willing to pay a toll	56%
Willing to pay a toll	44%
Average amount of those willing to pay	$1.70

5.6 PUBLIC OUTREACH CONCLUSIONS

All of the public input gathered over the course of the Public Outreach Program was provided to the project team at each interval so that public comments could be considered on an ongoing basis as the alternatives were being developed. The survey responses were excellent, with over 800 surveys completed for Phase II, and provided useful input to the project team as they are believed to be representative of regular users of the I-15 corridor.

Two elements of the Phase II survey results were of particular Interest to the project team as recommendations for the I-15 study corridor were developed: Ranking of Alternatives and Willingness to Pay Tolls. **Tables 5-12** and **5-15** summarize these responses, respectively.

Responses to the "ranking of Alternatives" survey question indicated that Alternative E was preferred most by survey respondents, and Alternative A was preferred least.

SECTION 6 RECOMMENDATIONS FOR THE I-15 STUDY CORRIDOR

Recommendations for the I-15 study corridor were formulated based on the detailed evaluation of the five strategies, as well as on the public outreach efforts described in the previous sections. The recommendations also acknowledge the status of ongoing planning initiatives by the cooperative client agencies for the study. The final recommendations to be carried forward into future phases of the project development process were based on consecutive consideration by the project team, project Technical Advisory Committee (TAC), and the Project Policy Committee. The TAC consisted of technical staff representing each of the client agencies, the cities within the study corridor, the County of San Bernardino, the County of Riverside, the federal oversight agencies and other affected local and regional transportation agencies (including the Riverside County Transportation Commission and the Western Riverside Council of Governments). The Project Policy Committee consisted of the members of the SANBAG Plans and Programming Committee (PPC) and several elected representatives from Riverside County.

The project team worked with the TAC throughout the analysis process to both inform and receive input on the analysis methodology and results. This process culminated in the April 11, 2005 TAC meeting where the project team's preliminary recommendations were presented to the TAC for consideration and were approved and supported by the TAC. These recommendations were then carried forward to the Project Policy Committee. At the April 20, 2005 PPC meeting, the Project Policy Committee reviewed and approved the project team and TAC's recommendations with one addendum; the inclusion of one general-purpose lane per direction north of US-395 and south of SR-210 in the Strategy C & E Hybrid option in addition to the HOV lanes identified for these segments.

The recommendation has three parts. These parts are as follows:

- *Part 1: Implementation of Strategy B TDM/TSM elements*
- *Part 2: Reconfiguration of the 15/I-215 Interchange*
- *Part 3: Delineation of two future build strategies to advance for further project development*
    - *Strategy D – Dedicated Truck Lanes (two lanes in each direction from SR-60 to the Mojave River)*
        - *Option A: With Provision for long combination vehicles (LCVs)*
        - *Option B: Without provision for LCVs*
    - *Strategies C & E Hybrid - Reversible Managed Lanes with HOV Lanes (two reversible managed lanes from SR-210 to US-395 and the addition of one HOV lane and one general-purpose lane in each direction south of SR-210 and north of US-395)*

The next few subsections define each part in greater detail, explain the basis for their inclusion in the recommendations, and discuss special issues such as toll operations. Specifically,

- **Section 6.1** discusses Recommendation Part 1
- **Section 6.2** discusses Recommendation Part 2
- **Section 6.3** discusses Recommendation Part 3

6.1 RECOMMENDATION PART 1: IMPLEMENTATION OF STRATEGY B TDM/TSM ELEMENTS

The first part of the recommendation involves the implementation of Strategy B (TDM/TSM). Strategy B consists of travel demand management (TDM) and transportation system management (TSM) elements that address existing and future needs in the corridor. The implementation of such measures provides modest benefit to the corridor for a limited cost and with low impacts. For this reason, the elements of Strategy B should be implemented within the study corridor irrespective of any further capital improvements in the corridor, at a time when each of the elements is warranted based on operational need and cost-effectiveness. These elements include:

- Additional ramp metering at interchanges.
- Improved freeway directional signage.
- Increased traffic enforcement.
- Expanded truck emission reduction programs.
- Coordination with major truck trip generators to maximize off-peak truck usage of the corridor.
- Increased 'Express Bus' service.
- Enhanced local bus service (local circulators).
- Expanded corridor Intelligent Transportation Systems (ITS).
- Emphasize ITS connectivity and dissemination of information.
- Enhanced Freeway Service Patrol during peak travel periods.
- Coordination with major intermittent event trip generators (such as Glen Helen Pavilion, California Speedway) to minimize impacts during peak travel periods.

In addition to the previously defined elements of Strategy B, several complementary TSM improvement opportunities have been identified through the technical analysis and public outreach efforts. It is recommended that the following additional TSM improvements be included as part of Strategy B for implementation:

- Providing auxiliary lanes between key interchanges along I-15, particularly SR-60 to I-10, to improve traffic flows within these areas of considerable weaving, merging and diverging.
- Providing better linkages from I-15 to Devore Road and SR-138 to allow Cajon Boulevard to be utilized as an alternative to I-15 in the event of a major incident or closure on I-15.
- Redesign or relocation of the Cajon Junction Truck Scales to minimize the effects of trucks queuing, weaving and accelerating/decelerating at the base of the Cajon grade and in the vicinity of SR-138.

6.2 Recommendation Part 2: Reconfiguration of I-15/I-215 Interchange

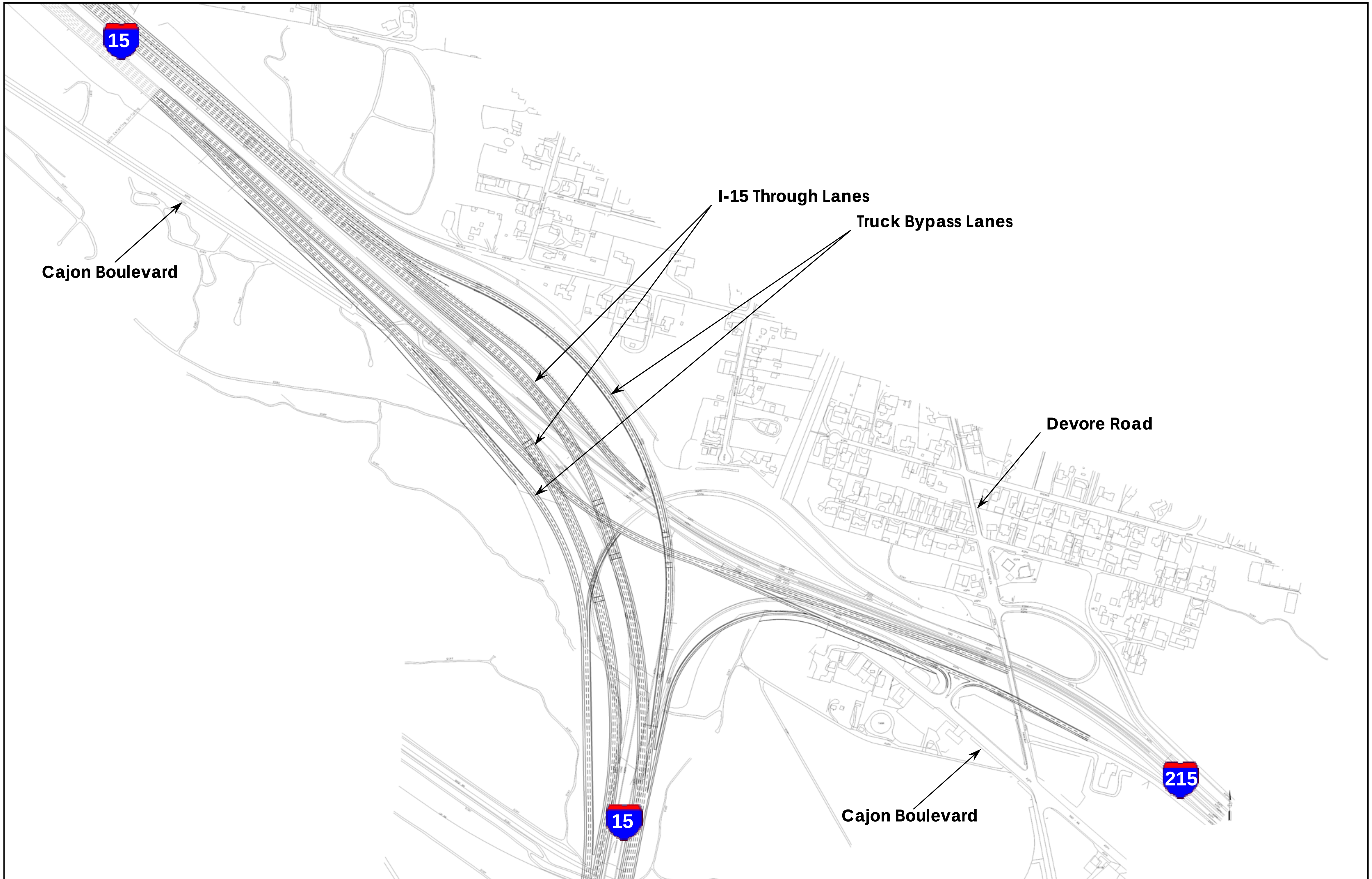
The results of the review of existing conditions on I-15 and findings from the public outreach efforts associated with the study both clearly identify the immediate need to reconfigure the I-15/I-215 interchange to better facilitate primary traffic movements. This interchange is recognized as the primary bottleneck in the corridor and improvement of the interchange identified as the highest priority for this corridor.

Improvement of this interchange should be completed in the following three phases to realize the most immediate benefits to motorists:

- Phase 1 – Eliminate the northbound drop lane on the I-15 connector ramp. This has recently been completed with restriping of the ramp and adjacent I-215 lanes by Caltrans.
- Phase 2 - Extend the northbound merge area on I-15 as an interim improvement to better facilitate the merging of traffic from I-215 and I-15.
- Phase 3 - Reconfigure the interchange to establish I-15 as the primary movement by providing four through lanes in each direction on I-15 through the interchange. Additionally,
  - Provide truck bypass lanes on I-15 through the interchange to minimize the impact of truck traffic and to reduce the potential for conflict between trucks and traffic entering/exiting I-15 to I-215.
  - Connect Devore Road and Cajon Boulevard through the interchange and improve Cajon Boulevard from the interchange to Cleghorn Road to enhance the use of Cajon Boulevard as a potential alternate route to I-15 during emergencies.
  - Preserve the ability to implement future corridor improvements through the interchange with minimal need to modify the reconfigured interchange and associated structures.

Figure 6.1 illustrates a conceptual layout for the reconfigured I-15/I-215 interchange including the provision of truck bypass lanes along I-15.

Figure 6.1 I-15/I-215 Interchange Conceptual Reconfigured Layout with Truck Bypass Lanes



6.3 RECOMMENDATION PART 3: ADVANCE TWO FUTURE BUILD STRATEGIES FOR FURTHER EVALUATION AND PROJECT DEVELOPMENT

The results of the alternatives analysis and public outreach have highlighted the relative benefits and associated costs of implementing the various strategies previously identified. However the findings of these efforts have also highlighted contrasting results that will require more detailed evaluation and assessment to delineate the most appropriate improvement strategy for this corridor. For this reason, it is recommended that two future build strategies be advanced for further detailed evaluation and comparison as part of the project development process, ultimately leading to the identification of a Locally Preferred Strategy (LPS): Strategy D (Dedicated Truck Lanes) and the Strategies C & E Hybrid (Reversible Managed Lanes with HOV Lanes).

Specifically, it is believed that the final selection between Strategy D and the Strategies C & E Hybrid needs to remain open at this time for the following reasons:

- To be most effective, the dedicated truck lanes (Strategy D) should be part of a regional system. Yet there are multiple uncertainties concerning the feasibility and funding of the dedicated truck lanes. The regional truck lane system cannot be ruled out at this point nor can it be assumed to be feasible and fundable. A conclusion on the feasibility of the regional truck lane system will be reached as part of the Multi-County Goods Movement Action Plan (Action Plan). This effort will not be completed until late in calendar year 2006.

- The Strategies C & E Hybrid (reversible managed lanes) is feasible, fundable, and provides substantial benefits to both local and regional travelers. Its cost is substantially lower than Strategy D. However, it provides slightly less overall traffic benefit than Strategy D. The effectiveness and use of high occupancy vehicle lanes has been demonstrated in recent studies by the Los Angeles County Metropolitan Transportation Authority (MTA) and SCAG. The HOV lanes are therefore included in this alternative to maintain regional HOV lane connectivity.

It is expected that an additional recommendation for long term I-15 improvements will be developed by SANBAG, Caltrans, and SCAG staff following the completion of the Multi-County Goods Movement Action Plan.

The two subsections below expand on the two future build strategies recommended for further evaluation: Strategy D and the Strategy C & E Hybrid. They provide a brief description of the strategy, outline the basis for their recommendation, and discuss special issues such as toll collection and LCVs. As indicated previously, Conceptual engineering layouts for Strategies C, D and E are included in **Appendix A**.

6.3.1 Strategy D – Dedicated Truck Lanes

Strategy Description

This strategy proposes the construction of two dedicated truck lanes in each direction for the full length of the I-15 study corridor. There would be limited direct access from the truck lanes to those interchanges serving the highest truck traffic volumes. The cost is estimated to be between $2 billion and $3.5 billion. Most of the funding must come from user-based sources.

Basis for Recommendation

The results of the analysis of this strategy highlight the following reasons for its inclusion in the recommendations for the I-15 study corridor:

- This strategy specifically addresses goods movement within the study corridor by better accommodating the relatively high volume of trucks that use I-15 and the conflict that exists between trucks and other traffic, particularly in those areas of the corridor with significant grades.
- This strategy provides the best overall mix of congestion relief and operational improvement for the corridor by physically separating a large portion of the truck traffic in the corridor from the general-purpose traffic and thereby helping to reduce the conflict between automobile traffic and slower moving trucks.
- Congestion relief for the truck lanes is slightly better than the Strategies C & E Hybrid.
- The cost of constructing the truck lanes is $2.0 to $3.5 billion, three to four times the cost of the Strategies C & E Hybrid.
- This strategy enhances goods movement through the corridor and supports goods movement as a critical element of the regional and national economies.
- This strategy is consistent with the SCAG RTP which currently identifies truck lanes in this corridor. It is also consistent with ongoing regional initiatives to promote goods movement within the region. For instance, the County Transportation Commissions, Caltrans, and SCAG have recently initiated the Multi-County Goods Movement Action Plan effort. The findings of this action plan will likely influence the feasibility or need to provide truck lanes along I-15 as part of a greater regional effort.

Feasibility & Financing – Tolls, LCVs, and Partial Implementation:

As noted previously, this strategy has significant capital costs ($2.0 to $3.5 billion), environmental impacts, and community impacts associated with its implementation. Little, if any, funding would likely be available from Measure I, Federal funding, or State funding. A variety of alternative funding sources, such as container fees, were explored. In addition, the following three mechanisms for improving the physical and financial feasibility of this strategy were considered:

1. Tolling of Truck Lane Users
2. Allowing and Tolling LCVs in the Truck Lanes

3. Partial Implementation of the Strategy

Mechanism 1, tolling of truck lane users, was found to be ineffective. Under the normal demand forecasting scenario, no trucks were willing to pay tolls in order to use the truck lanes. Only under the Sensitivity Test which tested the impacts of varying the demand forecasting assumptions, were congestion levels sufficient to provide some incentive for trucks to pay tolls to use the truck lanes. Even given the Sensitivity Test levels of congestion, tolling of the truck lanes generated a minimal amount of revenue, and had the net effect of discouraging the use of the truck lanes by trucks. The separation of trucks from smaller vehicles would be the primary benefit of the truck lane strategy and tolling of the truck lanes would significantly negate this positive benefit.

Mechanism 2, allowing and tolling LCVs in the truck lanes, was considered given that the economic benefit of LCV operations might provide sufficient incentive for payment of truck lane tolls if LCVs were only allowed to operate in the truck lanes on the study corridor. As was the case with mechanism 1, Sensitivity Test levels of congestion would be needed to provide sufficient incentive to pay truck lane tolls. Sensitivity Test levels of congestion combined with the economic benefit of LCV operations, could result in a significant amount of truck lane toll revenue. It was estimated that the toll revenue could generate up to 20 to 30 percent of the funding needed to construct the lanes.

As was the case with the general truck lane tolling mechanism, the LCV tolling mechanism would substantially negate the primary positive benefit of the truck lane strategy: separation of trucks from smaller vehicle traffic. The truck lane tolls would reduce the number of trucks using the truck lanes, thereby increasing the number of trucks in the general-purpose lanes. Perhaps more significant are the impacts to truck and small vehicle interaction that would occur beyond the study corridor where LCVs would continue their journey in the general-purpose lanes, if legislation to allow LCVs on general purpose lanes were to be enacted. More likely, exclusive truck lanes would need to be extended to the Nevada State Line. These costs have not been included in the LCV alternative.

In either case, in order for the use of the facility by LCVs to be feasible, both federal and state legislative action would be required to allow vehicles to operate through the corridor to the Nevada state line. Thus, major Federal and State legislative hurdles exist as well.

Mechanism 3, partial implementation of the strategy, was the third approach to improving the financial and physical feasibility of the truck lane strategy. Building only a single lane in each direction in selected level portions of the corridor, building truck lanes in only one direction, or only building truck lanes on certain segments are some possibilities to consider. In particular, not building truck lanes in the Victorville area where substantial ROW acquisition would be necessary for implementation would greatly reduce the cost and improve the feasibility of the truck lane strategy.

6.3.2 *Strategy C and E Hybrid – Reversible Managed Lanes with HOV Lanes*

Strategy Description

This strategy combines elements of two previously defined and evaluated strategies by proposing the construction of a two lane, reversible managed lanes facility between US-395 and SR-210. This facility would be operated on a directional basis to service traffic flows in the peak flow direction benefiting the dominant direction flow of traffic through the study corridor. The facility would be served with limited, direct access to major interchange locations.

The managed lanes facility would most likely provide free access to transit service providers and high-occupancy vehicle (HOV) users. Value pricing could be used to 'sell' additional capacity to single-occupant vehicles (SOV) and to manage demand for the facility to ensure that an acceptable level of service is maintained.

To further facilitate use of the managed lanes by transit and HOV users, a single HOV lane in each direction would be provided north of US-395 and south of SR-210 for the balance of the study corridor (along with direct connectors from the managed lanes to US-395 and SR-210). The provision of HOV lanes to supplement the reversible managed lanes would allow transit services and HOV users to benefit from improved travel time and trip reliability within the study corridor serving as an incentive to ride transit and carpool.

This strategy provides a new mobility option for the corridor that will promote increased vehicle occupancies thereby improving the efficiency of traffic operation in the corridor by allowing more people to be moved in fewer vehicles. The cost to complete this strategy is estimated to be between $632 million and $913 million with most of the funding likely to come from user-based sources.

Acknowledging the marginal volume to capacity observed in some segments (most notably segments 6 and 7) under Strategies C and E, the Project Policy Committee recommended also including one additional general-purpose lane per direction north of US-395 and south of SR-210 in the Strategy C & E Hybrid option. The provision of one additional general-purpose lane at these locations is intended to provide capacity to better accommodate future demand at these locations.

Basis for Recommendation

Based on analysis of Strategy C and Strategy E, the Strategies C & E Hybrid would have the following characteristics to merit its inclusion in the I-15 study corridor recommendations:

- This strategy provides excellent overall congestion relief in the corridor, particularly within the segments served by the reversible managed lanes facility.
- This strategy provides the flexibility to respond to demand changes within the corridor by utilizing the reversible nature of the managed lanes to accommodate irregular traffic patterns (such as holiday traffic flows or as an alternative route option during incidents).

- This strategy supports transit service operations and carpooling to more efficiently move more people through the corridor.
- This strategy is consistent with the SCAG RTP (which identifies HOV lanes within the study corridor) and supplements the substantial regional investment to develop a comprehensive HOV system.
- This strategy is feasible to implement with a relatively moderate cost and low environmental and community impacts based on analysis of Strategy C and Strategy E. However, inclusion of the additional general-purpose lanes north of US-395 and south of SR-210 has not been analyzed as part of this study and should be studied as the project development process proceeds.
- This strategy provides the opportunity for revenues to be generated by selling additional capacity to SOV users and/or by using value pricing to manage demand.

SECTION 7 IMPLEMENTATION PLAN FOR THE I-15 STUDY CORRIDOR

Selection of a Locally Preferred Strategy (LPS) for the I-15 Corridor establishes the long-term blueprint for meeting corridor transportation needs over the next 25-30 years. Achievement of this vision involves a multi-step process to plan, fund, design, and construct the various components of the overall strategy. Phased implementation is essential, since funding will be obtained incrementally over time and improvements are not immediately needed throughout the corridor.

This chapter presents the plan for implementing the selected LPS for I-15 from SR-60 to the Mojave River. It includes an overview of the implementation process, identifies near-term improvement needs and general phasing strategies, evaluates funding options and recommends funding strategies, and presents an action plan of steps leading to implementation of the various improvements. Because two overall corridor improvement strategies are being carried forward pending the results of the multi-county freight strategy study, the implementation plan discusses the needs and implications of each strategy individually, particularly with reference to funding opportunities and the integration of the truck lane strategy with potential development of a regional truck lane system.

7.1 IMPLEMENTATION ISSUES AND FACTORS

7.1.1 Corridor Implementation Process Overview

The following briefly describes the traditional process that is followed for the planning, programming, design and construction of highway projects. Most of the major improvements in the I-15 LPS are highway improvements and will follow this process. The order of some steps may vary, depending on availability and sources of funding. For example, if the sponsoring agencies desire to advance a project's design phase to make it more viable in a competitive funding process, they may utilize local funds to develop the Project Report before the project is programmed in the Transportation Improvement Program.

1. A Regionally Significant Transportation Investment Study (RSTIS, also called a Major Investment Study or Major Corridor Study) is undertaken to identify the LPS for the corridor. This step has been mostly accomplished with the completion of this I-15 Comprehensive Corridor Study that identifies two candidate LPSs for the corridor. Final confirmation of a single LPS is anticipated based on the findings of the Multi-County Goods Movement Action Plan study.
2. The LPS is incorporated into the next update of the Regional Transportation Plan (RTP), which is anticipated to be completed by SCAG in 2008.
3. Planning is undertaken for individual projects through Project Study Reports (PSRs), which evaluate alternatives and identify a preferred concept and its approximate cost.
4. Funding is identified for an individual project (one component of the overall LPS), and the project is incorporated into the local and regional programming documents, as reflected in the Regional Transportation Improvement Program (RTIP).

5. Preliminary design is performed and environmental clearance is achieved through the Preliminary Engineering/Environmental Document (PR/ED) process. The PR/ED produces a refined design concept and cost.
6. Right-of-way is acquired to accommodate the project (if necessary).
7. Final design produces Plans, Specifications, and Estimates (PS&E), and brings the project to the point of being ready for construction.
8. The project is constructed.

It should be noted that the length of time required for each step varies depending on the size and complexity of the project, the presence of environmental or community impact issues, and the ease of assembling the needed funding.

7.1.2 Determination of a Final LPS

Because of the dual-strategy recommendation for I-15, determination of a final LPS and its incorporation into the RTP must await the results of the Multi-County Goods Movement Action Plan (MCGMAP) study. If that study includes this I-15 corridor in a regional system of truck lanes and identifies some type of regional goods movement fee (or an equivalent new and substantial source of funding) to fund the truck lane system, a truck lane system (Strategy D) will be further considered for adoption as the LPS by the SANBAG Board and the Riverside County Transportation Commission. If the MCGMAP does not recommend a regional system of truck lanes, or if it does not provide a funding mechanism that will generate sufficient funds for such a system, the hybrid reversible lane/HOV lane strategy will likely be the LPS for I-15.

After completion of the MCGMAP, SANBAG and RCTC, in conjunction with Caltrans and local jurisdictions in the corridor, will need to:

1. determine how the MCGMAP outcome affects the recommendation for the I-15 corridor
2. adopt a final LPS
3. forward the final I-15 LPS to SCAG for incorporation into the RTP update

In addition to the MCGMAP, SANBAG is undertaking the preparation of the Victor Valley Area Transportation Study (VVATS). This study is expected to consider a range of options to address goods movement within the High Desert area including improvements to facilities other than I-15. The findings of VVATS may also be useful in determining the most appropriate final LPS for the I-15 corridor.

7.1.3 Incorporation into the RTP

The next RTP update by SCAG is scheduled for adoption in 2008. The MCGMAP is an 18-month effort, scheduled for completion in late 2006. If the MCGMAP stays on schedule, the final I-15 LPS can be incorporated into the next RTP update, no matter which adoption date is applied.

Inclusion of the LPS in the RTP is an essential precursor to obtaining federal and state funding for a project, so if the corridor improvements are not part of the RTP, the process to plan, program, and construct the corridor improvements could be substantially delayed. However, even if the MCGMAP is delayed, it should not keep the I-15 corridor improvements out of the 2008 RTP update.

The 2004 RTP includes the following major improvements in the I-15 corridor:
- addition of HOV lanes (one each direction) from SR-60 to D Street (Mojave River)
- addition of a northbound truck climbing lane from Devore to Summit (now completed)
- construction of user fee-supported truck lanes from SR-60 to D Street (and beyond to Barstow)

The adopted RTP includes I-15 corridor improvements that have elements of each of the final strategies under consideration. If the MCGMAP is delayed beyond the deadline for RTP input, a placeholder could be included in the RTP to indicate the two final strategies under consideration and the conditions under which each would become the final preferred LPS.

Since the adopted RTP includes major improvements in the corridor, and since the MCGMAP should be completed in time for the final LPS to be incorporated into the next RTP update, SANBAG should proceed with the next steps to begin planning for the highest priority near-term improvement needs in the corridor.

7.1.4 Advancing Near-Term Improvements: I-15/I-215 Interchange

In this study's technical evaluation of congestion levels and improvement needs in the corridor, one fact was exceedingly clear: the I-15/I-215 interchange is the critical bottleneck in the corridor. The design of the interchange reduces the total number of through lanes on I-15 at the interchange (from 4 to 3 lanes in each direction) and requires lane changes for traffic staying on I-15 (the higher-volume movement through the interchange), whereas the lower-volume movement to/from I-215 uses the continuous lanes through the interchange. These two factors combine to cause substantial delays and long backups for northbound traffic in the afternoon peak period.

The volumes on the mainline segments of I-15 and I-215 both north and south of the interchange are within the respective capacities of those segments. If the interchange constraints could be remedied, the corridor would experience relief from most of the current congestion for several years without any other improvements being made. Improvement of the I-15/I-215 interchange is the highest priority need in the corridor, and should be the focus of near-term project implementation efforts.

As a first step, Caltrans is undertaking two State Highway Operation and Protection Program (SHOPP) projects to provide better operations and safer conditions for northbound traffic through this interchange area. The first project (recently completed) eliminated the lane drop for northbound traffic on the transition from I-15 onto the merged freeway with I-215. This additional lane becomes an auxiliary lane which exits the northbound freeway at Kenwood Avenue. The second project, currently in final design, provides an auxiliary lane from Kenwood Avenue north to Cleghorn Road. Both of these projects will improve traffic operations and safety for northbound traffic on I-15 by adding capacity for merging and weaving maneuvers. However, since both Kenwood Avenue and Cleghorn Road are low-volume interchanges, the addition of an auxiliary lane will only partially address the problems that are primarily caused by inadequate geometrics for the mainline-to-mainline merge.

To fully address this most critical need in the corridor, complete reconstruction of the interchange is needed. The new design should enable traffic remaining on I-15 to pass through the interchange without changing lanes, and should maintain the I-15 through lanes without a lane drop.

Currently there are no plans being developed for this type of improvement, though the recently-extended Measure I program includes a substantial amount of funding to improve this interchange. The implementation of a major reconfiguration to the I-15/I-215 interchange could proceed as a stand-alone project with independent utility and benefit regardless of the final LPS selection. The conceptual engineering layout plan for the I-15/I-215 interchange that is included in this report incorporates design considerations that could accommodate the future implementation of either candidate LPS along with the connection of Cajon Boulevard through the interchange.

SANBAG and Caltrans should consider promptly initiating appropriate project development efforts (a Project Study Report or a combination Project Study Report/Project Report) to identify more specifically the preferred design and estimated cost to improve this interchange to accommodate long-term traffic needs (including bypass lanes to remove trucks from the merge areas, and with the ability to fit either of the final two corridor improvement strategies). Since a substantial funding source is already available through Measure I, the agencies may consider proceeding directly into a combined Project Study Report/Project Report (PSR/PR). The preliminary cost estimates for the reconfiguration of the interchange range from approximately $60 million to $140 million depending on the extent of inclusion of ancillary improvements such as the truck bypass lanes.

The typically process for implementing this type of interchange improvement project can take over five years from inception to construction. The completion of this MIS provides the first step in the project development process having identified a project purpose and need, evaluating alternative options and concluding by identifying this project as a locally preferred strategy for improving mobility in the study corridor.

Following the completion of a MIS, the next step in the project development process is the preparation of a Project Study Report (PSR) which serves as the project programming document for Caltrans to continue to advance this project. At its meeting on December 12, 2005, the I-15 Technical Advisory Committee identified funding of the PSR or combined PSR/PR for the I-15/I-215 interchange reconfiguration as a “primary goal for FY 2006-2007”. If the PSR and PR are undertaken sequentially, it is expected that the preparation and approval of the PSR will take 1 year to 2 years to complete. Combining the PSR and PR has the potential for streamlining the project development efforts. These project development efforts will need to be considered in the context of the preparation of SANBAG’s Measure I Strategic Plan.

With the completion of a PSR, funding could be provided to initiate the preparation of a Project Report and Environmental Documentation (PR/ED) in FY 2007-2008. This process will allow for the preparation of preliminary engineering for the interchange modification and the detailed evaluation of environmental impacts associated with the improvements. Since the proposed improvements are likely to be contained predominately within existing Caltrans rights-of-way, it is possible that the PR/ED could be completed in 12 months to 18 months leading to Final Design in FY 2009-2010.

The Final Design phase of the project would result in the preparation of detailed Plans, Specifications and Estimates (PS&E) for the interchange reconfiguration. These documents support the process for soliciting bids for the construction of the project and the completion of Final Design in FY 2010-2011 could allow construction to commence in FY 2011-2012. Completion of this project may take 2 years to 3 years depending of specific requirements for project phasing to allow traffic operations to be maintained during construction. Alternative construction delivery methods may also be appropriate for the I-15/I-215 interchange.

7.1.5 Advancing Long-Term Corridor Improvements

In addition to reconstructing the I-15/I-215 interchange, the recommended corridor improvement strategy includes major capacity improvements through the length of the corridor (SR-60 to Mojave River) and TSM/TDM elements. This section provides information on the relative priority for implementation of these components of the recommended corridor improvement strategy.

For the corridor's major mainline capacity enhancements, improvements through Cajon Pass and the more urbanized southern segment of the corridor will be more urgent than the improvements through the high desert, where traffic volumes are lower.

The relative priority for improving the mainline segments in Strategy C/E can be summarized as follows:

1. US-395 to SR-210 (construct two reversible managed lanes)
2. SR-210 to SR-60 (construct one HOV lane per direction)
3. Mojave River to US-395 (construct one HOV lane per direction)

The relative priority for improving the mainline segments in Strategy D can be summarized as follows:

1. US-395 to SR-210 (construct two truck lanes per direction).
2. SR-210 to SR-60 (construct two truck lanes per direction)
3. Mojave River to US-395 (construct two truck lanes per direction)

Implementation of the non-roadway TSM/TDM improvements will depend significantly on the ability of the responsible agencies to secure funding. The following list describes the key TSM/TDM elements of the LPS, identifies the responsible agencies, and provides comments on the importance or priority of the strategy.

- Increased express transit services in the corridor to link the high desert with the Valley area (Victor Valley Transit, Omnitrans). Increased transit service is important to provide a realistic alternative mode of travel for trips through Cajon Pass. Limitations on available transit operating subsidies will constrain the transit agencies' ability to provide additional service.
- Expanded ITS applications (Caltrans, SANBAG, cities). ITS strategies that would be most useful in the I-15 corridor are: (1) provision of more and better information to assist travelers with route selection and alternate routes during weather or traffic incidents; and (2) traffic information and agency coordination for major events. These strategies should be implemented as soon as practical and when funding is available, since they could help facilitate smoother traffic operations during major reconstruction of the I-15/I-215 interchange.
- Enhanced enforcement (California Highway Patrol) and service patrol (SANBAG).
- Include auxiliary lanes between key interchanges (SANBAG and Caltrans). Auxiliary lanes are not needed to address existing problems, and if implemented in the near term they would be affected when the mainline improvements are constructed in the future. They should be evaluated and developed where justified as part of the mainline improvement program.
- Improve existing Cajon Boulevard (SANBAG, Caltrans, and County of San Bernardino). Cajon Boulevard is intended as an alternate route to I-15 during closures and emergencies, and to improve linkages between I-15 and local roads. It would be desirable to improve Cajon Boulevard prior to the major reconstruction of the I-15/I-215 interchange, so it is available as an alternate route or a detour route during the reconstruction project. The ultimate design of the interchange should incorporate the improved Cajon Boulevard as a permanent improvement.

For improvements which are the responsibility of other agencies, SANBAG should work with the responsible agency to ensure that the need is understood and to help identify potential sources of funding.

7.2 FINANCIAL STRATEGY

This section develops financial strategies for each of the potential LPS alternatives. As a base assumption, the financial strategies attempt to self-finance the alternatives to the extent possible by imposing tolls on the vehicles that would use the new I-15 freeway lanes. These new lanes would be reversible managed lanes or exclusive truck lanes depending on which LPS alternative is finally adopted.

This section focuses on the financial aspects of the toll-based strategies, and does not approach other relevant issues affecting adoption of a toll. For example, the toll revenue potentially generated from truck lanes needs to be weighed against the benefit of increased separation of trucks and autos as tolling the truck lanes would likely result in a number of trucks opting to continue to travel within the general-purpose lanes for free rather than paying to use the truck lanes. Increased separation of trucks and autos and the related congestion and safety benefits was a primary factor making the truck lane strategy one of the two potential locally preferred strategies.

A total of three potential financial strategies each involving tolling of proposed lanes on I-15 were evaluated in detail, one applicable to reversible managed lanes and the remaining two applicable to exclusive truck lanes. They are as follows:

1. **Combination HOT/HOV Lanes:** This alternative has two reversible managed high occupancy vehicle or toll-paying vehicle (HOT) lanes on I-15 from SR-210 to US-395. South of SR-210 and north of US-395, this alternative was analyzed as having one high occupancy vehicle only (HOV) lane in each direction. Tolls were assumed to be collected only on the reversible managed lanes portion.

2. **Truck Toll Lanes:** This alternative has two exclusive truck toll lanes in each direction for the entire length of the corridor from SR-60 to D Street. This alternative assumes Longer Combination Vehicles (LCVs) do not use the truck toll lanes. Two variations of this alternative were considered:
    a. Without Mojave River to Bear Valley Road segment on an elevated structure, and
    b. With Mojave River to Bear Valley Road segment on an elevated structure.

3. **LCV Toll Lanes:** From an engineering and design perspective, this alternative is similar to the Truck Toll Lanes alternative. However, from the financial perspective this strategy differs in that it assumes LCV trucks are able to use the truck toll lanes, but not the existing general-purpose lanes. This alternative also assumes non-LCV trucks continue to use the general-purpose lanes, but do not use the truck toll lanes. For this alternative to be possible, additional investments would be required for infrastructure outside of this corridor for LCVs to reach I-15 (e.g. staging areas with direct connections to the I-15). The financial analysis does not include the cost implications of this additional infrastructure. Two variations of this alternative were considered:
    a. Without Mojave River to Bear Valley Road segment on an elevated structure, and
    b. With Mojave River to Bear Valley Road segment on an elevated structure.

Sections 7.2.1 through **7.2.6** review the:

- Methodology and Financial Assumptions
- Analysis of Financial Strategy 1: Combination HOT/HOV Lanes
- Analysis of Financial Strategy 2: Truck Toll Lanes
- Analysis of Financial Strategy 3: LCV Toll Lanes
- Evaluation of Potential Sources
- Summary and Implications for the Corridor Action Plan

7.2.1 Methodology and Financial Assumptions

The results and conclusions of the financial analysis depend on several assumptions, discussed in this section.

The financial analysis assumes that the I-15 LPS attempts to self-finance to the extent possible by imposing tolls on the vehicles that use the new toll lanes. For the Combination HOT/HOV Lanes and Truck Toll Lanes scenarios, it was assumed that vehicles have the discretion to use either the I-15 general-purpose lanes or the proposed new toll lanes, and that only those using the new toll lanes (with the possible exception of HOV users) pay tolls. Thus, vehicles use the toll lanes because the value of their travel time savings exceeds the cost of the toll.

The analysis also assumes that the toll is a per-mile toll and that the per-mile rate varies by vehicle type. For the Combination HOT/HOV Lanes scenario, it was assumed that the per-mile toll varies by roadway segment – the toll being higher on more congested segments and lower on less congested segments (value pricing).

For this analysis, trucks were categorized into light/medium trucks and heavy trucks. The definitions for these categories are consistent with their definition in the SCAG Heavy-Duty Truck Model; light/medium trucks are those with Gross Vehicle Weight (GVW) rating of 8501 – 33,000 lbs. and heavy trucks are those with GVW rating of more than 33,000 lbs.

For the LCV Toll Lanes alternative, it was assumed LCVs only use the new LCV toll lanes and are prohibited from using the general-purpose lanes. This alternative also assumes non-LCV trucks continue to use the general-purpose lanes, but do not use the truck toll lanes. A more realistic alternative would allow all trucks to use the truck lanes. However, given the relatively low usage of the tolled truck lanes in the non-LCV truck lane alternative, the lower toll rates in the non-LCV toll lane alternative, and the fact that some of the LCV trucks in the LCV toll lane alternative are the same trucks that would be using the truck lanes in the non-LCV truck lane alternative, this simplifying assumption does not affect the financial conclusions significantly.

For the LCV Toll Lanes scenario to be possible, it would be necessary for the California Legislature to enact enabling legislation to allow LCVs to operate along I-15 (and any other state highways including the Interstate freeway system). Furthermore, additional investments would be required to get LCVs on to I-15 within the study area (e.g. staging areas where LCVs can be assembled/broken down prior to accessing the LCV lanes), to continue to operate along I-15 outside of the study area (ideally to the Nevada and Arizona state lines making it more feasible to utilize LCVs on longer haul interstate commerce trips), as well as for upgrades to I-15 supporting facilities (e.g. rest areas, access ramps, etc.) to make them LCV compatible. The financial analysis assumes the passage of appropriate enabling legislation and does not include the cost implications of this additional infrastructure.

To raise construction funds, it was assumed that the net revenue from tolls is leveraged to issue tax-exempt toll revenue bonds, capital appreciation bonds and federal loans. The toll revenue bonds and capital appreciation bonds are assumed to require a 1.3x coverage factor and the federal loan is assumed to require a 1.1x coverage factor. It was assumed that these bonds and loans are repaid over 30 years, which is typical for major public infrastructure project debt such as this case.

The analysis shows that the net toll revenues alone are insufficient to fund the construction of the I-15 LPS. The resulting funding gap is assumed to be covered by $170 million from Measure I funds as well as federal, state and local grants to the extent possible. Any further remaining funding shortfall is assumed to be covered by GARVEE bonds. GARVEE bonds may provide the necessary financing to build the project, but will reduce the amount of resources available for other capital projects in the region.

Other key financial assumptions include the following:

- **Construction Costs (in 2005 dollars):** Cost estimate ranges were developed and presented as part of the detailed evaluation of alternatives. The cost estimate ranges for each strategy were established based on a single cost estimate calculated in accordance with the Caltrans Project Development Procedures Manual (1995 or later edition). The cost estimate ranges were subsequently determined by applying a reduction of 10% from the calculated value to establish the low and an increase of 30% to establish the high. For the purposes of the financial analysis, the calculated cost estimate value, rather than a range, was used for each strategy[4]. It was estimated that the Combination HOT/HOV Lanes alternative would cost about $700 million to construct. Either the Truck Toll Lanes or LCV Toll Lanes alternatives without the Mojave River to Bear Valley Road elevated structure were estimated to cost about $2.3 billion. Including the elevated structure increases construction costs to $2.6 billion. It should be noted that these costs are near the low end of the cost range specified in the evaluation of alternatives, and the results should be understood accordingly.

- **Construction Schedule and Opening Year:** The Combination HOT/HOV Lanes alternative is assumed to open for revenue service in 2023, with the bulk of the construction occurring between 2020 and 2022. Construction of the HOV lane portion of the project is assumed to occur later, between 2025 and 2027. The Truck Toll Lanes and LCV Toll Lanes alternatives are assumed to open for revenue service in 2030, with the bulk of the construction occurring between 2025 and 2029. Some segments of the truck toll lanes are planned to open after 2030, with construction between 2030 and 2034. However, the truck volumes on these segments are relatively low. As a simplifying assumption for the financial analysis, all truck toll lanes are assumed to be open for revenue service in 2030, though the construction costs for the low-volume segments are kept in 2030 through 2034. All three project alternatives include the reconstruction of the I-15/I-215 interchange. Construction for this portion is assumed to occur much earlier, between 2015 and 2017. All of these dates are approximate, for the purpose of the financial analysis only.

[4] For Strategy D (Dedicated Truck Lanes) four alternative cost scenarios were calculated based on differences in the type of improvements proposed including the use of elevated structures for the truck lanes through the Victor Valley and the utilization of the existing Cajon Boulevard alignment to accommodate the truck lanes between I-215 and SR-138. This financial evaluation references the two cost estimates for Strategy D that assume truck lanes located on I-15 between I-215 and SR-138 and both at grade and elevated structures through the Victor Valley.

- **Construction Costs Escalation:** Construction costs were escalated at 3 percent per year, which is the annual average escalation in the Caltrans Highway Construction Cost Index between 1982 and 2004.

- **Construction Costs (in year of expenditure dollars):** Including the cost escalation, it was estimated that the Combination HOT/HOV Lanes alternative would cost about $1.14 billion to construct. The Truck Toll Lanes or LCV Toll Lanes alternatives without the Mojave River to Bear Valley Road elevated structure were estimated to cost about $4.6 billion. Including the elevated structure increases construction costs to $5.3 billion.

- **Operations and Maintenance Costs:** The average operating and maintenance cost for the toll facilities on the existing Orange County SR-91 Express Lanes and the existing San Diego County I-15 Express Lanes is approximately $650,000 per mile. For this financial analysis, it was assumed a lower operating and maintenance cost for toll facilities, $500,000 per mile in 2005 dollars. This is because the I-15 study corridor is less intensive (i.e., fewer interchanges and less urbanized). Also, the Combination HOV/HOT Lanes alternative has fewer tolled lanes than the SR-91 facility (i.e., two versus four). The cost to operate and maintain the additional pavement is assumed to be about $42,000 per lane-mile in 2005 dollars. This is consistent with the cost figures provided by Caltrans for other freeway segments.

- **Operations and Maintenance Costs Escalation:** Operating costs are assumed to escalate at the same rate as construction costs, 3 percent per year. Combining and escalating all cost factors results in opening year operating and maintenance cost of $26 million for the Combination HOT/HOV Lanes alternative and $68 million for the Truck Toll Lanes or LCV Toll Lanes alternatives.

- **Toll Escalation:** It was assumed that the tolls are increased at the same rate as overall inflation, about 3 percent per year.

- **Debt Issuance:** The analysis times the issuance of various debt instruments to reduce the overall cost of financing, taking into account issuance cost, capitalized interest cost, reserve requirements and interest rates. To reduce these debt costs, the analysis assumes that grant revenue is available to fund early construction and that debt financing is used only when grant revenue is exhausted. Debt is issued as needed to pay construction costs starting with the lowest overall cost to the highest overall cost.

- **Debt Costs:** The toll revenue bonds include capitalized interest to cover the years between debt issuance and the commencement of toll revenue. They also include a 1.5% issuance cost and the establishment of a reserve fund to cover a potential toll revenue shortfall.

- **Reserve Funds:** In addition to the bond reserve fund, it was assumed that an operating reserve fund and a capital renewal fund are established. A half year of estimated opening year operations and maintenance expenses are deposited in the operating reserve fund, and a deposit of 1 percent of construction costs (in year of expenditure dollars) is deposited in the capital renewal fund.

- **Interest Earnings:** Interest is earned on the balance in the construction fund, the capitalized interest fund and the bond reserve fund. The interest rate is assumed to be the same as the rate on the toll revenue bonds issued for this project.

7.2.2 Analysis of Financial Strategy 1: Combination HOT/HOV Lanes

Financial Strategy 1, Combination HOT/HOV Lanes, is applicable to the first of the two potential LPS options: Strategies C and E Hybrid (Reversible Managed Lanes with HOV Lanes). This financial strategy attempts to self-finance the LPS using toll revenues generated from the reversible managed lanes, referred to also as High Occupancy Toll (HOT) lanes in the subsequent discussion. The next few subsections discuss the toll revenue that could potentially be generated and methods for filling in the funding gap.

7.2.2.1 Forecasted Toll Revenue

Revenue forecasts were developed using the Year 2030 traffic volume forecasts for Strategy E, Reversible Managed Lanes, which assumed the managed lanes would not be tolled. The Year 2030 forecasts were based on SCAG's travel demand model as described earlier in the report in **Section 5.2**. As described earlier, two sets of forecasts were developed: "normal" and "sensitivity test". The toll analysis described here used the higher, "sensitivity test" demand forecasts since the "normal" forecast conditions represent average travel conditions and do not necessary recognize the highly variable nature of traffic flow and recurring congestion within the corridor. The recurrence of congestion within the study corridor would likely motivate more drivers to use the toll facility to improve travel time and trip reliability making the use of the "sensitivity' forecast appropriate for this analysis. The Year 2030 forecasts were extrapolated to develop a starting year-by-year forecast of SOV and HOV traffic on I-15 by segment for the entire finance period.

For the HOT analysis, an off-model analytical approach was used that compared the value of time savings in the HOT lanes to the cost of the toll. Thus, in more congested portions of the corridor, HOT lane usage would be greater than on less congested segments. The results of this analysis are highly sensitive to the model results with respect to both traffic volumes and speed in the HOT lanes and the general-purpose lanes. The results are also sensitive to assumptions about the value of time. In this analysis only the trade-off between tolls and recurrent delay was considered. The travel time savings was obtained directly from the SCAG model runs.

In order to calculate the amount of traffic that would divert from the toll lanes for any given toll rate, logit diversion models were used. These models were developed from the data included in *Continuation Study to Evaluate the Impacts of the SR-91 Value-Priced Express Lanes: Final Report* (December 2000) prepared for Caltrans Traffic Operations Program by Edward Sullivan, Cal Poly State University. The logit models, estimated from revealed preference data collected on SR-91, were more complex in terms of parameter specifications than could be supported with available traveler characteristics data available for the I-15 corridor. For this reason simplified diversion equations were derived from these data.

The logit model approach was used to estimate the percent of each auto class (HOV and SOV) that would select the toll lanes versus the general-purpose lanes at a specified toll rate. The "percent of users" calculation was a function of trip purpose, time of day, travel time, and toll rate.

Based on research of the SR-91 Express Lanes, an estimate of $14.00 per hour was assumed as a driver's value of time in the corridor. Free-flow speeds of 70 mph were assumed for autos in areas with no grades, 65 mph for moderate uphill grades, and 60 mph for steep uphill grades. It was further assumed that trucks utilized only the rightmost two lanes of the four general-purpose lanes, with autos using the leftmost two lanes. In situations where the congestion from autos in the leftmost two lanes exceeded the congestion from trucks in the rightmost two lanes, it was then assumed that autos could use all four general-purpose lanes.

Although the HOT lanes are free for HOVs, in practice it has been found that only about 90 percent of HOVs would actually use the HOT lanes. This value was applied to the financial analysis model.

The revenues calculated in this analysis include tolls collected southbound for three hours during the AM peak period and northbound for four hours during the PM peak period. For each segment, the operating conditions were found that maximized the toll revenues based on the assumed value of time per driver. Fewer SOVs using the HOT lanes equated to higher time savings and the ability to collect more money per vehicle, but with fewer vehicles to actually pay the toll. More SOVs using the HOT lanes equated to more vehicles paying the toll, lower speeds in the HOT lanes, less time savings in the HOT lanes, and ultimately a lower charge per vehicle.

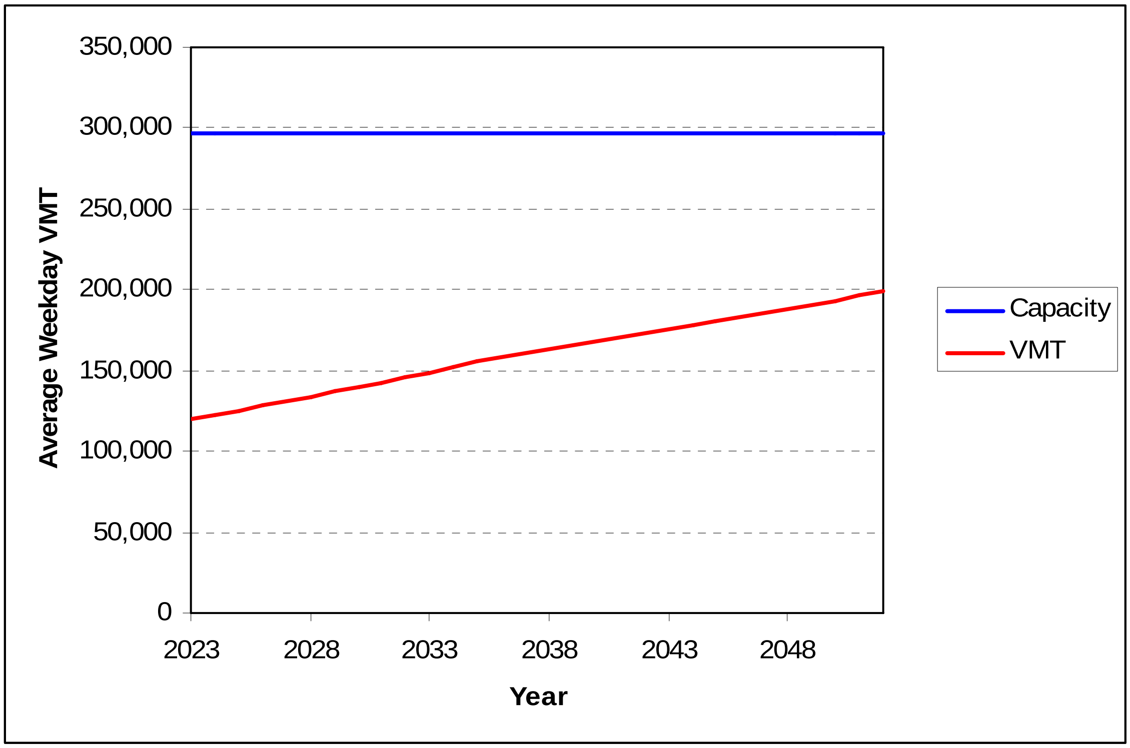
To achieve the maximum revenue, a vehicle traveling the entire 27 mile length of HOT lanes would have to be charged $6.10 southbound during the AM peak period or $5.77 northbound during the PM peak period (by comparison, tolls on the 8 mile SR-91 Express Lanes exceed $7.00 during the PM peak period). Tolls on a per mile basis for each of the three study segments with HOT lanes are shown in **Table 7-1**. The segment of HOT lanes from SR-138 to I-215 provides the most benefit to the greatest number of SOVs, and therefore yields the most revenue and warrants the highest toll of all three segments for both directions and time periods. As different travel time benefits are realized in each segment, the toll required to maximize revenue in each segment varies.

Table 7-1 HOT Lane Toll Rates (in Year 2000 dollars per mile)

Segment	AM Peak (southbound only)	PM Peak (northbound only)
US-395 to SR-138	$0.07	$0.02
SR-138 to I-215	$1.03	$1.48
I-215 to SR-210	$0.03	$0.01

In order to extend the Year 2030 analysis to a forecast of revenues for the entire financing period, additional adjustments to the utilization of the toll lanes were made. To account for the capacity of the I-15 HOT lanes, upper limits were implemented on the amount of SOV and HOV traffic allowed in each segment of the HOT lanes. The only HOT lane segment forecasted to reach capacity before 2053 is southbound from SR-138 to I-215 during the AM peak period. This segment is predicted to reach capacity around the year 2037. In the year 2040, the forecasted volume using this segment of the HOT lanes is 14,800 southbound during the three-hour AM peak period (55% SOVs, 45% HOVs) and 13,300 northbound during the four-hour PM peak period (47% SOVs, 53% HOVs). The total average weekday vehicle miles of travel (VMT) subject to tolls is shown in **Figure 7-1**.

Figure 7-1 VMT Subject to HOT Lane Tolls



7.2.2.2 Financial Feasibility

The financial analysis shows a maximum of $665 million or 59 percent of the $1.14 billion escalated construction cost could be financed by leveraging the net revenue collected from HOT lane tolls. This is a significantly lower percentage of costs covered by toll revenues than for other projects comparable to the proposed I-15 reversible managed lanes, as shown in **Table 7-2**.

It should be noted that the escalated construction cost for this strategy includes the sum of both reversible managed lanes and HOV lane improvements within the study corridor. Only the managed lanes segments (US-395 to SR-138, SR-138 to I-215 and I-215 to SR-210) are revenue producing with the balance of the study corridor served by HOV lanes that are not presently intended to be subject to tolling. If the cost of the managed lanes element of this strategy is separated from the HOV lane component, the full escalated construction cost (approximately $650 million) could potentially be financed by leveraging the net revenue collected from tolls. Completion of the balance of the improvements recommended in this strategy (HOV lanes from Mojave River to US-395 and SR-210 to SR-60) would require significant infusion of funding from federal, state or local sources to make the HOV element of this project financially feasible.

It should also be noted that the toll revenue analysis assumed higher, "sensitivity test" levels of demand forecasts. The use of lower, "normal" levels of demand would potentially have indicated less toll revenue being generated.

Table 7-2 Toll Revenue Financing for Completed Projects

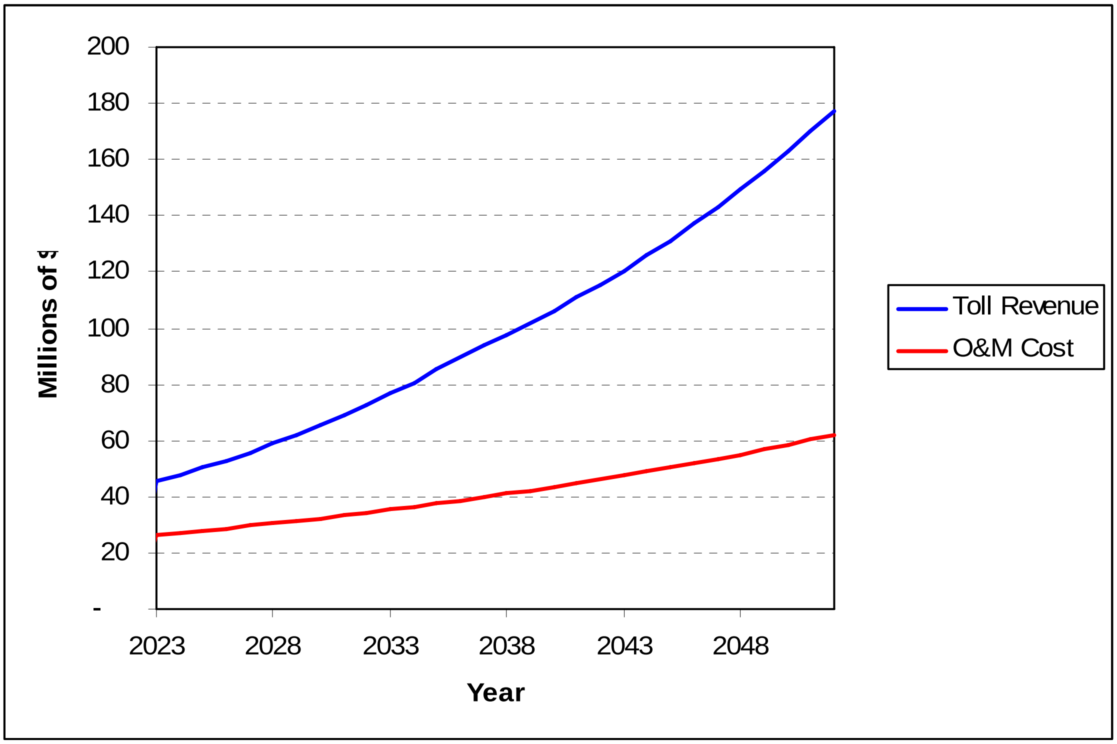
Facility	Toll Revenue Backed Financing ($M)	Percent of Total Financing
Mid Bay Bridge, Florida	81.7	97%
Foothill Transportation Corridor, California	1,743.0	96%
Pocahontas Parkway, Virginia	353.9	95%
San Jose Lagoon Bridge, Puerto Rico	116.8	93%
E-470 Highway, Colorado	587.6	92%
Santa Rosa Bay Bridge, Florida	95.0	92%
San Joaquin Hills Corridor, California	1,314.0	90%
Connector 2000, South Carolina	200.2	90%
Lake Ozarks Comm Bridge, Missouri	40.1	84%

7.2.2.3 Toll Revenue Operating Surplus

The HOT lane tolling generates an operating surplus[5] in each year of operation, as shown in **Figure 7-2**. The operating surplus is $20 million in the planned year of opening (2023), rising to $63 million in 2040. The steadily upward increase in toll revenue is caused by slowly increasing volumes of SOVs using the HOT lanes as well as steady increases in the toll rates. Once the construction debt service is paid off, this surplus operating cash flow could be used to fund other transportation projects in the Southern California region.

[5] Operating surplus is the gross revenue from tolls less operating and maintenance costs.

Figure 7-2 Annual Operating Surplus for I-15 HOT Lanes



7.2.2.4 Possible Funding Scenario

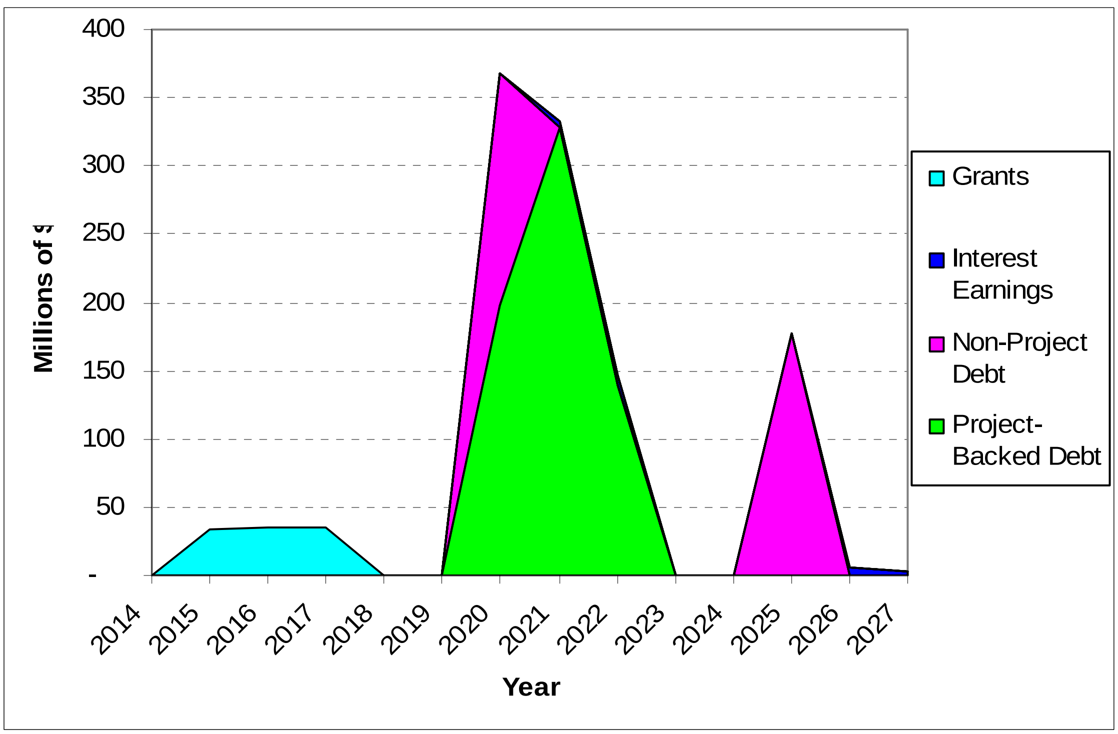
Should the decision be reached to pursue the Strategies C and E Hybrid (Reversible Managed Lanes with HOV Lanes) LPS option, rather than the second LPS option of Truck Lanes, toll revenue could be used to fund up to $665 million of the total $1.14 billion needed. This amount would be sufficient to cover the approximately $650 million cost of the managed lanes element of the strategy leaving the HOV lane element of the strategy unfunded. This section presents a funding scenario that assumes this maximum amount of toll revenue could be raised. This funding scenario attempts to raise as much debt backed by the net toll revenue as possible, and fund the balance of the strategy with a combination of federal, state and local grants, local debt and GARVEE bonds.

Table 7-3 shows the total amount of funding from each of the various sources. This funding scenario assumes $665 million of the project's construction costs are covered by project-related debt. The toll revenue bond is issued in 2020, the capital appreciation bond in 2021, and the federal loan in 2022. This scenario assumes regional agencies (i.e. SCAG, SANBAG and/or Caltrans) are able to find $104 million in new federal, state and local grants for the project, and that this money would be available between 2015 and 2017. It assumes $170 million of Measure I funds are used to fund the project in 2020. The remaining gap of $177 million is assumed to be funded with GARVEE bonds issued in 2025. Using GARVEE bonds for this project will, however, reduce the amount of funding available for other capital projects in the region. **Figure 7-3** shows the resulting stream of construction funds.

Table 7-3 Sources of Construction Funds for the Financial Strategy 1 (in millions of dollars)

Project-Backed Debt:		
Toll Revenue Bond	198	17%
Capital Appreciation Bond	328	29%
Federal Loan	140	12%
Grants	104	9%
Non-Project Debt:		
Local Debt (Measure I)	170	15%
GARVEE Bond	177	16%
Interest Earned on Construction Fund	21	2%
TOTAL	**1,137**	**100%**

Figure 7-3 Construction Funding Cash Flow Stream for Financial Strategy 1

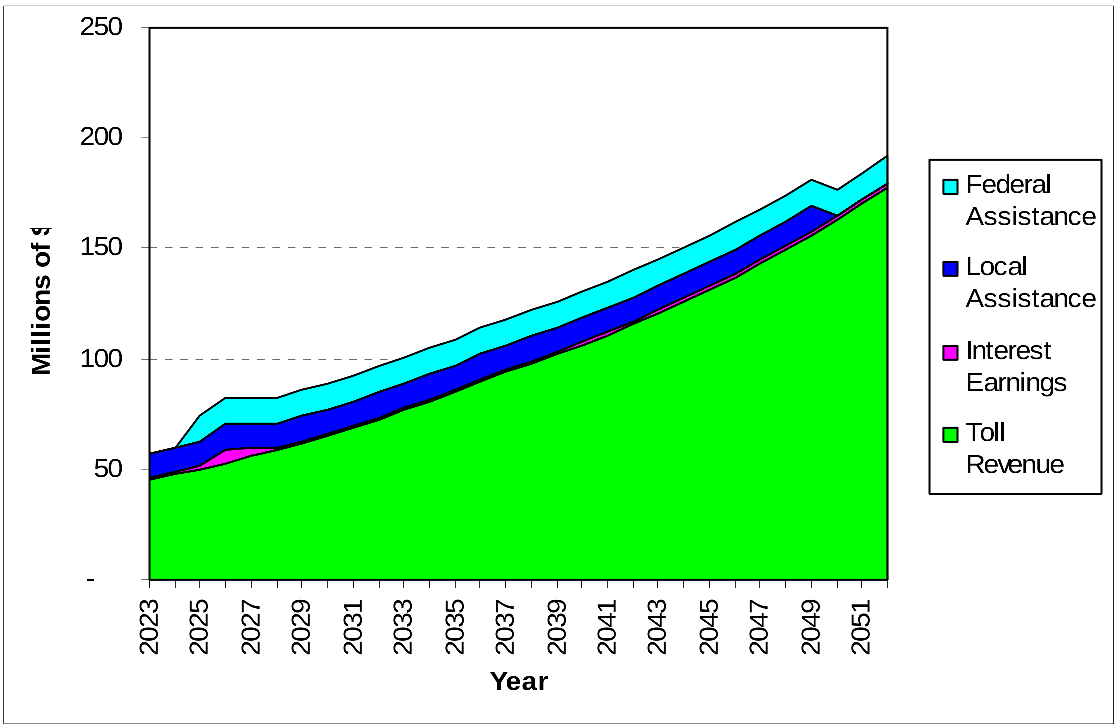


Ongoing operation of the HOT lane facility is primarily funded with toll revenues. However, federal and local assistance will be needed to pay-down the GARVEE bonds and Measure I debt, respectively. **Table 7-4** shows the sources and uses of funds over the 25 years after the construction period is over. The required federal and local assistance averages $22 million a year over this period. **Figure 7-4** shows the same information in a graphical format.

Table 7-4 Ongoing Sources and Uses of Funds under Financial Strategy 1 (2028-2052 annual average)

Sources of Funds ($ millions)				*Uses of Funds ($ millions)*		
Toll Revenue	110	83%		O&M Cost	44	34%
Interest Earnings	1	1%		Debt Service	87	66%
Federal Assistance	10	7%		Miscellaneous	0	0%
Local Assistance	12	9%		**TOTAL**	**132**	**100%**
TOTAL	**133**	**100%**				

Figure 7-4 Sources of Ongoing Funds under Financial Strategy 1



The overall cash flow and cash balance under this funding scenario are shown in **Figures 7-5** and **7-6**.

Figure 7-5 Cash Flow under Financial Strategy 1

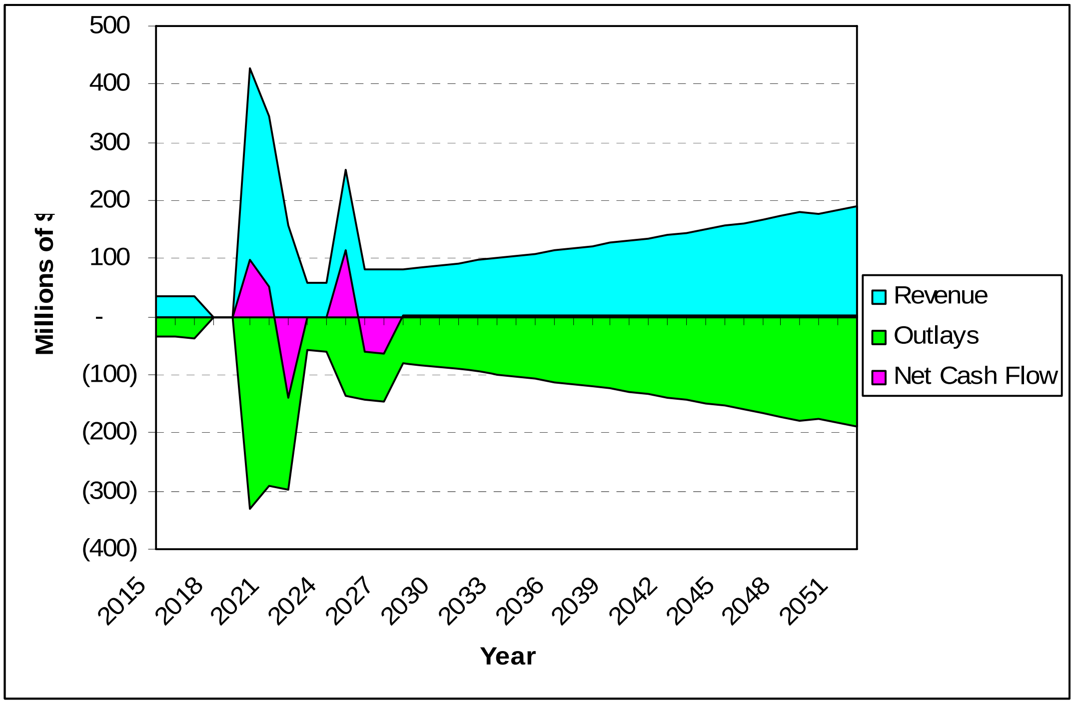
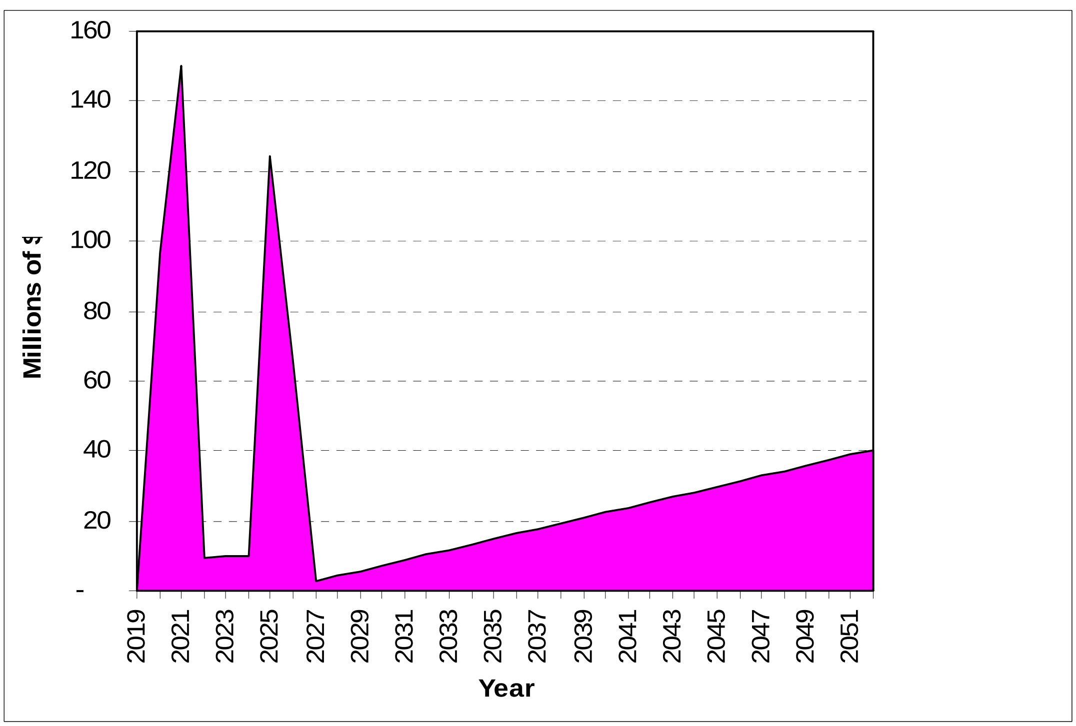


Figure 7-6 Cash Balance under Financial Strategy 1 (end of year)



7.2.3 Analysis of Financial Strategy 2: Truck Toll Lanes

Financial Strategy 2, Truck Toll Lanes, is applicable to the second of the two potential LPS options: Strategy D (Dedicated Truck Lanes). This financial strategy attempts to self-finance the LPS using toll revenues generated from the dedicated truck lanes. The next few subsections discuss the toll revenue that could potentially be generated and methods for filling in the significant funding gap.

7.2.3.1 Forecasted Revenue

Revenue forecasts were developed using the Year 2030 traffic volume forecasts for Strategy D, Dedicated Truck Lanes, which assumed the truck lanes would not be tolled. The Year 2030 forecasts were based on SCAG's travel demand model as described earlier in the report in **Section 5.2**. As described in **Section 7.2.2.1**, two sets of forecasts were developed: "normal" and "sensitivity test". Similarly, the toll analysis described for the dedicated truck lanes used the higher, "sensitivity test" demand forecasts. The Year 2030 forecasts were extrapolated to develop a starting year-by-year forecast of truck traffic on I-15 by segment for the entire finance period.

The approach to analyzing truck lane revenue was based on the assumption that trucks would use the truck lanes in order to achieve any combination of the following benefits:

- Time savings by avoiding recurrent congestion
- Improved reliability of travel time

There are clear safety benefits associated with separation of trucks and autos. However, this benefit is not incorporated in the evaluation of truck drivers' willingness or ability to pay tolls or the potential for truck drivers to continue to use the general-purpose lanes to avoid paying a toll. The approach to incorporating the effects of each item listed above on the evaluation of tolling alternatives for truck lanes is presented below.

<u>Congestion Benefits</u>
The basic approach to truck lane toll analysis assumes that trucks are willing to pay tolls in order to save time on trips. The amount of toll that drivers will pay is therefore a function of value of time and of time savings.

Many commercial vehicle toll studies have developed truck value of time based on operating cost savings for trucks. This is generally derived from the labor cost for drivers, fuel costs, and other operating costs. These studies generally produce a single value of time estimate. Some studies also include a carrying cost of inventory that is based on the value of the product that is being transported. In these cases there may be multiple values of time reflecting the different commodities carried.

The cost-based studies miss several important factors that tend to produce an over-estimate of the value of time, and thus, willingness to pay tolls. The most critical missing factor is the ability of the time savings to produce additional revenue for the carrier. If the amount of time (and delay) that a truck spends on the segment of highway to be tolled is small relative to the total amount of time spent on other roadways, waiting at the customer location, or conducting loading and unloading activities, time savings on a tolled truck lane may not generate significant new revenue generation opportunities and the willingness to pay tolls may be lower than anticipated. This varies depending on average trip length, the nature and efficiency of loading operations at each end of a trip, commodity carried, whether the driver gets paid by the hour or by the load, flexibility for the driver to reschedule travel to avoid congestion, etc.

An alternative to the cost-based value of time approach is to use stated preference survey methods to determine the willingness to pay tolls under a variety of circumstances. Dr. Kazuya Kawamura published dissertation research using the stated preference survey technique to get at truck willingness to pay tolls for a large sample of trucking firms in California. The results are best represented by a frequency distribution of values of time fitted to a logit probability distribution. The distribution is skewed in favor of the low end of the curve (a high percentage of drivers have relatively low value of time) and can be fitted to a desired median and mean value of time.

These data were used in both the SR-60 study and the I-710 study and the same data and similar approach were used for the I-15 Comprehensive Corridor Study. For this study, Dr. Kawamura's original survey data were obtained and a sample of trucks operating in Southern California was extracted from the data in order to re-estimate the value of time distribution. Another adjustment to the data that was made was the re-calibration of the distribution to provide a mean value of time that is more consistent with average cost of time estimates obtained from the FHWA Highway Economic Requirements System (HERS) model, inflated to current year dollars. There are clear arguments to be made about the unique nature of trucking operations in the I-15 corridor (higher fraction of long haul trips) that may result in a lower value of time assumptions (the ability of long haul drivers to more easily adjust schedules to avoid peak congestion suggests a potentially lower value of time if the potential time savings are very small relative to total trip travel time).

The starting point for the I-15 analysis was a mean value of time for heavy-heavy duty trucks (HHDT) of $30 per hour saved, which was consistent with the HERS data, the Caltrans California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C) data, and various other sources for combination trucks. These value of time estimates used in this study are also consistent with more recently published literature and were confirmed by limited anecdotal discussions with carriers operating in the corridor.

A further simplification that was made in the application of the value of time distribution was to represent it as a step function rather than a continuous distribution. In this analysis the distribution was represented as six discrete value of time categories. The distribution curve was used to estimate the percent of the distribution at a particular value of time that was at the midpoint of each of six ranges that covered the full range of values of time and that added to 100% of the distribution. This distribution was developed for two classes of trucks – heavy-heavy trucks and a combined light-heavy/medium-heavy category. This is because tolls are usually charged relative to the number of axles on the vehicle. The resulting value of time distribution is as follows:

- 21% of trucks have value of time of $5/hour
- 11% of trucks have value of time of $11/hour
- 25% of trucks have value of time of $20/hour

- 21% of trucks have value of time of $35/hour
- 11% of trucks have value of time of $57/hour
- 11% of trucks have value of time of $80/hour

This is an approximation of a curve that extends below $5/hour and above $80/hour but that is calibrated to the appropriate mean and median value of time. The values for medium and light heavy trucks would be calibrated to the same curve with a mean value of time of approximately $18.75 per hour (ratios derived from the HERS data for single unit trucks).

The basic approach to calculating diversion was to use output on travel times from the travel demand model runs to calculate time savings and to compare the value of this time savings to the toll cost for each of the categories of truck values of time. If the value of the time savings in a value of time category was less than the toll cost that fraction of the total trucks would divert back to the general-purpose lanes.

This approach was implemented off-model. The only limitations that the off-model approach presented were that time savings was only evaluated in comparison to the general-purpose lanes. This approach did not consider other routing alternatives that might have been available to avoid the toll that might be more desirable than the general-purpose lanes.

The base case (without tolls) trip times and time savings that served as the starting point for this analysis were described in **Section 5.2**. The base case truck lane runs also provided all of the necessary truck volume information on the truck lanes that was used for demand and revenue calculations. The analysis was conducted separately for each of the four time periods in the model to get average daily demand and this was annualized for revenue estimates and for use in the financial analysis.

The analysis assumed that tolls were assessed on a per mile basis so that longer trips paid higher tolls. For the purposes of this study the analysis could only be conducted for a single toll rate. This toll rate was determined after looking at average travel time savings and the mean value of these savings in order to determine an appropriate range for acceptable tolls and then comparing these to typical toll rates charged in other parts of the country.

It should be noted that given the structure of this analysis it was very sensitive to two key variables – the value of time and the time savings.

<u>Reliability</u>
Reliability reflects the fact that there is a real cost to shippers and carriers that comes from an inability to predict delays. If there is a significant difference in travel times under conditions of incidents versus day-to-day congestion and if incidents are fairly common, a carrier may have to build in buffer time to avoid these delays. Some carriers face payment penalties if they miss cutoffs and shippers may have to pay premium rates to get overnight deliveries to make up for unpredicted missed deliveries. Thus, shippers (and truckers) may be willing to pay a very high price to avoid these non-recurrent delays.

There are two basic problems associated with addressing reliability in a toll analysis – 1) how to measure or estimate non-recurrent delay and 2) what is the premium to use to adjust value of time to reflect reliability consequences. Approaches to address both of these concerns are still under development as part of other ongoing studies nationally and within this region. In the future, the value of reliability improvements should be reassessed using the new methodologies that incorporate estimates of buffer time as a function of congestion levels since in several studies these new methodologies are estimating higher reliability benefits than the approach used in this study.

The approach that was used in this study to assess reliability benefits of the toll lanes relied on data from the ITS Deployment Assessment System (IDAS) that Cambridge Systematics developed for FHWA. IDAS can be used to assess performance benefits for non-ITS alternatives and that is how it was used in this study.

IDAS operates to a large extent using a library of lookup tables that relate reliability benefits to common performance and facility characteristics that can be obtained from travel demand models. Reliability is measured as hours of non-recurrent delay. The lookup tables estimate non-recurrent delay at a link level based on the VMT on the link, the volume/capacity ratio on the link, the number of lanes on the link, and the facility class of the link. Thus, with data from the travel demand model for I-15, information was developed about non-recurrent delay changes associated with truck lanes at the link level and summed over the corridor.

IDAS is also a benefit-cost analysis tool. It monetizes time savings based on value of time and these factors can be adjusted to be consistent with the value of time used in the congestion analysis. IDAS assumes that time spent in non-recurrent congestion, because of its unpredictable nature and associated negative consequences, is valued at three times the value of recurrent delay.

The approach for reliability analysis was to use the travel demand model and the lookup tables in IDAS to estimate the amount of non-recurrent delay by segment in the general-purpose lanes and in the toll lanes, estimate the fraction of total delay this represented (including recurrent delay) and calculate a weighted value of time that reflected the higher value placed on this component of delay. This adjusted value of time would then be used in the congestion analysis described previously and would presumably reduce the amount of diversion that would occur when tolls are added.

To determine the revenue that can be raised by tolling, the results of the congestion and reliability analysis were utilized to determine the percent of truck traffic that would use the new toll lanes versus the adjacent general-purpose lanes (i.e. retention rate for the general-purpose lanes). The distribution for value of time for trucks was compared with the estimated time savings from using the toll lanes to determine the retention rate. The toll rates used are shown in **Table 7-5**.

Table 7-5 Toll Rates for Financial Strategy 2 (in Year 2000 dollars per mile)

Light/Medium Trucks	Heavy Trucks
$0.32	$0.46

To account for the capacity of the I-15 truck lanes, upper limits on the amount of truck traffic allowed were implemented in each segment of the truck lanes. Several truck lane segments are forecasted to reach capacity before 2060, as shown in **Table 7-6**. While heavy usage is projected for some truck lane segments with capacity reached within a few years after opening (2030), others have very low usage. **Table 7-7** lists truck lane segments that are forecasted to have low usage until around 2040. In Year 2040, 8,300 trucks per weekday are forecasted to use the segment of truck lanes from SR-138 to I-215, spread over both directions and in both the AM and PM peak periods. The maximum truck volume allowed on this segment of truck toll lanes is 9,400 trucks per day, which is reached around Year 2047. The most heavily used segment of truck toll lanes is from SR-60 to I-10. About 15,200 trucks are forecasted to use this segment in Year 2040, with the heaviest use during the four-hour PM peak period in the northbound direction (7,800 trucks).

The total average weekday truck vehicle miles of travel (VMT) using the truck toll lanes and therefore subject to tolls is shown in **Figure 7-7**. This figure shows low usage of the truck lanes in the planned opening year (2030), but rapidly increasing usage from that time on.

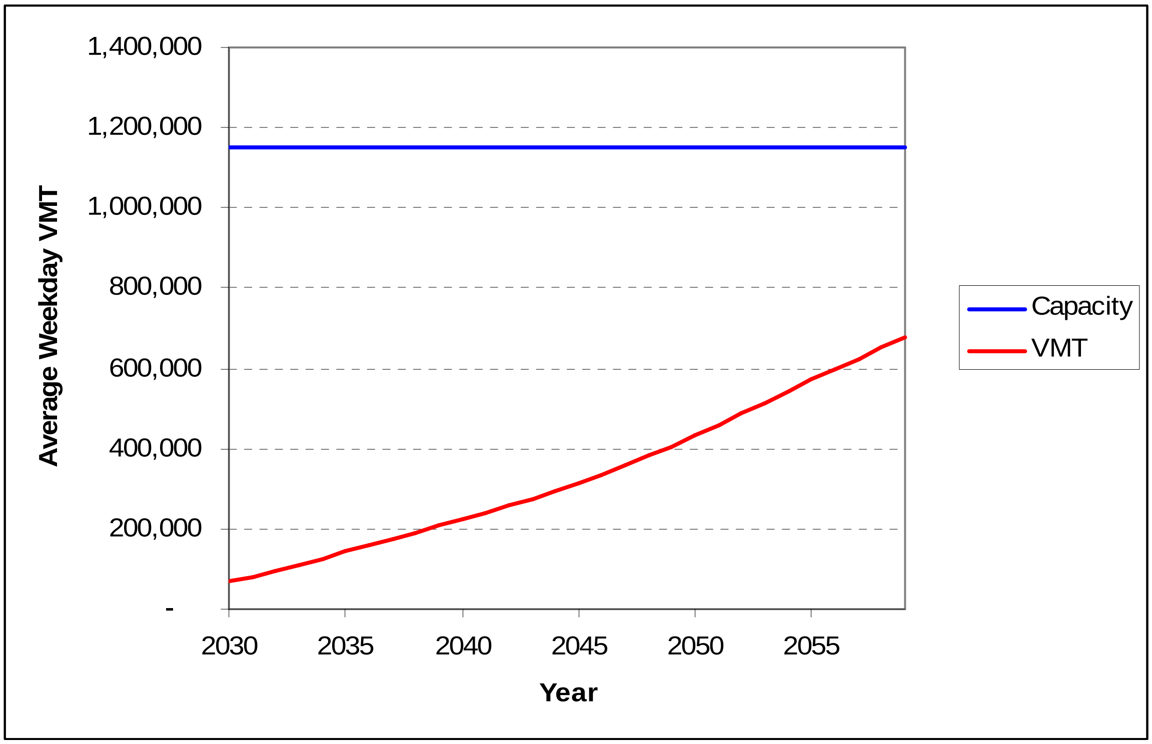
Table 7-6 Year Truck Lane Capacity Reached under Financial Strategy 2

Segment	Time Period	Direction	Year Capacity Reached
US-395 to SR-138	AM Peak	Southbound	2037
		Northbound	2055
	PM Peak	Southbound	2039
		Northbound	2042
SR-138 to I-215	AM Peak	Southbound	2036
		Northbound	2047
	PM Peak	Southbound	2034
		Northbound	2030
I-215 to SR-210	AM Peak	Southbound	2056
I-10 to SR-60	AM Peak	Southbound	2055
	PM Peak	Southbound	2052
		Northbound	2043

Table 7-7 Truck Lanes with Low Usage until 2040 under Financial Strategy 2

Segment	Time Period	Direction
Mojave River to Bear Valley Rd	AM Peak	Northbound
	PM Peak	Southbound
	PM Peak	Northbound
Bear Valley Rd to US-395	AM Peak	Northbound
	PM Peak	Southbound
US-395 to SR-138	AM Peak	Northbound
I-215 to SR-210	AM Peak	Northbound
	PM Peak	Southbound
SR-210 to I-10	AM Peak	Northbound
	PM Peak	Southbound

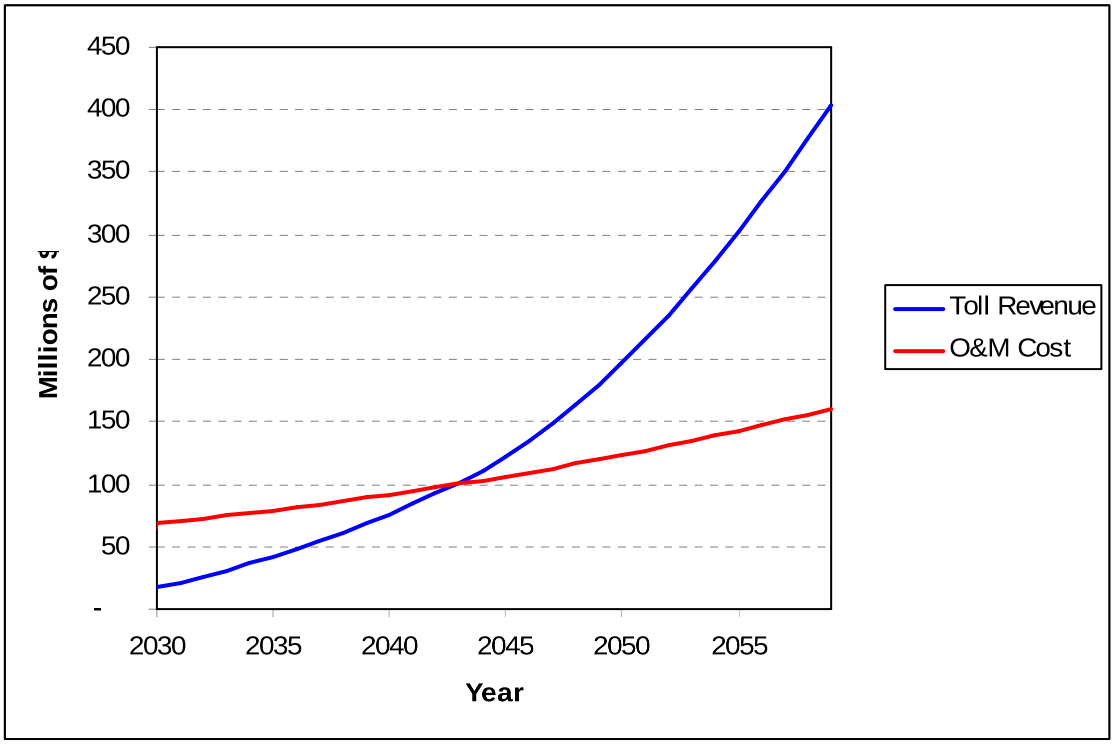
Figure 7-7 Truck VMT Subject to Tolls under Financial Strategy 2



7.2.3.2 Operating and Maintenance Costs

The annual operating and maintenance costs for the truck toll lanes are fairly substantial - $68 million in the opening year (2030), rising 3 percent per year, reaching $106 million in the year 2045. In the opening year, operating and maintenance costs are greater than the forecasted gross revenue from tolls ($68 million versus $18 million). Gross toll revenue is not expected to be greater than operating and maintenance costs until 2043, as shown in **Figure 7-8**.

Figure 7-8 O&M Costs Compared to Gross Toll Revenue under Financial Strategy 2



7.2.3.3 Financial Feasibility

Because of the unfavorable financial operating scenario described above, none of the $4.6 billion[6] escalated construction cost of Strategy D, Dedicated Truck Lanes, can be financed by leveraging the net toll revenue. Significant infusion of funding from federal, state and local sources or other types of non-toll user charges will be needed to make this project financially feasible.

7.2.4 Analysis of Financial Strategy 3: LCV Toll Lanes

Financial Strategy 3, LCV Toll Lanes, is applicable to the second of the two potential LPS options: Strategy D (Dedicated Truck Lanes). This financial strategy attempts to self-finance the LPS using toll revenues generated from allowing long-combination vehicles (LCVs) to operate within the dedicated truck lanes and allowing LCVs to use the I-15 beyond the extents of this study corridor all the way to the Nevada (and possibly along I-40 to the Arizona) State line. This strategy was analyzed given the limited toll revenue that could be generated under Financial Strategy 2, which did not consider use of the truck lanes (or the I-15 corridor in general) by LCVs. The next few subsections discuss the toll revenue that could potentially be generated and methods for filling in the funding gap.

[6] $5.3 billion if the Mojave River to Bear Valley Road elevated structure is included.

7.2.4.1 Background on LCV Operations and Market Estimation for the I-15 Study Corridor

It has been observed in work done by the Reason Foundation and others that there are significant potential productivity benefits to trucks that are associated with allowing LCV operation because trucks can carry significantly more cargo with only a very limited increase in cost of operation. By restricting LCV operation to special lanes, safety concerns about mixing LCVs and autos can be addressed and the incremental costs of building lanes capable of accommodating the additional loads can be limited to the special purpose lanes. The approach used by the Reason Foundation to calculate the benefits of LCV operation (and the potential for tolling to capture some of the value generated) is to determine the cost per vehicle mile change if cargo is carried in larger loads and fewer trips. This is a fairly straight forward calculation and it shows some fairly significant benefits, particularly if weight limits are increased.

The biggest obstacle to LCV operations in the I-15 corridor is that these trucks cannot currently operate within the State of California, and presumably, if permitted in the future to operate along I-15, would still not be legally permitted to operate outside of the proposed truck lanes (and applicable support facilities). For this reason, LCVs need logical staging locations for consolidation and breakdown of the combinations that are adjacent to the freeway and to load centers. One advantage to LCVs in the I-15 corridor is that the States of Nevada and Utah already allow triple trailer LCVs to operate within the respective States.

In order to estimate the demand for LCV operation, data were used from the Caltrans Intermodal Transportation Management System (ITMS) commodity flow data and the payload data used in calculation of truck volumes in the external portion of the SCAG Heavy Duty Truck (HDT) model. The commodity flow data describes the tonnage of each type of commodity transported to and from the SCAG region as well as identifying the location outside of the region where these shipments are coming from or going to. The payload information is the average cargo weight for a truck shipment of each commodity group and can be used to convert tonnage flows into truck trips. The ITMS data were used to identify concentrations of long haul truck trips that travel to/from the SCAG region to States outside of the region that allow LCV operations (trips to/from States that do not allow LCV operations were not considered to be part of the potential California LCV market).

The Vehicle Inventory and Use Survey (a product of the Bureau of the Census) was used to identify commodities that are typically transported using LCVs in States that currently allow LCVs as well as the average cargo weight for an LCV shipment of each of these commodities. Using this information and the ITMS data it was possible to estimate the number of trucks using I-15 that would transport commodities typically carried in LCVs that are being transported to/from LCV states. By estimating the cost advantage associated with transporting these commodities by LCV (cost per vehicle mile comparison) the potential willingness to pay tolls was calculated for these trips. Toll revenues could then be estimated.

LCV Market Assumptions

If LCVs are allowed on a dedicated truck lane in the I-15 study corridor (one that does not include contiguous extension of truck lanes along SR-60 and I-710 to the Ports of

Long Beach and Los Angeles), it was assumed that the market is restricted to long haul vehicles with trips of roughly 100 miles or more. This is consistent with the Reason Foundation assumptions. This is logical because the investments needed to operate LCVs are not justified unless they can be spread over longer trips. It was further assumed that all heavy-heavy trucks traveling on the northern most segment of the study corridor are long haul trucks. This is a generous assumption but without accurate origin and destination (O-D) data for this northern most segment, it seems at least reasonable. Within the SCAG region it was assumed that any shipper/receiver making a trip to/from one of the existing LCV states would have an incentive to drive to a staging area (either privately or publicly owned) near the I-15 to assemble/ breakdown their LCVs for the long haul trip.

The analysis also assumed that LCVs would be allowed in California on I-15 extending from the north end of the study area all the way to the Nevada border in order to allow a direct link to the existing LCV network. This is a critical assumption and the viability of the LCV concept requires this to be allowed. The costs of upgrading this essential section of the facility or increased maintenance costs of this additional segment were not included in the analysis.

The assumption that the market includes only vehicles traveling to/from LCV states may have resulted in an underestimation of the potential market for LCV operation since it does not recognize the potential for other States (such as Arizona) to allow for the operation of LCVs in the future, or the possibility for LCV operators to stage their LCVs in states that allow LCV operations, using consolidation/de-consolidation terminals along the route. There was not sufficient data on potential LCV operating strategies to account for this effect in the I-15 analysis. The analysis also does not take into account the obvious issue of getting LCV equipment with sufficient power to pull loads up the Cajon Grade. There are some serious technical feasibility issues that suggest this option may be marginally viable in this corridor.

Estimating the Market

The methodology described above was used to estimate the LCV market. This was determined to be approximately 13% of the total truck trips in the north end of the corridor.

7.2.4.2 Estimating LCV Toll Revenue

Three truck revenue and cost scenarios were analyzed. The first were truck revenues and costs provided in the Reason Foundation report. These provided the highest revenue estimates for long haul truckers operating LCVs and the highest operating margins for these trips. LCV revenues were reportedly based on rates charged on a 500 mile trip. The second scenario adjusted the truck revenues based on data collected by Cambridge Systematics for studies of short haul intermodal opportunities in California. The revenues per trip are slightly lower but the costs are assumed to stay the same as reported by the Reason Foundation. The third scenario is based on revenue and cost data provided by the Tioga Group in a critique of the Reason Foundation analysis that was submitted previously to SCAG staff.

Based on the Reason Foundation report, it was assumed that a Triple Short (a particular LCV tractor-trailer configuration using a single tractor and three short [typically 28 feet 6 inches] trailers) could carry 50% more tonnage (and earn 50% more revenue) and a Double Long (a second LCV tractor-trailer configuration using a single tractor and two long [typically 48 feet] trailers) could carry 100% more tonnage (and earn 100% more revenue) than an existing semi-trailer. Currently tractor-trailers with a Single Long (commonly referred to as a semi-trailer up to a maximum of 53 feet) or Double Short (up to a maximum of 28 feet 6 inches) trailer configurations are able to operate legally in California (California Vehicle Code section 35401.5).

Truck revenues for these scenarios were estimated for an 8 hour shift and are based on the assumption that on a long haul trip, average speeds are around the posted speed limit and that congestion effects should not be included. The net truck revenue per mile is calculated for each configuration in each scenario.

It is assumed that any net revenue for LCV operation above and beyond what would be earned for existing configurations will be split three ways – one-third going to reduce rates for the shipper, one-third going to increased profits for the carrier, and one-third available for tolling. The toll rate per mile was calculated based on this formula. Since the scenario based on Cambridge Systematics' estimates of trucking rates provided a toll rate per mile that was within the range bounded by the toll rates estimated in the other two scenarios, this was the toll rate that was used for the financial feasibility analysis. The results of this analysis are shown in **Table 7-8** below.

Table 7-8 Toll per mile Calculation for LCVs

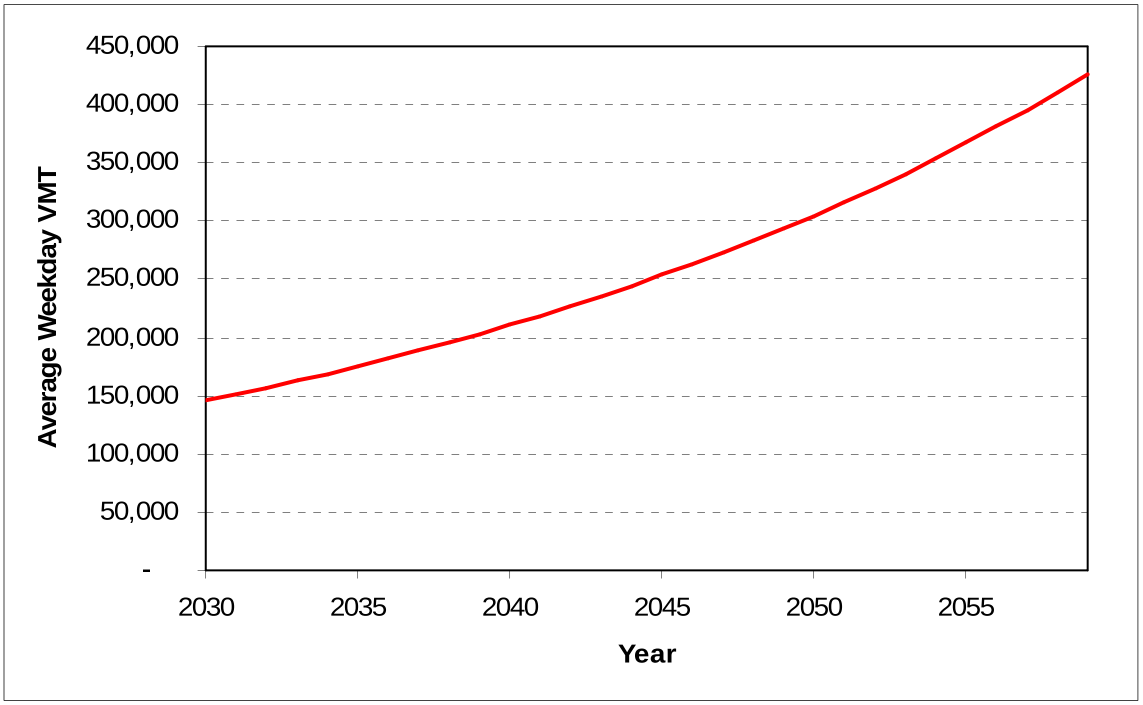
Item	Semi-trailer	Triple Short	Double Short	Double Long
Metric Tons	20	30	20	40
100 mile delivery-freight rates	$400.00	$600.00	$400.00	$800.00
Average speed	60	60	60	60
Miles driven in 8 hour shift (6 hours driving)	360	360	360	360
Revenue from 6 hour payload	$1,440.00	$2,160.00	$1,440.00	$2,880.00
Variable costs per shift (extra equipment and load per rig)	$684.00	$1,007.00	$684.00	$1,165.00
Differential (profit, overhead etc)	$756.00	$1,153.00	$756.00	$1,715.00
Extra earnings from LCV/shift/day		$397.00		$959.00
Assume 3-way split to Shippers, truckers and LCV operator in tolls		$132.33		$319.67
Savings per mile of travel that can be applied to tolls		**$0.37**		**$0.89**

Toll revenue calculations were made for travel on the study area portion of the I-15 only. Some trucks are assumed to use the study area corridor for its entire length while others are assumed to obtain access from within the corridor. Origin-Destination data at the zip code level were obtained from the ITMS database and field surveys within the I-15 study corridor to determine a trip length distribution for the LCV trucks. The weighted average trip length was just over 38 miles (on the study area corridor only).

Annual revenues were calculated for each scenario based on the average trip length, the potential toll rate per mile, the number of trucks in the market, and 300 working days per year (a typical assumption in truck travel demand analysis).

Forecasts of LCV traffic on I-15 were developed for an assumed toll of 89 cents per mile (in Year 2000 dollars) as presented in **Table 7-8** above for toll rate calculation and **Figure 7-9** below for LCV VMT forecasts. Since LCVs are only allowed on the new truck toll lanes, all of this traffic is subject to tolling. LCV truck volume in the I-15 LCV lanes starts modestly (146,000 vehicle-miles in the planned opening year of 2030), but grows fairly rapidly, reaching 253,000 vehicle-miles by 2045.

Figure 7-9 LCV VMT Subject to Tolls under Financial Strategy 3



7.2.4.3 Financial Feasibility

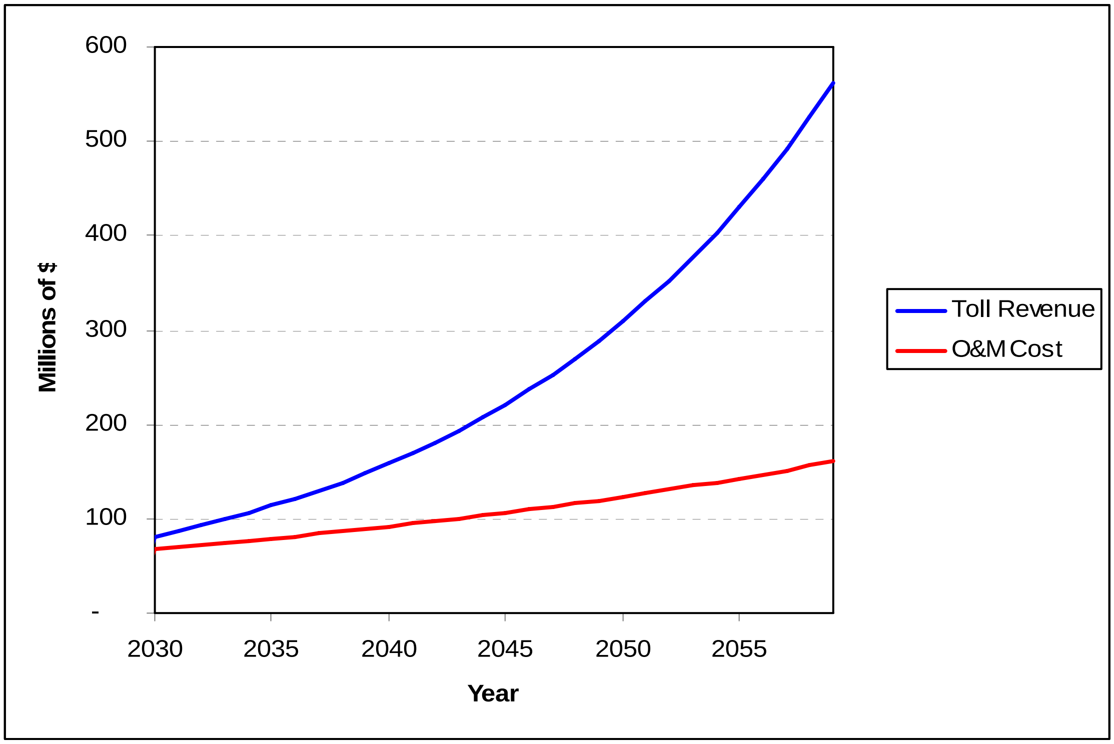
The financial analysis shows that at most $1.5 billion or 32 percent of the $4.6 billion escalated construction cost of the LCV Lanes Alternative without the Mojave River to Bear Valley Road elevated structure could be financed by leveraging the net revenue collected from truck lane tolls. If the elevated structure is included, the cost goes up to $5.3 billion. About 28 percent of this cost can be covered with project-related debt instruments.

These percentages of costs covered by toll revenues are significantly lower than for other projects comparable to the proposed I-15 truck toll lanes, as shown earlier in **Table 7-2**. Significant infusion of funding from federal, state and local sources or other types of non-toll user charges will be needed to make this project financially feasible.

7.2.4.4 Operating Surplus

The LCV Lanes Alternative generates an operating surplus in each year of operation, as shown in **Figure 7-10**. The operating surplus in the planned year of opening (2030) is quite small ($13 million), but rises quickly, reaching $115 million in 2045. The steadily upward increase in toll revenue is caused by increasing volumes of LCVs using the truck toll lanes as well as steady increases in the toll rates. Once the construction debt service is paid off, this surplus operating cash flow could be used to fund other transportation projects in the region.

Figure 7-10 Annual Operating Surplus from LCV Toll Lanes



7.2.4.5 A Possible Funding Scenario – No Mojave River to Bear Valley Road Elevated Structure

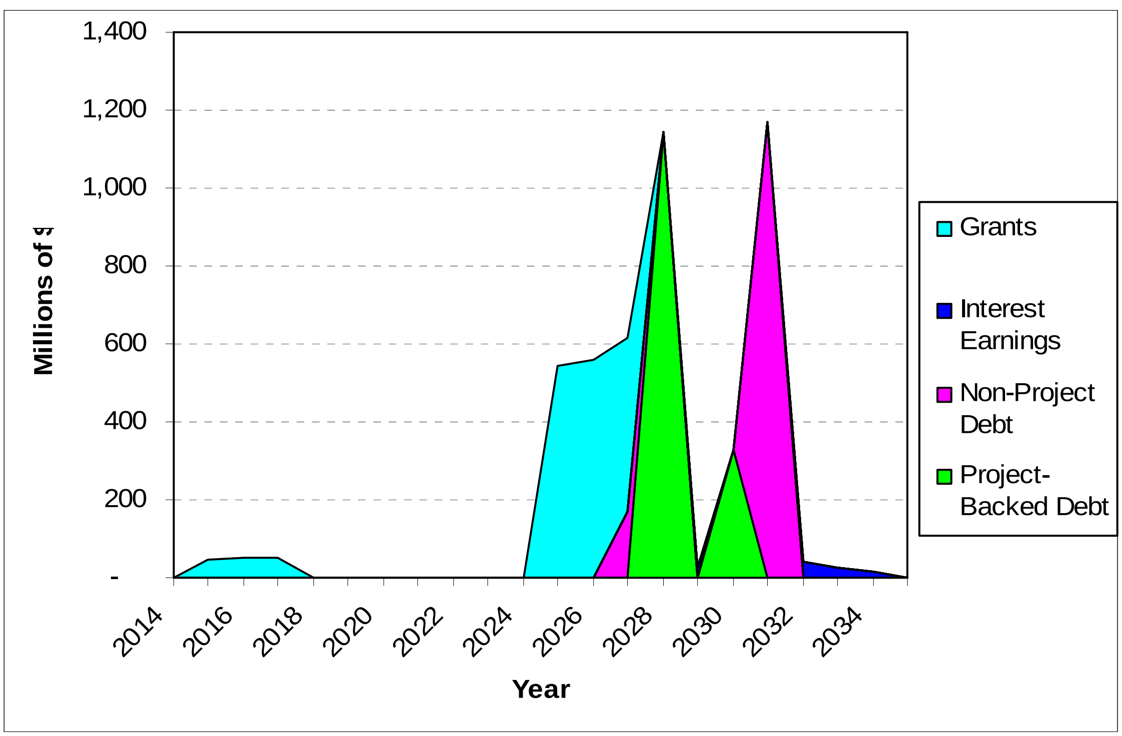
Should a decision be reached to pursue the Strategy D (Dedicated Truck Lanes) LPS option, rather than the first LPS option of Reversible Managed Lanes, toll revenue could be used to fund up to approximately $1.5 billion of the total $4.6 billion needed (assuming no elevated structure between the Mojave River Crossing and Bear Valley Road). This section presents a funding scenario that assumes this maximum amount of toll revenue could be raised. This funding scenario attempts to raise as much debt backed by the net toll revenue as possible, and fund the gap with a combination of federal, state and local grants, local debt and GARVEE bonds.

Table 7-9 shows the total amount of funding from each of the various sources. This funding scenario assumes $1.5 billion of the project's construction costs are covered by project-related debt. The toll revenue and capital appreciation bonds are issued in 2028, and the federal loan in 2030. This scenario optimistically assumes local and regional agencies are able to find $1.7 billion in new federal, state and local grants for the project, and that this money would be available between 2015 and 2027. The $170 million of Measure I funds are used to fund the project in 2027. The remaining gap of $1.2 billion is assumed to be funded with GARVEE bonds issued in 2031. Using GARVEE bonds for this project will, however, reduce the amount of funding available for other capital projects in the region. **Figure 7-11** shows the resulting stream of construction funds.

Table 7-9 Sources of Construction Funds under Financial Strategy 3 (in millions of dollars)

Project-Backed Debt:		
Toll Revenue Bond	147	3%
Capital Appreciation Bond	997	22%
Federal Loan	328	7%
Grants	1,700	37%
Non-Project Debt:		
Local Debt (Measure I)	170	4%
GARVEE Bond	1,168	25%
Interest Earned on Construction Fund	112	2%
TOTAL	**4,622**	**100%**

Figure 7-11 Construction Funding Cash Flow Stream under Financial Strategy 3

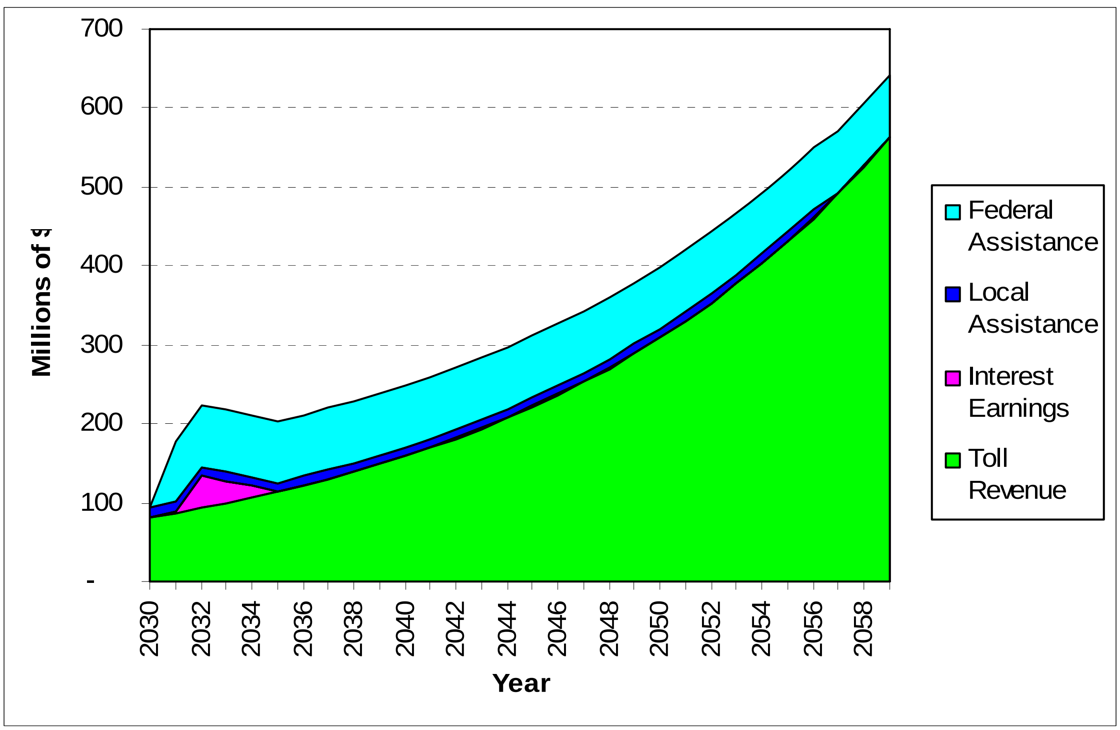


Ongoing operations of the LCV toll lanes are primarily funded with toll revenues. However, federal and local assistance will be needed to pay-down the GARVEE bonds and Measure I debt, respectively. **Table 7-10** shows the sources and uses of funds over the 25 years after the construction period is over. The required federal and local assistance averages $88 million a year over this period. **Figure 7-12** shows the same information in a graphical format.

Table 7-10 Ongoing Sources and Uses of Funds under Financial Strategy 3 (2035-2059 annual average)

Sources of Funds (\$ millions)				***Uses of Funds (\$ millions)***		
Toll Revenue	283	76%		O&M Cost	115	31%
Interest Earnings	1	0%		Debt Service	253	68%
Federal Assistance	10	3%		Miscellaneous	2	1%
Local Assistance	78	21%		**TOTAL**	**371**	**100%**
TOTAL	**372**	**100%**				

Figure 7-12 Sources of Ongoing Funds – LCV Lanes Alternative



The overall cash flow and cash balance under this funding scenario are shown in **Figures 7-13** and **7-14**.

Figure 7-13 Cash Flow under Financial Strategy 3

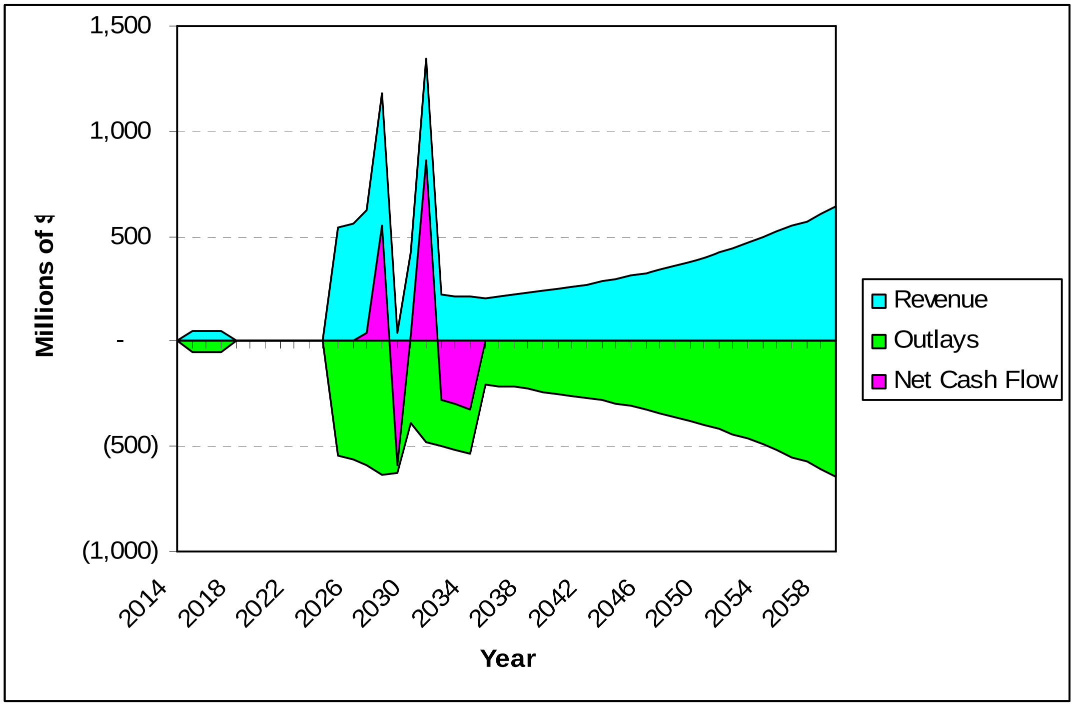
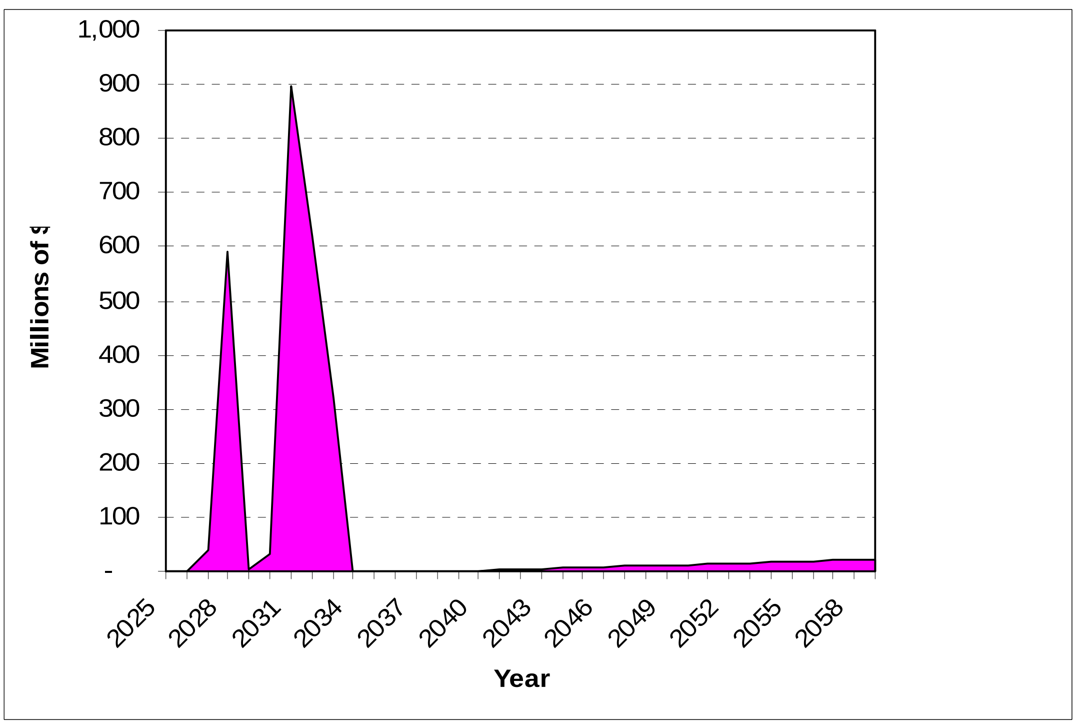


Figure 7-14 Cash Balance under Financial Strategy 3 (end of year)



7.2.5 *Evaluation of Potential Sources*

This section qualitatively assesses the three funding strategies presented above, as well as other potential financial sources and strategies applicable to each of the two candidate LPS options: the Strategy C and E Hybrid (Reversible Managed Lanes with HOV Lanes) and Strategy D (Dedicated Truck Lanes)

7.2.5.1 Strategy D (Dedicated Truck Lanes)

A basic element of the rationale for Financial Strategies 2 and 3 is that truck lanes generate value for users (both shippers and carriers) that can be captured through user fees and used as part of the funding strategy. The analysis shows that the toll revenue for truck lanes without LCVs does not generate sufficient revenue to make this a viable option. Thus, a mix of grants, other user fees (such as container fees like those levied to pay for the Alameda Corridor), or non-project revenue sources (such as could be used to cover GARVEE bonds) would be needed to fund the project. Allowing LCV operation, because of the higher toll rates, could at some point in the future generate enough revenue to cover a portion of the project costs (assuming no elevated structure between Mojave River and Bear Valley Road) using conventional revenue backed debt instruments. This section evaluates the other alternative sources that could be used to cover the gap between the funding raised through debt financing and the project costs.

The financial feasibility analysis considered three primary sources for these funds – 1) federal, state, and local grants, 2) GARVEE bonds, and 3)bonds backed by Measure I funds. The funding scenario requires a substantial contribution from grants ($1.7 billion) without identifying any new source of these grant funds. Provisions in SAFTEA-LU that created the program for "Projects of National Significance" and expansion of the "National Corridor Development Program", while they did generate substantially more project funding for projects like the truck lane strategy, were addressed exclusively through earmarking for the life of the current legislation. The State of California is developing a new Goods Movement Action program although budgets and sources of funding have not been identified. Thus, conventional grant-in-aid funding sources would have to provide the grant funding. Given the high level of unfunded regional needs, this may be difficult to accomplish. The GARVEE bonds would allow the project to be financed and debt service payments made from future transportation funding allocations. This would reduce the one-time commitment required by the funding agencies but would require a long-term commitment of funds. The annual requirement suggested by Financial Strategy 3 previously is fairly substantial (between approximately $78 million and $116 million) and would last for the entire financing term. Measure I funding for the project is limited to $170 million.

Another alternative that could be considered would be the use of another user-fee based revenue stream. Strategy D (Dedicated Truck Lanes) will likely only be the selected LPS if it is part of the full truck lane network as proposed by SCAG in the 2004 RTP. In this case it would be part of a network developed to serve international trade traffic and could potentially be financed through container fees that are being considered for application at the Ports of Los Angeles and Long Beach. Analysis in other studies suggest that in combination with other sources, container fees could be levied that would not affect port competitiveness and could generate substantial revenues for use in financing local freight transportation infrastructure projects. Part of this argument hinges on the notion that the lanes provide benefits to shippers and the value of the benefits are captured through the container fees. In order to obtain funding from this source, it may be possible to demonstrate the fraction of truck lane users in the I-15 corridor that are related to port traffic. This may be easier to demonstrate in the case of LCVs if they are allowed to operate on the I-15 corridor. This source of funding, while it does not exist today, is one of the more promising new sources of revenue that are likely to become available prior to the construction of the I-15 study corridor improvements.

The success of funding over 60 percent of the Alameda Corridor improvements with debt financed through container fees has led to further study and actual expansion of this new source of local revenues. PierPass, for example, extends the Alameda Corridor's container fees on rail borne or rail bound boxes to trucks entering the San Pedro Bay (SPB) Ports during peak periods. These revenues, however, are dedicated exclusively for the operations and administration of the program. Nevertheless, two other proposals to increase the amount and extend the coverage of container fees are now being considered: the SCAG Port and Modal Elasticity Study by Prof. Rob Leachman (Leachman & Associates LLC) in August 24, 2005, and the West Coast National Freight Gateway (WCNFG) prepared by the Los Angeles Economic Development Corporation (LAEDC).

The Leachman study determined that "…a container fee of $192 per FEU assessed on every inbound loaded container at the San Pedro Bay (SPB) ports could fund about $20 billion in access infrastructure improvements [of which] $16 billion for truck lanes from ports to warehouse districts [and] $4 billion for rail and terminal capacity[7]." These estimates can be used to measure the potential for funding the approximately $2.045 billion to $3.548 billion estimated cost range for implementing Strategy D. The cost range of implementing Strategy D is approximately 12.8% to 22.2% of the $16 billion in potential highway funding from a $192 per FEU container fee or roughly a $24.50 to $42.60 FEU container fee needed to fully fund this Strategy.

The implementation of this type of fee program is extremely complex and challenging, and unprecedented in its order of magnitude. While a portion of the cost of implementing Strategy D might be provided by other revenue sources, including user tolls, the use of container fees does provide some potential. However, the use of container fees to fund improvements to I-15 would need to be evaluated in the context of establishing a nexus between the fees being collected, the use of the I-15 corridor by those paying the fees, and the magnitude of fee revenues that could be allocated to improving the study corridor. Recognizing these limitations, it is unlikely that container fees could be utilized to fund the majority of the cost of implementing Strategy D although they could potentially be leveraged to fund a reasonable share of the project costs.

[7] The Leachman study assumes 'current year' constant dollar values for revenues generated. The revenue analysis in this report is generally provided for 'year of expenditure' dollar values (inflated). It should be noted that the project cost ranges associated with construction of Strategy D as referenced in this paragraph are in current year dollar values (not inflated).

Another way that a combination of the toll revenues and container fee revenues could be leveraged to create more project financing would be through the use of tax credit bonds. This concept envisions the issuance of bonds for which principal payments would be made using the toll/fee revenues and the interest payments would be made in the form of tax credits for the bond purchasers. Tax credits could be issued by either the state or federal government. While these programs effectively act as a grant of funding to the project from the state or federal government they have certain advantages in that they do not require pay-as-you-go funding and they are not subject to annual appropriations (like GARVEE bonds), reducing some of the risk associated with the bond repayments. There appeared to be serious consideration of this financing tool in the SAFETEA-LU authorization hearings but ultimately it was not included in the final legislation. They continue to be discussed in the ongoing deliberations about future financing of transportation systems.

The following examples demonstrate two scenarios for utilizing tax credit bonds as part of a funding strategy for completing truck lanes on I-15. These examples assume the dedicated truck lanes would provide for usage by LCVs thereby resulting in a reasonable generation of toll revenues.

- **LCV Use of Dedicated Truck Lanes without Elevated Structure**

  Under this scenario, without the increased cost of providing elevated structures in the north end of the corridor, the project could be mostly self-financing. This scenario assumes the availability of grant funding to cover early construction of the I-15/I-215 interchange ($146.6 million) and the allocation of $170 million of Measure I funding for use in the I-15 corridor. Net proceeds from different sources under this scenario could be as follows:

Federal, State, Local Grants	$ 146,550,725
Local Debt (Measure "I")	$ 170,000,000
GARVEE Debt	$ 95,430,730
Tax Credit Revenue Bond	$ 306,695,990
Tax Credit Cap Appreciation Bonds	$ 3,005,162,641
Federal Loan	$ 374,290,060
Total:	$ 4,098,130,146

  Under this scenario, the interest payments would be substantial. Over the 30-year life of bonds, the total interest costs are estimated to be as follows:

Tax Credit Revenue Bonds	$ 222,907,609
Tax Credit Cap Appreciation Bonds	$ 3,246,585,813

- **LCV Use of Dedicated Truck Lanes with Elevated Structure**

  Under this scenario, the higher cost of implementing Strategy D to include elevated structures would require a considerable increase in GARVEE debt to fully fund the project. Assuming the same initial contributions from grants and Measure I, net proceeds from different sources could be as follows under this scenario:

Federal, State, Local Grants	$ 146,550,725
Local Debt (Measure "I")	$ 170,000,000
GARVEE Debt	$ 792,530,979
Tax Credit Revenue Bonds	$ 306,695,990
Tax Credit Appreciation Bonds	$ 3,005,162,641
Federal Loan	$ 353,684,242
Total:	$ 4,774,624,577

Under this scenario, the interest payments would be the same as the previous example. Over the 30-year life of bonds, the total interest costs are estimated to be as follows:

Tax Credit Revenue Bonds	$ 222,907,609
Tax Credit Cap Appreciation Bonds	$ 3,246,585,813

While not immediately available for funding Strategy D (Dedicated Truck Lanes), tax credit bonds should be monitored as it may become available. The preceding examples illustrate the potential for utilizing tax credit bonds. Approximately 80% of the project cost of the LCV alternative without the northern corridor elevated structure could potentially be financed with tax credit bonds if LCV toll revenues were covering the principal payments only and state tax credits were used to cover the interest payments. However, this approach would require the willingness of (typically) the state government to subsidize the grants (although federal participation is also possible). This would represent an effective grant of foregone revenue from the state general fund that is quite substantial and might not be politically viable in light of current state deficits.

7.2.5.2 Strategies C and E Hybrid (Reversible Managed Lanes with HOV Lanes)

Funding Strategy 1, Combination HOT/HOV Lanes, has a similar set of components as Financial Strategy 3, LCV Toll Lanes. In the case of Financial Strategy 1, revenue bonds backed by toll revenues can account for a larger fraction of the total cost of the project. The funding gap would again be filled through conventional federal, state, and local grants (in this case only $104 million), the same allocation of Measure I funds, and GARVEE bonds. The GARVEE bond commitment for Financial Strategy 1 appears to also be more workable (approximately $11.8 million per year).

While it is theoretically possible that tax credit bonding authority could be made available for this type of project, it has mostly been discussed in connection with obtaining a new financing approach to goods movement projects. It is estimated that using the toll revenue stream to repay principal and state tax credits to pay interest would cover the entire project cost and even generate excess net proceeds that could be used to fund other projects ($488 million at end of 2027 when construction is finished). No Federal loan, GARVEE debt or local debt would be needed, and Measure I funding for I-15 projects could be utilized for other improvements in the corridor (or elsewhere).

The following example demonstrates how tax credit bonds could be leveraged to fully finance the implementation of Reversible Managed Lanes with HOV Lanes strategy:

- **Reversible Managed Lanes with HOV Lanes**

Net proceeds:	
Tax Credit Revenue Bond:	$ 434,502,852
Tax Credit Cap Appreciation Bonds:	$ 933,130,209
Total:	$ 1,367,633,061

Interest payment totals over the 30-year life of the bonds:	
Tax Credit Revenue Bond:	$ 314,711,333
Tax Credit Cap Appreciation Bonds:	$ 959,195,326

As stated previously, this approach would require the willingness of the state government to subsidize the grants. Under this scenario, the total tax credits needed over the life of the project financing term would total over $1.2 billion. This would represent an effective grant of foregone revenue from the state general fund that is substantial and might not be politically viable in light of current state deficits.

7.2.6 Summary and Implications for the Corridor Action Plan

A summary of the three financial strategies presented in this section is provided below. Implications of the financial analysis on the Corridor Action Plan are highlighted.

7.2.6.1 Financial Strategy 1: Combination HOT/HOV Lanes

The financial analysis indicates that Financial Strategy 1, Combination HOT/HOV Lanes, will not generate sufficient toll revenues to fully fund construction of the Strategies C and E Hybrid. Using toll rates that maximize toll revenues, assuming "sensitivity test" demand forecasts, and using a full range of financial instruments, at most $665 million or 59 percent of the $1.14 billion construction cost could be financed by leveraging the net revenue collected from HOT lane tolls. This is a significantly lower percentage of costs covered by toll revenues than for other comparable projects. The remaining $470 million in construction costs would have to be funded through other federal, state and local sources.

The feasibility of the GARVEE bond approach should be considered in the context of overall commitments to this financing approach that are being pursued in San Bernardino County.

7.2.6.2 Financial Strategy 2: Truck Toll Lanes

The financial analysis indicates that the annual revenue from truck lane tolls is similar in magnitude to the annual operating and maintenance cost for the truck lanes, even assuming "sensitivity test" levels of demand. Because of this unfavorable financial operating scenario, none of the $4.6 billion[8] escalated construction cost can be

[8] $5.3 billion if the Mojave River to Bear Valley Road elevated structure is included.

financed by leveraging the net toll revenue. Significant infusion of funding from federal, state or local sources will be needed to make this project financially feasible. These results are highly sensitive to the estimated value of time for trucks traveling in the corridor, the relative travel times on the truck lanes versus the general-purpose lanes, and the value of improved reliability.

The values of time estimates used in this study are based on published literature confirmed by limited anecdotal discussions with carriers operating in the corridor. Relative travel times reflect traffic volumes as calculated by the SCAG model. The value of reliability improvements is an area that is receiving considerable attention at this time and new methodologies should be applied to reassess the benefits of truck lanes since in congested corridors the new methodologies are estimating higher reliability benefits than the approach used in this study.

7.2.6.3 Financial Strategy 3: LCV Toll Lanes

The financial analysis indicates that Financial Strategy 3, LCV Toll Lanes, will not generate sufficient toll revenues to fully fund construction of Strategy D, Dedicated Truck Lanes, even assuming "sensitivity test" levels of demand. Using toll rates that maximize toll revenues and a full range of financial instruments, at most $1.5 billion or 32 percent of the $4.6 billion construction cost of the LCV Lanes Alternative without the Mojave River to Bear Valley Road elevated structure could be financed by leveraging the net revenue collected from truck lane tolls. If the elevated structure is included, the cost goes up to $5.3 billion with about 28 percent of this cost potentially covered with project-related debt instruments. These percentages of costs covered by toll revenues are significantly lower than for other comparable projects.

The remaining $3.15 billion in construction costs ($3.8 billion with the elevated structure) would have to be funded through other federal, state and local sources. The analysis of LCV toll revenues was based on estimates of the revenue benefits to carriers of operating with LCVs and estimates of potential LCV markets derived from commodity flow data for the SCAG region. These benefits could change in the future as trucking rates for carriers serving the SCAG region increase.

SCAG, SANBAG and Caltrans may want to consider two actions with regard to the LCV Lanes Alternative:

- ♦ Postpone any decisions regarding whether to proceed with Strategy D, Dedicated Truck Lanes, in combination with Financial Strategy 3, LCV Toll Lanes, until a later date. Because the planned year of opening, 2030, is 25 years in the future, there is no imminent reason to enter into any commitments. The agencies might also consider conducting another analysis of Financial Strategy 3, LCV Toll Lanes, at a later date as new information and evaluation methodologies become available.
- ♦ Postpone the planned year of opening of the LCV toll lanes. LCV volumes are forecasted to be modest in the early years immediately after planned opening. Postponing the opening year will allow the project to begin operations after LCV volumes have built up.

Either of the above two actions will also provide time to determine if the forecasted growth in LCV traffic, which the LCV Lanes Alternative critically depends on, can actually occur.

The most critical implication of this funding strategy for the corridor action plan is the need to resolve the fate of the regional truck lane network and to follow deliberations over the funding strategy for this network. This issue will be addressed as part of the Multi-County Goods Movement Action Plan and the scheduled SCAG 2008 RTP update. Since the I-15 truck lanes would likely only be advanced as part of the corridor strategy if they are included in this network, the funding strategy would be linked to that of the rest of the truck lane network.

An updated analysis of the value of reliability time savings in the corridor should be conducted using the buffer time savings approach that has been recently demonstrated for the truck lane network. Initial analysis by SCAG suggests that value of reliability benefits could be significantly greater than those estimated in this study. The analysis should be conducted for this corridor alone to determine whether higher toll rates (and, consequently, higher revenues) are justified and the financial analysis should be adjusted to take this into account.

7.3 ACTION PLAN

Based on the above discussions of implementation factors and funding strategies, two action plans have been prepared: one for the critical near-term improvements to the I-15/I-215 interchange, and one for the long-term corridor improvement process. Each action plan includes near-term steps and the responsible agency, followed by an overview of subsequent steps leading to ultimate implementation of the Locally Preferred Strategy.

7.3.1 Near-Term Improvements Action Plan: I-15/I-215 Interchange

Next Steps:

1. Complete design of the SHOPP project (auxiliary lane from Kenwood Avenue to Cleghorn Road – anticipated to be completed in FY 2005-2006) – Caltrans
2. Construct auxiliary lane from Kenwood Avenue to Cleghorn Road (construction expected to commence in FY 2005-2006) – Caltrans
3. Conduct a PSR and PR/ED for the major interchange improvement (identified as a primary goal for funding in FY 2006-2007) – SANBAG and Caltrans.
4. Perform preliminary design and environmental clearance for improvements to Cajon Boulevard (potentially part of PR/ED for I-15/I-215 interchange) – SANBAG and County of San Bernardino.

Overview of subsequent steps leading to reconstruction of the interchange:

1. Identify funding for the I-15/I-215 interchange reconstruction – SANBAG and Caltrans.
2. Perform final design of I-15/I-215 interchange improvements – SANBAG and Caltrans.
3. Acquire right-of-way for I-15/I-215 interchange improvements – Caltrans.

4. Construct I-15/I-215 interchange improvements – Caltrans.
5. Identify funding for Cajon Boulevard improvements (connecting Cajon Boulevard through the I-15/I-215 interchange could potentially be part of the overall funding package for the I-15/I-215 interchange) – SANBAG and County of San Bernardino.
6. Perform final design of Cajon Boulevard improvements – County of San Bernardino.
7. Acquire right-of-way for Cajon Boulevard improvements – County of San Bernardino.
8. Construct Cajon Boulevard improvements – County of San Bernardino.

7.3.2 Long-Term Improvements Action Plan: I-15 Corridor Projects

Next Steps:

1. Based upon results of Multi-County Goods Movement Action Plan, adopt the final LPS for the I-15 Corridor – SANBAG.
2. Request SCAG to include the final LPS in the 2008 RTP update.

Overview of Long-term Corridor Improvement Process:

1. Conduct PSRs for the corridor mainline improvements by segment: southern (SR-60 to SR-210), central (SR-210 to US-395), and northern (US-395 to Mojave River) – SANBAG and Caltrans. Include consideration of need for auxiliary lanes in design studies.
2. Identify funding for the corridor mainline improvements – SANBAG and Caltrans.
3. Conduct PR/EDs for the corridor mainline improvements by segment – SANBAG and Caltrans.
4. Perform final design of the corridor mainline improvements by segment – SANBAG and Caltrans.
5. Acquire right-of-way for corridor mainline improvements by segment – Caltrans.
6. Construct corridor mainline improvements by segment – Caltrans.

Overview of Ongoing TSM/TDM Strategy Implementation

1. Work with corridor cities to plan, design, and implement Intelligent Transportation Systems strategies for the corridor – SANBAG and Caltrans.
2. Work with the California Highway Patrol to identify opportunities and means to enhance enforcement through the corridor – SANBAG and Caltrans.
3. Identify opportunities and means to enhance freeway service patrol in the corridor – SANBAG.
4. Work with Victor Valley Transit and Omnitrans to identify opportunities and means to increase express transit service between the high desert and the Valley area – SANBAG.