



# ***Preliminary Value Analysis Study Report***



## ***D-3 US 50 Camino Safety Project***

**PN 0314000039**

**03-ED-50-PM 21.95-24.25**

**Contract No. 53A0177**

**Task Order No. 966**

***July 2016***

***Prepared by***

**Value Management Strategies, Inc.**



Date: July 13, 2016

To: Clark Peri, Project Manager

Subject: Preliminary VA Study Report (Task Order 966)  
***D-3 US 50 Camino Safety Project***

Value Management Strategies, Inc. is pleased to submit this Preliminary VA Study Report for the referenced project. This report summarizes the results and events of the study June 20-22 and June 27-29, 2016 in El Dorado County offices in Placerville, California, and District 3 offices in Marysville, California.

Please submit the enclosed VA Alternative Project Stakeholder Implementation Action Recommendation Forms no later than July 31, 2016 to Fred Kolano at [fred@vms-inc.com](mailto:fred@vms-inc.com).

It was a pleasure working with Caltrans District 3 on this project, and I look forward to the next one. If you have any questions or comments concerning this preliminary report, please do not hesitate to contact me at (970) 216-1739 or [fred@vms-inc.com](mailto:fred@vms-inc.com).

Sincerely,

VALUE MANAGEMENT STRATEGIES, INC.



Fred Kolano, CVS-Life, FSAVE, PVM  
VA Study Team Leader

Copy: (PDF) Addressee  
(PDF) Kevin Espinoza, North Region VA Coordinator  
(PDF) Troy Tusup, HQ VA Branch  
(PDF) Stephen Poole, HQ VA Branch

**NOTE TO DECISION-MAKERS**  
**D-3 US 50 CAMINO SAFETY PROJECT (TASK ORDER 966)**

A VA Implementation Meeting will be scheduled at a future date at the District 3 Offices, Marysville. You will be asked to accept, conditionally accept, or reject each VA alternative included in this report.

In addition, you will be asked to agree or disagree with the cost savings and performance attribute ratings the VA team applied to each VA alternative that is accepted or conditionally accepted.

**Acceptance of alternatives denotes intent to implement, based on current information, in the given project development phase (PID, PA&ED or PS&E). It is recognized that future conditions may change this disposition.** The validation of disposition, the cost changes, and performance changes for the alternative is required by Caltrans to ensure that the project decision makers agree with the study results. Furthermore, these validated results become the basis for the VA Program reportables.

The VA process is complete only when the implementation decisions for every VA alternative have been received from the Project Manager and documented in the VA Study Report. The Assess Alternatives and Resolve Alternatives activities provide the VA team, the project manager, and district/region management the assurance that the alternatives are properly evaluated and the implementation decisions are based on the merit of the alternative. This process helps to eliminate inaccurate study alternatives and legitimizes the results of the study and the VA Program.

**Please complete your review of the VA alternatives and provide your written comments on the VA Alternative Project Stakeholder Implementation Action Recommendation forms no later than July 31, 2016 to:**

e-mail: [kevin.espinoza@dot.ca.gov](mailto:kevin.espinoza@dot.ca.gov)

During the Implementation Meeting, we will review the individual Implementation Action Recommendation Form responses, develop a consensus for each VA alternative, document the responses to each alternative, and conclude decisions related to implementation. After that meeting, we will integrate the results into the Final VA Study Report.

<b>VA STUDY SUMMARY REPORT..... 1</b>	<b>PROJECT ANALYSIS (continued)</b>
Project Summary	Value Metrics
Project Purpose and Need	• Define Performance Requirements
VA Study Timing	• Define Performance Attributes and Scales
VA Study Objectives	• Prioritize Performance Attributes
Key Project Issues	• Measure Performance of Baseline Concept
Evaluation of Baseline Concept	• Measure Performance of VA Alternatives
• Performance Attributes	• Define VA Strategies
VA Alternatives	• Compare Performance – Baseline Concept and VA Strategies
VA Study Results	• Rating Rationale for VA Strategies
VA Team	• Compare Value
<b>VALUE ANALYSIS ALTERNATIVES ..... 8</b>	• Value Matrix – Baseline Concept and VA Strategies
VA Strategies	<b>IDEA EVALUATION ..... 78</b>
VA Alternative Summary Tables	Performance Attributes
• VA Alternatives	Evaluation Process
• VA Strategies	Idea Summary
Other Considerations	Idea Summary List
Summary of Performance Improvements	Detailed Idea Evaluation Summary
• Proposed	
VA Alternative Documentation	
<b>PROJECT INFORMATION .....55</b>	<b>VALUE ANALYSIS PROCESS ..... 96</b>
Background	Pre-Study
Project Description	VA Study
Project Design Exceptions	VA Report
Information Provided to the VA Team	Caltrans VA Job Plan & Study Activity Chart
Project Drawings	VA Study Agenda
Project Cost Estimate	VA Study Meeting Attendees
<b>PROJECT ANALYSIS .....64</b>	
Summary of Analysis	
Key Project Factors	
• Project Issues	
• Site Visit Observations	
Cost Model	
Function Analysis	
• Random Function Determination	
• FAST Diagram	

# **VA STUDY SUMMARY REPORT**

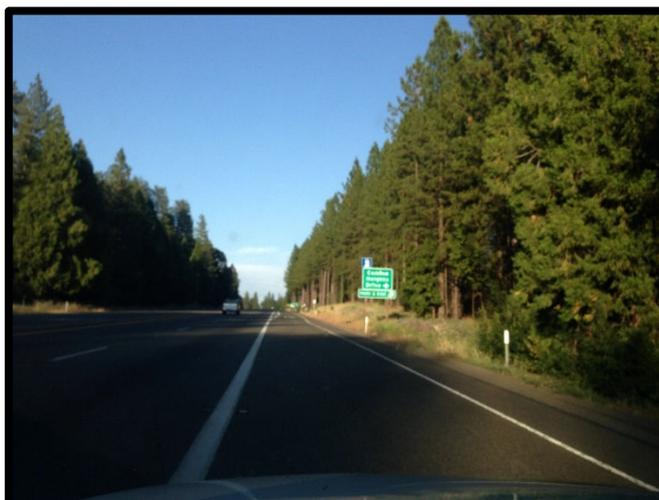
---

## ***PRELIMINARY FINDINGS***

# **VA Study Summary Report – Preliminary Findings**

## **D-3 US 50 Camino Safety Project**

03-ED-50  
PN 0314000039  
(PM 21.95-24.25)



A Value Analysis (VA) study, sponsored by Caltrans and facilitated by Value Management Strategies, Inc., was conducted for the US 50 Camino Safety Project near Camino, CA. This report summarizes the results and events of the study conducted June 20-22 and 27-29, 2016. The study was conducted in El Dorado County offices in Placerville, California and District 3 offices in Marysville, California. This *VA Study Summary Report – Preliminary Findings* provides an overview of the project, key findings, and the alternatives developed by the VA team.

***Note to reviewer: This is a summary of the VA study results. Please contact the DVAC if you would like a copy of the entire Preliminary VA Study Report with the detailed VA alternatives.***

### **PROJECT SUMMARY**

US 50 within the project limits is a four-lane expressway with a striped median that separates opposing traffic lanes. The surrounding portion of US 50 in this area is a multi-lane facility. Median barrier exists at each end of the limits of this project. US 50 also contains 12-foot-wide lanes with shoulders that vary from 1 foot to 8 feet. The profile of US 50 from Smith Flat follows a steep topography with grades that vary from 3.9% to 6.0%.

The project proposes to install a concrete median barrier that will restrict left-turn movements within the project limits. Widening the outside shoulders to standard width and installing several acceleration/deceleration lanes will help to reduce collisions. The baseline concept used for the VA study was Project Study Report Alternative 1A. This alternative provides a median barrier, shoulders constructed to standard, and a roundabout south of US 50 in the Camino Hills area. The baseline concept proposes to leave a gap in the median barrier at the Still Meadows area in the west end of the project; however, subsequent to the Project Study Report of December 2015, District 3 management directed that this gap be closed as part of the project.

Total project costs for all elements of the project are currently estimated at \$33,488,000. The schedule for design and construction was determined to be 64 months from the time of the VA study.

## **PROJECT PURPOSE AND NEED**

The purpose of the project is to improve the safety on US 50 in the Camino Corridor by modifying the facility. The project is needed because collision rates along this segment of US 50 in El Dorado County are higher than the state-wide average. Uncontrolled left-turn movements at intersections and driveways, as well as cross-centerline collisions, contribute to an increase in potential conflicts. There is a need to reduce the collision rate along this segment of US 50.

## **VA STUDY TIMING**

The VA study was conducted early in the PA&ED phase of project development, which is to be completed in April 2017. The project is scheduled for Ready to List (RTL) in October 2018.

## **VA STUDY OBJECTIVES**

The objectives of the VA study are to identify and develop value-improving alternatives to the baseline concept that will reduce cost and schedule while maintaining or improving performance.

## **KEY PROJECT ISSUES**

The items listed below are the key drivers, constraints, or issues being addressed by the project and considered during this VA study to identify possible improvements.

- Public acceptance issues related to project awareness, active HOA concerns, concerns about the accident history timeframe (date of the data), and concerns related to additional traffic in neighborhoods related to construction of the extension of Tiera Vista Road.
- Conflicting movements and cross median areas do not meet driver expectations.
- The project design does not include accommodations for Apple Hill traffic during the fall agritourism events. However, the project will look for opportunities to accommodate this seasonal traffic.
- Traffic management during construction.
- Emergency vehicle access.
- Impacts such as noise and inconvenience from construction activities to residential areas.
- US 50 east of Placerville is designated as a scenic highway.

## **EVALUATION OF BASELINE CONCEPT**

During the course of the VA study, a number of analytical tools and techniques were applied to develop a better understanding of the baseline concept. A major component of this analysis was Value Metrics which seeks to assess the elements of cost, performance, time, and risk as they relate to project value. These elements required a deeper level of analysis, the results of which are detailed

in the *Project Analysis* section of this report. The key performance attributes identified for the project are listed in the table, “Performance Attributes.”

Below is an evaluation of the baseline design concept which led the VA team to develop the alternatives and recommendations presented in this report.

The baseline project will provide a median barrier for almost the entire length of the project. There will also be project features that will allow local traffic to cross US 50. These changes to the roadway within the project limits will reduce the possibility of collisions. It will also reduce out-of-direction travel that residents may encounter, while keeping access to businesses.

---

**Performance Attributes**

- Mainline Operations
  - Maintainability
  - Local Operations
  - Environmental Impacts
  - Land Use Compatibility
  - Construction Impacts
- 

**VA ALTERNATIVES**

The VA team developed 9 alternatives for improvement of the project. The following are the alternatives identified, along with their associated potential initial cost savings, potential change in schedule, performance change, and a brief discussion of each. Please note that because the cost data depicted below represent *savings*, a number in parentheses represents a cost *increase*.

Alternative No. and Description	Initial Cost Savings	Change in Schedule	Change in Performance
<b>1.0 Eliminate the mitigation for the loss of the left turns and the north-south movements across US 50</b>	<b>\$7,550,000</b>	<b>-18 months</b>	<b>-6 %</b>

This VA alternative presents the lowest cost that will achieve the primary purpose and need of the project. The VA alternative proposes to eliminate those features that are being constructed to maintain local and regional access to and from the north and south sides of US 50 while providing safe east-west access on and off US 50, the secondary purpose of the project. Further, no improvements that are off the US 50 mainline will be made. This alternative would be considered if local improvements cannot be advanced. There would be construction cost and time savings, but performance would be decreased in some areas.

<b>2.1 Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing</b>	<b>(\$1,170,000)</b>	<b>No change</b>	<b>+5 %</b>
--	----------------------	------------------	-------------

This alternative proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new frontage road would connect Paul Bunyan to Camino Heights at Sierra Blanca. A new eastbound off-ramp would be constructed that would close Camino Heights Drive at US 50 and Sierra Blanca Road at US 50. The eastbound off-ramp would connect to a new roundabout intersection south of US 50. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road

connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part of the undercrossing. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Safety will be improved by reducing the severity of intersection related collisions. Allows segregated traffic flow for residents of the Camino Heights area by way of frontage connection to Paul Bunyan Road.

**2.2 Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing**

**(\$40,000)**

**No change**

**+3 %**

The alternative proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new eastbound off-ramp would be constructed that would close Camino Heights Drive at US 50 and Sierra Blanca Road at US 50. The eastbound off-ramp would connect to a new roundabout intersection south of US 50. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part the undercrossing. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Safety will be improved by reducing the severity of intersection related collisions.

**2.3 Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing**

**(\$480,000)**

**No change**

**+5 %**

The alternative concept proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new two-lane eastbound off-ramp to Camino Heights would be constructed that would provide a right turn Camino Heights Drive at US 50. Also, two roundabouts at the undercrossing at US 50 would be constructed. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part the undercrossing. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Improvement in safety would be achieved by reducing the severity of intersection related collisions.

<b>3.1 Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50</b>	<b>(\$2,870,000)</b>	<b>+3 months</b>	<b>-6 %</b>
--	----------------------	------------------	-------------

---

The alternative proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road to the existing concrete median barrier located at Upper Carson Road. In addition, an undercrossing of US 50 with eastbound on-/off-ramps would be constructed that would connect to a new roundabout on Carson Road east of Upper Carson Road and adjacent to Barkley Road. A frontage road would be constructed from the undercrossing back to Camino Heights Drive. The main benefit of this concept is to reduce impacts to the Camino Heights residents. It will also improve access to Upper Carson Road businesses. Therefore, this alternative is proposed to address local concerns while maintaining north and south access across US 50.

---

<b>3.2 Construct a classic L-1 type interchange ¼ mile east of Upper Carson with frontage connection to Camino Heights (consider park and ride/rest area)</b>	<b>(\$8,420,000)</b>	<b>+120 months</b>	<b>+3 %</b>
---	----------------------	--------------------	-------------

---

This VA alternative proposes to construct the mainline improvements of the baseline concept, excluding local improvements which will be replaced by constructing a classic L-1 type interchange ¼ mile east of Upper Carson Road with frontage connection to Camino Heights. Consider constructing a park and ride/rest area facility between US 50 and Carson Road on the interchange access and remove the Upper Carson Road access point to US 50. The main benefit of this alternative is that collisions would be reduced by closing Upper Carson Road access. A traditional interchange is safer than an at-grade interchange. There would be additional cost for the construction of an interchange and a frontage. The park and ride facility would enhance opportunities for transit mobility throughout the region. This concept is presented to explore alternatives in the vicinity of Upper Carson Road to reduce impacts on local neighborhoods and businesses.

---

<b>4.1 Construct right-in/right-out hook ramps between Camino Heights and Sierra Blanca</b>	<b>\$165,000</b>	<b>-2 months</b>	<b>-3 %</b>
---	------------------	------------------	-------------

---

The alternative will construct the median barrier and close access to US 50 from Camino Heights Drive and Pondorado road and install a four-legged intersection at the Vista Tierra Drive/Camino Hills Drive intersection. On-/off-ramps would be constructed from US 50 to the Vista Tierra Drive/Camino Hills Drive four-legged intersection. Sierra Blanca Drive would be closed off by installing a cul-de-sac. The park and ride lot would be modified. The main benefit of this concept is that it provides easier construction because of the elimination of the roundabout.

---

<b>4.2 Construct right-in/right-out ramps at Sierra Blanca keeping Camino Heights Drive open</b>	<b>\$995,000</b>	<b>-2 months</b>	<b>-2 %</b>
--	------------------	------------------	-------------

---

The alternative will construct the median barrier and maintain from Camino Heights Drive and Pondorado Road. The three-way intersection at the Vista Tierra Drive/Camino Hills Drive intersection will be maintained. A 1,400-foot eastbound auxiliary lane on US 50 that would exit at Pondorado Road will be installed that connects to Vista Tierra Drive at an all-way stop controlled three-way intersection. The Pondorado Road exit into a right-in and right-out access point to US 50 will be

modified. The main benefit of this concept is that it provides simpler construction because of the elimination of the roundabout. There will also be cost savings because of the elimination of the roundabout. Local opposition may be reduced because of less right-of-way impacts; however, it would likely remain due to increased traffic in local neighborhood consistent with traffic expected in the baseline concept. Right-of-way costs would be reduced because of fewer parcels needed.

---

**4.3 Maintain Camino Heights Drive as the main off-ramp to the undercrossing and close Sierra Blanca**      **\$1,095,000**      **-2 months**      **No change**

---

The alternative will construct the median barrier and maintain access to US 50 from Camino Heights Drive and close access to US 50 from Pondorado Road. A three-way intersection at the Vista Tierra Drive/Camino Hills Drive intersection will be maintained. The main benefit of this alternative is cost and schedule savings. There will be fewer construction impacts to local residents because of less noise and construction activities and fewer delays for motorists.

---

**4.4 Construct eastbound loop off-ramp as connection to new Pondorado Road undercrossing with a four-leg intersection for local traffic on south side**      **\$200,000**      **-3 months**      **-3 %**

---

The main benefit of this concept is to replace the proposed roundabout and the two hook ramps from the residential neighborhood by constructing an eastbound loop off-ramp starting at Camino Heights Drive and extend all the way to the new proposed Pondorado Road undercrossing. The alternative would close the existing Sierra Blanca Drive connection to US 50. There could be a weave issue with eastbound traffic entering US 50 at Camino Heights with exiting traffic to the new eastbound off-ramp.

## VA STUDY RESULTS

After the VA study, the project development team and senior management determined that a combined VA alternative would be developed. This new alternative (VA Alternative 4.4) has the benefit of keeping construction out of the residential area and reduces out-of-direction travel for motorists crossing US 50. Implementation of this alternative will reduce cost by \$200,000 and the project schedule by 3 months, but will slightly decrease performance by 3%.

### Summary of VA Strategies

Strategy Description	Initial Cost Savings	Change in Schedule	Change in Performance	Value Change
Recommended VA Strategy <i>VA Alternative 4.4</i>	\$200,000	-3 months	-3 %	No change

## VA TEAM

### VA Study Team

Name	Organization	Title
Fred Kolano	Value Management Strategies	VA Study Team Leader
Eric Royer	Caltrans District 3	Traffic Operations
Darryl Chambers	Caltrans District 3	Traffic Safety
Robin Chen	Caltrans District 3	Roadway Design
Jim Philipp	Caltrans District 3	Roadway Design
Steve Waikel	Caltrans HQ	Structures
Matt Smeltzer	El Dorado County	County Representative
Woody Deloria	El Dorado County Transportation Commission	Traffic Planner

### Key Project Contacts

Name	Organization	Title
Clark Peri	Caltrans District 3	Project Manager
Andrew Brandt	Caltrans District 3	Maintenance & Operations
Kevin Espinoza	Caltrans North Region	District VA Coordinator

# **VALUE ANALYSIS ALTERNATIVES**

---

The results of this study are presented as individual alternatives to the baseline concept. Each alternative consists of a summary of the baseline concept, a description of the suggested change, a listing of its advantages and disadvantages, a cost comparison, change in performance and value, discussion of schedule and risk impacts (if applicable), and a brief narrative comparing the baseline design with the alternative. (Please refer to the *Project Analysis* section of this report for an explanation of how the performance attributes and value are calculated.) Sketches, calculations, and performance attribute ratings are also presented where applicable.

The cost comparisons reflect a comparable level of detail as in the baseline estimate.

## VA STRATEGIES

VA studies result in the development of a number of alternatives. While it is possible for all alternatives to be implemented, typically there are combinations of some alternatives that may provide the best solution for the project. This is due to the fact that some alternatives may be competing ideas or different ways to address the same issue. Some alternatives are developed to answer a question raised by a decision maker or to resolve an open issue and found not to be beneficial to the ultimate project.

As a result of these factors, the VA team develops a VA strategy(s) that represents their opinion of the best combination of alternatives for the project to assist the decision makers in their evaluation of the VA alternatives. The VA strategy is based on factors that include improved performance, likelihood of implementation, least community impact, cost savings, or any combination of project’s performance attributes. This information is a guide and is not intended to reject the other alternatives from project stakeholder consideration. The rationale for not including some alternatives in the recommended VA strategy, if applicable, is discussed in the *VA Study Summary Report – Preliminary Findings*.

## VA ALTERNATIVE SUMMARY TABLES

**Summary of VA Alternatives**

Alternative No. & Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
<b>1.0</b> Eliminate the mitigation for the loss of the left turns and the north-south movements across US 50	\$7,550,000	-18 months	-6 %	+26 %
<b>2.1</b> Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing	(\$1,170,000)	No change	+5 %	+3 %

Alternative No. & Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
<b>2.2</b> Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing	(\$40,000)	No change	+3 %	+3 %
<b>2.3</b> Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing	(\$480,000)	No change	+5 %	+4 %
<b>3.1</b> Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50	(\$2,870,000)	+3 months	-6 %	-11 %
<b>3.2</b> Construct a classic L-1 type interchange ¼ mile east of Upper Carson with frontage connection to Camino Heights (consider park and ride/rest area)	(\$8,420,000)	+120 months	+3 %	-49 %
<b>4.1</b> Construct right-in/right-out hook ramps between Camino Heights and Sierra Blanca	\$165,000	-2 months	-3 %	-1 %
<b>4.2</b> Construct right-in/right-out ramps at Sierra Blanca keeping Camino Heights Drive open	\$995,000	-2 months	-2 %	+1 %
<b>4.3</b> Maintain Camino Heights Drive as the main off-ramp to the undercrossing and close Sierra Blanca	\$1,095,000	-2 months	No change	+4 %

*Note: Because the cost data depicted above represent savings, a number in parentheses represents a cost increase.*

### Summary of VA Strategies

Strategy Description	Initial Cost Savings	Change in Schedule	Change in Performance	Value Change
Recommended VA Strategy VA Alternative 2.3	(\$480,000)	No change	+5 %	+4 %

*Note: Because the cost data depicted above represent savings, a number in parentheses represents a cost increase.*

## **OTHER CONSIDERATIONS**

The VA team identified the following observations and design suggestions, relatively general in nature, for consideration by the Project Development Team (PDT).

- Shift the roadway center line at the west end of the project to the south to straighten the curve (widen to the south)
- Construct the undercrossing with precast girders in lieu of cast-in-place at Lower Carson and Upper Carson and align the structure perpendicular to US 50
- Construct 2:1 fill slopes at the west end and eliminate retaining walls
- Use soldier pile walls in lieu of soil nail walls
- Consider including CHP or emergency turnarounds in the median
- Consider animal crossings via box culvert or tunnel

## SUMMARY OF PERFORMANCE IMPROVEMENTS

The following information is required by the Caltrans HQ VA Program to enable reporting of performance to the FHWA. Only the six standard Caltrans performance attributes, shown in the table below, are to be documented. Caltrans does not require reporting of the performance of any other attributes utilized in this study.

### Summary of Proposed VA Alternative Performance Improvements

<b>Alt. No.</b>	<b>Mainline Operations</b>	<b>Local Operations</b>	<b>Maintainability</b>	<b>Environmental Impacts</b>	<b>Construction Impacts</b>	<b>Project Schedule</b>
1.0			Improve		Improve	Improve
2.1	Improve	Improve		Improve	Improve	
2.2		Improve		Improve	Improve	
2.3		Improve		Improve	Improve	
3.1						
3.2	Improve				Improve	
4.1						
4.2			Improve			Improve
4.3			Improve			Improve

## VALUE ANALYSIS ALTERNATIVE 1.0

### Eliminate the mitigation for the loss of the left turns and the north-south movements across US 50

---

<b>Initial Cost Savings:</b>	\$7,550,000
<b>Change in Schedule:</b>	-18 months
<b>Performance Change:</b>	-6 %
<b>Value Change:</b>	+26 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** The VA alternative proposes to eliminate those features that are being constructed to maintain local and regional access to and from the north and south sides of US 50 while providing safe east-west access on and off US 50, the secondary purpose of the project. Further, no improvements that are off the US 50 mainline will be made.

#### Advantages:

- Reduces construction costs
- Reduces design time
- Reduces construction time
- Fewer environmental impacts
- Fewer impacts to neighborhoods because of less construction

#### Disadvantages:

- Increases out-of-direction travel because of loss of US 50 crossover features
- Increases inconvenience to residents
- Increases traffic load on the Smith Flat and Cedar Grove interchanges that are east and west of this project and are outside of the project limits
- Emergency vehicle response time would increase
- Highway Safety Improvement Program funds would be returned

**Discussion:** This alternative will present the lowest cost that will achieve the primary purpose and need of the project. This concept proposes full median barrier closure from the existing barrier west of Still Meadows to the existing barrier east of Upper Carson Road. There would be construction cost and time savings. Performance would be decreased in some areas. The proposed median barrier would be designed with probably two or three opening locations (and signs) that would accommodate emergency vehicles. This alternative would be considered if local improvements cannot be advanced and potentially extend the project completion date.

NOTE: The signed Project Report of 2015 proposes the gap in median barrier at Still Meadows for westbound left-turn movements onto Still Meadows Road be closed by extending the proposed

## VALUE ANALYSIS ALTERNATIVE 1.0

### Eliminate the mitigation for the loss of the left turns and the north-south movements across US 50

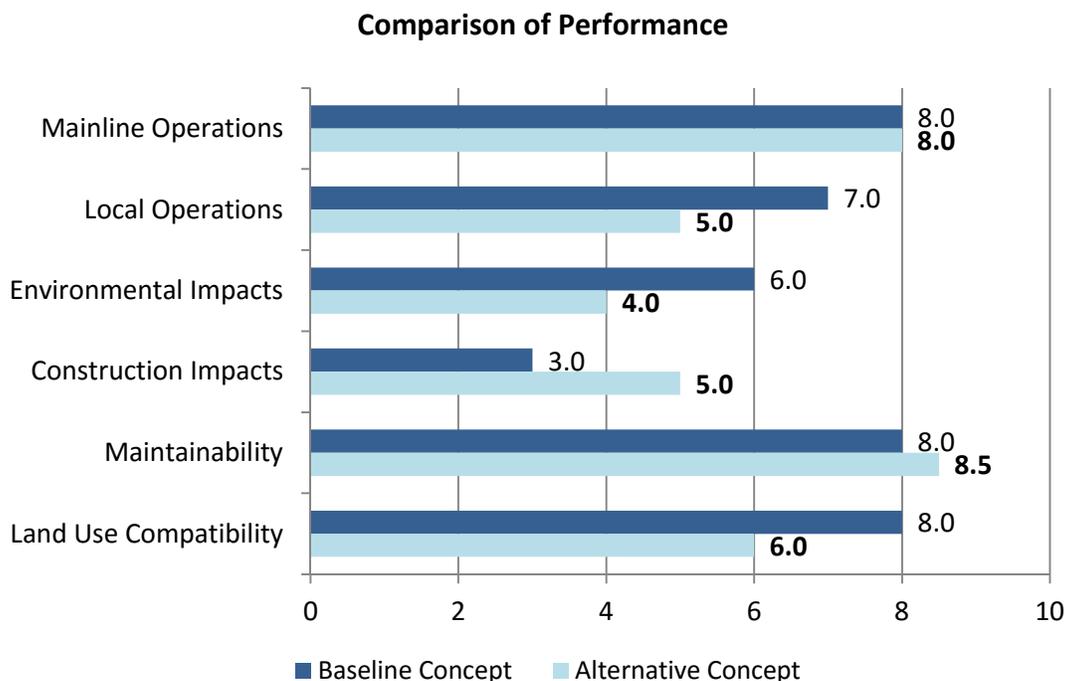
median barrier to meet with the existing median barrier at the west end of the project limits. The left-turn westbound movement would be eliminated and two options will be added at the Upper Carson Road (one will keep the gap and the other will close the gap).

**Technical Review Comments:** Shoulders will be widened and improve the geometry. There is a concern that motorists may use the openings. Comment: Delineators will be installed or barriers will be offset with a gap to accommodate emergency vehicle movements.

**Project Management Considerations:** Redesign of the baseline project. The project purpose and need would be revised to eliminate the secondary purpose.

**Discussion of Schedule Impacts:** Eliminates local road construction, structure construction time, construction staging time, right-of-way acquisition time, and environmental work time. Estimate that this would save 18 months.

**Discussion of Risk Impacts:** Risks are reduced due to no construction of local improvements. Environmental work would be reduced. Some right-of-way issues can be expected.



### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	There would be a full median closure at Still Meadows Road, which improves this accident focus area, but not enough to change this attribute compared to the increase in out-of-direction travel.

## VALUE ANALYSIS ALTERNATIVE 1.0

Eliminate the mitigation for the loss of the left turns and the north-south movements across US 50

Performance Attribute	Rationale for Change in Performance
Maintainability	Less facility to maintain.
Local Operations	More out-of-direction travel increases the chance of an incident on local roads.
Environmental Impacts	Eliminates environmental impacts in local residential areas, but there will be more greenhouse gases in long term.
Land Use Compatibility	Less access to parcels.
Construction Impacts	No local construction and less construction time.

Assumptions and Calculations: None noted.

### Initial Cost Estimates

CONSTRUCTION ELEMENT		BASELINE CONCEPT			ALTERNATIVE CONCEPT		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
<b>ROADWAY ITEMS</b>							
Earthwork (save 60%)		1	\$ 740,000	\$ 740,000	1	\$ 296,000	\$ 296,000
Pavement Structure Section (no local access road saves ~15%)		1	\$ 4,860,000	\$ 4,860,000	1	\$ 4,131,000	\$ 4,131,000
Lighting (assume 15% savings)		1	\$ 560,000	\$ 560,000	1	\$ 476,000	\$ 476,000
<b>ROADWAY SUBTOTAL</b>				\$ 6,160,000			\$ 4,903,000
<b>ROADWAY MARK-UP</b>	40.0%			\$ 2,464,000			\$ 1,961,200
<b>ROADWAY TOTAL</b>				\$ 8,624,000			\$ 6,864,200
<b>STRUCTURE ITEMS</b>							
Pondorado Road UC		1	\$ 3,885,000	\$ 3,885,000			\$ -
<b>STRUCTURE SUBTOTAL</b>				\$ 3,885,000			\$ -
<b>STRUCTURE MARK-UP</b>				\$ -			\$ -
<b>STRUCTURE TOTAL</b>				\$ 3,885,000			\$ -
<b>RIGHT-OF-WAY ITEMS</b>							
Right-of-Way Acquisition (all saved)		1	\$ 1,764,000	\$ 1,764,000			\$ -
Utility Relocation (save 50%)		1	\$ 279,000	\$ 279,000	1	\$ 139,500	\$ 139,500
<b>RIGHT-OF-WAY TOTAL</b>				\$ 2,043,000			\$ 139,500
<b>TOTAL</b>				\$14,552,000			\$7,003,700
<b>TOTAL (Rounded)</b>				\$14,550,000			\$7,000,000
						<b>SAVINGS</b>	<b>\$7,550,000</b>

## VALUE ANALYSIS ALTERNATIVE 2.1

### Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing

---

<b>Initial Cost Savings:</b>	(\$1,170,000)
<b>Change in Schedule:</b>	No change
<b>Performance Change:</b>	+5 %
<b>Value Change:</b>	+3 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** This alternative proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new frontage road would connect Paul Bunyan to Camino Heights at Sierra Blanca. A new eastbound off-ramp would be constructed that would close Camino Heights Drive at US 50 and Sierra Blanca Road at US 50. The eastbound off-ramp would connect to a new roundabout intersection south of US 50. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part of the undercrossing.

#### Advantages:

- A perpendicular undercrossing structure is easier to construct, needs less maintenance, and lowers life-cycle costs compared to a skewed structure
- The roundabout will provide smoother traffic flows and reduce greenhouse gas while improving safety
- Allows segregated traffic flow for residents of the Camino Heights area by way of frontage connection to Paul Bunyan Road
- Right-of-way acquisition may be easier
- May be more acceptable to local residents
- The existing Camino Park and Ride would have minor impacts vs. elimination in the baseline concept

#### Disadvantages:

- Increases construction costs for a second roundabout and Paul Bunyan Road connector and eastbound on-ramp
- Increased funding may present challenges
- Would have a larger footprint requiring more environmental work

## VALUE ANALYSIS ALTERNATIVE 2.1

### Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing

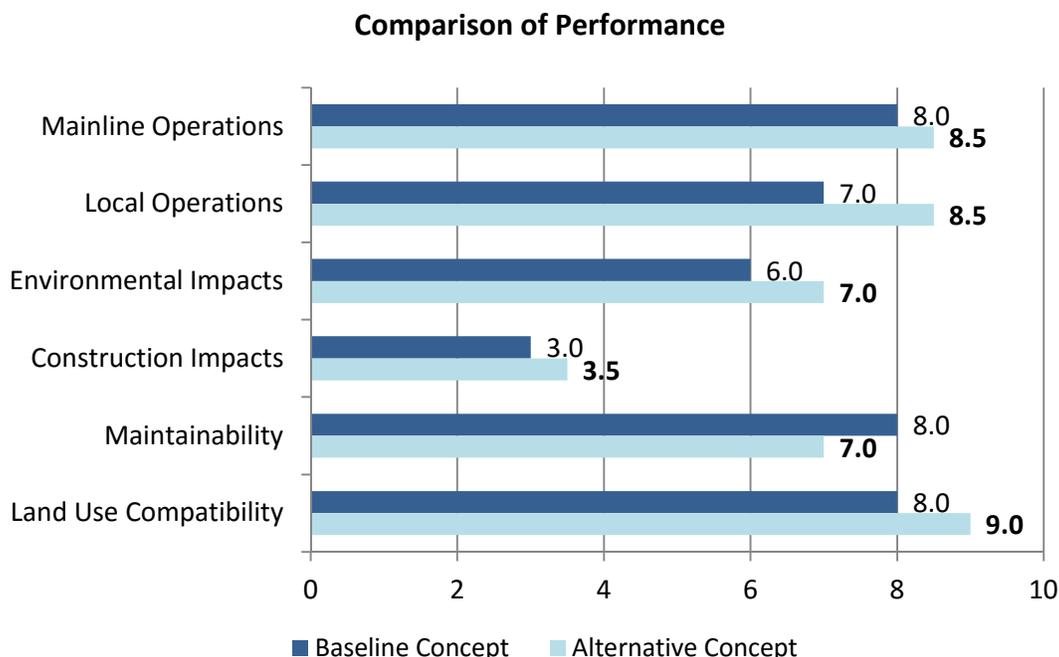
**Discussion:** Based on preliminary public outreach, local residents have voiced concerns about the traffic impacts on local neighborhoods from the baseline concept. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Safety will be improved by reducing the severity of intersection related collisions. Allows segregated traffic flow for residents of the Camino Heights area by way of frontage connection to Paul Bunyan Road. Right-of-way acquisition may be easier because of less impact to existing land use. The existing Camino Park and Ride would have minor impacts because of the elimination of a few parking stalls vs. the entire elimination of the Park and Ride facility as proposed in the baseline concept. NOTE: The baseline concept is proposed to be a mitigated negative declaration. This VA alternative may lessen the risk of a higher level and costlier environmental document because of a more favorable and acceptable design.

**Technical Review Comments:** Interchange spacing to Cedar Grove is over 2 miles and would meet standards. There is a concern about enough length to effectively operate acceleration and deceleration lanes. Ensure that the ramp and diverge areas are built to standard. Ensure that ADA compliance and “complete streets” standards are evaluated and met.

**Project Management Considerations:** Expand the environmental footprint. Slightly more survey work would be needed. Acquire more funding for the added local road connections and the additional roundabout.

**Discussion of Schedule Impacts:** No change.

**Discussion of Risk Impacts:** Would need to acquire additional funding. Would need to do more environmental work.



## VALUE ANALYSIS ALTERNATIVE 2.1

Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing

### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	A parallel roadway will reduce the traffic on mainline US 50.
Maintainability	More drainage, more pavement, and more retaining wall.
Local Operations	The frontage road is an improvement for Camino Heights; better north side access to eastbound US 50. The north side roundabout reduces severity of collisions.
Environmental Impacts	Larger footprint is offset by lower greenhouse gas generation; socioeconomic is improved, noise to residents is reduced.
Land Use Compatibility	Improves access to parcels and Paul Bunyan Road connections.
Construction Impacts	Major construction work is shifted out of the residential area.

### VA Alternative Concept Sketch



**Assumptions and Calculations:** Assume 10% more for a new Paul Bunyan Road to Camino Heights frontage road connector. Assume a 10% increase in Pavement Structural Section for construction of the Camino Heights frontage road connector. Will need additional cross culverts at the new frontage

## VALUE ANALYSIS ALTERNATIVE 2.1

### Construct a ½-mile Paul Bunyan to Sierra Blanca connector with two roundabouts at the undercrossing

road, roundabouts, on-ramps; assume a 5% increase. More retaining wall will need approximately 5% more treatments. Retaining wall: 500 feet x 4 feet high = 2,000 SF of new wall, assume \$120/SF.

#### Initial Cost Estimates

CONSTRUCTION ELEMENT		BASELINE CONCEPT			ALTERNATIVE CONCEPT		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
<b>ROADWAY ITEMS</b>							
Earthwork (increase by 10%)		1	\$ 740,000	\$ 740,000	1	\$ 814,000	\$ 814,000
Pavement (increase by 10%)		1	\$ 4,860,000	\$ 4,860,000	1	\$ 5,346,000	\$ 5,346,000
Drainage (increase by 5%)		1	\$ 1,056,000	\$ 1,056,000	1	\$ 1,108,800	\$ 1,108,800
Architectural Treatment (+5%)		1	\$ 1,008,000	\$ 1,008,000	1	\$ 1,058,400	\$ 1,058,400
<b>ROADWAY SUBTOTAL</b>				\$ 7,664,000			\$ 8,327,200
<b>ROADWAY MARK-UP</b>	40.0%			\$ 3,065,600			\$ 3,330,880
<b>ROADWAY TOTAL</b>				\$ 10,729,600			\$ 11,658,080
<b>STRUCTURE ITEMS</b>							
Retaining Wall				\$ -	2,000	\$ 120	\$ 240,000
<b>STRUCTURE SUBTOTAL</b>				\$ -			\$ 240,000
<b>STRUCTURE MARK-UP</b>				\$ -			\$ -
<b>STRUCTURE TOTAL</b>				\$ -			\$ 240,000
<b>TOTAL</b>				\$10,729,600			\$11,898,080
<b>TOTAL (Rounded)</b>				\$10,730,000			\$11,900,000
						<b>SAVINGS</b>	<b>(\$1,170,000)</b>

## VALUE ANALYSIS ALTERNATIVE 2.2

### Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing

<b>Initial Cost Savings:</b>	(\$40,000)
<b>Change in Schedule:</b>	No change
<b>Performance Change:</b>	+3 %
<b>Value Change:</b>	+3 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** The alternative proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new eastbound off-ramp would be constructed that would close Camino Heights Drive at US 50 and Sierra Blanca Road at US 50. The eastbound off-ramp would connect to a new roundabout intersection south of US 50. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part the undercrossing.

#### **Advantages:**

- A perpendicular undercrossing structure is easier to construct, needs less maintenance, and lowers life-cycle costs compared to a skewed structure
- The roundabout will provide smoother traffic flows and reduce greenhouse gas while improving safety
- Right-of-way acquisition may be easier
- May be more acceptable to local residents
- The existing Camino Park and Ride would have minor impacts vs. elimination in the baseline concept

#### **Disadvantages:**

- Increases construction costs for a second roundabout and the eastbound on-ramp
- Slightly increased funding may present challenges

**Discussion:** Based on preliminary public outreach, local residents have voiced concerns about the traffic impacts on local neighborhoods from the baseline concept. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Safety will be improved by reducing the severity of intersection related collisions. Right-of-way acquisition may be easier because of less impact to existing land use. The existing Camino Park and Ride would have minor impacts because of the elimination of a few parking stalls vs. the elimination of the entire Park and Ride facility as

## VALUE ANALYSIS ALTERNATIVE 2.2

### Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing

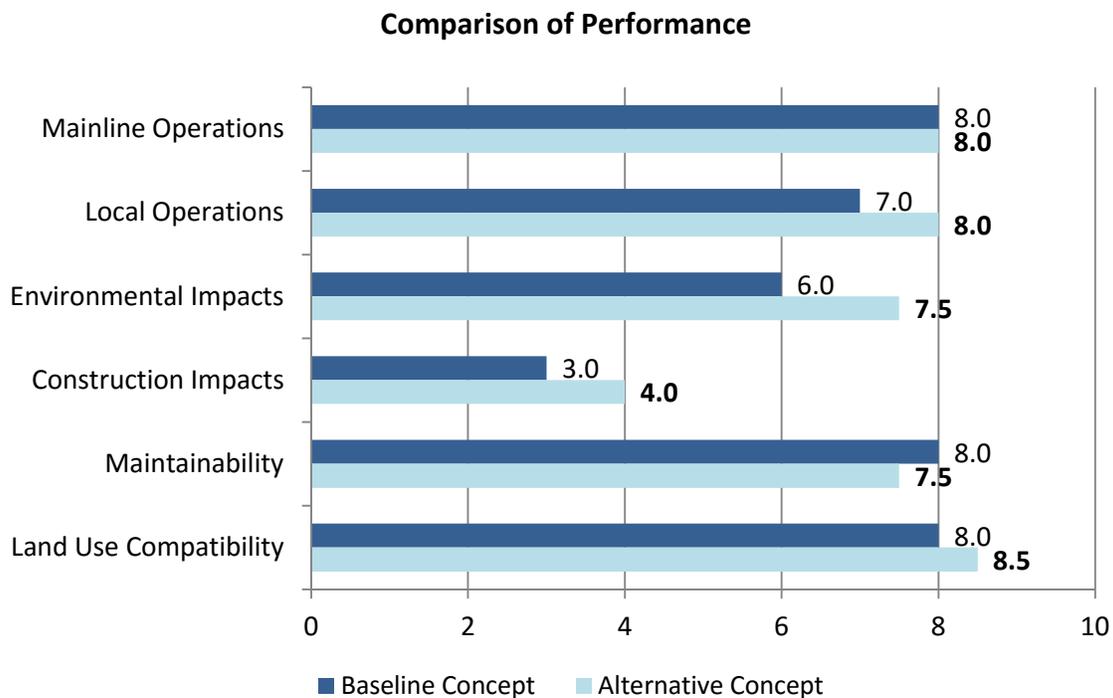
proposed in the baseline concept. NOTE: The baseline concept is proposed to be a mitigated negative declaration. This alternative may lessen the risk of a higher level and costlier environmental document because of a more favorable and acceptable design.

**Technical Review Comments:** Interchange spacing to Cedar Grove is over 2 miles and would meet standards. There is concern about having enough length to effectively operate acceleration and deceleration lanes. Ensure that the ramp and diverge areas are built to standard. Ensure that ADA compliance and “complete streets” standards are evaluated and met.

**Project Management Considerations:** Expand the environmental footprint. Slightly more survey work would be needed. Acquire more funding for the added local road connections and the additional roundabout.

**Discussion of Schedule Impacts:** No change.

**Discussion of Risk Impacts:** Nominal cost increase may present challenges. Would need to do more environmental work.



### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	No change.
Maintainability	More drainage and more pavement.

## VALUE ANALYSIS ALTERNATIVE 2.2

### Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing

Performance Attribute	Rationale for Change in Performance
Local Operations	Removes the on and off movements from the residential neighborhood.
Environmental Impacts	Lower greenhouse gas generation. Socioeconomic is improved. Noise to residents is reduced.
Land Use Compatibility	Moves access to parcels; no frontage road near parcels.
Construction Impacts	Major construction work is shifted out of the residential area.

### VA Alternative Concept Sketch



## VALUE ANALYSIS ALTERNATIVE 2.2

### Construct the eastbound on-/off-ramps to connect with two roundabouts at the undercrossing

**Assumptions and Calculations:** Drainage will need additional cross culverts at the roundabouts and on ramps; assume a 3% increase.

#### Initial Cost Estimates

<i>CONSTRUCTION ELEMENT</i>		<i>BASILINE CONCEPT</i>			<i>ALTERNATIVE CONCEPT</i>		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
<b>ROADWAY ITEMS</b>							
Drainage (increase by 3%)		1	\$ 1,056,000	\$ 1,056,000	1	\$ 1,087,680	\$ 1,087,680
<b>ROADWAY SUBTOTAL</b>				\$ 1,056,000			\$ 1,087,680
<b>ROADWAY MARK-UP</b>	40.0%			\$ 422,400			\$ 435,072
<b>ROADWAY TOTAL</b>				\$ 1,478,400			\$ 1,522,752
<b>TOTAL</b>				\$1,478,400			\$1,522,752
<b>TOTAL (Rounded)</b>				\$1,480,000			\$1,520,000
						<b>SAVINGS</b>	<b>(\$40,000)</b>

## VALUE ANALYSIS ALTERNATIVE 2.3

### Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing

---

<b>Initial Cost Savings:</b>	(\$480,000)
<b>Change in Schedule:</b>	No change
<b>Performance Change:</b>	+5 %
<b>Value Change:</b>	+4 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** The alternative concept proposes to widen US 50 for the installation of concrete median barrier from west of Still Meadows Road to the existing concrete median barrier located east of Upper Carson Road. A new two-lane eastbound off-ramp to Camino Heights would be constructed that would provide a right turn Camino Heights Drive at US 50. Also, two roundabouts at the undercrossing at US 50 would be constructed. A new eastbound on-ramp would connect the roundabout to US 50. The roundabout would connect under US 50 to a roundabout on the north side of US 50 to Carson Road. A new local road connection would be built from the south roundabout to Camino Heights Drive via Golden Chain Drive and Vista Tierra Drive. Class II bike lanes and sidewalk will be included as part the undercrossing.

#### Advantages:

- Moves local improvements to the east and north away from local neighborhoods
- A perpendicular undercrossing structure is easier to construct, needs less maintenance, and lowers life-cycle costs compared to a skewed structure
- The roundabout will provide smoother traffic flows, reduce greenhouse gas, and improve safety
- Right-of-way acquisition may be easier
- May be more acceptable to local residents
- The existing Camino Park and Ride would have minor impacts vs. elimination in the baseline concept

#### Disadvantages:

- Increases construction costs for a second roundabout and the eastbound on-ramp
- Slight increase in cost may present challenges

**Discussion:** Based on preliminary public outreach, local residents have voiced concerns about the traffic impacts on local neighborhoods from the baseline concept. This alternative was developed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Improvement in safety would be achieved by reducing the severity of intersection related collisions. Right-of-way acquisition may be easier

## VALUE ANALYSIS ALTERNATIVE 2.3

### Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing

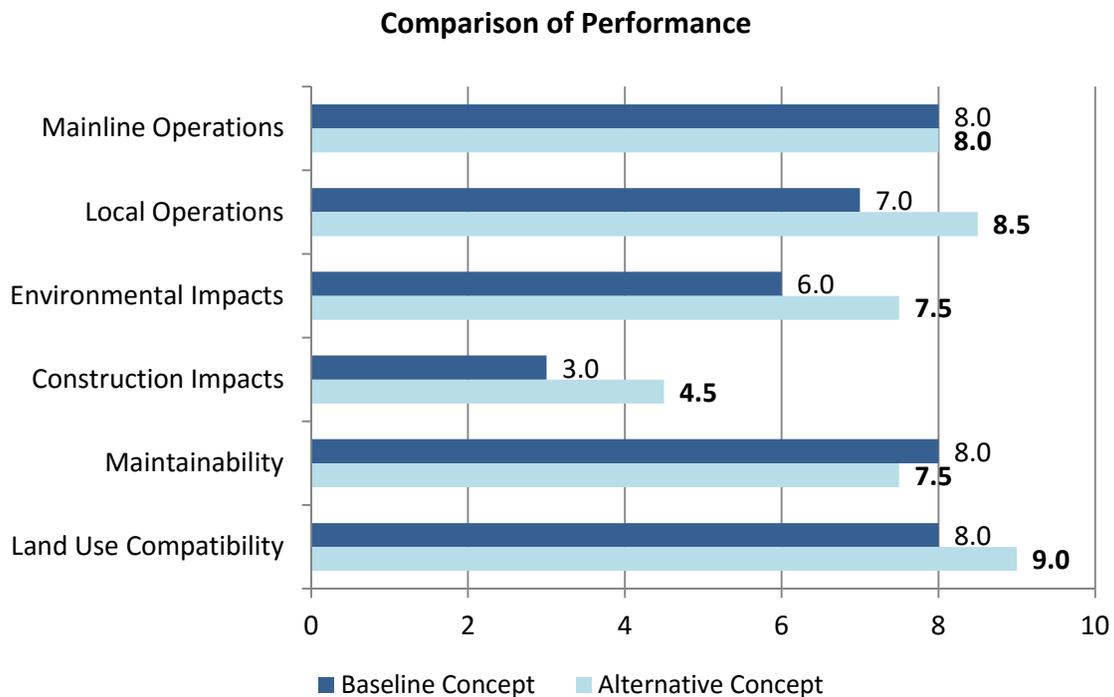
because of less impact to existing land use. The existing Camino Park and Ride would have minor impacts because of the elimination of a few parking stalls vs. the entire elimination of the Park and Ride facility as proposed in the baseline concept. NOTE: The baseline concept is proposed to be a mitigated negative declaration. This VA alternative may lessen the risk of a higher level and costlier environmental document because of a more favorable and acceptable design.

**Technical Review Comments:** Interchange spacing to Cedar Grove is over 2 miles and would meet standards. There is a concern about enough length to effectively operate acceleration and deceleration lanes. Make sure the ramp and diverge areas are built to standard. Ensure that ADA compliance and “complete streets” standards are evaluated and met. The right turn at Camino Heights needs adequate deceleration space.

**Project Management Considerations:** Expand the environmental footprint. Slightly more survey work would be needed. Acquire more funding for the added local road connections and the additional roundabout.

**Discussion of Schedule Impacts:** No change.

**Discussion of Risk Impacts:** Nominal cost increase may present challenges. Would need to do more environmental work.



## VALUE ANALYSIS ALTERNATIVE 2.3

Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing

### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	No change
Maintainability	More drainage, more pavement, and new sign (small).
Local Operations	Removes the on and off movements from the residential neighborhood. Also provides improved local traffic movements.
Environmental Impacts	Lower greenhouse gas generation. Socioeconomic is improved. Noise to residents is reduced.
Land Use Compatibility	Direct connectivity to Camino Heights improves access to parcels.
Construction Impacts	Major construction work is shifted out of the residential area.

### VA Alternative Concept Sketch



## VALUE ANALYSIS ALTERNATIVE 2.3

### Construct a two-lane eastbound off-ramp to Camino Heights Road with two roundabouts at the undercrossing

**Assumptions and Calculations:** Need more earthwork to construct the two-lane off-ramp to Camino Heights; approximately 5% increase. Construction of the two-lane off-ramp and the connection to Camino Heights; approximately 5% increase in pavement structural section. Drainage increases by 3% for extra culverts and channelization. New Camino Heights exit sign; approximately \$35,000. The new two-lane off-ramp would not need retaining walls; a cut and fill opportunity exists in this area of the project.

#### Initial Cost Estimates

<i>CONSTRUCTION ELEMENT</i>		<i>BASELINE CONCEPT</i>			<i>ALTERNATIVE CONCEPT</i>		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
<b>ROADWAY ITEMS</b>							
Earthwork (+5%)		1	\$ 740,000	\$ 740,000	1	\$ 777,000	\$ 777,000
Pavement (+5)		1	\$ 4,860,000	\$ 4,860,000	1	\$ 5,103,000	\$ 5,103,000
Drainage (increase by 3%)		1	\$ 1,056,000	\$ 1,056,000	1	\$ 1,087,680	\$ 1,087,680
Signage				\$ -	1	\$ 35,000	\$ 35,000
<b>ROADWAY SUBTOTAL</b>				\$ 6,656,000			\$ 7,002,680
<b>ROADWAY MARK-UP</b>	40.0%			\$ 2,662,400			\$ 2,801,072
<b>ROADWAY TOTAL</b>				\$ 9,318,400			\$ 9,803,752
<b>TOTAL</b>				\$9,318,400			\$9,803,752
<b>TOTAL (Rounded)</b>				\$9,320,000			\$9,800,000
						<b>SAVINGS</b>	<b>(\$480,000)</b>

## VALUE ANALYSIS ALTERNATIVE 3.1

### Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50

---

<b>Initial Cost Savings:</b>	(\$2,870,000)
<b>Change in Schedule:</b>	+3 months
<b>Performance Change:</b>	-6 %
<b>Value Change:</b>	-11 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** The alternative proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road to the existing concrete median barrier located at Upper Carson Road. In addition, an undercrossing of US 50 with eastbound on-/off-ramps would be constructed that would connect to a new roundabout on Carson Road east of Upper Carson Road and adjacent to Barkley Road. A frontage road would be constructed from the undercrossing back to Camino Heights Drive.

#### Advantages:

- A perpendicular undercrossing structure is easier to construct, needs less maintenance, and lowers life-cycle costs compared to a skewed structure
- The roundabout will provide smoother traffic flows and reduce greenhouse gas while improving safety
- May be more acceptable to local residents
- The existing Camino Park and Ride would have minor impacts vs. elimination in the baseline concept
- Improved access to businesses at Upper Carson Road

#### Disadvantages:

- Right-of-way acquisition may be costlier and difficult
- Larger environmental cost and footprint
- Additional cost for frontage road
- More out-of-direction travel for local neighborhoods
- May require a higher level and costlier environmental document

**Discussion:** Based on preliminary public outreach, local residents have voiced concerns about the traffic impacts on local neighborhoods from the baseline concept. The main benefit of this concept is to reduce impacts to the Camino Heights residents. It will also improve access to Upper Carson Road businesses. Therefore, this alternative is proposed to address local concerns while maintaining north and south access across US 50. The roundabout will provide smoother traffic flows and reduce greenhouse gas. Improvement in safety would be achieved by reducing the severity of intersection

### VALUE ANALYSIS ALTERNATIVE 3.1

#### Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50

---

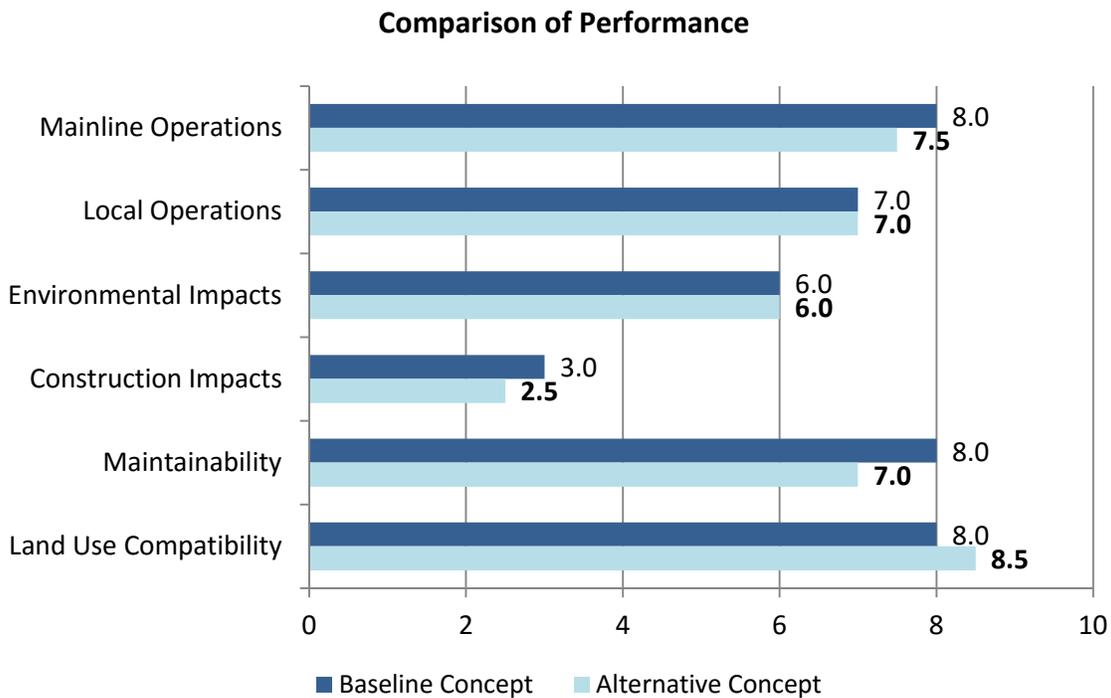
related collisions. Right-of-way acquisition may be more difficult and costly. This alternative may require a higher level and costlier environmental document. Most likely the roundabout would be depressed into the existing topography. Drainage would be similar to the baseline concept.

**Technical Review Comments:** Close proximity to the existing Carson Road and Upper Carson Road intersection would require integration of the roundabout into the intersection. There is some geometric concern about matching grades and an oval shaped roundabout

**Project Management Considerations:** Redesign needed. Additional environmental work. Approval from Traffic organization.

**Discussion of Schedule Impacts:** More time to design and construct. Traffic staging will be more difficult. Approximately 3 months of additional time for design and to accommodate traffic during construction with bypass lane.

**Discussion of Risk Impacts:** Funding concerns, environmental work, and public acceptance would increase project risk.



### VALUE ANALYSIS ALTERNATIVE 3.1

#### Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50

---

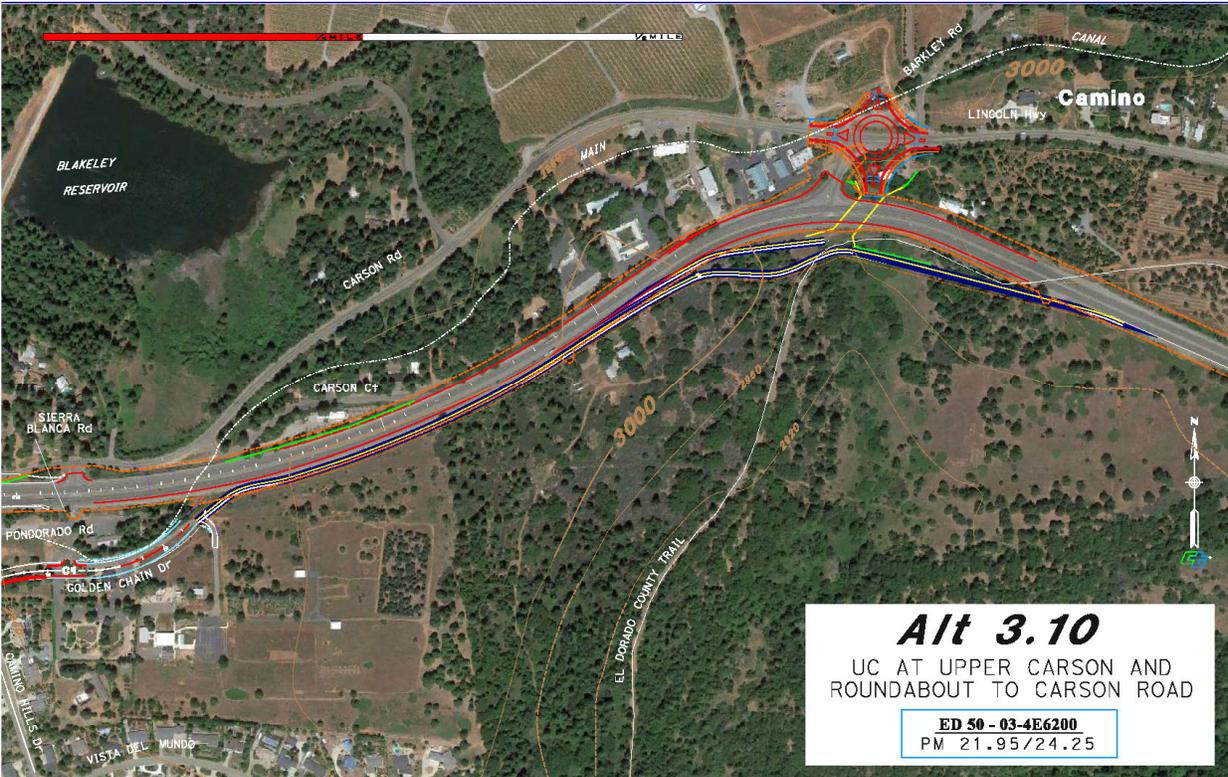
##### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	Small increase in vehicle miles traveled results in a degradation of this attribute.
Maintainability	New frontage road and new wider ramps will be easy to maintain.
Local Operations	More out-of-direction travel for local residents is offset by a safer intersection on Carson Road.
Environmental Impacts	Maintains access for Upper Carson Road businesses which requires less footprint than new construction which improves this attribute. Also removes impacts out of Camino Heights areas.
Land Use Compatibility	Improves access to existing Upper Carson Road businesses. Decreased impacts to Camino Heights neighborhood is offset by increased impacts to residential uses at Upper Carson Road. Potential for new access to undeveloped parcels.
Construction Impacts	More construction impact to regional Camino traffic is slightly offset by reduced impacts to the Camino Heights neighborhood.

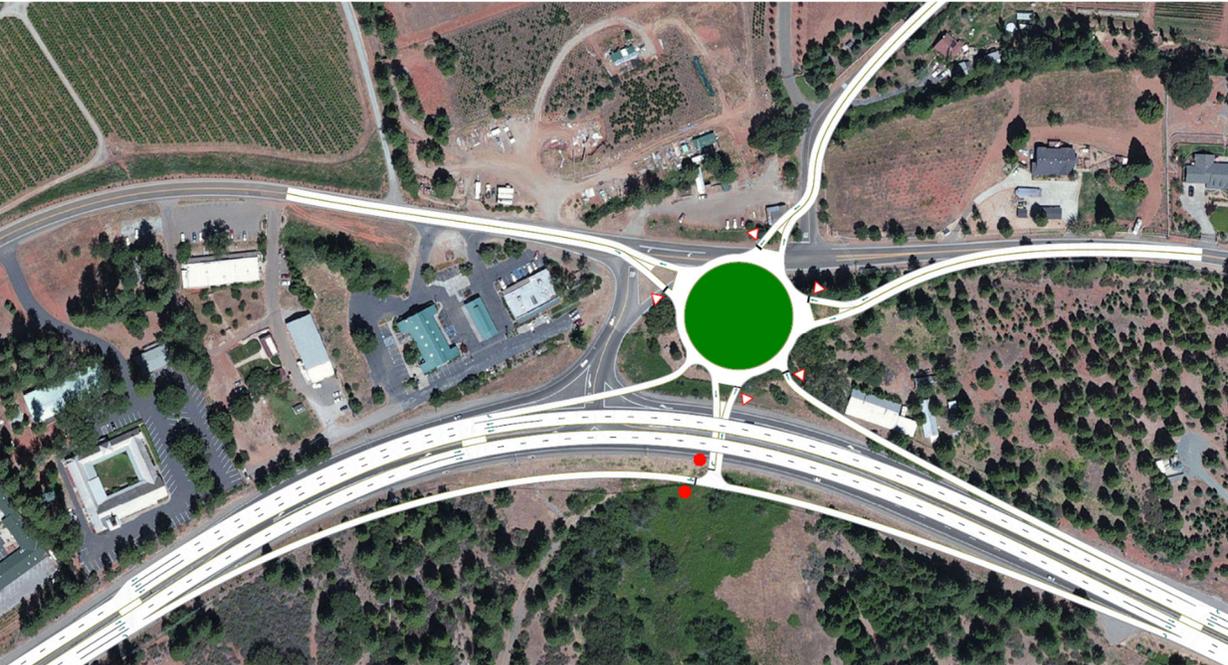
**VALUE ANALYSIS ALTERNATIVE 3.1**

**Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50**

**VA Alternative Concept Sketch**



**Alternative General Plan**



**Roundabout Concept**

### VALUE ANALYSIS ALTERNATIVE 3.1

#### Construct an undercrossing at Upper Carson with a roundabout connection to Carson Road with a roundabout on the north side of US 50

**Assumptions and Calculations:** Assume 20% more earthwork for a new frontage road, ramps, and roundabout. Assume a 20% increase in Pavement Structural Section for construction of the new frontage road, roundabout, and ramps. Will need additional cross culverts at the new frontage road, roundabouts, and on-ramps; assume a 5% increase in drainage. Additional retaining wall will need approximately 5% more treatments. Additional retaining wall: 800 feet x 8 feet high = 6,400 SF of new wall; assume \$120/SF.

#### Initial Cost Estimates

CONSTRUCTION ELEMENT		BASELINE CONCEPT			ALTERNATIVE CONCEPT		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
<b>ROADWAY ITEMS</b>							
Earthwork (increase by 20%)		1	\$ 740,000	\$ 740,000	1	\$ 888,000	\$ 888,000
Pavement (increase by 20%)		1	\$ 4,860,000	\$ 4,860,000	1	\$ 5,832,000	\$ 5,832,000
Drainage (increase by 5%)		1	\$ 1,056,000	\$ 1,056,000	1	\$ 1,108,800	\$ 1,108,800
Architectural Treatment (+5%)		1	\$ 1,008,000	\$ 1,008,000	1	\$ 1,058,400	\$ 1,058,400
<b>ROADWAY SUBTOTAL</b>				\$ 7,664,000			\$ 8,887,200
<b>ROADWAY MARK-UP</b>	40.0%			\$ 3,065,600			\$ 3,554,880
<b>ROADWAY TOTAL</b>				\$ 10,729,600			\$ 12,442,080
<b>STRUCTURE ITEMS</b>							
Additional Retaining Wall				\$ -	6,400	\$ 120	\$ 768,000
Additional UC cost (+10%)		1	\$ 3,885,000	\$ 3,885,000	1	\$ 4,273,500	\$ 4,273,500
<b>STRUCTURE SUBTOTAL</b>				\$ 3,885,000			\$ 5,041,500
<b>STRUCTURE MARK-UP</b>				\$ -			\$ -
<b>STRUCTURE TOTAL</b>				\$ 3,885,000			\$ 5,041,500
<b>TOTAL</b>				\$14,614,600			\$17,483,580
<b>TOTAL (Rounded)</b>				\$14,610,000			\$17,480,000
					<b>SAVINGS</b>		<b>(\$2,870,000)</b>

## VALUE ANALYSIS ALTERNATIVE 3.2

**Construct a classic L-1 type interchange ¼ mile east of Upper Carson with frontage connection to Camino Heights (consider park and ride/rest area)**

---

<b>Initial Cost Savings:</b>	(\$8,420,000)
<b>Change in Schedule:</b>	+120 months
<b>Performance Change:</b>	+3 %
<b>Value Change:</b>	-49 %

**Description of Baseline Concept:** The baseline concept proposes to widen US 50 for the installation of concrete median barrier from Still Meadows Road (PM 22.0) to the existing concrete median barrier located at Upper Carson Road (PM 24.01). A partial median access opening (westbound, left turn only) at Still Meadows Road would be maintained. Vista Tierra Drive would be extended in a northeasterly direction through a proposed undercrossing (PM 23.48) at US 50 with a connection to Carson Road on the north side of US 50 to include Class II bike lanes and sidewalk. Carson Road will be realigned and improved to accommodate traffic at this location.

**Description of Alternative Concept:** This VA alternative proposes to construct the mainline improvements of the baseline concept, excluding local improvements which will be replaced by constructing a classic L-1 type interchange ¼ mile east of Upper Carson Road with frontage connection to Camino Heights. Consider constructing a park and ride/rest area facility between US 50 and Carson Road on the interchange access. Remove the Upper Carson Road access point to US 50.

### **Advantages:**

- Provides a parallel connection and east-west access
- Provides a large park and ride facility
- Moves impacts away from neighborhoods
- Access to local businesses from both directions of travel at Upper Carson Road

### **Disadvantages:**

- Increases cost for interchange and longer frontage road
- More out-of-direction travel for residents
- Close proximity to existing Cedar Grove intersection (maybe an interchange spacing issue)

**Discussion:** The main benefit of this alternative is that collisions would be reduced by closing Upper Carson Road access. A traditional interchange is safer than an at-grade interchange. There would be additional cost for the construction of an interchange and a frontage. The park and ride facility would enhance opportunities for transit mobility throughout the region. This concept is presented to explore alternatives in the vicinity of Upper Carson Road to reduce impacts on local neighborhoods and businesses.

**Technical Review Comments:** May need a design exception for interchange spacing. The distance is approximately 1.6 miles.

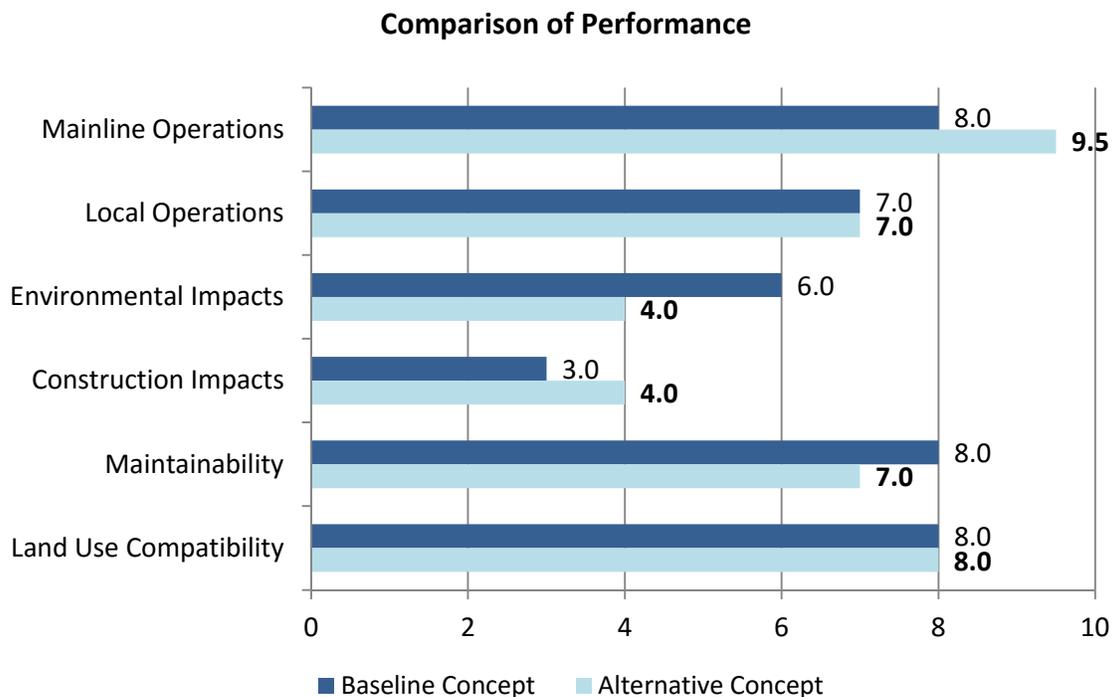
**Project Management Considerations:** A new project would have to be initiated. The baseline concept would be deprogrammed and VA Alternative 1.0 (median barrier only) would be implemented. Because the project limits change, a new project would have to be initiated.

## VALUE ANALYSIS ALTERNATIVE 3.2

### Construct a classic L-1 type interchange ¼ mile east of Upper Carson with frontage connection to Camino Heights (consider park and ride/rest area)

**Discussion of Schedule Impacts:** Additional project design and construction would move delivery of the full project out approximately 10 to 20 years.

**Discussion of Risk Impacts:** Funding issues would jeopardize delivery of local improvements. At the time of the VA study, the forecast for future State Transportation Improvement Program (STIP) funding was unclear. Based on the 2016 STIP fund estimate (-\$754,000,000) it is unlikely that funding would become available to deliver this alternative in the 10- to 20-year horizon.



### Performance Assessment

Performance Attribute	Rationale for Change in Performance
Mainline Operations	A full interchange at Upper Carson Road improves traffic operations and safety.
Maintainability	More facility to maintain; frontage road and more retaining walls.
Local Operations	No change.
Environmental Impacts	Larger footprint, more disturbance.
Land Use Compatibility	No change.
Construction Impacts	Most of the construction would be off system because it is mostly off the present US 50 alignment.

# VALUE ANALYSIS ALTERNATIVE 3.2

Construct a classic L-1 type interchange ¼ mile east of Upper Carson with frontage connection to Camino Heights (consider park and ride/rest area)

VA Alternative Concept Sketch

