

Value Analysis Report



I-5/SR56 North Connectors

11-SD-5/56

KP 52.9/53.7 (I-5) and 0.0/0.8 (SR56)

17790K Special Designation: 6VA56N5



**Contract No. 53A0063
Task Order No. 202.173**

April 2002



Prepared by

Value Management Strategies, Inc.

The Value Analysis (VA) team examined the proposed project to improve traffic flow between State Route 56 (SR-56) and Interstate 5 (I-5). The VA team assessed the alternatives identified in the December 2000 Caltrans *Project Study Report* (PSR). The PSR recommends two primary alternatives for further study:

✍ Direct Connectors - construction of two connector ramps, one from southbound I-5 to eastbound SR-56 and the other from westbound SR-56 to northbound I-5.

✍ Local Street Connection - improve the local street connection to northbound I-5 by improving the ramps at El Camino Real and Carmel Valley Road.

The project is currently listed in the Regional Transportation Improvement Plan's *2020 Highway Plan*, but not included in the *Revenue Constrain Plan*. The PSR estimated the project to cost \$137,000,000 (escalated to assume construction in the year 2005). However, during the course of the VA study the team identified additional needs that could increase project cost.

The VA Team's *mission* was to identify all viable alternatives (e.g., highway, local streets, and/or traffic management solutions) that meet the project's need, purpose and functional requirements. The study objective was to accelerate the implementation of solutions by determining lower cost alternatives that met or exceed the performance criteria of the PSR alternatives. In addition, the VA team considered the requirements set forth by 1998 approved City of San Diego ballot measure "M". Measure "M" restricts the build-out Pacific Highlands Ranch until a complete connection between SR-56 and I-5 has been constructed.

Development within the phase shifted area of the Pacific Highlands Ranch Subarea Plan shall not exceed 1,900 dwelling units until such time that the ramps for westbound SR-56 connecting with I-5 North and I-5 South connecting with eastbound SR-56 are constructed and operational.

The VA Team was comprised of representatives from the community's local planning groups, the City of San Diego, SANDAG, Caltrans and highway design consultant engineers.

After identifying and evaluating 42 alternative ideas, the VA team endorsed the PSR proposed design for the *direct connectors*. The VA team also developed an understanding for the need to add a lane to I-5 to accommodate safe merging of traffic and why all elements of the project described in the PSR are necessary. The over-riding fatal flaw of the other alternatives developed by the VA team was safety. The alternatives developed by the team were determined not viable due to unsafe operational conditions such as insufficient merging and sight distance.

The VA team's primary recommendation is to initiate the environmental process to study the direct connectors and to include in that process an alternative that would:

1. Initiate a project to improve city street (such as, adding turning lanes and signal timing/coordination) and freeway operational improvements on I-5 and SR-56 (widen El Camino Real off-ramp, add auxiliary lanes on I-5 from Carmel Road to Del Mar Heights Road)

2. Construct the PSR proposed westbound SR-56 to northbound I-5 connector and improve operations on eastbound Carmel Valley Road to permit southbound I-5 to eastbound SR56 traffic to continue to use this movement.
3. Construct the PSR proposed southbound I-5 to eastbound SR-56 connector when appropriate

Implementation of the three-phase approach will be easier to finance thereby expediting the short and long-term improvements to accommodate increasing regional demand along the I-5 and SR-56 corridors. However, the direct connectors do not serve as a stand-alone solution to meet future needs. SANDAG's updated traffic forecast model data and the team's traffic simulations indicate continued congestion degradation on local streets. In addition, the increased traffic volumes resulted in the VA Team identifying operational deficiencies with the PSR defined *direct connector* proposal that may necessitate improvements to SR-56 such as adding braided lanes to prevent merging conflicts. Therefore, the VA team recommends the following actions to extend the range of benefits and design life to further decrease travel time and improve the travel experience for future freeway and local street commuters:

- ☞ Conduct traffic studies to better understand the relative impacts of converging freeway connections with local streets with planned improvements and expected growth.
- ☞ Initiate studies to identify integrated multi-modal solutions that address the areas long-term needs to more effectively facilitate the movement of people and goods.

The VA team's efforts resulted in a greater understanding of community needs and the project's complexity. In summary, the VA Study results are:

- ☞ Validated the freeway to freeway connector alternative as described in Caltrans' PSR.
- ☞ Identified the potential for additional operational improvements to SR-56 to meet project performance objectives.
- ☞ Pursue a three-phase staged approach.

Initiate additional studies to identify alternatives to implement short-term local street and freeway operational improvements.

Investigate the potential to study the separating the freeway to freeway connectors into two separate projects to expedite the delivery of the westbound SR-56 to northbound I-5 connector.

Initiate studies to identify strategies for a long term comprehensive solution that integrates local street, freeway, transit, carpool and bicycle improvements to circumvent local street congestion forecasts.

Project Development Funding

Currently, \$300,000 of federal demonstration grant funds and the required non-federal 20% match, \$60,000 of State Transportation Improvement Program (STIP) funds is dedicated to this project. An approved Project Report and environmental document is needed to proceed with the project's design. A Federal Corridors and Borders grant of \$2 million dollars has been earmarked for this effort. Additionally, \$400,000 of non-federal matching funds is required to take advantage of federal dollars available to fund the project's environmental study and review phase.

INTRODUCTION

This Value Analysis (VA) Report summarizes the events of the VA study conducted by Caltrans District 11 and facilitated by Value Management Strategies, Inc. The subject of the study was the I-5/SR56 North Connectors in San Diego, California:

☞ 11-SD-5/56 KP 52.9/53.7 (I-5) and 0.0/0.8 (SR56)

☞ EA 17790K Special Designation: 6VA56N5

The VA study was intended to focus on alternatives that would minimize the impact of regional traffic on State Route 56 from congesting the local in the Carmel Valley area and develop project stakeholder consensus in determining feasible alternatives.

PROJECT DESCRIPTION

SR-56 will serve as an east-west connector between I-5 and I-15 and will connect the communities of Carmel Valley and Rancho Penasquitos. Two sections of SR-56 between I-5 and I-15 have been completed and are currently operational. The middle section, approximately 8.0 KM, is scheduled to be advertised for construction in April 2002. Based on the SR-56 traffic study, the SR-56/I-5 north direct connectors need to be built between 2015 and 2020, in order to maintain level of service “D” operating conditions in the SR-56/I-5 Interchange area. Caltrans recently completed a PSR in order to identify project impacts.

The direct connector concept proposed in the PSR is to construct connectors from westbound SR-56 to northbound I-5 and southbound I-5 to eastbound SR-56. Improvements would include constructing two-lane direct connector structures, approach pavement sections, and auxiliary lanes on westbound SR-56 and northbound and southbound I-5. The truck bypass facilities on north and southbound I-5 would be realigned to the outside of the 5/56 connector structures and the bypasses and barrier separation would be extended to Del Mar Heights Road. To facilitate the alignment of the direct connectors, Carmel Valley Road, the entrance ramp from El Camino Real to eastbound SR-56, the northbound entrance ramp and southbound exit ramp at Carmel Valley Road, and all ramps at the Del Mar Heights Road Interchange will be realigned to facilitate the alignment of the direct connectors.

Project cost is estimated at \$137,000,000 in 2005 dollars. However, this estimate does not include the design modification that may be needed based on the most recent traffic numbers. This project is not currently funded in the Regional STIP/RTP.

PROJECT ISSUES

The following are some of the issues and concerns associated with the direct connector project:

? ? South to east flyover

☞ Visual impact

Community Character Impact

- ?? West to north connector is more important to local community. Their main concern is for traffic on WB56
- ?? Both movements are needed to satisfy Measure M
- ?? South to East connector is more important for I-5 traffic operations
- ?? Impact of not providing connectors – it would constrain the area of SR 56 (middle portion) and delay planned smart growth and delivery of associated infrastructure improvements (schools, libraries, etc.)
- ?? Funding – The project is currently listed in the Regional Transportation Improvement Plan’s *2020 Revenue Constrained Plan* as an unfunded project.
- ?? A solution is needed to avoid regional traffic from SR56 from further impacting the existing surface street traffic congestion.
- ?? Local stakeholders do not understand why the total cost of the project is as high as it is.

PROJECT ANALYSIS

The VA team used the Value Analysis techniques and process to analyze the project and develop alternative concepts. Key conclusions and results of this analysis are summarized below.

Using function analysis and Function Analysis System Technique (FAST) diagramming, the team defined the basic functions of this project as *Provide Freeway to Freeway Connection* in order to *Satisfy Measure M* and *Reduce Local Impact* of regional traffic on local streets. This process also helped to gain understanding by the local stakeholders participating on the VA Team why the widening on I5 is a necessary part of the direct connectors.

Specific performance criteria were developed in cooperation with the designers and stakeholders. These criteria were weighted, using a paired comparison approach, and resulted in the following criteria being used to evaluate ideas and alternative concepts. These criteria are listed in the order of priority.

- | | |
|--|--|
| <ul style="list-style-type: none"> Safety Environmental Impacts Community Character Freeway Operations Local Traffic Operations | <ul style="list-style-type: none"> Facilitate Smart Growth Support Multi-modal Use Constructibility Compatibility with other Highway Improvement Projects Right of Way Impact |
|--|--|

Based on the cost estimate in the PSR, approximately 13% of the estimated project costs are for right of way and utility relocation, 12% for retaining walls to accommodate widening of I-5, 12% for the SB5 to EB 56 Connector and 7% for the EB to NB Connector. As a result of the traffic simulation developed to evaluate the relative effectiveness of the various concepts, the team identified possible congestion on WB56 between Carmel Creek Road and El Camino Real. This congestion is caused by weaving between vehicles at the Carmel Creek westbound on-tamp and the El Camino Real westbound off-ramp on SR 56. Correcting this weaving problem could add ~10% to the project cost.

The development and analysis of the traffic simulations also resulted in the following revelations regarding traffic in the area.

- Based on the latest traffic model data from SANDAG, released during the VA Study, shows an increase traffic demand for the North Connectors from ~1500 vph, which was the information provided to Caltrans for the PSR, to ~2100 vph in the year 2025.

- ✍ Based on latest traffic projections from the City of San Diego, local traffic on El Camino Real and Carmel Valley Road has also increased over the traffic numbers available at the time the PSR was developed. This increase is partially due to the removal of the segment of Carmel Creek Road to the south of SR 56. This forces more traffic onto El Camino Real, which impacts operations on Carmel Valley Road.
- ✍ The development of the local area has created significant trip generators from the area to southbound I-5 in both AM and PM rush hours. This local demand creates significant local congestion and is independent of regional traffic using SR56.
- ✍ The westbound to northbound Connector will be capable of handling the year 2030 regional traffic demands caused by the completion of SR56. The local streets cannot handle this volume without creating significant traffic congestion.
- ✍ The southbound to eastbound Connector will be capable of handling the regional traffic demands in the year 2030. Eastbound Carmel Valley Road also appears capable of handling this volume of traffic, although local operational improvements may be necessary to ensure the viability of using Carmel Valley Road until the completion of the southbound I-5 to eastbound SR56 Connector.
- ✍ Freeway congestion is only apparent during peak travel times. Non-peak traffic in the area is not expected to be a problem.

VA ALTERNATIVES

The VA Study resulted in validating the Direct Connector concept described in the PSR and led to local stakeholder understanding of the required project scope and the resulting cost. One VA Alternative presented is to stage the project elements and balance funds with needs. The VA Team developed two additional alternatives to determine their feasibility. They are included in this report to document why they are not feasible and should not be pursued.

Summary lists of the VA alternatives are in a following report section; descriptions of VA alternatives are given below:

Alt. No.	Description	Potential Savings (Added Cost)	Performance
1.1	Use Direct Connector for WB56 to NB5 Movement and Carmel Valley Road for SB5 to EB56 Movement. Use the direct connector from WB56 to NB5 as planned in the PSR. For the SB5 to EB56 move, use the existing EB Carmel Valley Road and optimize traffic signals and provide other operational improvements to minimize the potential for traffic congestion on local streets. While the Environmental Document should include both connectors, stage the project to break-up project costs into values that are easier for the region to fund and provide interim improvements to balance with the increased traffic projections in future years. Concurrently, the region needs to examine multi-modal solutions that can address long-term congestion in the area. This approach might preclude the need for the SB5 to EB56 Direct Connector until sometime after 2020.	47,000,000	+4%

Alt. No.	Description	Potential Savings (Added Cost)	Performance
1.2	<p>Loop Ramp I.L.O. Direct Connector Flyover for SB to EB Traffic (Not feasible)</p> <p>Use a loop ramp from SB5 to EB56 and provide for continuous flow from freeway to freeway using a dedicated and segregated lane on the surface street. Once the SB off ramp lane crosses under the NB5 to EB56 connector, it would need to become grade separated with the EB Carmel Valley Road to permit continuous flow into EB56 and allow EB Carmel Valley Road to connect with the El Camino Real Intersection.</p> <p><i>Considering there is no cost savings potential, environmental issues and the fact that it cannot be built to operate safely, it should be dropped from further consideration.</i></p>	0	-29%
1.3	<p>Use City Streets by Grade Separating SR56 On/Off Ramps at El Camino Real (Not feasible)</p> <p>This concept was based on grade separating SR56 with El Camino Real and using Carmel Valley Road between El Camino Real and I-5 to carry both local and regional traffic. This would require all business access along Carmel Valley Road between El Camino Real and I-5 to be closed, requiring the take of the Shell gas station. The EB Carmel Valley Road left turn to NB 5 would be no longer allowed to improve traffic signal operations and traffic flow in the area. This traffic would need to travel to El Camino Real and loop back to the NB on ramp. At the end of the EB 56 off ramp there would need to be a traffic metering signal across both the off ramp lanes and the lanes on WB Carmel Valley Road to provide traffic the opportunity to weave and get in the desired lane to access either the NB or SB I-5 on ramps or go westbound on Carmel Valley Road. Both SR56 on and off ramps at El Camino Real would need to be closed.</p> <p><i>The team concluded that this is not viable and there are too many operational and safety related issues to warrant further consideration.</i></p>	0	-26%

Detailed documentation of all the VA alternatives is in the Value Analysis Alternatives Section of this report.

PERFORMANCE AND VALUE IMPROVEMENTS

The VA team evaluated the performance of each alternative to determine its effect on the project based on the performance criteria identified by the project stakeholders.

The Performance Rating Matrix and rationale for the ratings are included on the following pages. Performance for Alternatives 1.2 and 1.3 have been included as part of the documentation to help clarify why these alternatives are not viable.

PERFORMANCE RATING MATRIX											Caltrans			
I-5 / SR56 North Connectors														
Criteria	Criteria Weight	Concept	Performance Rating										Total Performance	
			1	2	3	4	5	6	7	8	9	10		
Constructibility	6	Baseline		2										12
		Alternative 1.1						6						36
		Alternative 1.2		2										12
		Alternative 1.3						6						36
Local Traffic Operations	11	Baseline										10	110	
		Alternative 1.1							8				88	
		Alternative 1.2						6					66	
		Alternative 1.3	1										11	
Environmental Impact	16	Baseline								8			128	
		Alternative 1.1								8			128	
		Alternative 1.2				4							64	
		Alternative 1.3									9		144	
Community Character	14	Baseline			3								42	
		Alternative 1.1								8			112	
		Alternative 1.2					5						70	
		Alternative 1.3					5						70	
I-5 Freeway Operations	13	Baseline								8			104	
		Alternative 1.1								8			104	
		Alternative 1.2					5						65	
		Alternative 1.3										10	130	
Facilitate Smart Growth	9	Baseline										10	90	
		Alternative 1.1							7				63	
		Alternative 1.2										10	90	
		Alternative 1.3					5						45	
Compatible with Other Highway Projects	4	Baseline									9		36	
		Alternative 1.1									9		36	
		Alternative 1.2									9		36	
		Alternative 1.3										10	40	
R/W Impacts	2	Baseline								8			16	
		Alternative 1.1								8			16	
		Alternative 1.2								7			14	
		Alternative 1.3		2									4	
Safety	18	Baseline								8			144	
		Alternative 1.1								7			126	
		Alternative 1.2			3								54	
		Alternative 1.3	1										18	
Support Multi-Modal Use	7	Baseline					5						35	
		Alternative 1.1					5						35	
		Alternative 1.2					5						35	
		Alternative 1.3					5						35	
Overall Performance		Total Performance	% Performance Improvement			Total Cost	Value Index (P/C)	% Value Improvement						
Baseline Design		717				\$137.0	5.23							
Alternative 1.1		744	4%			\$90.0	8.27	58%						
Alternative 1.2		506	-29%			NA	NA	NA						
Alternative 1.3		533	-26%			NA	NA	NA						

BASIS FOR CHANGE IN PERFORMANCE AND VALUE

Baseline – Direct Connector	Alternative 1.1 – Staged Approach
<p>Constructibility Environmental process time due to SB to EB Connector issues and funding for complete project could result in a project that would take ~12 years to complete.</p>	<p>Constructibility Will be able to be delivered sooner and allow needs to better match traffic demand</p>
<p>Local Traffic Operations Direct connectors can handle all projected traffic and there would be no reason for regional traffic to impact local streets</p>	<p>Local Traffic Operations WB to NB traffic will not impact local streets. SB to EB traffic will have some impact.</p>
<p>Environmental Impact No significant impact to local wildlife or habitat</p>	<p>Environmental Impact No significant impact to local wildlife or habitat</p>
<p>Community Character Concern for visual and noise impacts from the SB5 to EB52 connector. Local opposition due to these factors could further delay approval for the project.</p>	<p>Community Character Possible minor noise impact from WB to NB connectors.</p>
<p>I-5 Freeway Operations Concept include added lane on I-5 to permit safe merging of traffic on I-5 with minimal disruption to traffic flow.</p>	<p>I-5 Freeway Operations Concept include added lane on I-5 to permit safe merging of traffic on I-5 with minimal disruption to traffic flow.</p>
<p>Facilitate Smart Growth Permits the development of planned smart growth communities along the SR56 corridor.</p>	<p>Facilitate Smart Growth Need to determine if SB to WB connection using local streets satisfy Measure M and permits development of smart growth communities.</p>
<p>Compatibility with Other Highway Projects No significant impacts to other projects in the area.</p>	<p>Compatibility with Other Highway Projects No significant impacts to other projects in the area.</p>
<p>R/W Impacts No business takes or business disruptions</p>	<p>R/W Impacts No business takes or business disruptions</p>
<p>Safety Minor design exceptions required.</p>	<p>Safety Minor design exceptions required. Added congestion on EB Carmel Valley Road could increase accident rate.</p>
<p>Support Multi-modal Use Does not add to or restrict multi-modal operations</p>	<p>Support Multi-modal Use Does not add to or restrict multi-modal operations</p>

BASIS FOR CHANGE IN PERFORMANCE AND VALUE

Alternative 1.2 – Loop Connector	Alternative 1.3 – Use Surface Street
<p>Constructibility Environmental process time due to SB to EB Connector issues and funding for complete project could result in a project that would take ~12 years to complete.</p>	<p>Constructibility Reduced cost and environmental issues could improve delivery time.</p>
<p>Local Traffic Operations Would require closing of the NB5 off ramp at Carmel Valley Road. This would force this traffic off at other locations and result in added traffic on local streets</p>	<p>Local Traffic Operations Added significant amount of traffic to local roads that are already congested by local traffic. Significant impact during rush hours.</p>
<p>Environmental Impact Impacts wetlands SW of interchange.</p>	<p>Environmental Impact No significant environmental impact.</p>
<p>Community Character Loop ramp impacts access to recreational area near wetlands.</p>	<p>Community Character May impact both noise and air quality due to congestion on Carmel Valley Road.</p>
<p>I-5 Freeway Operations Concept include added lane on I-5 to permit safe merging of traffic on I-5 with minimal disruption to traffic flow. Exit spacing from SB5 do not meet required standards for driver decisions.</p>	<p>I-5 Freeway Operations No impact to I-5 operations. Traffic entering I-5 is controlled by ramp meter</p>
<p>Facilitate Smart Growth Permits the development of planned smart growth communities along the SR56 corridor.</p>	<p>Facilitate Smart Growth Need to determine if this option using local streets satisfy Measure M and permits development of smart growth communities.</p>
<p>Compatibility with Other Highway Projects No significant impacts to other projects in the area.</p>	<p>Compatibility with Other Highway Projects Does not impact other planned projects in the area</p>
<p>R/W Impacts No business takes or business disruptions</p>	<p>R/W Impacts Requires take of Shell station and possible environmental clean-up and closing of access to businesses along Carmel Valley Road</p>
<p>Safety Significant design exceptions required. Insufficient separation between exits on SB5. Cannot maintain geometry required for freeway to freeway connector</p>	<p>Safety Significant safety problems due to poor stopping sight distances, weave conflicts and potentially confusing conditions for drivers.</p>
<p>Support Multi-modal Use Does not add to or restrict multi-modal operations</p>	<p>Support Multi-modal Use Does not add to or restrict multi-modal operations</p>

VA TEAM AND PROCESS

The VA study was performed between June 2001 and March 2002. The first phase of the VA Study, June through September 2001, focused on alternatives to the freeway-to-freeway direct connector alternatives. The second phase of the VA Study, October 2001 through February 2002 focused on alternatives that would use the city streets as part of the solution. Consultants were added to the team at this point to provide expertise in city street design and operations. In March 2002, a presentation of the findings was made to the community planning groups in the area. The VA study was led by Terry Hays, CVS, from Value Management Strategies, Inc. The VA team members are listed below:

Scott Mann	Caltrans D-11, Design
Mike Powers	Caltrans D-11, Traffic Ops
Julie Carlin	Caltrans D-11 Traffic Ops – Route Mgr.
Michelle McCart	Caltrans D-11, Environmental (part-time)
Bob Dauffenbach	Caltrans D-11, Right of Way
Bob Gibbs	Caltrans D-11, Planning – (part-time)
Curtis Johnson	Caltrans D-11, Landscape
Gary Levitt	Carmel Valley Community Planning
Lisa Ross	Chair, SR56 Task Force
John Dean	SR56 Task Force Member
Rick Smith	Sabre Springs Planning Group
Bob Lewis	Torrey Pines Planning Board
John Eardensohn	Latitude 33 Planning & Engineering
Dean Hiatt	SANDAG
Labib Qasem	City of San Diego
Arnold Torma	Katz, Okitsu and Associates
Graham Fraser	Fraser Engineering

Throughout the VA session, several members of Caltrans and the stakeholders supported the VA team. These participants included:

Chili Cilch	Caltrans D-11	VA Program Manager
Carmen Mullinex	Caltrans D-11	Value Analysis Coordinator
Eric Pahlke	SANDAG	Director of Transportation
Pedro Orso-Delgado	Caltrans D-11	District Director
Joel Haven	Caltrans D-11	Deputy District Director, Traffic Operations
Allan Kossup	Caltrans D-11	Deputy District Director, PPM
Rick Hopkins	Caltrans D-11	Deputy District Director, Design
Arturo Jacobo	Caltrans D-11	Project Manager
Majid Kharrati	Caltrans D-11	Design Manager

The VA Job Plan was followed to analyze the functions of the project, create and evaluate ideas for change, and develop and present alternatives to the project team.