Final Value Analysis Study Report

Davis Road Bridge Replacement

February 2017

Prepared by

Value Management Strategies, Inc.

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Date: February 1, 2017

To: Mark Imbriani, Project Manager

Subject: Final VA Study Report (Task Order 238)
Davis Road Bridge Replacement Project

Value Management Strategies, Inc. is pleased to submit this Final VA Study Report for the referenced project. This report summarizes the results and events of the study conducted October 3-7, 2016 at Monterey County Resource Management Agency Department of Public Works in Salinas, CA.

It was a pleasure working with TRC on this project, and I look forward to the next one. If you have any questions or comments concerning this final report, please do not hesitate to contact me at (503) 957-9642 or rob@vms-inc.com.

Sincerely,

VALUE MANAGEMENT STRATEGIES, INC.

Robert B. Stewart, CVS-Life, FSAVE, PMP, PMI-RMP
VA Study Team Leader

Copy: (PDF) Addressee

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY **FINAL**

A VA study, sponsored by Monterey County and facilitated by Value Management Strategies, Inc., was conducted for the Davis Road Bridge Replacement Project in Salinas, CA at the offices of the Monterey County Public Works Department. The study was conducted October 3-7, 2016. This *Executive Summary* provides an overview of the project, key findings, and the alternatives developed by the VA team.

PROJECT SUMMARY

The Monterey County Public Works Department is proposing to replace the existing two-lane, low-level Davis Road Bridge (Bridge No. 44C-0068) over the Salinas River with a longer bridge that meets current American Association of State Highway and Transportation Officials (AASHTO) requirements. The existing Davis Road Bridge is located approximately 2 miles (mi) south of the City of Salinas in Monterey County. The County is also proposing to widen Davis Road from two lanes to four lanes for a distance of approximately 2.1 mi between Blanco Road on the north and Reservation Road on the south. The following alternatives are being considered. One of the Alternatives includes a design variation.

- **Preferred Alternative:** The Preferred Alternative would replace the existing bridge over the Salinas River with a four-lane, 74 ft. 10 in. wide, cast-in-place (CIP) box girder bridge that would include two 12 ft. lanes in each direction, an 8 ft. painted median, and an 8 ft. shoulder on each side that is striped for a Class II bicycle lane. This Alternative would widen Davis Road from two lanes to four lanes between Reservation Road and Blanco Road, which is approximately 11,164 ft. (2.1 mi).

- **Preferred Alternative – Design Variation:** The Preferred Alternative – Design Variation would replace the northbound and southbound Class II bike lanes with a Class IV two-way cycle track along the east side of Davis Road from Blanco Road to Reservation Road. This Alternative would require changes to the roadway and bridge cross-sections for the Preferred Alternative, but would not change the impact limits (i.e., footprint) of the roadway widening or bridge as currently proposed under the Preferred Alternative.

- **Alternative 2:** Alternative 2 would replace the existing bridge over the Salinas River with a two-lane, 42 ft. 10 in. wide bridge that would include two 12 ft. travel lanes and an 8 ft. shoulder on each side that is striped for a Class II bicycle lane. Under Alternative 2, Davis Road would remain a two-lane road. However, some road improvements would still occur between Foster Rd. and Reservation Rd. This alternative is not being considered as it does not meet the minimum requirements of two of the project's major funding partners, Caltrans or the Fort Ord Reuse Agency (FORA).

The Preferred Alternative served as the baseline for the VA Study. The Preferred Alternative – Design Variation was considered during the VA Study and was included in the VA Alternatives. The No Build and Alternative 2 did not meet the project need and purpose; therefore, they were not included as part of the VA Study.

Total project costs for all elements of the project are currently estimated at $60,450,000 including escalation.

PROJECT PURPOSE AND NEED

The primary purpose of the proposed project is to provide an arterial roadway crossing over the Salinas River that: 1) meets current bridge and roadway structural and geometric design standards; 2) provides an all-weather bridge crossing that can accommodate seasonal high flows of the Salinas River; 3) accommodates projected travel demand for the 2040 planning horizon at an acceptable level of service (LOS); and 4) improves traffic safety.

Davis Road is reliably passable only from the months of May through December because floodwaters inundate the existing bridge over the Salinas River during the winter and spring months. In addition, the County has identified Davis Road as a critical link in a countywide transportation system that is needed to handle future increases in traffic between the Cities of Salinas and Monterey as a result of regional population and employment growth. The existing capacity of Davis Road is insufficient to accommodate the projected high traffic demands through the 2040 planning horizon. Furthermore, the structural and geometric design of the roadway must be updated to improve safety. The accident rate along Davis Road corridor is much greater than the statewide average.

VA STUDY TIMING

The VA study was conducted early in the Engineering Design Phase which is to be at 65% complete in June 2017. The project has recently received environmental clearance with an approved EIR/EA. The project is scheduled to award a construction contract in March 2019 with construction through 2020.

VA STUDY OBJECTIVE

The objective of the VA study was to identify alternative concepts that have the potential to improve project value that consider cost, performance, schedule, and risk.

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.

- Potential for seasonal flooding on the roadway segment between Foster Rd. and Blanco Rd.
- Issues with farming access and conflicts with bicycle traffic.
- Addressing bus/bike multi-modal corridor with potential bus bypass (right-turn) at Blanco Rd. and Davis Rd.
- Possibility of phasing project elements to meet project funding constraints.
- The in-water work windows for Steelhead and Riparian (assumed: June – October).

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."

Performance Attributes
Operational Reliability
Traffic Operations
Corridor Operations
Maintainability
Environmental Impacts
Construction Impacts

Below is a summary of the major observations and conclusions identified during the evaluation of the baseline concept which led the VA team to develop the alternatives and recommendations presented in this report.

- The bridge and structural section for the roadway (42,830 ton of HMA and 61,187 cubic yards of Class 2 Aggregate Base) are the key drivers for the project cost.
- Right-of-Way acquisition is a key driver with associated mitigation costs for prime farmland.
- The bridge structure will be located above the 100-year flood; however, portions of Davis Rd. between Foster Rd. and Blanco Rd. are believed to fall below the 100-year flood level.
- Drainage and hydraulic issues are major design considerations.
- The operations at the Davis Rd. / Reservation Rd. intersection are good given the two-lane cross-section of Reservation Rd. west of Davis Rd. However, there are opportunities for further enhancing traffic operations at this intersection for the interim condition (e.g., before Reservation Rd. is widened to four lanes west of Davis Rd.).
- No special bus transit facilities are included in the baseline design; however, a bus bypass lane at the intersection of Davis Rd. and Blanco Rd. is desired to support multi-modal operation.
- Current bicycle facilities include a Class II bikeway (8 ft. with no barriers or delineators) on the northbound and southbound shoulders. The Transportation Agency of Monterey County (TAMC) is considering a Class IV cycle track.
- Farming operations are limited to access at Hitchcock, Foster and two additional driveway access points on NB/SB Davis Rd. All other existing access will be restricted by drainage facilities on either side of Davis Rd.

FINAL VA STUDY RESULTS

The project decision makers elected to implement six (6) of the 18 proposed VA alternatives. Much of the cost savings may be attributed to the roadway profile reductions in the median while maintaining Class II bike lanes due to less structural material and a reduction in the right-of-way take for prime farmland. Additional cost savings are attributed to the elimination of column flares at the bridge and the reduction of dikes. The associated performance benefits are expected to be positive as well, with most of the benefits being related to the installation of field fence along Davis Road for access control and a multi-modal bus turn from northbound Davis Road to eastbound Blanco Road. The accepted alternatives offer a cost savings of over $3.6 million with a 6% performance improvement, offering the project an overall 11% value improvement.

The following describes the accepted alternatives along with their initial cost savings, change in schedule, and performance that were validated by the Project Team after the VA study. Please note that because the cost data depicted below represent *savings*, a number in parentheses represents a cost *increase*. The alternatives that were not implemented, and the reasons why, are discussed in the *VA Alternatives* section of this report.

Accepted VA Alternatives

Alternative No. and Description	Initial Cost Savings	Change in Schedule	Change in Performance
2.0 Eliminate column flares at bridge	**$80,000**	**No change**	**No change**
The alternative concept eliminates column flares and maintains constant 4 ft. diameter bridge columns from the tops of the foundation piles up to the bottoms of the box girder pier diaphragms. This lightens the structure and reduces construction costs. The columns will not be visible by the public due to the low profile of the bridge and lack of access beneath it.			
5.1a Reduce median width on roadway	**$970,000**	**No change**	**+1 %**
The alternative concept proposes a 1 ft. wide median with rumble strips on the roadway. This concept reduces material cost, maintenance, and right-of-way farmland impacts. The baseline's 8 ft. shoulders as Class II bike lanes remain in this concept.			
5.1b Reduce median width on bridge	**$3,130,000**	**No change**	**+1 %**
The alternative concept proposes a 1 ft. wide median with rumble strips on the bridge. This concept reduces material cost, maintenance, and right-of-way farmland impacts. The baseline's 8 ft. shoulders as Class II bike lanes remain in this concept.			
7.0 Reduce Type "D" dikes	**$400,000**	**No change**	**+1 %**
The alternative concept would reduce the amount of asphalt concrete dike by removing all the dikes from the typical roadway cross-section and keeping the dike only at the intersections. This will reduce accumulation of mud and improve maintenance.			

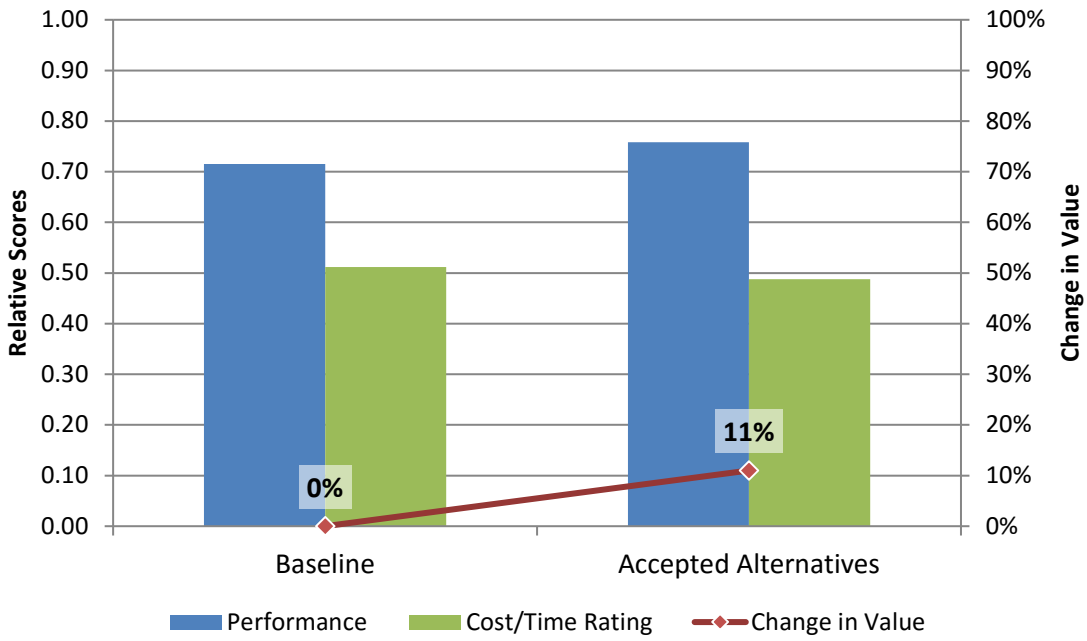
8.0 Install field fence along Davis Rd. for access control **($120,000)** **No change** **+3 %**

The alternative concept would install a 6 ft. high field fence along the right-of-way line on Davis Rd. on both sides to provide access control. This will restrict access for farming vehicles, but it also provides a frame on which to install fabric field screening. Traffic safety would also improve.

9.0 Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd. **($490,000) to ($690,000)** **No change** **+2 %**

The alternative concept would add a bus-only free right-turn lane at northbound Davis Rd. to eastbound Blanco Rd., making bus travel faster by minimizing delays at this intersection. Bus operations would improve, but will require additional right-of-way take and land mitigation.

Comparison of Value – Baseline Concept and Accepted VA Alternatives



Net Effect of Accepted VA Alternatives

Accepted Alternatives	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
2.0, 5.1a, 5.1b, 7.0, 8.0, 9.0	$3,870,000	No change	+6 %	+11 %

Conditionally Accepted VA Alternatives

Alternative No. and Description	Initial Cost Savings	Change in Schedule	Change in Performance
1.0 Utilize temporary steel casings in lieu of permanent steel casings	**$2,030,000**	**No change**	**No change**
The alternative concept would utilize 72" cast-in-drilled-hole (CIDH) foundation piles. The steel casing under this method is temporary, so the permanent steel shells used in the baseline concept would not be required. In addition to the material cost savings, construction impacts would also be reduced.			
3.1 Reconsider a precast girder bridge	**$4,130,000**	**-3 months**	**No change**
The alternative concept replaces the post-tensioned box girder bridge with a precast girder bridge. Based on the VA team's assessment, this type of bridge will be less expensive than a post-tensioned concrete box girder bridge for this application (low level, partially over water and/or environmentally sensitive areas). A precast girder bridge will also take less time to construct and reduce risk related to completing construction within the in-water work windows.			
4.0 Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood	**($100,000)**	**No change**	**+12 %**
This concept raises the elevation of Davis Rd. to 1 ft. above the 100-year flood elevation. This will ensure all-weather access is provided the full length of Davis Rd. between Blanco Rd. and Reservation Rd. with a lower annual risk of closure.			

Rejected VA Alternatives – Reason for Rejection

3.2 Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

This alternative is rejected due to the preliminary geotechnical findings that include potential for high seismic loads, lateral spreading and the identification of liquefiable layers in the borings obtained to date. These conditions likely preclude the use of small diameter piles.

Additional details may be found in the VA Alternative Implementation Action Form.

3.3 Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Similar to VA Alternative 3.2, this alternative is rejected due to the preliminary geotechnical findings that include potential for high seismic loads, lateral spreading and the identification of liquefiable layers in the borings obtained to date. These conditions likely preclude the use of small diameter piles.

However, the portion of this alternative to investigate the use of precast prestressed California Wide-Flange Girders will be considered under VA Alternative 3.1. As in VA Alternative 3.1, it will be studied for the entire length of the proposed bridge, 1,700 feet.

5.1c Reduce width of travel lanes on bridge to 11 ft.

The minimum AASHTO standard roadway width for a Rural Arterial with an ADT over 2000 and design speed higher than 55mph is 12-foot lanes with 8-foot outside shoulders. Because of the high volumes of vehicles that travel this roadway daily at a minimum speed of 55mph and the high volumes of large trucks and farm equipment, reducing the lane width is not safe. Safety of the general public is valued at a higher priority than the cost savings to the project by implementing this alternative and therefore this alternative is being rejected.

5.1d Reduce width of travel lanes on roadway to 11 ft.

The minimum AASHTO standard roadway width for a Rural Arterial with an ADT over 2000 and design speed higher than 55mph is 12-foot lanes with 8-foot outside shoulders. Because of the high volumes of vehicles that travel this roadway daily at a minimum speed of 55mph and the high volumes of large trucks and farm equipment, reducing the lane width is not safe. Safety of the general public is valued at a higher priority than the cost savings to the project by implementing this alternative and therefore this alternative is being rejected.

5.2a Adopt Class IV bikeway cross-section

Precludes accepting 5.1a and 5.1b savings. See commentary in the VA Alternatives *section of this report further addressing technical feasibility.*

5.2b Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

Precludes accepting 5.1a and 5.1b savings. See commentary in the VA Alternatives *section of this report further addressing technical feasibility.*

6.0 Modify frontage road and reduce length

Davis Road is a high speed Rural Arterial, with a substantial volume of vehicles that travel along the corridor daily. One of the goals of the project is to improve safety and mobility through the corridor. Minimizing the access points along the corridor is one solution to accomplish this goal. Adding a driveway on Davis Road between the north side of the bridge and Foster Road creates challenges. Although the amount of vehicles that will be utilizing this driveway is minimal, it still will create the potential need for a northbound left-turn pocket on Davis Road, in order to avoid rear end accidents, which will add to the cost of the project. The proposed driveway location is also too close to the bridge which will make conforming grade issues and sight distance exiting the driveway challenge as well. For these reasons, this alternative was rejected.

10.1 Realign intersection at Reservation Rd. and Davis Rd.

Realigning the intersection at Reservation Road and Davis Road to make Davis Road the main movement does present some traffic operation challenges. Because the Bluffs driveway located on the south side of the existing intersection would be located relatively close to the re-aligned intersection, movements in and out of this driveway will result in the need to install two traffic signals too close together or eliminating left turns in or out of this driveway, which would result in a

substantial impact to the residences that use that driveway. Also, related to traffic, there are high volumes travelling westbound on Reservation Road that would eliminate the benefit of the re-aligned intersection.

Regardless of the impacts mentioned above, the County, through political choice, would rather construct a roundabout at this intersection.

10.2 Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

This alternative would have a substantial impact on the agricultural property located on the northwest corner of the Reservation Road and Davis Road intersection. There are plans for future development on this corner that would also be impacted. It was also determined that traffic operations would not be improved enough to justify this alternative because of the high volumes travelling both westbound and eastbound on Reservation Road to northbound on Davis Road.

Regardless of the impacts mentioned above, the County, through political choice, would rather construct a roundabout at this intersection.

VA TEAM

VA Study Team

Name	Organization	Title
Robert Stewart	VMS, Inc.	VA Team Leader
Jodie Puzio	VMS, Inc.	VA Team Assistant
Jim Daubersmith	Daubersmith, Inc.	Construction & Estimating
Frank Drouillard	OPAC	Bridges & Structures
Heidi Ouren	HQE, Inc.	Traffic and Roadway Design
Chuck Anderson	Schaaf & Wheeler	Hydrology & Hydraulics
Rodney Cahill	Mesiti-Miller Engineering, Inc.	Civil, Utilities & Drainage

Key Project Contacts

Name	Organization	Title
Mark Imbriani	TRC	Project Manager
Enrique Saavedra	Monterey County RMA-Public Works	Project Manager
Peter Said	FORA	Project Specialist
Hank Myers	TAMC	Transportation Planning
Reinie Jones	Caltrans, District 5	Engineer

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.

The VA alternative documents in this section are presented as written by the team during the VA study. While they may have been edited from the *Preliminary Value Analysis Study Report* to correct errors or better clarify the alternatives, they have not been edited to reflect the implementation dispositions, presented on the Implementation Action Forms. These forms can be found following the Other Considerations.

PROPOSED VA ALTERNATIVES

Alternative No. & Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
1.0 Utilize temporary steel casings in lieu of permanent steel casings	$2,030,000	No change	No change	+3 %
2.0 Eliminate column flares at bridge	$80,000	No change	No change	No change
3.1 Reconsider a precast girder bridge	$4,130,000	-3 months	No change	+7 %
3.2 Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents	$4,230,000	-2 months	+1 %	+8 %
3.3 Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans	$5,990,000	-3 months	+1 %	+11 %
4.0 Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood	($100,000)	No change	+12 %	+12 %
5.1a Reduce median width on roadway	$970,000	No change	+1 %	+2 %
5.1b Reduce median width on bridge	$3,130,000	No change	+1 %	+4 %

Alternative No. & Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
5.1c Reduce width of travel lanes on bridge to 11 ft.	$1,790,000	No change	No change	+3 %
5.1d Reduce width of travel lanes on roadway to 11 ft.	$590,000	No change	No change	+1 %
5.2a Adopt Class IV bikeway cross-section	($1,140,000)*	No change	-1 %	-2 %
5.2b Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track	($1,140,000)*	No change	-1 %	-2 %
6.0 Modify frontage road and reduce length	$1,270,000	No change	+1 %	+3 %
7.0 Reduce Type "D" dikes	$400,000	No change	+1 %	+1 %
8.0 Install field fence along Davis Rd. for access control	($120,000)	No change	+3 %	+2 %
9.0 Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.	($170,000)	No change	+2 %	+2 %
10.1 Realign intersection at Reservation Rd. and Davis Rd.	($1,140,000)	No change	+10 %	+9 %
10.2 Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.	($270,000)	No change	+3 %	+3 %

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

**Reflects the true cost to implement a Class IV two-way cycle track without the pavement width reductions of Alternatives 5.1a and 5.1b. Would preclude implementation of Alternatives 5.1a and 5.1b.*

OTHER CONSIDERATIONS

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

- **Roundabouts:** The design team investigated using a roundabout at the intersection of Davis Road/Reservation Road. The analysis showed that it would operate at LOS F in the 2040 PM peak hour. The heavy movements from EB Reservation Road to NB Davis Road (1066 vph) and from SB Davis Road to WB Reservation Road (798 vph) prevent vehicles for the other approaches from entering the roundabout. It is common in roundabout operations that the volumes from all approaches need to be fairly balanced or a breakdown in operations occurs.

- **Bikeway Classification:** The VA team evaluated both the Class II and Class IV Bikeway options for the project. The VA team compared the VA alternatives related to these two strategies. VA Alternatives 5.1a - 5.1d, if implemented, would reduce the total cross-section on Davis Rd. (and the bridge) by 11 feet in width, resulting in significant reductions in construction cost, farmland takes, and future maintenance costs as compared to the baseline. VA Alternatives 5.2a and 5.2b, if implemented, would preclude the pavement width reductions of Alternatives 5.1a - 5.1d, reducing the total cross-section on Davis Rd. (and the bridge) by only 5 feet in width, resulting in less reduction in farmland take and maintenance cost, and would be less desirable from a cyclist viewpoint based on stakeholder feedback from Pedali Alpini which stated a preference for a Class II Bikeway.

  Note: Additional details are included in the 5.2 Commentary provided by TRC post-VA Study following the VA Alternative Implementation Action forms for VA Alternatives 5.2a and 5.2b and the VA Alternative Documentation for VA Alternatives 5.2a and 5.2b.

- **Hydrologic Reconciliation Regulatory Compliance:** The following report was completed by the VA Team for consideration with respect to the procedures for compliance with the NFIP.

Monterey County Department of Public Works
Davis Road Bridge at Salinas River
Value Engineering

Compliance with NFIP Regulations

Discussion Topic

This technical brief discusses the following issue associated with value engineering for the proposed Davis Road Bridge over the Salinas River (Project) in Monterey County, California:

- Procedures for Project compliance with National Flood Insurance Program (NFIP) regulations as administered by the Federal Emergency Management Agency (FEMA) and Monterey County Water Resources Agency (MCWRA).

Basis of Project Hydraulic Design

As described by the Draft Design Hydraulic Study Report (Avila and Associates, June 2013), the Davis Road Bridge replacement is designed to accommodate the FEMA-published base flood (100-year) discharge of 81,000 cfs for the Salinas River at Blanco Road with no rise in the base flood elevation. Table 1 lists discharge estimates for the Project vicinity as excerpted from the Flood Insurance Study (FIS) for Monterey County, which became effective April 2, 2009.

Table 1: FEMA Discharge Estimates

	Discharge (cfs)			
Location	**10-year**	**50-year**	**100-year**	**500-year**
Salinas River at Spreckles	35,000	64,000	85,000	121,000
Salinas River at Blanco Road	35,000	64,000	81,000	121,000

Regulatory Compliance

Construction of the bridge foundation, piers and superstructure will take place within a regulatory floodway as indicated in Figure 1. Federal regulations listed in CFR §60.3(d)(3)

> "Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge."

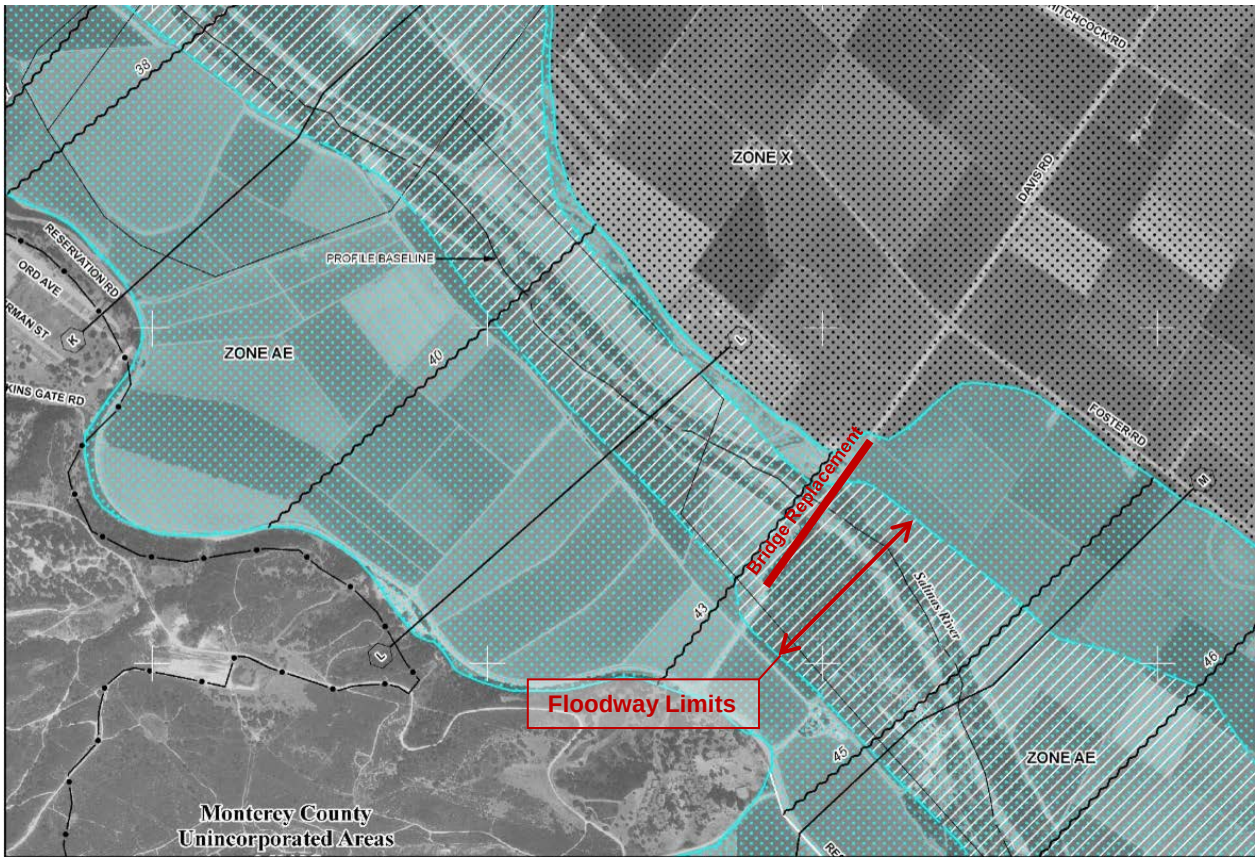


Figure 1. Regulatory Floodway at Davis Road

Achieving Regulatory Compliance

Structural encroachment into the regulatory floodway necessitates completion of a "No Rise Certification." The pertinent question is what constitutes "hydrologic and hydraulic analyses performed in accordance with standard engineering practice."

Base flood elevations and the regulatory floodplain illustrated in Figure 1 were originally developed in 1980. A review of the Design Hydraulic Study Report indicates that the basis of hydrologic analysis for the Davis Road Bridge replacement is the original FIS hydrology developed in 1980, but the basis of hydraulic analysis is a set of topographic surveys completed circa 2008. Using the most recent topographic data available is consistent with standard engineering practice, particularly given the propensity for local topographic modification within the floodplain, permitted or otherwise. The use of the FEMA base flood discharge is also consistent with sound engineering practice as elaborated subsequently.

The general regulatory procedure is as follows:

1. Per FEMA regulations, any project in a floodway must be reviewed to determine if the project will increase flood elevations. The County's permit file must have a record of the results of this analysis, which can be in the form of a No-rise Certification. This No-rise Certification must be supported by technical data and signed by a registered professional engineer.

Supporting technical data is generally based on the computer model used to develop the 100-year floodway shown on the Flood Insurance Rate Map (FIRM) or Flood Boundary and Floodway Map (FBFM). Ms. Avila has indicated she encountered "challenges" when using the available models.

2. The Monterey County Water Resources Agency is the floodplain administer for unincorporated Monterey County. (Reference: Chapter 16.16 of the Monterey County Code.) The following provisions are applicable to the Davis Road Bridge project:

    a. If the proposed improvement is within a Special Flood Hazard Area, the project's permit application shall be referred to the Monterey County Water Resources Agency for review. (§16.16.040.B)

    b. The Agency shall review the permit application to determine if the proposed project adversely affects the flood capacity of the Special Flood Hazard Area. "Adversely affects" means that the cumulative effect of the proposed project when combined with all other existing and anticipated development will not increase the water surface elevation of the base flood more than one foot at any point, until such time as a regulatory floodway is designated, noting that a regulatory floodway is designated at the Project site. (§16.16.040.D.4)

    c. The County prohibits encroachments within a regulatory floodway, including fill, new construction, substantial improvements, and other development, unless certification by a registered civil engineer is provided demonstrating that the proposed encroachment shall not result in <u>any</u> increase in flood levels during the occurrence of the base flood discharge. (§16.16.050.J.2)

    d. The Agency shall submit or assure that the permit applicant submits technical or scientific data to FEMA for a Letter of Map Revision (LOMR) if there are base flood elevation changes due to physical alterations. (§16.16.040.H.2)

3. The County needs to ascertain whether there is any increase in base flood elevations within the floodplain due to project improvements. (By Federal and County regulation there can be no increase in base flood elevation due to planned encroachment within the regulatory floodway; this must also be demonstrated.)

4. If there is an increase in base flood elevation due to the project in conjunction with planned cumulative development within the floodplain, the Department of Public Works would need to obtain a Conditional Letter of Map Revision from FEMA, verifying the proposed regulatory changes. These conditions would be analyzed:

a. Effective floodplain and floodway based on published FIS models.

b. Corrected effective floodplain and floodway, reflecting physical changes including in ground elevations and river conditions (e.g. vegetation) that have occurred since 1980. (Essentially the Avila model, but with a floodway analysis.)

c. Post-Project floodplain and floodway. The Project applicant must show:

   i. Proposed encroachment into the corrected floodway does not increase 100-year flood elevations.

   ii. Proposed encroachment within the corrected Zone A floodplain (e.g. due to a raised Davis Road at either bridge approach) does not increase 100-year flood elevations by more than one foot, when considering cumulative planned development in the community. MCWRA has told Monterey County Public Works that they will not accept more than a 0.1 foot rise in the 100-year floodplain elevation.

5. As the floodplain administer for unincorporated Monterey County, MCWRA would sign a "concurrence" form that indicates they concur with the proposed flood hazard mapping changes if those changes are made.

6. Once the Project is completed, assuming per plan, the County would apply for a Letter of Map Revision (LOMR) that follows the Conditional LOMR. FEMA would decide, largely based on their available funding and the extent of changes to the Flood Insurance Rate Map, whether to publish new maps through a Physical Map Revision (PMR).

Project Risk

In a risk registry there would be two major issues to consider:

1. An updated floodplain analysis could potentially change the level of operational reliability afforded by the completed project (i.e. how often Davis Road would close) or the scope of the project itself, both to provide the desired operational reliability or to remain flood neutral (no rise).

2. Completing a detailed re-evaluation of regulatory flood hazards based on current ground conditions and updated hydrology will take time, as would completing the CLOMR process. The re-evaluation could take several months, and while by Federal Statute, FEMA has 90 days to respond to CLOMR requests, experience shows that the application of statute is often very lax. The timing of a LOMR or PMR does not play into the construction schedule of the bridge as those process occur after project completion.

Hydrologic Reconciliation

The Draft Design Hydraulic Study Report indicates that FEMA discharges are used for the bridge design and hydraulic impact analysis. This is appropriate. FEMA's original hydrologic analysis completed in 1980 is based on a rainfall-runoff model calibrated to the results of a flood frequency analysis performed using stream flow data recorded by the United States Geologic Survey at the Salinas River near Spreckels. The gaging station is located at Highway 68, the next upstream crossing of the river from Davis Road. (Figure 2)

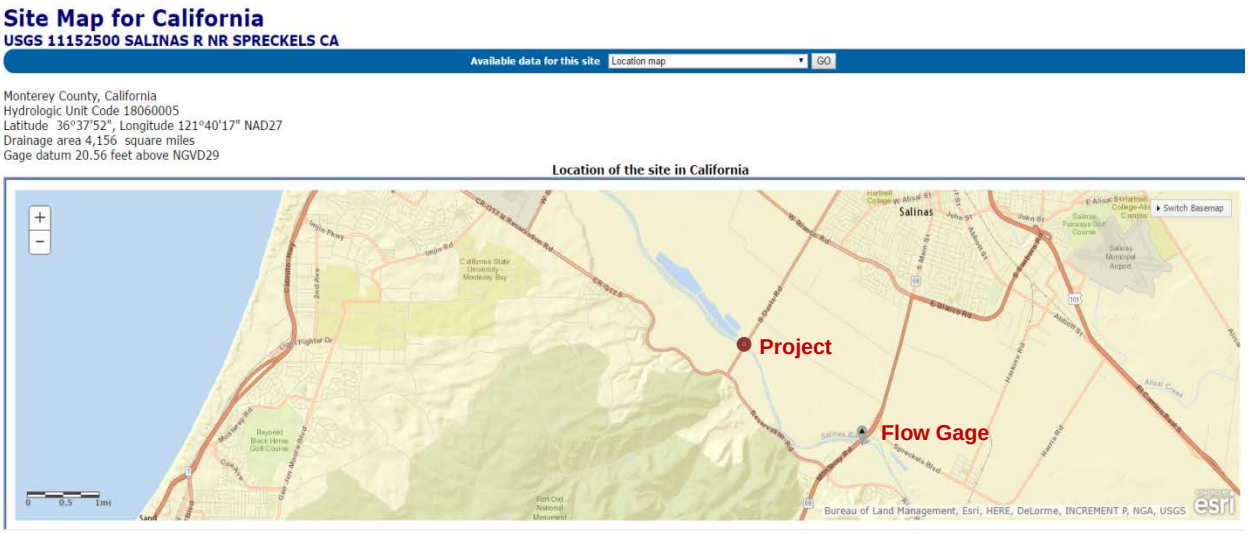


Figure 2. Location of USGS Gaging Station on Salinas River

Systematic Flow Record

The USGS has recorded peak annual streamflow on the Salinas River near Spreckels continuously since 1930. Nacimiento Reservoir was built in San Luis Obispo County on the tributary Nacimiento River in 1956 and San Antonio Reservoir was built on the tributary San Antonio River in Monterey County in 1965. Reservoir operation has a significant effect on flood discharges in the Salinas River. As such a flood-frequency analysis should not be performed on stream flow data more recent than 1956. Table 2 lists the ten largest recorded instantaneous peak discharges for the Salinas River with post-reservoir flows highlighted, noting that without reservoir operation (i.e. when the systematic flow record is truncated at Water Year 1955) the estimated 100-year discharge at Spreckels would be 140,000 cfs.

Table 2: Ten Largest Flow Events for Salinas River near Spreckels

Rank	Water Year	Date	Maximum Annual Peak Discharge (cfs)
1	1995	3/12/95	95,000
2	1969	2/26/69	83,100
3	1938	2/12/38	75,000
4	1983	3/03/83	63,000
5	1978	2/11/78	57,400
6	1941	3/04/41	45,400
7	1998	2/08/98	44,800
8	1945	2/03/45	44,800
9	1943	1/22/43	42,800
10	1932	12/29/31	42,100

100-year Flow Estimate

The peak annual discharge recorded in 1995 is the flood of record and exceeds the estimated 100-year discharge by roughly 12 percent. There is no readily available means to assign a return period to this discharge, given the impact of reservoir operation. The 95,000 cfs recorded discharge cannot be simply read from a flood-frequency curve. The Draft Hydraulic Study Report presents a flood-frequency curve that shows a 100-year discharge of 80,000 cfs for the Salinas River, but it is not clear how this was performed, nor with which data set.

Including the 1995 event would not change the original model calibration, because that flow was affected by upstream reservoirs. An event calibration might show why the event was greater than the 85,000 cfs estimate but this can be difficult since detailed distributed rainfall data for this specific storm, antecedent reservoir storage and operations are needed. It is likely not worth the effort to assign a probability to the 1995 discharge and other flood analyses within Monterey County suggest that this was greater than a 100-year event.[1]

Furthermore, FEMA's statistical threshold for changing an effective discharge is likely not met by the 12 percent increase represented by the flood of record. Therefore we would recommend the use of FEMA discharges for bridge design and impact analysis.

Hydraulic Reconciliation

Based on the Draft Hydraulic Study Report and other available information, the Davis Road Bridge replacement is designed to pass 81,000 cfs with no rise in flood elevations. Their analysis is based on steady-state backwater models using channel and floodplain cross sections field-surveyed in 2008. Figure 3 shows the calculated 100-year water surface profile in the vicinity of Davis Road superimposed over the water surface profile for the Salinas River published in the FIS.[2]

As evidenced by a comparison of water surface profiles, changed conditions in the vicinity of Davis Road have apparently increased 100-year flood elevations by up to nearly two feet, so the revised 100-year water surface elevation is equivalent to the previously mapped 500-year water surface. A non-regulatory levee constructed on the south bank west of the road may be at least partly responsible, particularly if said levee was built subsequent to 1980. This levee, which is roughly six feet higher than the adjacent protected ground, is located within the regulatory floodway and while it would be overtopped in the 100-year event, it represents a partial blockage of flow conveyance area on the south bank. When calculating water surface elevations upstream of Davis Road, the hydraulic effect of this levee cannot be ignored and the levee cannot be assumed to fail and completely wash out prior to the arrival of the peak flood discharge.

Potential hydraulic impacts due to bridge and road approach construction should be evaluated against the revised floodplain delineation rather than effective floodplain elevations.

[1] Personal communication with James R. Schaaf, PE, PhD, October 6, 2016.

[2] From water surface profile titled "16g-Figures to County 4-16-2013 Water Surface Profiles.pdf"

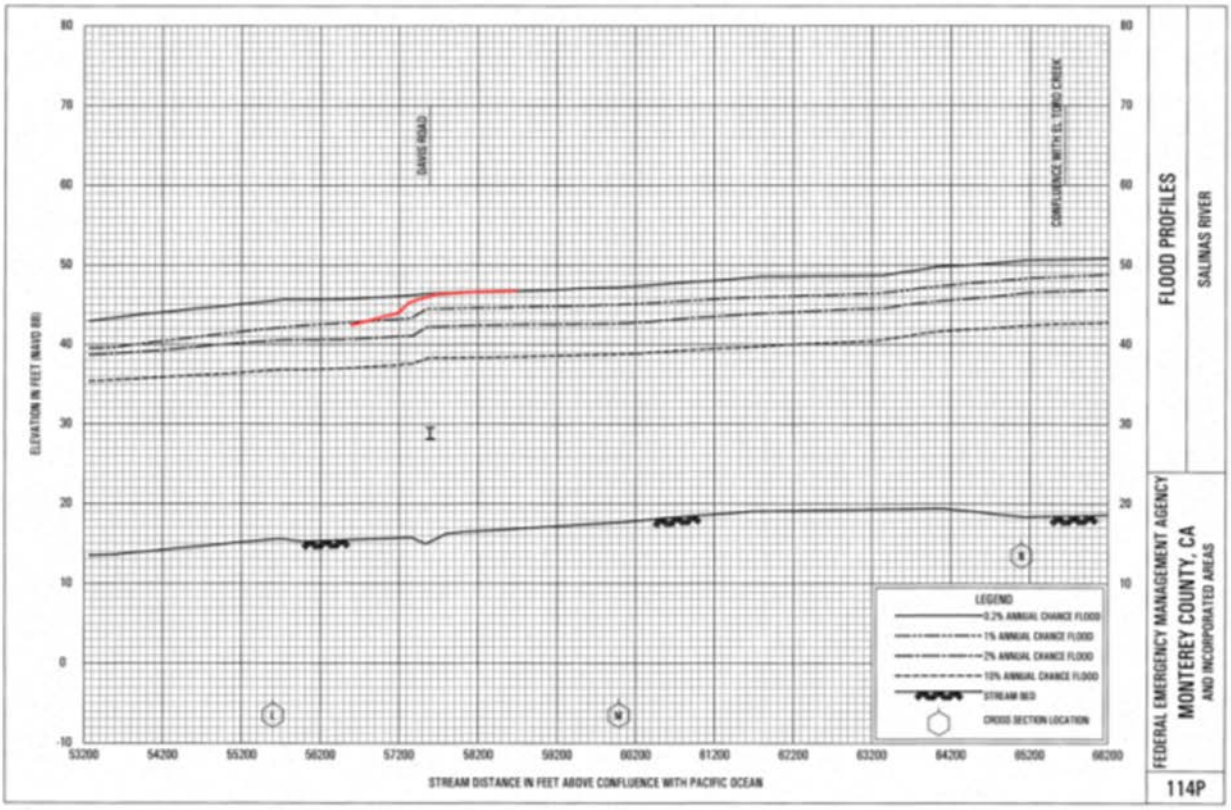


Figure 3. Revised 100-year Water Surfce Profile near Davis Road

Operational Reliability in the Context of Regulatory Compliance

The HEC-RAS model used to inform the Draft Hydraulic Study Report is a steady-state backwater model. As shown in Figure 4, the model is encroached to limit what is known as the effective flow area in both the pre-project and post-project conditions. (The encroachment is shown as green shading in the figure.)

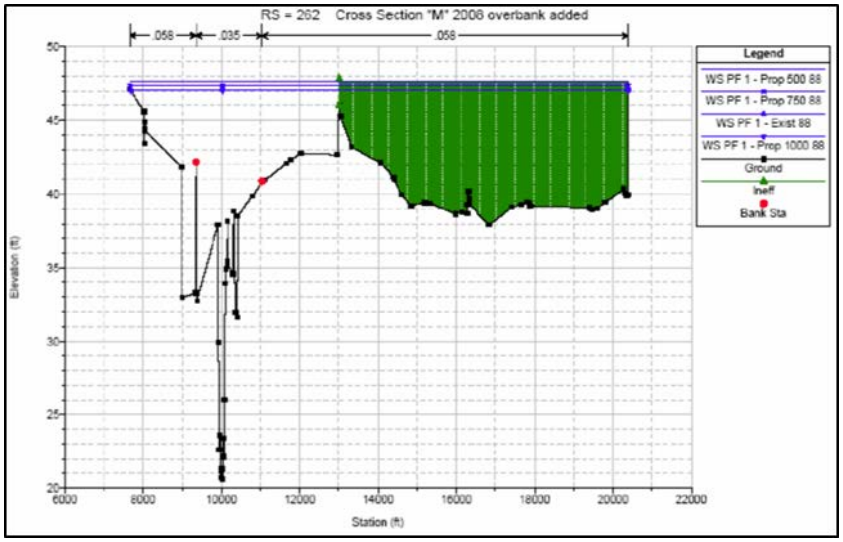


Figure 4. Modeled Cross Section for No-Rise Analysis

Figure 4 shows a cross section of the modeled floodplain at FEMA Section "M". The encroached width is 5,400 feet, which happens to roughly match the width of the FEMA floodplain, although it is not clear why this encroachment is modeled when water surface elevations are not clearly contained. That is the blue lines in Figure 4 are higher than the (black) ground elevation at the point of encroachment. Flood water would spill over the ridge in the north floodplain, flow toward Salinas and likely cross Davis Road. This behavior needs to be better understood to ascertain how often Davis Road might be overtopped, and whether any increase in the Davis Road elevation to provide all weather access during major flooding events would raise 100-year flood elevations by more than 0.1 foot, thereby violating the County's no-rise criterion or by more than one foot, thereby violating FEMA's no-rise criterion.

It may also be noted that the modeled 100-year water surface elevation of 47.8 feet NAVD shown in Figure 4 (source: "16h-2008_10_07_Additional Info Floodplain.pdf") matches the 100-year water surface elevation of 48 feet NAVD shown on the project plans, but does not match the modeled 100-year water surface elevation excerpted in Figure 3, which has been copied from the background document file titled "16g-Figures to County 4-16-2013." An explanation for this discrepancy is desired.

Bottom Line

The flooding situation needs to be better understood, not only to evaluate the proposed bridge's hydraulic performance but to remain in compliance with Federal and local regulations and process the necessary permits prior to construction.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 1.0

Utilize temporary steel casings in lieu of permanent steel casings

Responses prepared by: Mark A. Imbriani ***Date:*** December 16, 2016

Disposition:	Conditionally Accepted
Validated Initial Cost Savings:	$2,030,000
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	0%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: This alternative will be explored during the design phase. The following is taken from Parikh's Preliminary Geotechnical Memo dated June 20, 2013.

Due to thick liquefiable layers found at the site, foundations are expected to take large lateral loads due to lateral spreading induced loading during a major seismic event. Based on our discussion with the designer large diameter CISS or CIDH piles may be used as foundation support. The presence of loose sand layers, water and lateral load demands at the site favor the use of CISS due to ease of construction and relatively higher lateral stiffness of these piles. Both piles may be evaluated for final design at this stage.

Validated Performance: As we design the bridge we will compare total cost to Furnish and Drive CISS Concrete Piles to the equivalent CIDH Concrete Piles and include Furnish and Install Temporary Steel Casings.

The current estimate to Furnish and Drive CISS Concrete Piles is $6,240,000 and it is unlikely that switching to CIDH Concrete Piles and include Furnish and Install Temporary Steel Casings will save $2,030,000. This VA alternative assumes the cost of the casing is already in the cost to place the CIDH piles.

Implementable Portions: N/A

Project Development Delivery Impacts: Minor time and cost as we determine whether to use either CISS piles or CIDH piles with temporary casing. Adds additional bid items for the temporary casing.

Other Comments: Extraction of the temporary casing will increase the construction time for each individual pile resulting in possibly an additional month to construct CIDH piles vs CISS piles.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Responses prepared by: Mark A. Imbriani ***Date:*** December 19, 2016

Disposition:	Accepted
Validated Initial Cost Savings:	$80,000 appears reasonable
Validated LCC Savings:	$0
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	No change
Validated Change in Performance:	0%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: Yes. Column flares are a non-structural component.

Validated Performance: Column flares were included in the box girder bridge to aesthetically match the sloped exterior girders.

Implementable Portions: N/A

Project Development Delivery Impacts: None.

Other Comments: This alternative will be implemented as documented in the report.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 3.1

Reconsider a precast girder bridge

Responses prepared by: Mark A. Imbriani ***Date:*** December 19, 2016

Disposition:	Conditionally Accepted
Validated Initial Cost Savings:	$4,130,000 appears high
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	3 months
Validated Change in Performance:	0%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: A preliminary superstructure will be designed using precast prestressed California Wide-Flange Girders to better predict quantities for this alternative. Prices of the precast girders will be updated using the latest available data from Caltrans and by contacting several precast suppliers. Other items will also be modified to reflect the new superstructure section.

A one-page addendum to the Type Selection Report will be prepared to summarize revisions to the report and confirm the recommended structure type. Included with this addendum is a revised General Plan Estimate and a comparison of construction schedules for the two proposed structure types.

If the precast girder alternative is recommended, additional features will need to be included in the final design phase to make sure there is continuity over the piers as this bridge is in a high seismic area with liquefiable soil layers and therefore classified as a site class F.

This addendum to the report is scheduled to be completed by 1/6/2017.

Validated Performance: Using precast girders versus a cast-in-place box girder will certainly accelerate construction of the superstructure, but the predicted savings of 3 months has not been validated yet but appears reasonable.

Implementable Portions: N/A

Project Development Delivery Impacts: Time delay and cost increase as we prepare a design and determine a cost for the precast girder alternative.

Other Comments: This alternative will be implemented if the precast girders are determined to be more cost effective and if approval by Caltrans is obtained.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

Responses prepared by: Mark A. Imbriani ***Date:*** December 19, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: This alternative is rejected due to the preliminary geotechnical findings that include potential for high seismic loads, lateral spreading and the identification of liquefiable layers in the borings obtained to date. These conditions likely preclude the use of small diameter piles. The following is taken from Parikh's Preliminary Geotechnical Memo dated June 20, 2013.

The soil borings completed in 2009 indicate liquefaction potential due to loose sandy soils encountered at the site. The liquefiable soil layers of up to 30 feet thick were identified. For estimating the design acceleration response spectrum (ARS), both liquefied and non-liquefied states need to be evaluated.

For liquefied case, the site is not consistent with the basic assumption of Caltrans ARS Online tool (Vs>=150 m/s). Per Appendix B - Figure B.12 of Caltrans Seismic Design Criteria (SDC) v1.7, the site is classified as a “Site Class F” site which is defined as “Soils vulnerable to failure or collapse under seismic loading” and a site-specific seismic evaluation is required for “Site Class F” sites.

Based on the recent boring data, liquefaction potential is relatively high at the site for the loose sands. Liquefaction, lateral spreading, post-liquefaction settlement and downdrag load issues will be addressed later based on the results of our site-specific study.

Additionally, the Balanced Stiffness requirement in Caltrans Seismic Design Criteria will be difficult to satisfy given the significant difference between the performances of a flat slab bridge on piers consisting of ten 16" diameter piles as compared to the box girder bridge supported on three 4' diameter columns.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: None noted.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Responses prepared by: Mark A. Imbriani ***Date:*** December 19, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: For the same reasons as stated in VA Alternative 3.2 this alternative is rejected. However, the portion of this alternative to investigate the use of precast prestressed California Wide-Flange Girders will be considered under VA Alternative 3.1. As in VA Alternative 3.1, it will be studied for the entire length of the proposed bridge, 1,700 feet.

Validated Performance: N/A

Implementable Portions: Portion of this alternative is included in VA Alternative 3.1.

Project Development Delivery Impacts: N/A

Other Comments: None noted.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Conditionally Accepted
Validated Initial Cost Savings:	($100,000)
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+12%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: The baseline maintains the existing roadway profile grade north of Foster Road. This alternative involves raising the road profile at two low spots and installing culverts there to increase the flood level at which the road would become inundated and unpassable. Specialized hydraulic modelling is required to confidently establish any new profile grade.

Flow within a channel can often be modeled sufficiently using a 1D hydraulic model with cross sections oriented perpendicular to the main flow direction. For floodplain / overbank areas, however, flood flows can spread out and move not only down the floodplain but laterally across the floodplain (and various directions in between). These flow dynamics can be simulated best by the use of a 2D hydraulic model, yielding more realistic computed water surface elevations and flow velocities. Lidar information would be used for the survey of the area.

For the Salinas River / Davis Road study, we would recommend the use a combined 1D/2D HEC-RAS unsteady flow model, which includes 1D model cross sections for the main channel and bridges, and a 2D mesh for the overbank areas and approach roads. We would first model existing conditions, using the 1995 flood event to calibrate the model. We would add the proposed bridge to the calibrated model to create the proposed conditions model. Next, we would model alternatives for raising the Davis Road profile above the 100-year water surface elevation and determine what impacts the alternatives would have.

Validated Performance: After the model has been established, the Consultant will report back to the County the results/impacts for raising the road to the adjoining properties. The Consultant will also be able to report the duration the road would be inundated based on different storm events. It is estimated that these results will not be available until approximately March 2017.

Implementable Portions: The County will decide what areas to implement raising the road, after the results of the hydraulic study, as described above.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Project Development Delivery Impacts: Minor delays in design schedule, awaiting results of hydraulic study.

Other Comments: This alternative may or may not be implemented as documented in the report. The County will make the decision regarding implementation after the results of the hydraulic study are known. See attached commentary for additional information.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

COMMENTARY – VA ALTERNATIVE 4.0 – provided by TRC post-VA Study

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Introduction: Davis Road is part of a planned multi-modal corridor from Salinas to Monterey, and currently is frequently closed during high flood events. As such, it is desirable that the road remain open during the 100-year flood. The bridge portion of the project does provide this 100-year protection however certain segments of Davis Road north of the bridge do not, as they are within an overflow (overbank) area of the Salinas River.

The Alternative: Value Analysis (VA) Alternative 4.0 proposes raising the profile grade within two 250' long segments of the roadway by 0.5', and perhaps adding a culvert at each such location, to allow the road to remain open during a 100-year flood.

Engineering Analysis: The suitability of this would need to be verified by refined hydraulic studies, particularly given that we would be claiming the road would be open during a 100-year flood. Following are a few paragraphs on the approach for analyzing Salinas River flows, using a combination of 1D/2D modeling, utilizing the strengths of each.

Flow within a channel can often be modeled sufficiently using a 1D hydraulic model with cross sections oriented perpendicular to the main flow direction. For floodplain / overbank areas, however, flood flows can spread out and move not only down the floodplain but laterally across the floodplain (and various directions in between). These flow dynamics can be simulated best by the use of a 2D hydraulic model, yielding more realistic computed water surface elevations and flow velocities. In addition, a 2D hydraulic model can better simulate the impact of embankment fill, structures, or other impediments to flow that can change the flow direction significantly, as well as have an impact on floodplain storage. It should be noted that 1D hydraulic models do have one major advantage over 2D models—1D models have more robust procedures for modeling bridges.

For the Salinas River / Davis Road study, we would recommend the use a combined 1D/2D HEC-RAS unsteady flow model, which includes 1D model cross sections for the main channel and bridges, and a 2D mesh for the overbank areas and approach roads. We would first model existing conditions, using the 1995 flood event to calibrate the model. We would add the proposed bridge to the calibrated model to create the proposed conditions model. Next, we would model alternatives for raising the Davis Road profile above the 100-year water surface elevation and determine what impacts the alternatives would have.

If a FEMA Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) submittal is required, we would recommend using the results of the 1D/2D model to help guide the revision of a 1D HEC-RAS model, rather than using the 1D/2D model directly for the CLOMR and/or LOMR. The main reason is that FEMA is still in the early stages of developing comprehensive regulations and review guidelines for the use of 2D and 1D/2D models. For flooding sources with regulatory floodways established, including the Salinas River, this is even more of an issue. Until better procedures have been developed by FEMA, the use of a 1D model is recommended for FEMA submittal purposes.

The County may not wish to pursue the CLOMR route, thus we will raise the profile as much as possible without requiring that approval process.

COMMENTARY – VA ALTERNATIVE 4.0 – provided by TRC post-VA Study

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Cost Estimate: The cost to raise the profile and add two culverts would not be significant, on the order of a few hundred thousand dollars at most. The cost for the profile rise alone was estimated as $100,000 by the VA Study Team.

Value Change: The value of providing 100-year flood access is tremendous, particularly given the low cost involved.

Further Considerations: It is important to note that any new culvert should remain within the current APE limits established for the environmental document such that the environmental document will not need to be amended to include the additional impacts.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.1a

Reduce median width on roadway

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Accepted
Validated Initial Cost Savings:	$970,000
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+1%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: According to the AASHTO Green Book, for a Rural Arterial, the minimum median width is 4'. Reducing the median width to 4' on Davis Road is technically feasible and within code.

Validated Performance: N/A

Implementable Portions: Median width reduction will be implemented throughout the entire Davis Road Corridor.

Project Development Delivery Impacts: Minor time and cost to revise geometric approval drawings.

Other Comments: This alternative will be implemented with a 4-foot median.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.1b

Reduce median width on bridge

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Accepted
Validated Initial Cost Savings:	$3,130,000
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+1%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: According to AASHTO Green Book, for a Rural Arterial, the minimum median width is 4'. Reducing the median width to 4' on Davis Road is technically feasible and within code.

Validated Performance: N/A

Implementable Portions: Median width reduction will be implemented for the entire bridge length.

Project Development Delivery Impacts: Minor time and cost to revise the Bridge General Plan.

Other Comments: This alternative will be implemented with a 4-foot median.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.1c

Reduce width of travel lanes on bridge to 11 ft.

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: The minimum AASHTO standard roadway width for a Rural Arterial with an ADT over 2000 and design speed higher than 55mph is 12-foot lanes with 8-foot outside shoulders. Because of the high volumes of vehicles that travel this roadway daily at a minimum speed of 55mph and the high volumes of large trucks and farm equipment, reducing the lane width is not safe. Safety of the general public is valued at a higher priority than the cost savings to the project by implementing this alternative and therefore this alternative is being rejected.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: N/A

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.1d

Reduce width of travel lanes on roadway to 11 ft.

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: The minimum AASHTO standard roadway width for a Rural Arterial with an ADT over 2000 and design speed higher than 55mph is 12-foot lanes with 8-foot outside shoulders. Because of the high volumes of vehicles that travel this roadway daily at a minimum speed of 55mph and the high volumes of large trucks and farm equipment, reducing the lane width is not safe. Safety of the general public is valued at a higher priority than the cost savings to the project by implementing this alternative and therefore this alternative is being rejected.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: N/A

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section and reduce width of median buffer

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: Importantly, the ultimate users of the cycle-track, bicyclists, prefer the baseline Class II shoulder/bike lanes over the cycle-track. Another reason for rejection is the required reduction in main corridor lane, shoulder, and buffer widths. Cost is also a factor as the hard barrier would cost approximately $1 million, the project is financially constrained, and this would preclude the significant ($4 million) savings that can be realized by implementing alternatives 5.1a and 5.1b. Additionally, the hard barrier would be an impediment to flood flows, impounding water that would otherwise overtop the roadway. This would cause a rise in backwater surface elevations which is unacceptable. See attached commentary (following VA Alternative Implementation Action form for VA Alternative 5.2b) further addressing technical feasibility.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: Precludes accepting 5.1a and 5.1b savings.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: Importantly, the ultimate users of the cycle-track, bicyclists, prefer the baseline Class II shoulder/bike lanes over the cycle-track. Another reason for rejection is the required reduction in shoulder, and buffer widths. By reducing the buffer between shoulder and two-way cycle track would require a concrete barrier. If a concrete barrier is used, according to the Caltrans Highway Design Manual, the use of a concrete barrier would require the specified minimum 2' clearance from the edge of travel way of a bike path/cycle track to a continuous fixed object, with 3' clearance recommended. The purpose of the clearance to the barrier is to avoid bicyclists getting their handlebars hung up on the barrier. A traffic rated concrete barrier typically has a base of 2' width, increasing the minimum buffer width to 4', with 5' being preferred. Thus a 3' or the narrower 1' buffer of V.A. Alternative 5.2b are not acceptable in this application. Cost is also a factor as the hard barrier would cost approximately $1 million, the project is financially constrained, and this would preclude the significant ($4 million) savings that can be realized by implementing alternatives 5.1a and 5.1b. Additionally, the hard barrier would be an impediment to flood flows, impounding water that would otherwise overtop the roadway. This would cause a rise in backwater surface elevations which is unacceptable. See attached commentary further addressing technical feasibility.

Parking stops were mentioned as a possible barrier solution. However, the use of parking stops is not an acceptable inflexible physical barrier. A parking stop does not provide the same level of comfort for the Cycle Track users and may be dangerous for vehicles that strike it at the posted 55 mph speed. Although the use of parking stops in the separation buffer between the cycle track and vehicular traffic does adhere to the intention of section 3.1 of DIB 89, as it discourages the intrusion of motor vehicles into the bikeway, it will not redirect a vehicle that strikes the stop.

Validated Performance: N/A

Project Development Delivery Impacts: N/A

Other Comments: Precludes accepting 5.1a and 5.1b savings.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

5.2 COMMENTARY – provided by TRC post-VA Study

VA Alternatives 5.2a and 5.2b, Cycle-Track

Introduction: V.A. Alternatives 5.2a and 5.2b propose a reduced traveled way width and the inclusion of a two-way Class IV bikeway (cycle-track) along Davis Road from Reservation Road to Blanco Road as compared to the baseline project roadway configuration of AASHTO minimum lane and shoulder widths and 8' Class II bike lanes/shoulders on each side of Davis Road. The alternatives as proposed incorporate flexible delineators and a reduced buffer width to separate traffic from a dedicated Class IV bikeway. This analysis comments on that configuration and calculates the true cost and value change of incorporating this alternative.

The Alternatives:

- V.A. Alternative 5.2a proposes the use of an 8' wide two-way cycle track with a 3' unpaved shoulder and a 3' striped buffer, separated from vehicular traffic by flexible delineators, per the attached typical section FIGURE 1.

- V.A. Alternative 5.2b proposes the use of a narrower 1' wide buffer separating a two-way cycle track, per the attached typical section FIGURE 2.

Engineering / Traffic Analysis: Although V.A. Alternative 5.2a does adhere to FHWA and Caltrans DIB 89 guidelines for separation (see attached FIGURE 3, DIB 89 Figure 3.0), it would not provide the same level of comfort and safety for bicyclists as would the option of separating vehicular traffic with a concrete barrier.

With regards to the physical separation of the cycle-track, in high speed environments such as Davis Road an inflexible barrier should be used to separate traffic. Specifically, a concrete barrier is recommended here as the design speed along Davis Road is 60 mph, posted at 55 mph. In Caltrans DIB 89 (page 9) it is stated, in the inflexible barrier section, that "in higher speed environments a concrete barrier should be used". Thus, flexible barriers, such as delineators, are not proper in this application.

Further, according to Caltrans Highway Design Manual, the use of a concrete barrier would require the specified minimum 2' clearance from the edge of travel way of a bike path/cycle track to a continuous fixed object, with 3' clearance recommended, in order to avoid bicyclists getting their handlebars hung up on the barrier. A traffic rated concrete barrier typically has a base of 2' width, increasing the minimum buffer width to 4', with 5' being preferred. Thus a 3' or the narrower 1' buffer of V.A. Alternative 5.2b are not acceptable in this application.

We further consider Alternative 5.2b to not be a viable alternative as discussed following. The V.A. Study Report Preview references a picture from the FHWA Separated Bike Lane Planning and Design Guide that uses parking stops to separate the cycle track from the travel way. See attached FIGURE 4 from VA Alternative 5.2b. It shows a 1' – 2' typical width of the parking stop measured from the buffer zone outside edge to the inside edge of the parking stop. It does not allow for a 1' wide buffer zone, nor does Figure 3.0 from Caltrans DIB 89. The Value Analysis Study Report also references pictures representing one way traffic in low speed environments. The minimum specified buffer zone is 2' for this situation with 3' recommended. Thus, we consider this scenario not applicable in our proposed high speed environment.

5.2 COMMENTARY – provided by TRC post-VA Study

VA Alternatives 5.2a and 5.2b, Cycle-Track

In addition, the use of parking stops is not an acceptable inflexible physical barrier. A parking stop does not provide the same level of comfort for the Cycle Track users and may be dangerous for vehicles that strike it at the posted 55 mph speed. Although the use of parking stops in the separation buffer between the cycle track and vehicular traffic does adhere to the intention of section 3.1 of DIB 89, as it discourages the intrusion of motor vehicles into the bikeway, it will not redirect a vehicle that strikes the stop.

Cost Estimates: The construction cost estimate calculated herein for the cycle-track includes traffic striping, pavement markings, a concrete barrier, and traffic signing. It also includes decomposed granite as the shoulder material on the cycle track side of the barrier that would be used as a bicycle shoulder, as typically used with Class 1 bicycle paths. The cost estimate does not include the cost savings attributable to the reduction in the width of the vehicular travelled way, as those cost savings are properly included in V.A. Alternative 5.1a. That is, the median width reduction realized in accepted V.A. Alternative 5.1a and the bridge width reduction in accepted V. A. Alternative 5.1b can be realized without the inclusion of a cycle track. The cost estimate does include the thinner structural section that can be specified in the cycle track area in lieu of the thicker vehicular structural section in the baseline.

The true cost of Alternative 5.2a, using a concrete barrier, is $1,140,000 over the baseline per the cost estimate in Attachment 1. If a flexible barrier is used in lieu of the concrete barrier, the calculated cost is $290,000 over the baseline, per the cost estimate in Attachment 2. Again, however, the use of delineators is not recommended nor warranted in this scenario.

A cost was not calculated for V.A. Alternative 5.2b as again for our scenario that configuration violates the relevant design codes and guidelines regarding buffer widths and barrier types.

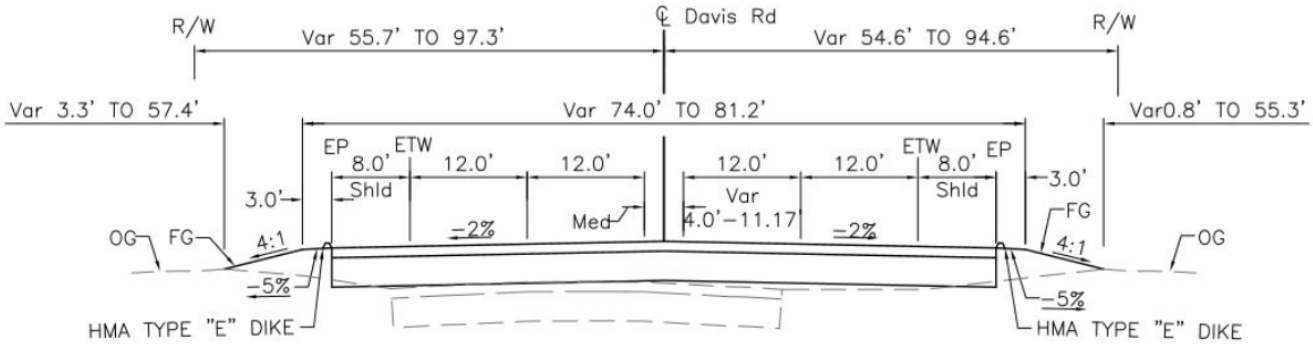
Further Considerations: It is noted that V.A. Alternatives 5.1a and 5.1b, incorporating a 4’ reduction in the median width along the roadway and bridge, cannot be implemented if the cycle-track is added to the project. Thus, the cost savings of $4.1 million and increased value resulting from that reduction in width in accepted V.A. Alternatives 5.1a and 5.1b would not be realized if the cycle-track is incorporated.

VA ALTERNATIVE 5.2a

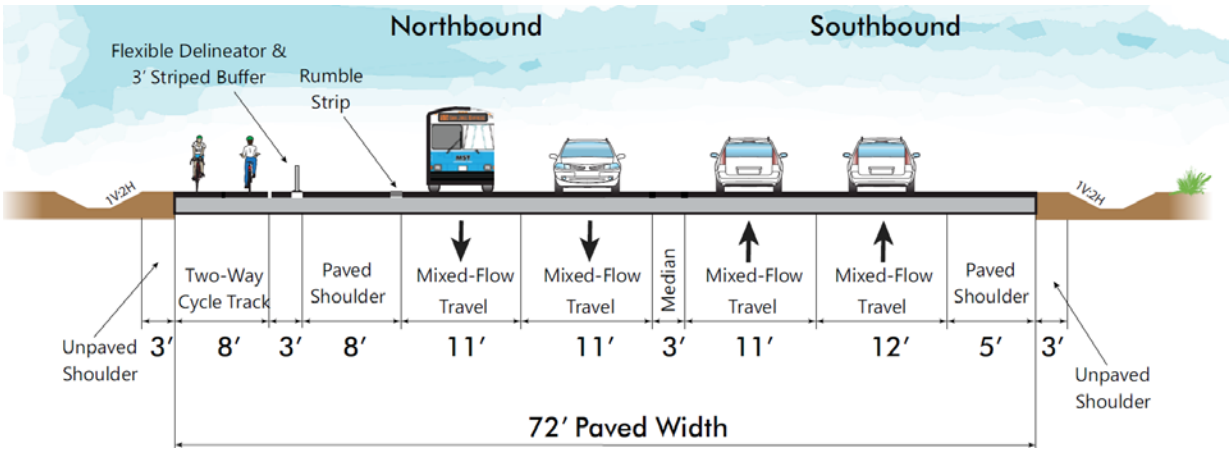
FIGURE 1

Adopt Class IV bikeway cross-section

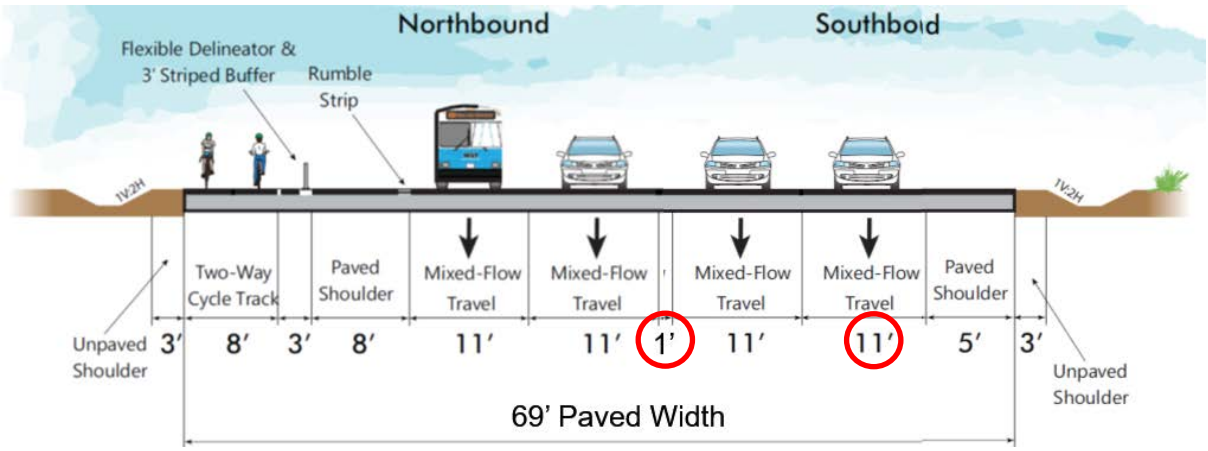
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch

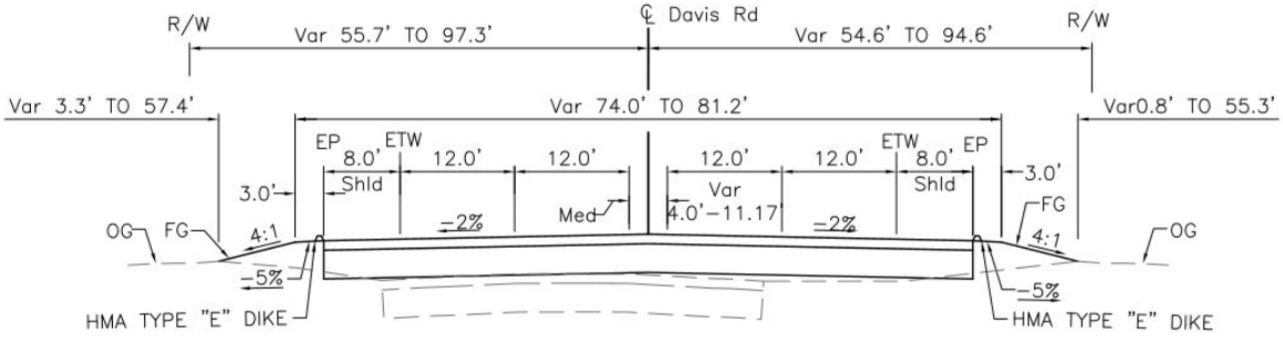


VA ALTERNATIVE 5.2b

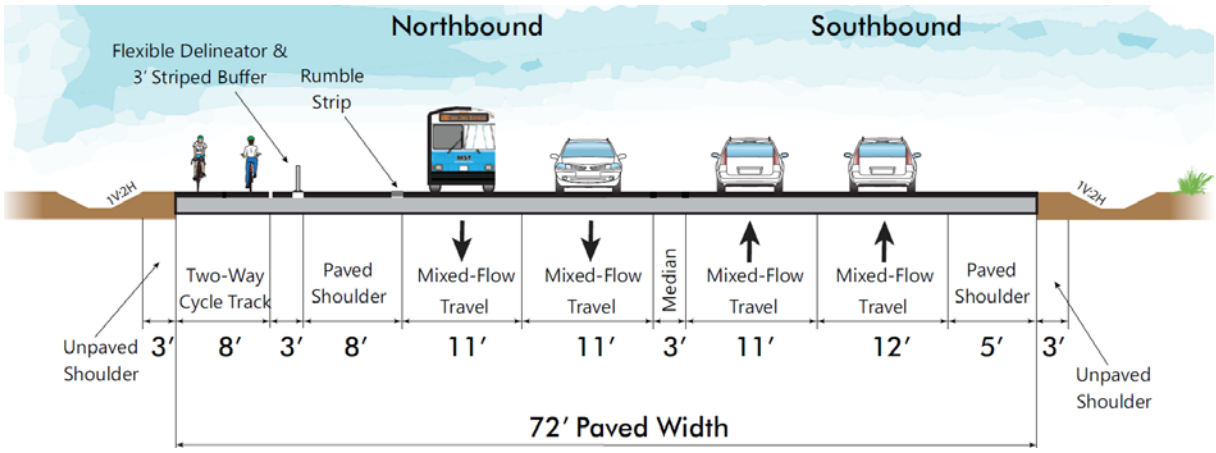
FIGURE 2

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

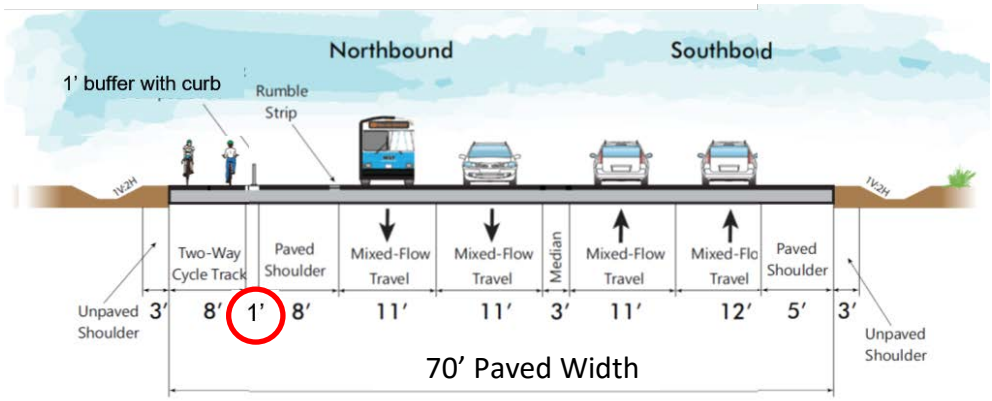
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch



Assumptions and Calculations:

- 1 ft. wide flexible delineator post buffer per Caltrans Standard Plan A73C.

VA ALTERNATIVE 5.2b

FIGURE 3

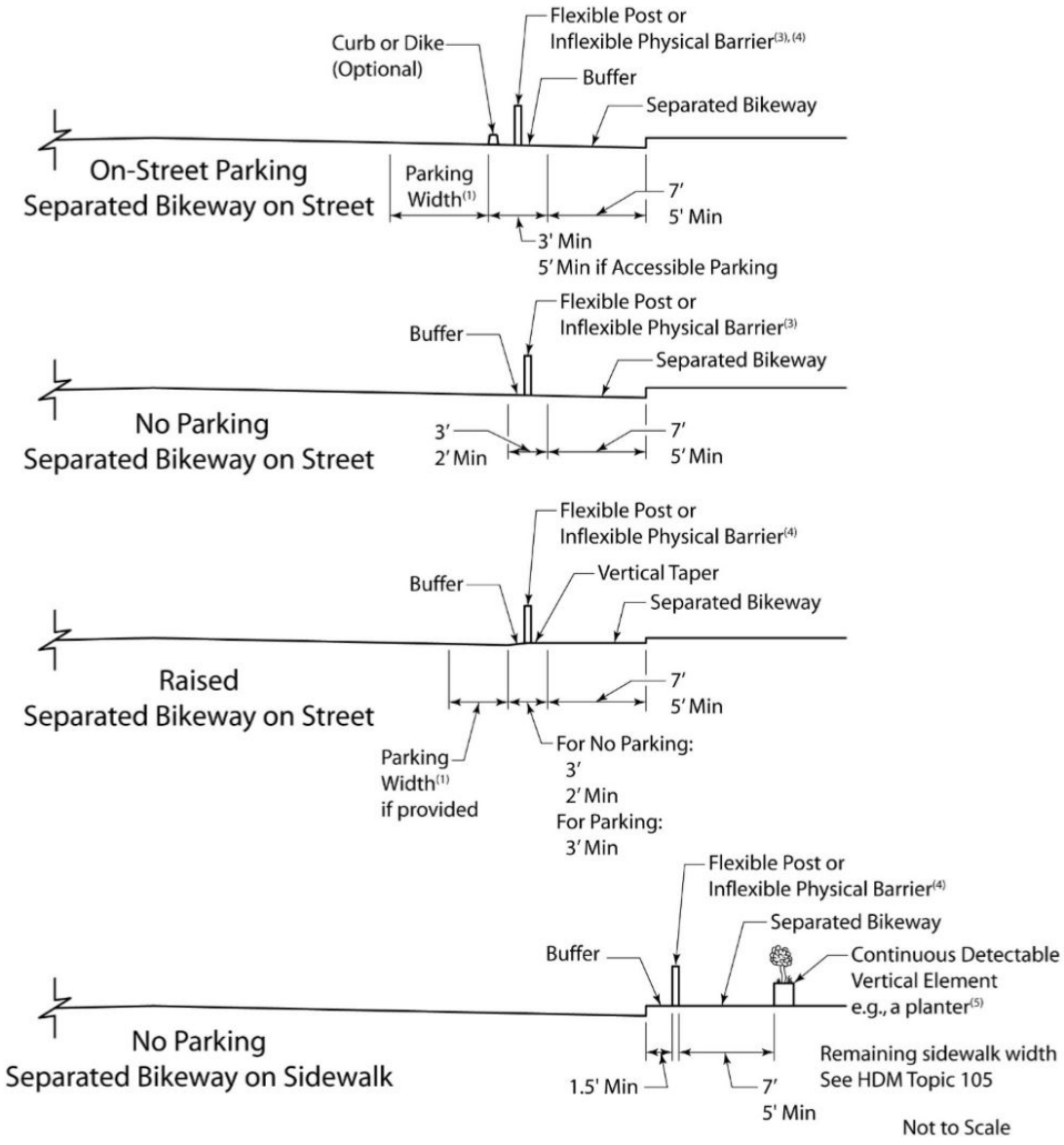
Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

References:

DIB 89 December 30, 2015

Figure 3.0

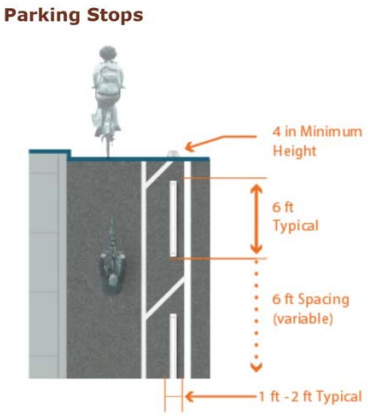
Typical Class IV Bikeway (Separated Bikeway) Cross Sections



VA ALTERNATIVE 5.2b

FIGURE 4

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track



In the case of Davis Road, an 8 ft. shoulder separated the travelled lane and the cycle track, so the separation could be reduced. FHWA recommends a parking stop buffer of 1 to 2 ft. (see right image), per attached Figure 12 from the Separated Bikeway Planning and Design Guide, 2015. The proposed separation is 1 ft. with an intermittent AC dike, recycled plastic parking stop, or recycled rubber channelizer.

During the team's site visit, large accumulations of mud were present on the roadway and agricultural vehicles were frequently using the road. Flexible posts may be damaged more easily by large agricultural equipment and could become a maintenance burden. Instead of the proposed flexible post, a low dike or curb is recommended, with openings to allow for drainage.

An example of the Santa Cruz cycle-track is shown below:

Technical Review Comments: During the VE Technical Review Meeting, the County Project Manager explained the roadway shoulders on Davis Rd. are frequently used by large and slow-moving farm tractors.

Project Management Considerations: Removal of the flexible posts could improve communications with the farming stakeholders during design and operations.

Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: There would be a mandatory design exception required for the 5 ft. shoulder on the opposite side in order to fit the cycle track on the bridge. There is some risk in not getting approval, and the entire bridge may not be eligible for reimbursement by FHWA. This implication of the loss of federal funds from FHWA could be around $30 M.

SHEET NO. 1 OF 1
PROJECT NO. 154189
DATE 11/4/16
BY GWA
CHK'D

SUBJECT Cycle Track True Cost (Concrete Barrier)

Concrete Barrier (Type 60) - Assume $50/LF per Caltrans Contract Cost Data.

Davis Road Length 10,900 LF
(Reservation to Blanco)

∴ 10,900 LF x 50 $/LF = $545,000

Pavement Markings - Cycle Track

Centerline Stripe - 4" Assume $1/LF ∴ 10,900

Inside lane line to separate bicycle traffic from Continuous obstruction.
line 27B - 10,900 Assume $1/LF ∴ 10,900

Paint - Pavement Marking - Bicycle symbols & Special Green Paint @ intersects & driveways.
Assume $20,000

Traffic Signs - Assume $5,000.

Concrete Barrier End Treatments - 25' TRACC System
Assume 6 needed @ 35,000 each = $210,000

Decomposed Granite Shoulder - 3" Thick section @ $5/SF 2' wide
All weather surface for Class IV Bicycle Shoulder - one side only
10,900' x 2' x $5/SF = $109,000

Total Cost = $545,000 + $10,900 + $10,900 + $20,000 + $5,000 + $109,000 + $210,000 =
= $910,800

Contingency = 25% = 227,700
Cycle Track Concrete Barrier True Cost = $1,140,000

A

SHEET NO. _____ OF _____

PROJECT NO. _____

DATE 11/7/16

BY GWA

CHK'D _____

SUBJECT V.A. 5.2A Recommended Cycle Tract

True Cost

Flexible Delineators @ 10' Seperation Class 1 Delineator

10,900 ft of Project / 10' = 1090 posts.

Assume $45 each = 49,050

Striping - Centerline - Assume $1/LF ∴ $10,900

Paint Pavement Marking (2) 27B Stripe = 2(10,900 Lf) = 21,800 Lf x $1/LF = 21,800
+ Cross hatch Stripe @ 6' OC

10,900 / 6' ≈ 1816 Stripes

$\cos 45° = \frac{3}{z}$

$z = \frac{3}{\cos 45°} = 4.24'$

Clevron Stripe 1816 x 4.24' = 7699 Lf x $2/LF ≈ $15,400

Paint Pavement Marking - Bicycle Symbols / Special Green Paint @ Intersections & driveways.

Assume $20,000

Traffic Signs - Assume $5,000

2' Decomposed Granite Shoulder - $109,600 - See Concrete Barrier A11 for Calculation

Total Cost = $49,050 + $10,900 + $21,800, $15,400, $20,000 + $5000 $109,60
= $231,150

Contingency 25% = $57,787

V.A 5.2A True Cost ≈ 290,000

A

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 6.0

Modify frontage road and reduce length

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: Davis Road is a high speed Rural Arterial, with a substantial volume of vehicles that travel along the corridor daily. One of the goals of the project is to improve safety and mobility through the corridor. Minimizing the access points along the corridor is one solution to accomplish this goal. Adding a driveway on Davis Road between the north side of the bridge and Foster Road creates challenges. Although the amount of vehicles that will be utilizing this driveway is minimal, it still will create the potential need for a northbound left-turn pocket on Davis Road, in order to avoid rear end accidents, which will add to the cost of the project. The proposed driveway location is also too close to the bridge which will make conforming grade issues and sight distance exiting the driveway challenge as well. For these reasons, this alternative was rejected.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: N/A

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 7.0

Reduce Type "D" dikes

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Accepted
Validated Initial Cost Savings:	$400,000
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+1%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: The VA study recommends removing dikes from the project with the exception of around the intersections. However, it was assumed that ditches were constructed throughout the entire project corridor along Davis Road. The length of AC dike will be reduced where feasible, however, some AC dike will be required along Davis Road where roadside ditches are not provided. Hitchcock Road will be designed such that it will now be sloped to one side, towards the existing ditch, and allow drainage to sheet flow into the existing ditch along Hitchcock.

Validated Performance: The original estimate of 14,710 LF of Type D dike at $30/LF totaled $441,300. After validating this alternative the quantity of AC dike can be reduced to 4950 LF of Type E dike, totaling $148,500. That is a total savings of $292,800 for this alternative.

Implementable Portions: Will minimize the use of AC dike where feasible throughout the corridor.

Project Development Delivery Impacts: None.

Other Comments: This alternative will be implemented in areas with roadside ditches, otherwise AC dike will remain to channelize roadside drainage to specific points and not drain onto the adjacent farm fields.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Accepted
Validated Initial Cost Savings:	($120,000)
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+3%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: 6' field fence will be installed along all the properties adjoining Davis Road at the property line. Fences installed at intersections or at driveways will be installed such that sight visibility is not an issue.

Validated Performance: N/A

Implementable Portions: Both sides of the roadway from Blanco Road to Reservation Road.

Project Development Delivery Impacts: None.

Other Comments: This alternative will be implemented as documented in the report.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Responses prepared by: Mark A. Imbriani ***Date:*** January 18, 2017

Disposition:	Accepted
Validated Initial Cost Savings:	($490,000) to ($690,000)
Validated LCC Savings:	$0
Project Development Support Cost Savings:	---
Validated Schedule Savings:	No change
Validated Change in Performance:	+2%

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **N/A**

Technical Feasibility: After evaluating the VA Alternative concept, we agree with the recommendation and have come up with two alternatives to be considered by the County for implementation. Alternative 1 (Interim) constructs the multi-modal bus turn lane matching the existing lanes on Blanco Road. Alternative 2 (Ultimate) constructs the multi-modal bus turn lane to include the full build out of the intersection at Davis Road and Blanco Road. Both alternatives include a 200' approach taper along Davis Road, a 500' long "bus lane only" queue jump, which uses a 118' radius curve. The 118' radius corresponds to a 20 mph design speed along the curve. After the curve, a 200' long pocket along Blanco Road is proposed, separated by the existing 7' wide bicycle lane. The bus lane drop takes place over 506', adhering to the standard equation for lane drops for vehicle speeds less than 45mph, $wv^2/60$, where w is the edge of pavement horizontal transition distance and v is the design speed along Blanco Road, assumed to be 40 mph. It is important to note that the VA analysis did not take this required lane drop distance into consideration, thus underestimating the implementation cost.

Validated Performance: Will improve traffic operations for Multi-Modal users.

Implementable Portions: County will need to direct Consultant on which alternative to pursue.

Project Development Delivery Impacts: The project footprint will increase with this alternative and will impact the existing APE map. Therefore, some impacts to project schedule as a result of amending the environmental document to study the additional area, as well as designing, securing right-of-way, and constructing the improvements.

Other Comments: See attached commentary for additional information.

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

COMMENTARY – VA ALTERNATIVE 9.0 – provided by TRC post-VA Study

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Introduction: Davis Road is part of a planned multi-modal corridor from Salinas to Monterey. As such, it is desirable to add certain multi-modal features to this project, including accommodation for Bus Rapid Transit. One desirable feature is a bus queue jump lane(s). This can be accommodated at the intersection of Davis Road and Blanco Road. The VA Study identifies this alternative and states that "...Further study is required to determine the most efficient configuration of the bus lane..." Determining that configuration is the purpose of this commentary.

The Alternative: Value Analysis (VA) Alternative 9.0 proposes a 12' wide bus-only free right-turn lane from northbound Davis Road to Eastbound Blanco Road to improve bus turning movements and reduce bus travel times.

Engineering Analysis: After evaluating the VA Alternative concept, we agree with the recommendation and have come up with two alternatives to be considered by the County for implementation. The lanes at the intersection would remain as proposed per the approved traffic report. Both alternatives include a 200' approach taper along Davis Road, and a 500' long "bus lane only" queue jump, which uses a 118' radius curve. The 118' radius corresponds to a 20 mph design speed along the curve. After the curve, a 200' long pocket along Blanco Road is proposed, separated by the existing 7' wide bicycle lane. The bus lane drop takes place over 506', adhering to the standard equation for lane drops for vehicle speeds less than 45mph, $wv^2/60$, where w is the edge of pavement horizontal transition distance and v is the design speed along Blanco Road, assumed to be 40 mph. It is important to note that the VA analysis did not take this required lane drop distance into consideration, thus underestimating the cost.

Unfortunately, the eastbound leg of the Blanco Road and Davis Road intersection has not been built out to the ultimate configuration. If we were to construct this "bus lane only" queue jump with our current project and were not planning on re-constructing the lanes on Blanco Road, then there are two alternatives that the County needs to consider for implementation of this improvement with the Davis Road Project. In the ultimate intersection configuration, two through lanes are proposed in both directions with westbound dual left turn lanes. The existing intersection would need to be widened to accommodate the ultimate lane configuration.

These alternatives are described as follows:

<u>Alternative 1 – Interim: Conforming to the Existing Improvements on Blanco Road</u>

For the interim condition, we propose to hold the existing eastbound bike lane along Blanco Road, east of Davis Road, and widen 12' directly to the south. See the attached Davis Blanco Bus Lane Interim Intersection Configuration Exhibit. This alternative utilizes the existing lane configuration along Blanco Road at the intersection and adds the least amount of additional improvements in order to transition the bus turn lane back to the existing Blanco Road lane configuration.

COMMENTARY – VA ALTERNATIVE 9.0 – provided by TRC post-VA Study

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Alternative 2 – Conforming to the ultimate intersection configuration on Blanco Road

For the ultimate condition, we take into consideration the proposed lane configurations for the intersection in the future, per the project traffic report (Peters Engineering Group's Traffic Report dated 5/13/2014). That geometry includes two left-turn lanes along westbound Blanco Road compared to the current lane configuration of one left-turn lane. The reason this is important is because the additional lane corresponds to the intersection year 2040 traffic operating at a level of service (LOS) E during the a.m. peak hour and LOS D during the p.m. peak hour, compared to the current LOS of F during the a.m. and LOS E during the p.m.

The ultimate condition exhibit will include the "bus lane only" queue jump lane located in order to accommodate the future widening to add the dual left turn lanes at this intersection. See the attached Davis Blanco Bus Lane Ultimate Intersection Configuration Exhibit. The ultimate transition length is nearly identical to the interim condition length along Blanco Road, although the pavement and right of way is pushed out to the south, by the westbound dual left hand turn pocket. This alternative can be implemented without striping the additional left hand turn pocket until future traffic demands warrant the additional lane, if desired.

Cost Estimates:

- Alternative 1 results in an additional project cost of $490,000 over the baseline estimate, which includes the additional pavement, striping, and right of way acquisition. See the attached Bus Lane 7-Page Estimate (Interim Additional Cost).

- Alternative 2 results in an additional project cost of $690,000 over the baseline estimate, including the additional pavement, striping, and right of way acquisition. See the attached Bus Lane 7-Page Estimate (Ultimate Additional Cost).

The cost for either alternative is much greater than the $170,000 estimated by the VA Study Team.

Value Change: The additional cost and R/W acquisition would reduce the value somewhat, but that is beyond the scope of this commentary as we believe the County wishes to pursue this alternative in any event, and it would more economical to include it as part of the construction of this project rather than as a separate project.

Further Considerations: It is important to note that either alternative will exceed the current APE limits established for the environmental document and as such the environmental document will need to be amended to include the additional impacts.

SHEET NUMBER	TOTAL SHEETS
–	–

LEGEND

APE LIMITS

BUS LANE ONLY – BUS QUEUE JUMP AND FREE RIGHT TURN LANE

NOTES:

BUS LANE WOULD NEED TO BE RECONSTRUCTED WITH THE FUTURE DEVELOPMENT OF BLANCO ROAD AND DAVIS ROAD INTERSECTION.

INTERIM INTERSECTION CONFIGURATION - WITHOUT WESTBOUND DUAL LEFT TURN LANES ON BLANCO ROAD (MAINTAIN EXISTING BLANCO ROAD CONFIGURATION)

Submitted by: – Design Engineer C.E. No.

DESIGN BY: ASB CHKD BY: JLC

DRAWN BY: ASB CHKD BY: JLC

SPECIFICATIONS WRITTEN BY: – CHKD BY: –

Approval Recommended by: Deputy Public Works Director, Engineering

TRC
10680 White Rock Rd., Suite 100
Rancho Cordova, California 95670

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

NO.	DATE	REVISION DESCRIPTION	APPROVED
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△			
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△			
△			

MONTEREY COUNTY PUBLIC WORKS
ENGINEERING DIVISION
BRIDGE DESIGN
168 WEST ALISAL STREET
SALINAS, CALIFORNIA 93901
(831) 755-4800/FAX (831) 755-4958

DAVIS ROAD WIDENING AND BRIDGE REPLACEMENT

DAVIS/BLANCO INTERSECTION - INTERIM

STATE NO. 44C0185 RLS– 5944(068) COUNTY NO. 208

DATE	FILE	VIEW	SHEET
11/07/16	H:154189	–	1
SCALE 1"=50'	CONTRACT NO. –		OF 2 SHEETS

Drawing name: H:\154189 – Davis Road\DWG\154188_Z_00.dwg Layout Tab: BLANCO BUS TURN Nov 07,2016 – 2:38pm abedol

SHEET NUMBER	TOTAL SHEETS
–	–

LEGEND

EXISTING APE LIMITS

BUS LANE ONLY – BUS QUEUE JUMP AND FREE RIGHT TURN LANE

NOTES:

1. ULTIMATE INTERSECTION CONFIGURATION DETERMINED FROM TRAFFIC REPORT DATED MAY 13, 2014.
2. ELIMINATES THE NEED TO RECONSTRUCT THE BUS LANE AT THE INTERSECTION WHEN FUTURE IMPROVEMENTS OF BLANCO ROAD AND INTERSECTION ARE DEVELOPED.

ULTIMATE INTERSECTION CONFIGURATION - WITH WESTBOUND DUAL LEFT TURN LANES ON BLANCO ROAD

Submitted by: –
Design Engineer C.E. No.

DESIGN BY: ASB | CHKD BY: JLC

DRAWN BY: ASB | CHKD BY: JLC

SPECIFICATIONS WRITTEN BY: – | CHKD BY: –

Approval Recommended by:
Deputy Public Works Director, Engineering

TRC
10680 White Rock Rd., Suite 100
Rancho Cordova, California 95670

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

REGISTERED PROFESSIONAL ENGINEER
No. _____
Exp. _____
CIVIL
STATE OF CALIFORNIA

NO.	DATE	REVISION DESCRIPTION	APPROVED
1			
2			
3			
4			
5			
6			

MONTEREY COUNTY PUBLIC WORKS
ENGINEERING DIVISION
BRIDGE DESIGN
168 WEST ALISAL STREET
SALINAS, CALIFORNIA 93901
(831) 755-4800/FAX (831) 755-4958

DAVIS ROAD WIDENING AND BRIDGE REPLACEMENT

DAVIS/BLANCO INTERSECTION - ULTIMATE

STATE NO. 44C0185 RLS– 5944(068) COUNTY NO. 208

DATE	FILE	VIEW	SHEET
11/07/16	H:154189	–	2
SCALE 1"=50'	CONTRACT NO. –		OF 2 SHEETS

Drawing name: H:\154189 – Davis Road\DWG\154189_2_ULT (bus turnout ultimate).dwg Layout Tab: Blanco Bus Turn Nov 07,2016 – 3:31pm vbeidl

PRELIMINARY PROJECT COST ESTIMATE SUMMARY
ALTERNATIVE 1

Type of Estimate (Pre-PR, PSR, PR, etc.): PR

Project Description:

Limits: Interim Blanco Intesercection

Improvement: (Scope) Additional improvement to Blanco Road and Davis Road Intersection to accommodate a free right turn bus lane per the Value Analysis Alternative 9.

Alternative 1B: **From Reservation Road to Blanco Road**

ROADWAY ITEMS	$346,000
STRUCTURE ITEMS	$0
SUBTOTAL CONSTRUCTION	**$346,000**
RIGHT OF WAY	$121,000
UTILITY RELOCATION	$0
TOTAL ALTERNATIVE COST	**$467,000**
TOTAL ESCALATED COST AT 2% ANNUAL INFLATION RATE	**$490,000**

Reviewed by Program Manager

(Signature) (Date)

Approved by Project Manager

(Signature) (Phone) (Date)

Sheet: 1 of 7

Attachment B

Today's Date = 1/10/2017

Date of Anticipated Mid-Point of Construction= 2/1/2019

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

I. ROADWAY ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 1 - Earthwork					
Roadway Excavation	2300	CY	$30	$69,000	
Imported Borrow		CY	$20	$0	
Clearing & Grubbing		LS	$200,000	$0	
Develop Water Supply		LS	$7,000	$0	
V-Ditch		CY	$30	$0	
Retention Basins		CY	$30	$0	
Stepped Slopes and Slope		-	-	-	
Rounding (Contour Grading)	-	-	-	-	
				Total Earthwork	$69,000
Section 2 - Structural Section *					
PCC Pavement	-	-	-	-	
RAC-G		-	-	-	
HMA Overlay**					
HMA	1193	TON	$105	$125,265	
Lean Concrete Base		-	-	-	
Cement-Treated Base		-	-	-	
Class 2 Aggregate Base	1705	CY	$30	$51,150	
Treated Permeable Base		-	-	-	
Aggregate Sub-Base		-	-	-	
Pavement Reinforcing Fabric		-	-	-	
Relocated SIWTF Access	-	-	-	-	
				Total Structural Section	$176,415
Section 3 - Drainage					
Drainage Improvements		LS	$250,000	$0	
18" Reinforced Concrete Pipe	0	LF	$95	$0	
Box Culvert Extension	0	LF	$1,500	$0	
Remove Inlet/Manhole	0	EA	$1,000	$0	
Drop Inlet	0	EA	$3,900	$0	
Manhole	0	EA	$4,500	$0	
				Total Drainage	$0

***** Structural Section based on 6" HMA over 18" aggregate base

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

Sheet: 2 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Cost	Section Cost	
Section 4 - Specialty Items					
Construction Staking		LS	$50,000	$0	
Retaining Walls (19'-21' tall)		SF	$92	$0	
Relocate RR at grade crossing		-	-	-	
MGBR Terminal System End Treatment		EA	$3,000	$0	
Barriers and Guardrails		LS	$25,000	$0	
Prepare SWPPP		LS	$10,000	$0	
Water Pollution Control/Treatment BMP's		LS	$100,000	$0	
Hazardous Waste Work		LS	$50,000	$0	
Remove Concrete Curb		LF		$0	
Minor Concrete (Curb & Gutter)		LF	$22	$0	
Minor Concrete (Median Curb)		LF	$13	$0	
Minor Concrete (Sidewalk)		SF	$7	$0	
Minor Concrete (Curb Ramp)	1,370	SF	$13	$17,810	
Detectable Warning Surfaces		EA	$400	$0	
Type "D" Dike		LF	$18	$0	
				Total Specialty Items	$17,810
Section 5 - Traffic Items					
Lighting and Sign Illumination**		LF	$45	$0	
Traffic Delineation Items		LS	$10,000	$0	
Traffic Signals (New)		EA	$250,000	$0	
Traffic Signals (Modification)		LS	$150,000	$0	
Overhead Sign Structures		LS	$50,000	$0	
Roadside Signs		LS	$50,000	$0	
Traffic Control Systems		LS	$125,000	$0	
Transportation Management Plan		LS	$15,000	$0	
Traffic Handling		LS	$150,000	$0	
				Total Traffic Items	$0

**Along the Bridge only

SUBTOTAL SECTIONS 1 - 5: $263,225

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. ROADSIDE ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 6 - Planting and Irrigation					
Highway Planting		LS	$500,000	$0	
Replacement Planting				-	
Median Landscape		SF	$7	$0	
Landscape Strip in Sidewalk		SF	$5	$0	
Irrigation Modification				-	
Relocate Existing Irrigation Facilities		LS	$50,000	$0	
Irrigation Crossovers		LS	$50,000	$0	
			Subtotal Planting and Irrigation		$0
Section 7- Roadside Management and Safety Section					
Vegetation Control Treatments				-	
Gore Area Pavement				-	
Pavement beyond Gore Area				-	
Miscellaneous Paving				-	
Permanent Erosion Control		LS	$100,000	$0	
Roadside Facilities				-	
			Subtotal Roadside Management and Safety Section		$0
			TOTAL SECTIONS 6 & 7:		$0

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 8 - Minor Items			(5-10%)		
Subtotal Sections 1 - 7		$263,225	X 5%	$13,161	
				TOTAL MINOR ITEMS:	$13,170
Section 9 - Roadway Mobilization					
Subtotal Sections 1 - 7		$263,225			
Minor Items		$13,170	(5-10%)		
	Sum	$276,395	X 5%	$13,820	
				TOTAL ROADWAY MOBILIZATION	$13,820
Section 10 - Roadway Additions					
Supplemental					
Subtotal Sections 1 - 7		$263,225			
Minor Items		$13,170	(5-10%)		
	Sum	$276,395	X 5%	$13,820	
Contingencies					
Subtotal Sections 1 - 7		$263,225			
Minor Items		$13,170			
	Sum	$276,395	X 15% *	$41,459	
				TOTAL ROADWAY ADDITIONS	$55,280
				TOTAL ROADWAY ITEMS	$345,495
			(Total of Sections 1 - 10)		

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017
(Print Name) (Phone) (Date)

* Use 25% at the PSR stage or a higher or lower rate if justified.

Sheet: 5 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3	#4	#5	
Bridge Name						
Bridge No.						
Structure Type						
Width (Ft) - out to out						
Span Lengths (Ft)						
Total Area (SF)						
Footing Type (pile/spread)						
Cost per SF.						
Including:						
Mobilization: 10%						
Contingency: 20%						
Bridge Removal (Portion)						
Approach Slabs						
Total Cost For Structure						
				SUBTOTAL STRUCTURES ITEMS		$0
Railroad Related Costs						
				TOTAL STRUCTURES ITEMS:		$0

COMMENTS:

Estimate Prepared By: _____ (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

Sheet: 6 of 7

III. RIGHT OF WAY

Right-of-Way estimates should consider the probable highest and best use and type and intent of improvements at the time of acquisition. Assume acquisition including utility relocation occurs at the right of way certification milestone as shown in the Funding and Scheduling Section of the report. For further guidance see Chapter 1, Caltrans Right of Way Procedural Handbook.

** Right of Way Cost Assumptions as follows: $4/SF for Private R/W	Current Value (Future Use)	Escalation Rate (%/yr)	Escalated Value *
A. Total Acquisition Cost	$8,000	2.00%	
(Assume $8,000/parcel + $20,000 addtl for every 10 parcels for Acquisition Agent)			
B. Mitigation Acquisition & credits		0.00%	
C. Project Development Permit Fees		0.00%	
Subtotal (A-C)	$8,000		
D. Utility Relocation	$0	0.00%	
E. RAP	$0	0.00%	
F. Clearance/Demolition	$0	0.00%	
G. Title and Escrow Fees ($750 x 1 parcels)	$750	2.00%	
H. Total Estimated Right of Way Cost ($4/SF)	$96,040	2.00%	
I. Total Estimated Construction Easement ($1.50/SF)	$15,777	2.00%	
J. Right of Way Support Costs	$0	2.00%	
K. Construction Contract Work	$0	2.00%	

TOTAL RIGHT OF WAY ** $120,567 (CURRENT VALUE)

TOTAL ESCALATED RIGHT OF WAY

Major Utility Relocation - High Transmission Poles $20,000 0 poles

* - Anticipated date of Right of Way Certification December 2019

Estimate prepared by: Aaron Bedal (Print Name) (916) 366-0632 (Phone) 1/10/2017 (Date)

Sheet 7 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY
ALTERNATIVE 2

Type of Estimate (Pre-PR, PSR, PR, etc.): PR

Project Description:

Limits: Ultimate Blanco Intersection

Improvement: (Scope) Additional improvement to Blanco Road and Davis Road Intersection to accommodate a free right turn bus lane per the Value Analysis Alternative 9

Alternative 1B: **From Reservation Road to Blanco Road**

ROADWAY ITEMS	$498,000
STRUCTURE ITEMS	$0
SUBTOTAL CONSTRUCTION	**$498,000**
RIGHT OF WAY	$156,000
UTILITY RELOCATION	$0
TOTAL ALTERNATIVE COST	**$654,000**
TOTAL ESCALATED COST AT 2% ANNUAL INFLATION RATE	**$690,000**

Reviewed by Program Manager

(Signature) (Date)

Approved by Project Manager

(Signature) (Phone) (Date)

Sheet: 1 of 7

Attachment B

Today's Date = 1/10/2017

Date of Anticipated Mid-Point of Construction= 2/1/2019

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

I. ROADWAY ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 1 - Earthwork					
Roadway Excavation	2900	CY	$30	$87,000	
Imported Borrow		CY	$20	$0	
Clearing & Grubbing		LS	$200,000	$0	
Develop Water Supply		LS	$7,000	$0	
V-Ditch		CY	$30	$0	
Retention Basins		CY	$30	$0	
Stepped Slopes and Slope		-	-	-	
Rounding (Contour Grading)	-	-	-	-	
			Total Earthwork		$87,000
Section 2 - Structural Section *					
PCC Pavement	-	-	-	-	
RAC-G		-	-	-	
HMA Overlay**					
HMA	1520	TON	$105	$159,600	
Lean Concrete Base		-	-	-	
Cement-Treated Base		-	-	-	
Class 2 Aggregate Base	2170	CY	$30	$65,100	
Treated Permeable Base		-	-	-	
Aggregate Sub-Base		-	-	-	
Pavement Reinforcing Fabric		-	-	-	
Relocated SIWTF Access	-	-	-	-	
			Total Structural Section		$224,700
Section 3 - Drainage					
Drainage Improvements		LS	$250,000	$0	
18" Reinforced Concrete Pipe	0	LF	$95	$0	
Box Culvert Extension	0	LF	$1,500	$0	
Remove Inlet/Manhole	0	EA	$1,000	$0	
Drop Inlet	0	EA	$3,900	$0	
Manhole	0	EA	$4,500	$0	
			Total Drainage		$0

***** Structural Section based on 6" HMA over 18" aggregate base

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Cost	Section Cost	
Section 4 - Specialty Items					
Construction Staking		LS	$50,000	$0	
Retaining Walls (19'-21' tall)		SF	$92	$0	
Relocate RR at grade crossing		-	-	-	
MGBR Terminal System End Treatment		EA	$3,000	$0	
Barriers and Guardrails		LS	$25,000	$0	
Prepare SWPPP		LS	$10,000	$0	
Water Pollution Control/Treatment BMP's		LS	$100,000	$0	
Hazardous Waste Work		LS	$50,000	$0	
Remove Concrete Curb	520	LF	$20	$10,400	
Minor Concrete (Curb & Gutter)		LF	$22	$0	
Minor Concrete (Median Curb)	675	LF	$13	$8,775	
Minor Concrete (Sidewalk)		SF	$7	$0	
Minor Concrete (Curb Ramp)	1,370	SF	$13	$17,810	
Detectable Warning Surfaces		EA	$400	$0	
Type "D" Dike		LF	$18	$0	
				Total Specialty Items	$36,985
Section 5 - Traffic Items					
Lighting and Sign Illumination**		LF	$45	$0	
Traffic Delineation Items		LS	$10,000	$0	
Traffic Signals (New)		EA	$250,000	$0	
Traffic Signals (Modification)		LS	$150,000	$0	
Overhead Sign Structures		LS	$50,000	$0	
Roadside Signs		LS	$50,000	$0	
Traffic Control Systems		LS	$125,000	$0	
Transportation Management Plan		LS	$15,000	$0	
Traffic Handling		LS	$150,000	$0	
				Total Traffic Items	$0

**Along the Bridge only

SUBTOTAL SECTIONS 1 - 5: $348,685

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. ROADSIDE ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 6 - Planting and Irrigation					
Highway Planting		LS	$500,000	$0	
Replacement Planting				-	
Median Landscape	4,330	SF	$7	$30,310	
Landscape Strip in Sidewalk		SF	$5	$0	
Irrigation Modification				-	
Relocate Existing Irrigation Facilities		LS	$50,000	$0	
Irrigation Crossovers		LS	$50,000	$0	
				Subtotal Planting and Irrigation	$30,310
Section 7- Roadside Management and Safety Section					
Vegetation Control Treatments				-	
Gore Area Pavement				-	
Pavement beyond Gore Area				-	
Miscellaneous Paving				-	
Permanent Erosion Control		LS	$100,000	$0	
Roadside Facilities				-	
			Subtotal Roadside Management and Safety Section		$0
				TOTAL SECTIONS 6 & 7:	$30,310

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

Sheet: 4 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 8 - Minor Items			(5-10%)		
Subtotal Sections 1 - 7		$378,995	X 5%	$18,950	
				TOTAL MINOR ITEMS:	$18,950
Section 9 - Roadway Mobilization					
Subtotal Sections 1 - 7		$378,995			
Minor Items		$18,950	(5-10%)		
	Sum	$397,945	X 5%	$19,897	
				TOTAL ROADWAY MOBILIZATION	$19,900
Section 10 - Roadway Additions					
Supplemental					
Subtotal Sections 1 - 7		$378,995			
Minor Items		$18,950	(5-10%)		
	Sum	$397,945	X 5%	$19,897	
Contingencies					
Subtotal Sections 1 - 7		$378,995			
Minor Items		$18,950			
	Sum	$397,945	X 15% *	$59,692	
				TOTAL ROADWAY ADDITIONS	$79,590
				TOTAL ROADWAY ITEMS	$497,435
			(Total of Sections 1 - 10)		

Estimate Prepared By: Aaron Bedal (916) 366-0632 1/10/2017
(Print Name) (Phone) (Date)

* Use 25% at the PSR stage or a higher or lower rate if justified.

Sheet: 5 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3	#4	#5	
Bridge Name						
Bridge No.						
Structure Type						
Width (Ft) - out to out						
Span Lengths (Ft)						
Total Area (SF)						
Footing Type (pile/spread)						
Cost per SF.						
Including:						
Mobilization: 10%						
Contingency: 20%						
Bridge Removal (Portion)						
Approach Slabs						
Total Cost For Structure						
				SUBTOTAL STRUCTURES ITEMS		$0
Railroad Related Costs						
				TOTAL STRUCTURES ITEMS:		$0

COMMENTS:

Estimate Prepared By: _____ (916) 366-0632 1/10/2017

(Print Name) (Phone) (Date)

Sheet: 6 of 7

III. RIGHT OF WAY

Right-of-Way estimates should consider the probable highest and best use and type and intent of improvements at the time of acquisition. Assume acquisition including utility relocation occurs at the right of way certification milestone as shown in the Funding and Scheduling Section of the report. For further guidance see Chapter 1, Caltrans Right of Way Procedural Handbook.

** Right of Way Cost Assumptions as follows: $4/SF for Private R/W	Current Value (Future Use)	Escalation Rate (%/yr)	Escalated Value *
A. Total Acquisition Cost	$8,000	2.00%	
(Assume $8,000/parcel + $20,000 addtl for every 10 parcels for Acquisition Agent)			
B. Mitigation Acquisition & credits		0.00%	
C. Project Development Permit Fees		0.00%	
Subtotal (A-C)	$8,000		
D. Utility Relocation	$0	0.00%	
E. RAP	$0	0.00%	
F. Clearance/Demolition	$0	0.00%	
G. Title and Escrow Fees ($750 x 1 parcels)	$750	2.00%	
H. Total Estimated Right of Way Cost ($4/SF)	$130,976	2.00%	
I. Total Estimated Construction Easement ($1.50/SF)	$15,777	2.00%	
J. Right of Way Support Costs	$0	2.00%	
K. Construction Contract Work	$0	2.00%	

TOTAL RIGHT OF WAY ** $155,503 (CURRENT VALUE)

TOTAL ESCALATED RIGHT OF WAY

Major Utility Relocation - High Transmission Poles $20,000 0 poles

* - Anticipated date of Right of Way Certification December 2019

Estimate prepared by: Aaron Bedal (916) 366-0632 1/10/2017
(Print Name) (Phone) (Date)

Sheet 7 of 7

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: Realigning the intersection at Reservation Road and Davis Road to make Davis Road the main movement does present some traffic operation challenges. Because the Bluffs driveway located on the south side of the existing intersection would be located relatively close to the re-aligned intersection, movements in and out of this driveway will result in the need to install two traffic signals too close together or eliminating left turns in or out of this driveway, which would result in a substantial impact to the residences that use that driveway. Also, related to traffic, there are high volumes travelling westbound on Reservation Road that would eliminate the benefit of the re-aligned intersection.

Regardless of the impacts mentioned above, the County, through political choice, would rather construct a roundabout at this intersection.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: N/A

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION ACTION — VA ALTERNATIVE 10.2

Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

Responses prepared by: Mark A. Imbriani ***Date:*** December 10, 2016

Disposition:	Rejected
Validated Initial Cost Savings:	N/A
Validated LCC Savings:	N/A
Project Development Support Cost Savings:	N/A
Validated Schedule Savings:	N/A
Validated Change in Performance:	N/A

If Alternative is Rejected: *Was rejection due to VA study taking place too late in the project development process to implement the change?* **No**

Technical Feasibility: This alternative would have a substantial impact on the agricultural property located on the northwest corner of the Reservation Road and Davis Road intersection. There are plans for future development on this corner that would also be impacted. It was also determined that traffic operations would not be improved enough to justify this alternative because of the high volumes travelling both westbound and eastbound on Reservation Road to northbound on Davis Road.

Regardless of the impacts mentioned above, the County, through political choice, would rather construct a roundabout at this intersection.

Validated Performance: N/A

Implementable Portions: N/A

Project Development Delivery Impacts: N/A

Other Comments: N/A

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 and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE 1.0

Utilize temporary steel casings in lieu of permanent steel casings

Initial Cost Savings:	$2,030,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	No change
Value Change:	+3 %

Description of Baseline Concept: The baseline concept uses 72" cast-in-steel-shell (CISS) foundation piles. The "steel shell" would be permanent.

Description of Alternative Concept: The alternative concept would utilize 72" cast-in-drilled-hole (CIDH) foundation piles. The steel casing under this method is temporary, so the permanent steel shells used in the baseline concept would not be required.

Advantages:

- Reduces cost
- Eliminates impact/vibratory pile driving

Disadvantages:

- Eliminates structural advantage of permanent steel casing

Discussion: Cast-in-drilled-hole piling without permanent casings are common. Where permanent casings are not required by design, but ground conditions require casing during construction, a temporary casing system is used. This temporary casing is commonly installed in sections using oscillator/rotator methods as shaft excavation is advanced. When excavation is complete, the reinforcing steel cage is installed. As shaft concrete is placed, the temporary casing is extracted and removed in sections using the oscillator/rotator methods. The concrete level in the shaft is maintained above the bottom of the casing during concrete placement. The completed shaft does not have an exterior steel casing.

Technical Review Comments: Confirm 72" diameter cast-in-drilled-hole pile (without permanent casing) is adequate for design loads. If 72" diameter is inadequate, a slight increase in diameter (e.g. up to 78") would likely be adequate and still result in a cost savings.

Project Management Considerations: Oscillator/rotator pile installation methods have less environmental impact during construction as compared to driven pile methods.

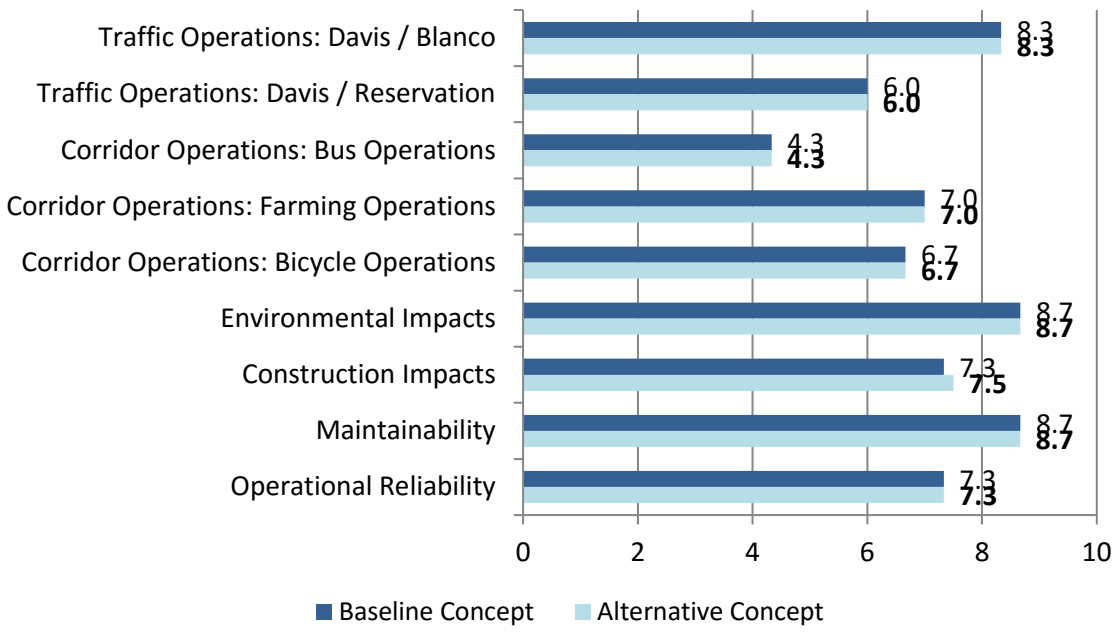
Discussion of Schedule Impacts: Schedule should remain the same.

Discussion of Risk Impacts: Risk should be reduced as oscillator/rotator methods are better for overcoming obstructions during pile driving.

VA ALTERNATIVE 1.0

Utilize temporary steel casings in lieu of permanent steel casings

Comparison of Performance



Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	No significant change.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	Improved. Due to oscillator/rotator method of pile construction not requiring impact or vibratory pile driving, vibration and noise impacts would be reduced during construction.
Corridor Operations: Farming Operations	No significant change.

Assumptions and Calculations:

On recent projects, Caltrans 72" CIDH pile weighted average unit price is $1219/lf. Large quantity project unit price is $1000/lf. For this analysis, $1200/lf was used and should be relatively conservative.

VA ALTERNATIVE 1.0

Utilize temporary steel casings in lieu of permanent steel casings

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ -
ROADWAY MARK-UP	*36%*			$ -			$ -
ROADWAY TOTAL				$ -			$ -
STRUCTURE ITEMS							
				$ -			$ -
Furnish CISS Pile (NPS 72)	lf	3,900	$ 1,200	$ 4,680,000			$ -
Drive CISS Pile (NPS 72)	ea	39	$ 40,000	$ 1,560,000			$ -
72" CIDH Pile	lf			$ -	3,900	$ 1,200	$ 4,680,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 6,240,000*			*$ 4,680,000*
STRUCTURE MARK-UP	*30%*			*$ 1,872,000*			*$ 1,404,000*
STRUCTURE TOTAL				*$ 8,112,000*			*$ 6,084,000*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$8,112,000			$6,084,000
TOTAL (Rounded)				$8,110,000			$6,080,000
						SAVINGS	**$2,030,000**

VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Initial Cost Savings:	$80,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	No change
Value Change:	No change

Description of Baseline Concept: The baseline concept includes parabolic flares at the tops of the bridge columns. The flares are 12 ft. high and transition from the 4 ft. diameter columns at the bottoms of the flares to 8 ft. wide at the bottom of the box girder pier diaphragms.

Description of Alternative Concept: The alternative concept eliminates column flares and maintains constant 4 ft. diameter bridge columns from the tops of the foundation piles up to the bottoms of the box girder pier diaphragms.

Advantages:

- Reduces construction cost, lighter structure

Disadvantages:

- Arguably less aesthetically pleasing; however, columns won't be seen by many

Discussion: Elimination of parabolic flares at the tops of the bridge columns will reduce construction cost and lighten the structure. The columns will not be visible by the public due to the low profile of the bridge and lack of access beneath it.

Technical Review Comments: Confirm no structural value considered for column flares.
Note that if column flares are not eliminated, Pier 2 columns appear too short (less than the minimum 12 ft. height) to incorporate the flares.

Project Management Considerations: None noted.

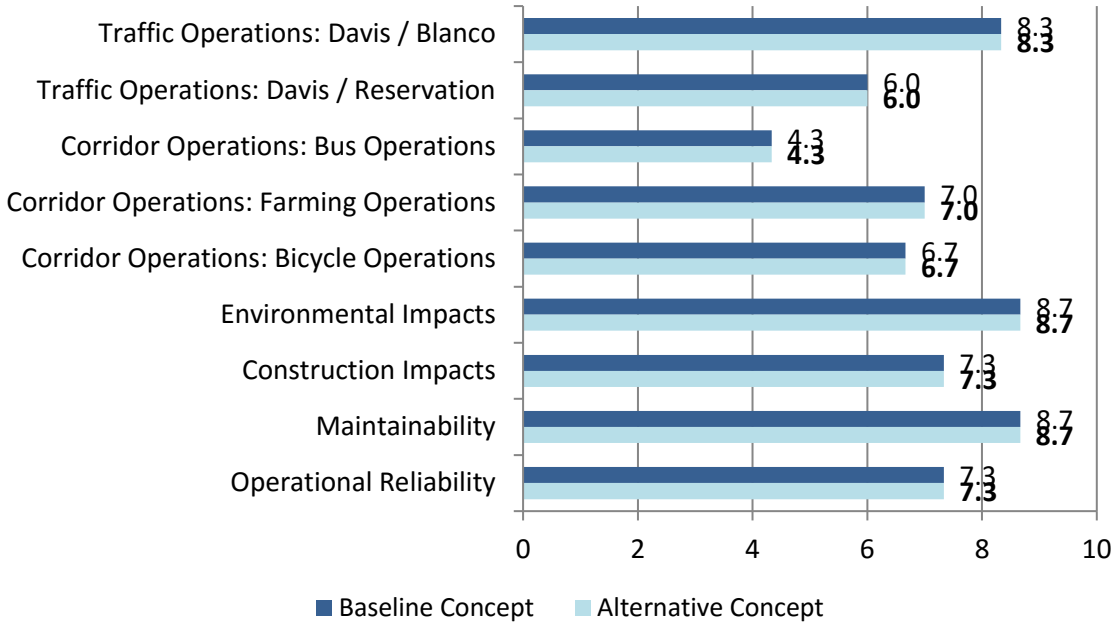
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Comparison of Performance



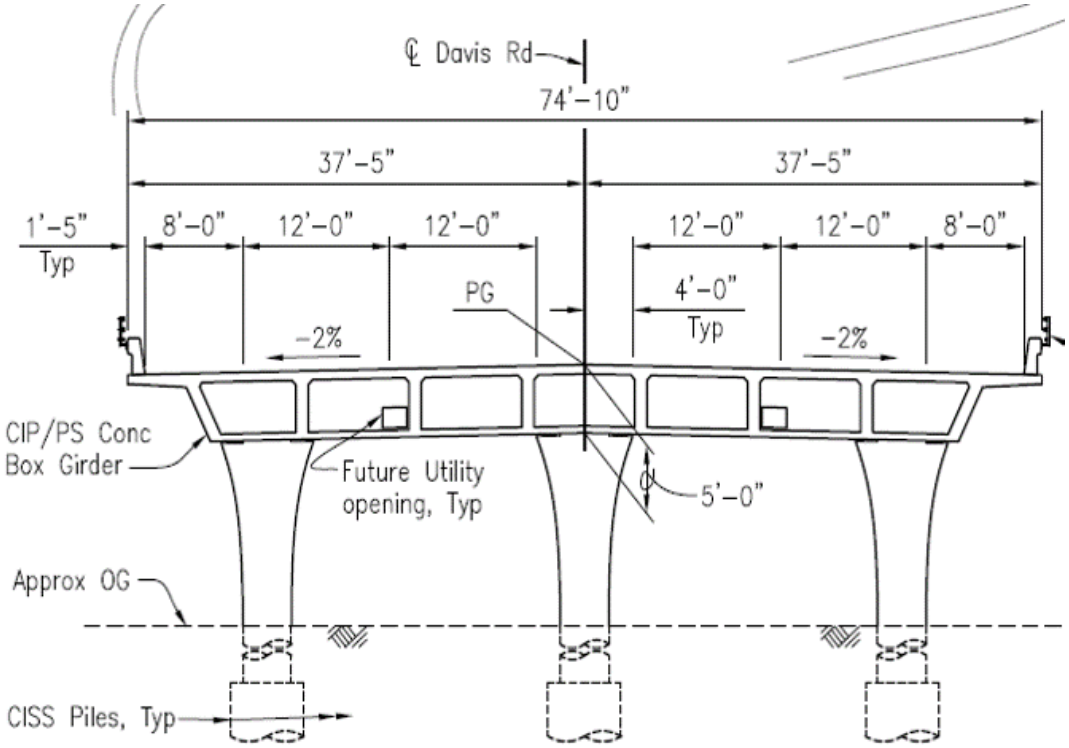
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	No significant change.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

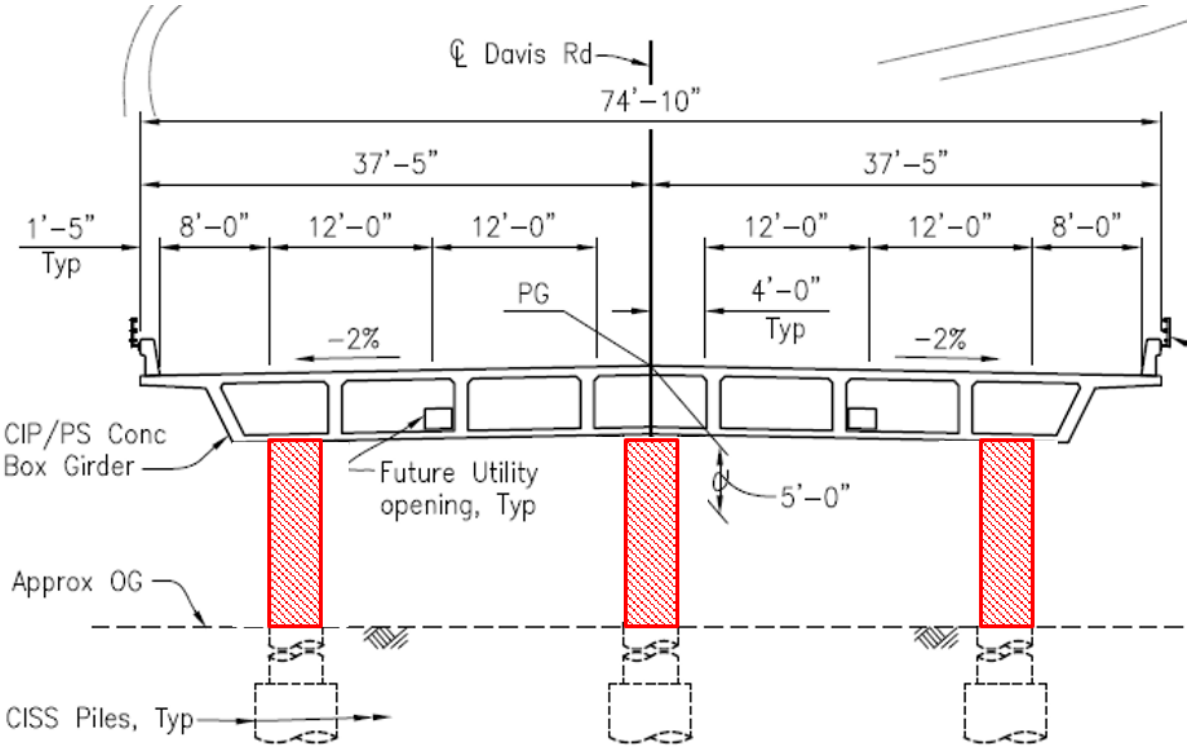
VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Baseline Concept Sketch



VA Alternative Concept Sketch



VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Assumptions and Calculations:

There are 13 bents (not including abutments) with 3 columns each. The flare portion of each column contains approximately 3 cy of concrete. For this analysis, assume reinforcing steel weight in flares is negligible. 39 columns x 3 cy of flare concrete per column = 117 cy of flare concrete. Elimination of flares results in 117 cy of bridge concrete savings. The current estimate includes a unit price for bridge concrete of $900/cy. This flare concrete has a lower marginal cost than the average (but forming costs are higher, as must furnish parabolic column forms). Assume savings at $500/cy. Savings = 117 cy @ $500/cy = $58,500 (without mark-up).

VA ALTERNATIVE 2.0

Eliminate column flares at bridge

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ -
ROADWAY MARK-UP	*36%*			$ -			$ -
ROADWAY TOTAL				$ -			$ -
STRUCTURE ITEMS							
Bridge Column Flare Concrete	cy	117	$ 500	$ 58,500	0	$ -	$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ *58,500*			$ -
STRUCTURE MARK-UP	*30%*			$ *17,550*			$ -
STRUCTURE TOTAL				$ *76,050*			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$76,050			$0
TOTAL (Rounded)				$80,000			$0
						SAVINGS	**$80,000**

VA ALTERNATIVE 3.1

Reconsider a precast girder bridge

Initial Cost Savings:	$4,130,000
LCC Savings:	$0
Change in Schedule:	-3 months
Performance Change:	No change
Value Change:	+7 %

Description of Baseline Concept: The baseline concept is a cast-in-place (CIP) post-tensioned box girder bridge.

Description of Alternative Concept: The alternative concept replaces the post-tensioned box girder bridge with a precast girder bridge.

Advantages:

- Reduces cost
- Reduces schedule

Disadvantages:

- Decreases available freeboard

Discussion: Precast girder bridges are becoming more popular in California, particularly on design-build projects. Based on the VA team's assessment, this type of bridge will be less expensive than a post-tensioned concrete box girder bridge for this application (low level, partially over water and/or environmentally sensitive areas). A precast girder bridge will also take less time to construct. The cost estimates provided indicate that the dead loads for the precast girder bridge may be higher than those for the CIP box girder. The VA Team's calculations indicate that this may not be the case.

Technical Review Comments: None noted.

Project Management Considerations: The precast girder bridge has been considered by the project team. Based on potential cost savings, it's recommended the alternative is revisited and the cost estimate re-evaluated.

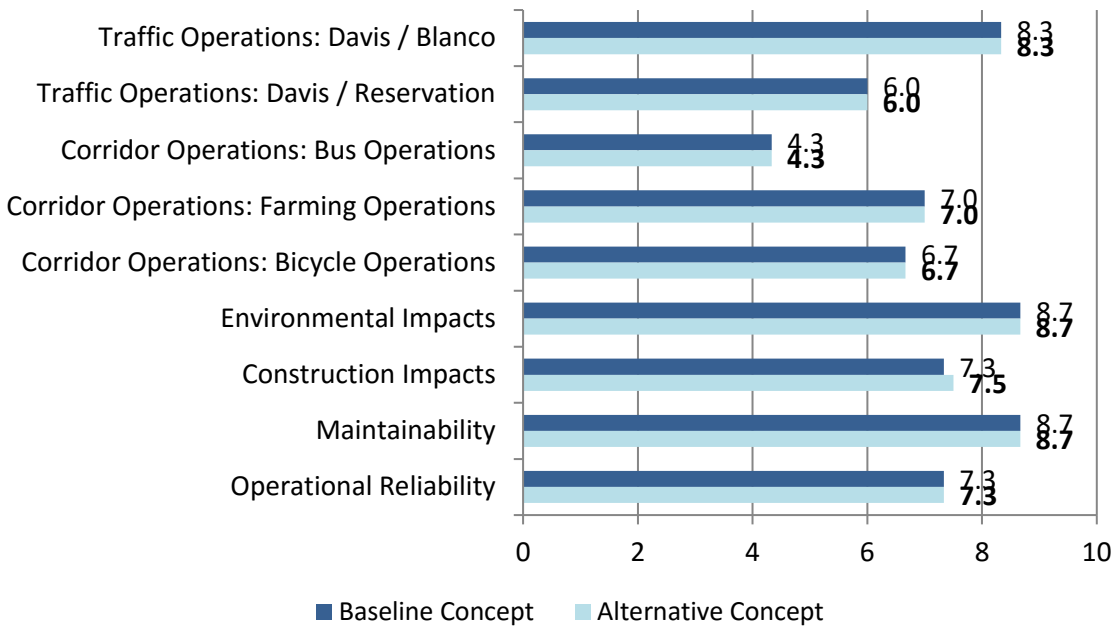
Discussion of Schedule Impacts: The time for construction for a precast girder bridge should be shorter than that for the CIP base condition. The VA team estimates that using precast construction for the bridge would reduce the critical path by approximately 3 months.

Discussion of Risk Impacts: There is likely less construction risk due to the elimination of a major amount of bridge falsework. The risk of completing construction within the in-water work windows is also reduced. This also eliminates the risk of poor ground conditions being inadequate to support falsework bents, which are required for the CIP box girder bridge.

VA ALTERNATIVE 3.1

Reconsider a precast girder bridge

Comparison of Performance



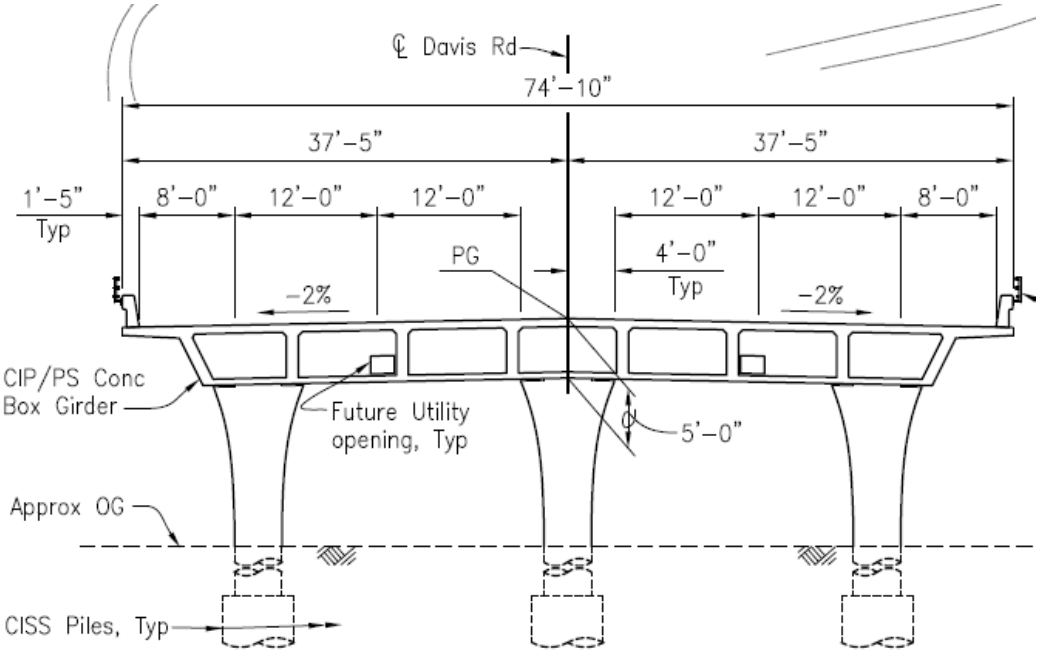
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	No significant change.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	Improved. The use of a precast construction bridge will shorten the schedule by approximately 3 months and will also reduce impacts in the river due to the elimination of a large amount of falsework.
Corridor Operations: Farming Operations	No significant change.

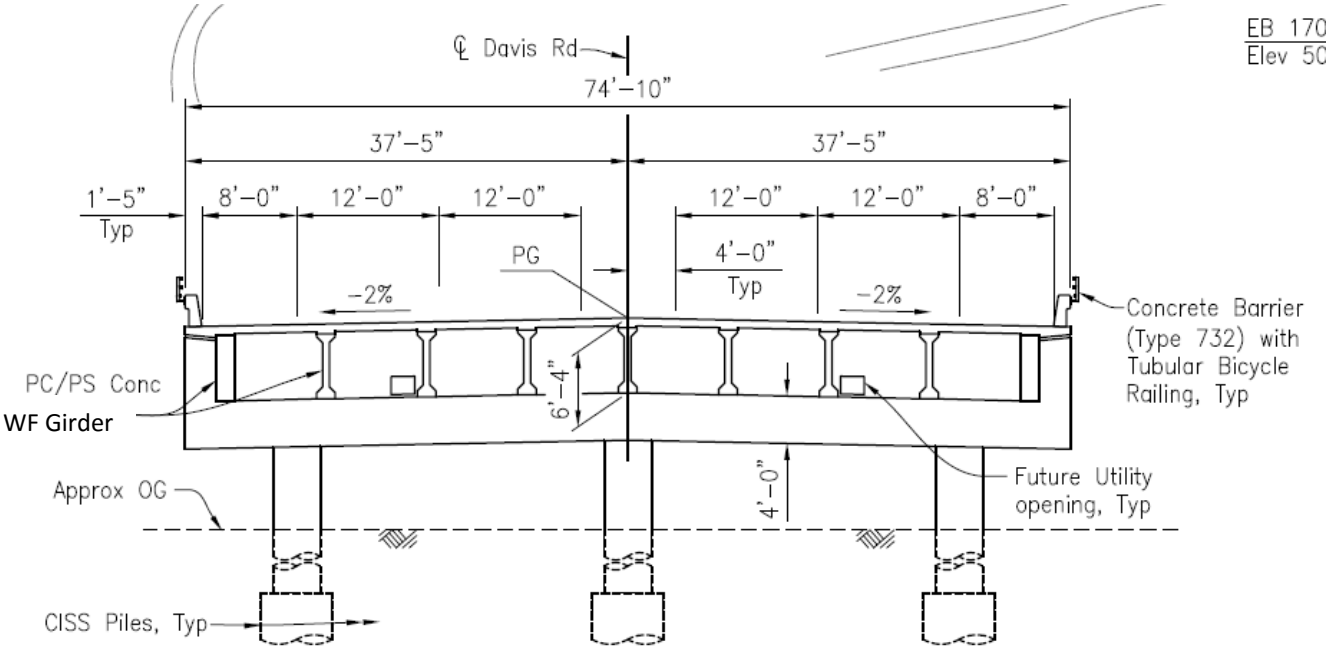
VA ALTERNATIVE 3.1

Reconsider a precast girder bridge

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations: The cost estimate assumes the same foundations and substructure (e.g. same foundation pile lengths).

VA ALTERNATIVE 3.1

Reconsider a precast girder bridge

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ -*			*$ -*
ROADWAY MARK-UP	*36%*			*$ -*			*$ -*
ROADWAY TOTAL				*$ -*			*$ -*
STRUCTURE ITEMS							
Box Girder Superstructure	sf	127,211	$ 125	$ 15,901,375			$ -
Precast Girder Superstructure	sf			$ -	127,211	$ 100	$ 12,721,100
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 15,901,375*			*$ 12,721,100*
STRUCTURE MARK-UP	*30%*			*$ 4,770,413*			*$ 3,816,330*
STRUCTURE TOTAL				*$ 20,671,788*			*$ 16,537,430*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ -*			*$ -*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$20,671,788			$16,537,430
TOTAL (Rounded)				$20,670,000			$16,540,000
						SAVINGS	**$4,130,000**

VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

Initial Cost Savings:	$4,230,000
LCC Savings:	$0
Change in Schedule:	-2 months
Performance Change:	+1 %
Value Change:	+8 %

Description of Baseline Concept: The baseline bridge type is a 1,700 ft. long CIP/PS multi-celled box girder bridge. The superstructure is supported on reinforced concrete bents with an integral bent cap and three 4 ft. diameter flared columns supported on CISS piles. The span arrangement consists of two 80 ft. end spans and twelve 125 ft. interior spans. The bridge profile includes a 712.30 ft. north approach at a +1.5% grade, a 650 ft. vertical curve, and a 337.70 ft. south approach at a -2.3% grade.

Description of Alternative Concept: The alternative concept includes profile changes and modifying the CIP box girder (designer's Alternative 1: 14-span CIP) to a reinforced concrete (RC) slab at the approaches. The profile was modified by shifting the PVI to the north by 190 ft. and increasing the length of the vertical curve from 650 ft. to 1,600 ft. The structure type modification is to change 420 ft. of the north approach and 380 ft. of the south approach from a CIP box to a 2 ft. deep (or shallower) reinforced concrete slab superstructure supported on ten (10) 16" diameter precast piles at each of the nineteen (19) approach structure bents. The 900 ft. main bridge will remain a 5'-0" CIP box girder supported by nine (9) bents, each with an integral bent and three (3) 4 ft. diameter columns.

Advantages:

- Modest decrease in pier height
- Reduces construction cost
- Reduces construction schedule
- Improved design flood conveyance

Disadvantages:

- Additional pile driving

Discussion: Revisions to the vertical geometry equalized the approach grades and lowered the highpoint of the profile by roughly 2 ft. That lower profile resulted in a more gradual vertical curve as well as a slight decrease in the average column height. With excess freeboard in the baseline design, the loss of up to 2 ft. of freeboard should not affect hydraulic performance.

Approach Structures:
Revising the approach structures from a 5'-0" deep CIP box girder (designer's Alternative 1: 14-span CIP) to a 2-foot RC slab saves construction cost. The cost savings are attributable to simpler falsework and forms as well as fewer concrete pours. The additional pile driving would occur on dry land far from the water's edge during the in-channel construction season (June 15 through October 15).

Use of a pin at the pile tops should be considered to eliminate the need for reinforced concrete drop caps and greatly simplify the deck reinforcing at the piles.

VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

Pre-drilling the piles should be considered to alleviate driving noise and vibration and any potential soil consolidation or settlement attributable to pile driving.

Technical Review Comments: None noted.

Project Management Considerations: None noted.

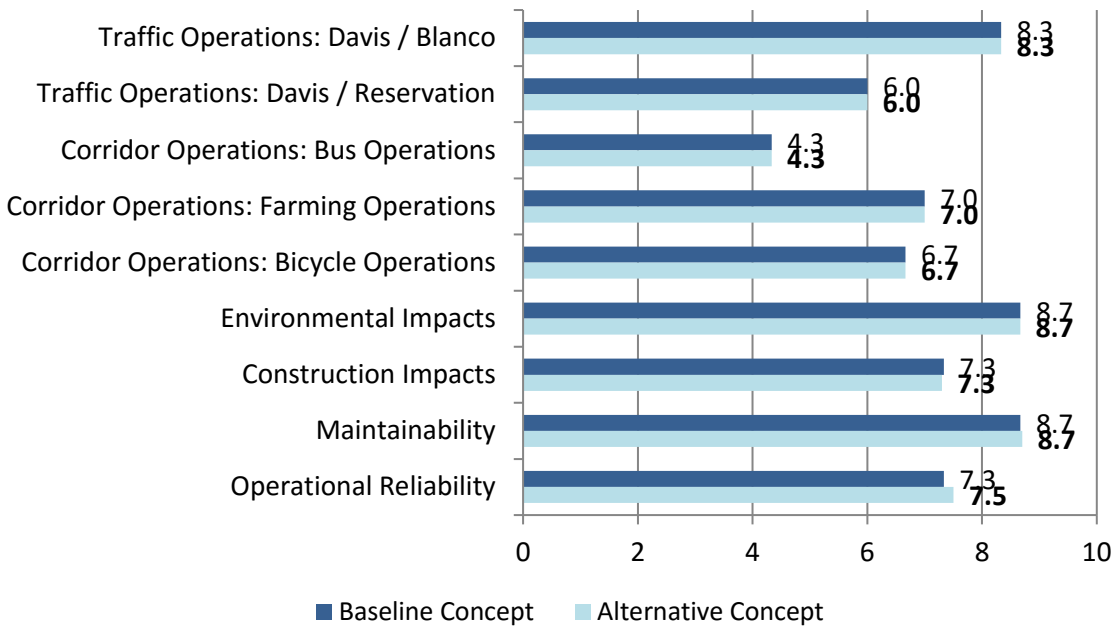
Discussion of Schedule Impacts: Since there is less in-channel falsework and fewer concrete pours, the 2'-0" RC slab portion of the bridge can be built in less time than the CIP girder alternative. The VA team estimates that this alternative would reduce the critical path by approximately 2 months.

Discussion of Risk Impacts: Because they require less in-channel falsework, the 2'-0" RC slab presents less risk of adverse impacts to the river channel.

VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

Comparison of Performance



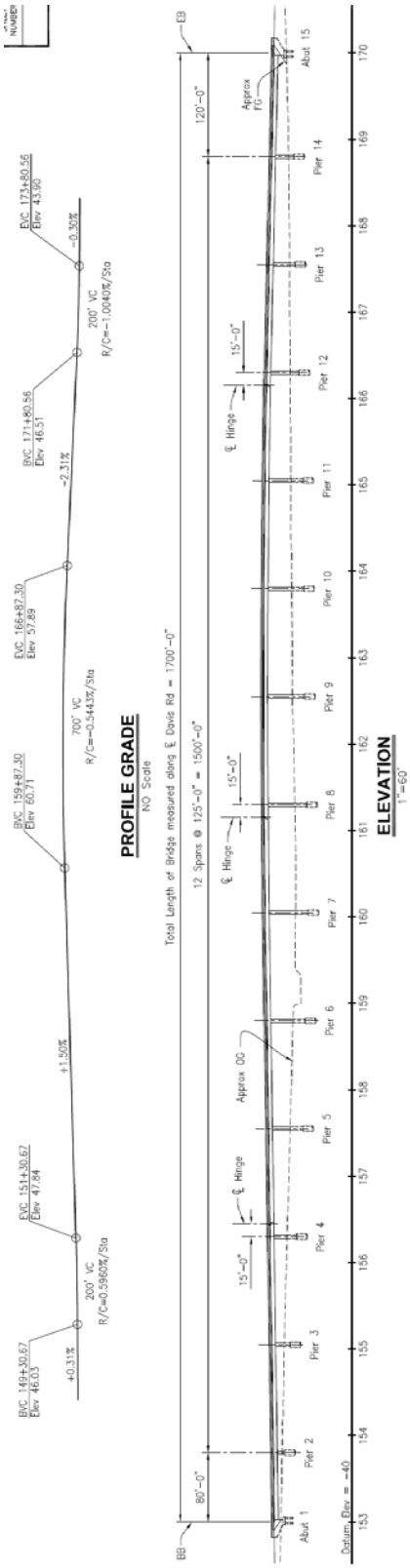
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	Increased operational reliability because of the increased design flood conveyance area.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Negligible. Increased headroom at approach structures results in easier inspection and more room for cleanup after a flood.
Environmental Impacts	Negligible. Replaces (12) 6-ft. diameter piles with (190) 1'-4" diameter piles that are smaller and easier to install, but may have a greater environmental impact. Less in-channel falsework results in fewer impacts to the river channel and riparian corridor.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	Negligible. Shorter duration of construction impacts because of shorter schedule.
Corridor Operations: Farming Operations	No significant change.

VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

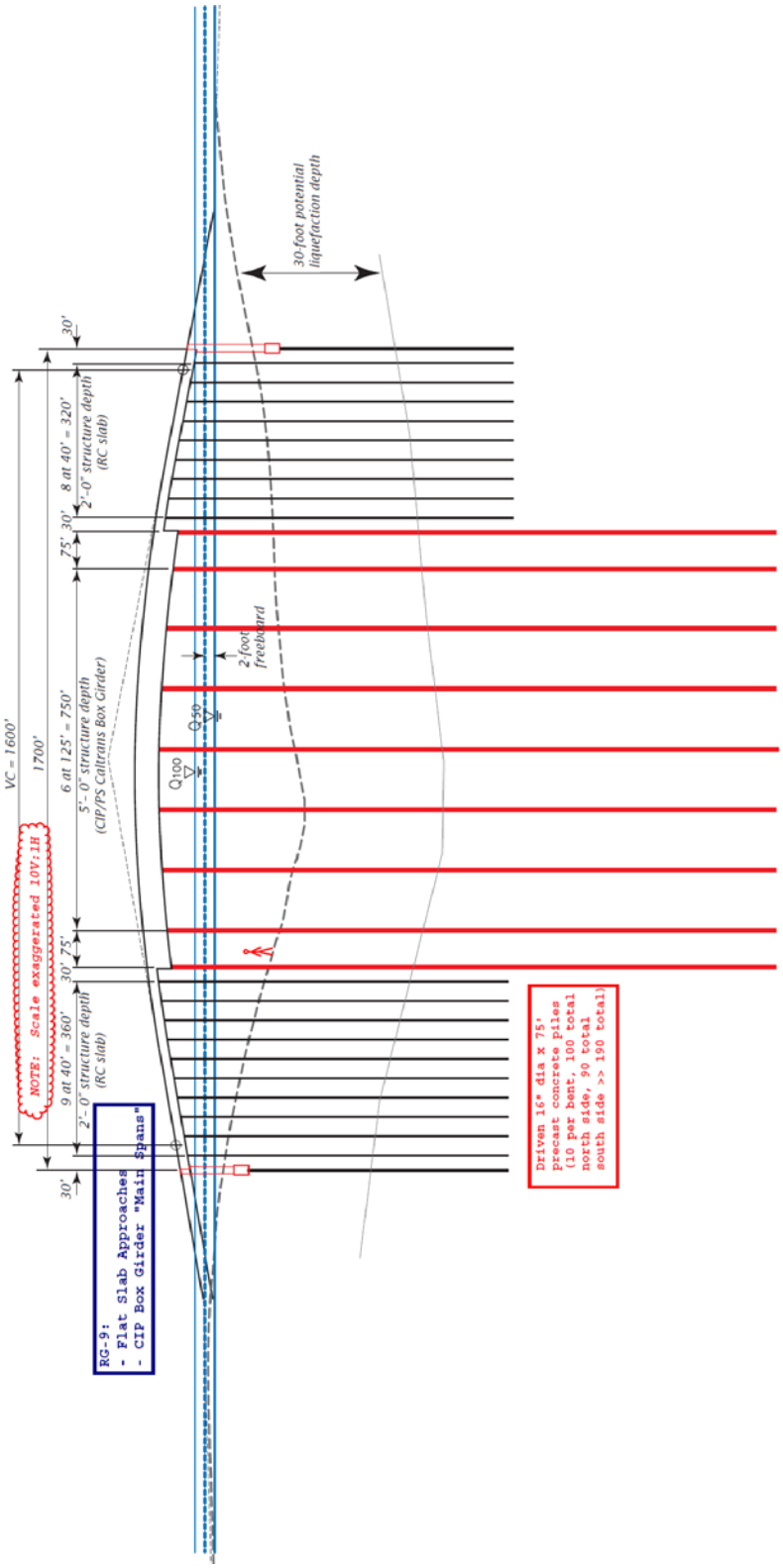
Baseline Concept Sketch



VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

VA Alternative Concept Sketch



VA ALTERNATIVE 3.2

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ -
ROADWAY MARK-UP	*36%*			$ -			$ -
ROADWAY TOTAL				$ -			$ -
STRUCTURE ITEMS							
Furnish CISS Concrete Pile (NPS72)	lf	3,900	$ 1,200	$ 4,680,000	2,700	$ 1,200	$ 3,240,000
Drive CISS Concrete Pile (NPS72)	ea	39	$ 40,000	$ 1,560,000	27	$ 40,000	$ 1,080,000
Furnish 16" dia. Precast Piles	lf			$ -	14,250	$ 50	$ 712,500
Drive 16" dia. Precast Piles	ea			$ -	190	$ 2,500	$ 475,000
Column Concrete	cy	600	$ 900	$ 540,000	450	$ 900	$ 405,000
Column Rebar (275pcy)	lb	165,000	$ 1.10	$ 181,500	123,750	$ 1.10	$ 136,125
Box Girder Superstructure	sf	127,211	$ 125	$ 15,901,375	67,347	$ 125	$ 8,418,375
Flat Slab Bridge Concrete	cy			$ -	4,500	$ 1,000	$ 4,500,000
Flat Slab Bridge Rebar (130pcy)	lb			$ -	585,000	$ 1.10	$ 643,500
(No other significant changes)				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 22,862,875*			*$ 19,610,500*
STRUCTURE MARK-UP	*30%*			*$ 6,858,863*			*$ 5,883,150*
STRUCTURE TOTAL				*$ 29,721,738*			*$ 25,493,650*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$29,721,738			$25,493,650
TOTAL (Rounded)				$29,720,000			$25,490,000
						SAVINGS	**$4,230,000**

VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Initial Cost Savings:	$5,990,000
LCC Savings:	$0
Change in Schedule:	-3 months
Performance Change:	+1 %
Value Change:	+11 %

Description of Baseline Concept: The baseline bridge type is a 1,700 ft. long CIP/PS multi-celled box girder bridge. The superstructure is supported on reinforced concrete bents with an integral bent cap and three 4 ft. diameter flared columns supported on CISS piles. The span arrangement consists of two 80 ft. end spans and twelve 125 ft. interior spans. The bridge profile includes a 712.30 ft. north approach at a +1.5% grade, a 650 ft. vertical curve, and a 337.70 ft. south approach at a -2.3% grade.

Description of Alternative Concept: This alternative concept includes profile changes and modifying the CIP box girder (designer's Alternative 1: 14-span CIP) to a reinforced concrete (RC) slab at the approaches and the main spans to a 6'-4" deep California wide flange (designer's Alternative 2: 14-span PC). The profile was modified by shifting the PVI to the north by 190 ft. and increasing the length of the vertical curve from 650 ft. to 1,600 ft. in order to lower the bridge peak height by 2 ft. The 420 ft. north approach and the 380 ft. south approach are comprised of a 2 ft. deep reinforced concrete slab superstructure supported on 16" diameter precast piles. The 900 ft. main bridge is comprised of nine (9) precast California wide flange girders with an 8" CIP reinforced concrete deck for an overall structure depth of 6'-4".

Advantages:

- Reduces construction cost
- Reduces construction schedule
- Improved design flood conveyance
- Modest decrease in pier height
- Minimizes the use of in-channel falsework

Disadvantages:

- Additional pile driving

Discussion: Revisions to the vertical geometry equalized the approach grades and lowered the highpoint of the profile by roughly 2 ft. That lower profile resulted in a more gradual vertical curve as well as a slight decrease in the average column height, resulting in a cost savings.

Approach Structures:
Revising the approach structures from a 6'-4" deep California wide flange (designer's Alternative 2: 14-span PC) to a 2 ft. RC slab saves construction cost. The cost savings are attributable to simpler falsework and forms as well as fewer concrete pours. The additional pile driving would occur on dry land far from the water's edge during the in-channel construction season (June 15 through October 15).

VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Use of a pin at the pile tops should be considered to eliminate the need for reinforced concrete drop caps and greatly simplify the deck reinforcing at the piles.

Pre-drilling the piles should be considered to alleviate driving noise and vibration and any potential soil consolidation or settlement attributable to pile driving.

Main Bridge:
Revising the main bridge from a 5'-0" box (designer's Alternative 1: 14-span CIP) to a 6'-4" California wide flange (designer's Alternative 2: 14-span PC) results in a lower bridge soffit, but one that is still well above the 100-year water surface elevation as well as the 50-year water surface elevation plus 2 ft. freeboard. (The profile grade may be further lowered and still achieve design flood compliance over at least 50% of the bridge length.)

The composite precast girder alternative can be built without falsework and requires a single concrete pour to complete the superstructure.

In the three years since the project Structure Type Selection Report was prepared, composite California wide flange bridges have become more cost competitive and are being used more frequently in California. For example, several portions of the elevated California High Speed Rail are being built with California wide flanges under design-build contracts. Sonoma County recently built a bridge replacement over Porter Creek using 140 ft. California wide flanges. The East Bay Regional Park District is also planning to build a new bridge over existing RR tracks for an extension of Atlas Road to create a new park entrance at Point Pinole in Richmond, CA. For this reason, the bridge owner and designer may consider re-evaluating the construction cost estimate for designer's Alternative 2: 14-span PC.

Technical Review Comments: None noted.

Project Management Considerations: None noted.

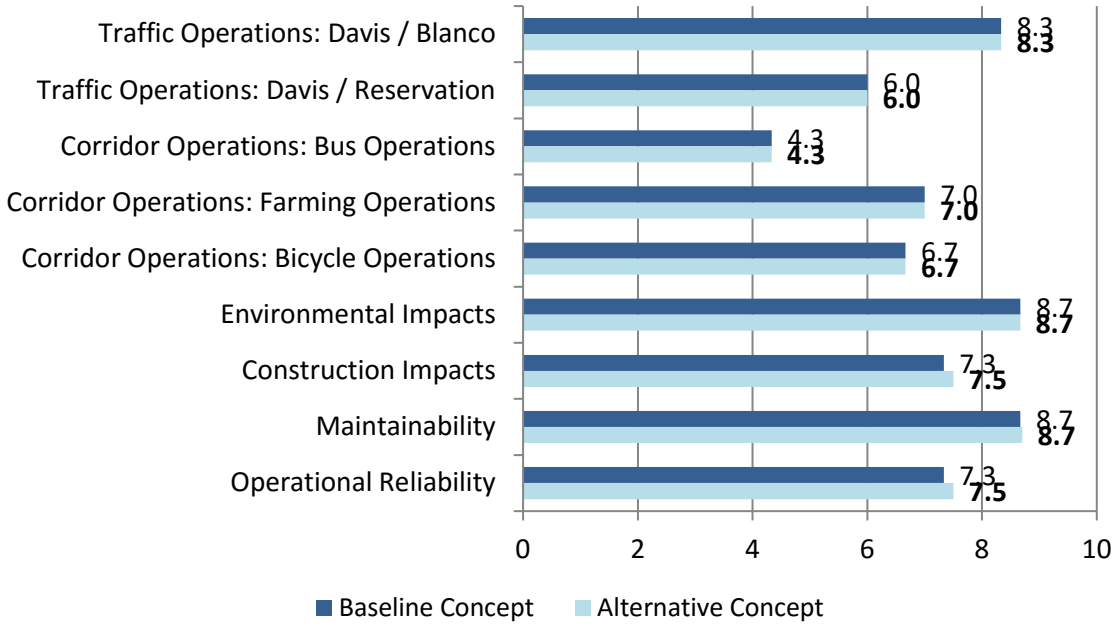
Discussion of Schedule Impacts: Since there is less in-channel falsework and fewer concrete pours, both the 2'-0" RC slab and the 6'-4" PC girder can be built in less time than the CIP girder alternative. The VA team estimates that this alternative would reduce the critical path by approximately 3 months.

Discussion of Risk Impacts: Because they require less in-channel falsework, both the 2'-0" RC slab and the 6'-4" PC girder alternatives present less risk of adverse impacts to the river channel.

VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Comparison of Performance



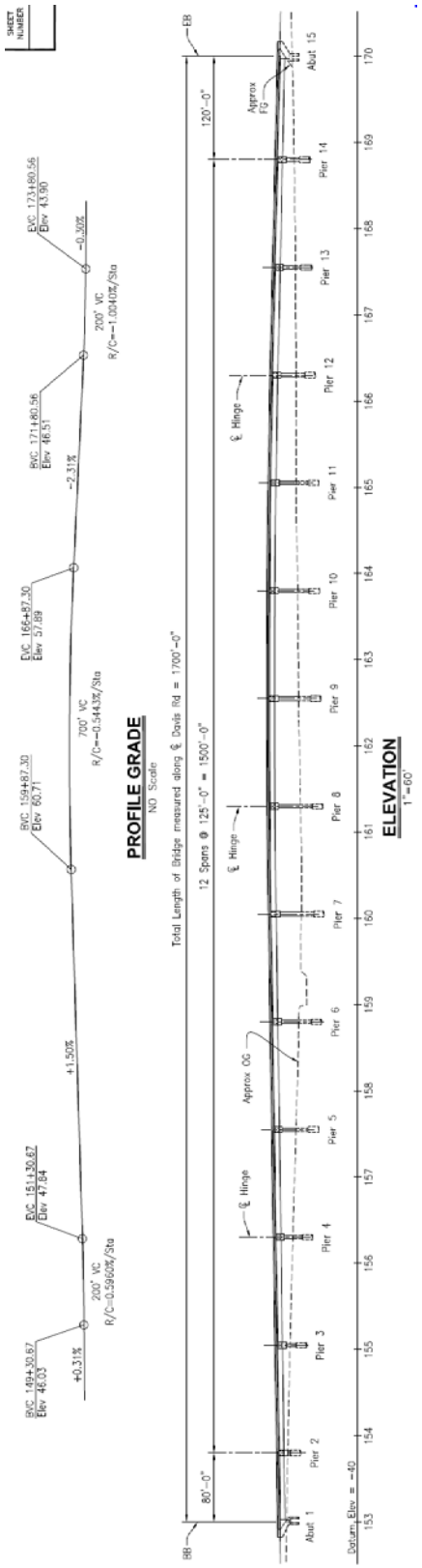
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	Increased due to increased design flood conveyance area.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Negligible. Increased headroom at approach structures results in easier inspection and more room for cleanup after a flood.
Environmental Impacts	Negligible. Replaces (12) 6 ft. diameter piles with (190) 1'-4" diameter piles that are smaller and easier to install, but may have a greater environmental impact. Less in-channel falsework results in fewer impacts to the river channel and riparian corridor.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	Reduced impact duration due to shorter schedule.
Corridor Operations: Farming Operations	No significant change.

VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

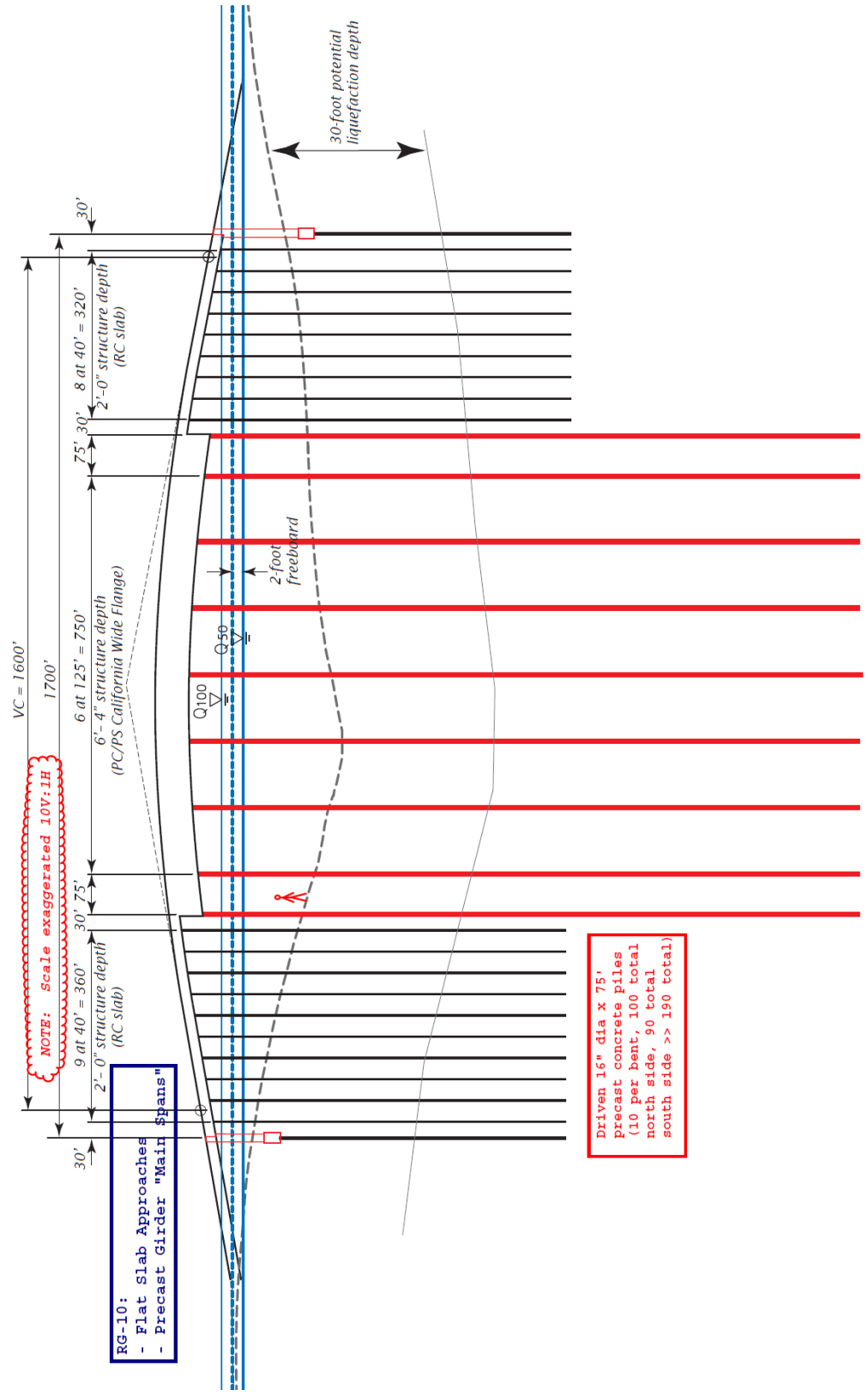
Baseline Concept Sketch



VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

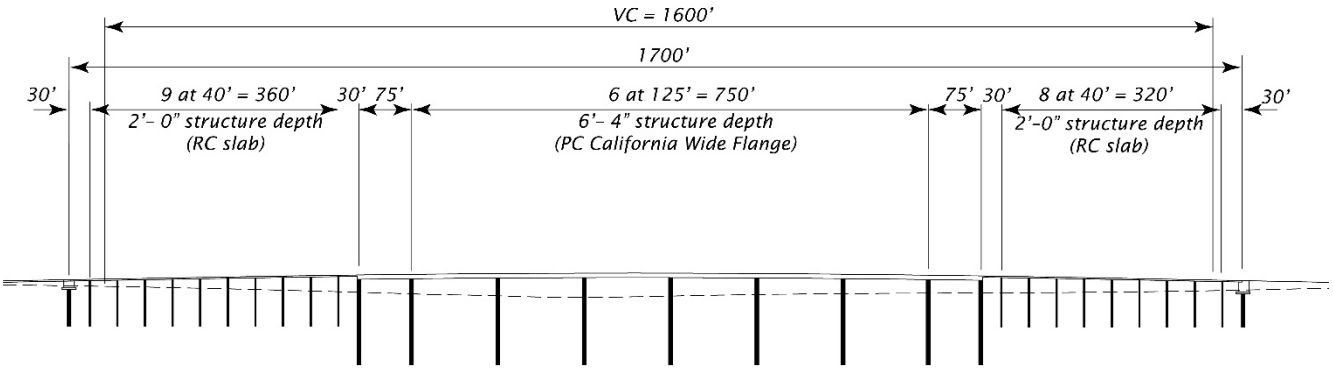
VA Alternative Concept Sketch



VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

VA Alternative Concept – Elevation to Scale



VA Alternative Concept – Example

Assumptions and Calculations:

The typical cast-in-place box girder section is estimated to have an area of 112 SF at a unit weight of 16.8 kips per lineal foot. The typical precast girder section is estimated to have an area of 108 SF at a unit weight of 16.2 kips per lineal foot. Assuming an effective pile length of 70 ft. (100 ft. depth less 30 ft. liquefaction) and that two-thirds (2/3) of that length is needed to resist dead loads, the effective pile length attributable to dead load is 70' times 2 divided by 3 is about 47 ft. Scaling that length down by 16.2 divided by 16.8 yields a required effective length of about 45 ft. Thus, the PC alternative requires CISS piles of a length roughly the same as in the CIP alternative.

VA ALTERNATIVE 3.3

Replace first 3 spans at each end of bridge with flat slab deck on precast pile bents with precast girder main spans

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ -
ROADWAY MARK-UP	*36%*			$ -			$ -
ROADWAY TOTAL				$ -			$ -
STRUCTURE ITEMS							
Furnish CISS Concrete Pile (NPS72)	lf	3,900	$ 1,200	$ 4,680,000	2,970	$ 1,200	$ 3,564,000
Drive CISS Concrete Pile (NPS72)	ea	39	$ 40,000	$ 1,560,000	27	$ 40,000	$ 1,080,000
Furnish 16" dia. Precast Piles	lf			$ -	14,250	$ 50	$ 712,500
Drive 16" dia. Precast Piles	ea			$ -	190	$ 2,500	$ 475,000
Column Concrete	cy	600	$ 900	$ 540,000	450	$ 900	$ 405,000
Column Rebar (275pcy)	lb	165,000	$ 1	$ 181,500	123,750	$ 1	$ 136,125
Box Girder Superstructure	sf	127,211	$ 125	$ 15,901,375	0	$ 125	$ -
Precast Girder Superstructure	sf			$ -	67,347	$ 100	$ 6,734,700
Flat Slab Bridge Concrete	cy			$ -	4,500	$ 1,000	$ 4,500,000
Flat Slab Bridge Rebar (130pcy)	lb			$ -	585,000	$ 1	$ 643,500
(No other significant changes)				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 22,862,875*			*$ 18,250,825*
STRUCTURE MARK-UP	*30%*			*$ 6,858,863*			*$ 5,475,248*
STRUCTURE TOTAL				*$ 29,721,738*			*$ 23,726,073*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$29,721,738			$23,726,073
TOTAL (Rounded)				$29,720,000			$23,730,000
						SAVINGS	**$5,990,000**

VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Initial Cost Savings:	($100,000)
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+12 %
Value Change:	+12 %

Description of Baseline Concept: The baseline design generally follows the existing ground elevation of Davis Rd. between Blanco Rd. and Foster Rd.

Description of Alternative Concept: This concept raises the elevation of Davis Rd. to 1 ft. above the 100-year flood elevation. This will ensure all-weather access is provided the full length of Davis Rd. between Blanco Rd. and Reservation Rd. with a lower annual risk of closure.

Advantages:

- Road open longer during flooding
- Discourages uncontrolled access between driveways

Disadvantages:

- Additional earthwork needed

Discussion: The FEMA flood map shows that Davis Rd. is currently overtopped during the 1% annual chance (or "100 year") flow in two locations. The Salinas River crossing location will be addressed by the new 1,700 ft. bridge. The Blanco Rd. location can be addressed by raising the elevation of Davis Rd. above the published flood elevation.

Downstream of the project, the West Blanco crossing chokes the flow and causes floodwaters to back up and pond within a topographic swale that extends to Blanco Rd. A large backwater is anticipated to develop and cause inundation of the valley extending back to the Davis Rd. and Blanco Rd. intersection. The Flood Insurance Rate Map (Map 06053C0215G, FEMA FIRM, 2009) maps the area as Zone AH, with depths varying from 1 to 3 ft., and the base flood elevation is 35 ft. NAVD. The photo below shows Blanco Rd. with shallow inundation.

VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Existing road profile elevations currently range from 35.9 ft. at Blanco, 37 ft. at Hitchcock, 43 ft. at Foster, and up to 45 ft. at Reservation. There are two low points in the road profile that dip slightly below 36 ft., and these could be raised to provide flood separation. Minor profile adjustments would be needed to fine tune drainage and maintain longitudinal grades.

Additional consideration could be given to increasing the cross drainage. This could be accomplished by adding new culverts or increasing the size of the existing Hitchcock culverts (see below).

Consideration should also be given to check for any adverse drainage impacts of this alternative on neighboring properties.

For reference, at the Salinas River the base flood elevation is 44.5 ft. per the FEMA Flood Insurance Study profile (Profile 114P, FEMA FIS, 2009).

This is a common "natural levee" scenario where the ground surface adjacent to the river is higher than the floodplain, often due to the historic deposition of sediments during flooding adjacent to the channel. This scenario needs to be better analyzed hydraulically, so the impact of raising the roadway of Davis Rd. on floodplain elevations can be evaluated. Hydraulic analyses presented in the Draft Hydraulic Study Report suggest that base flood elevations and delineated Special Flood Hazard Zones shown on the effective FEMA FIRM may not reflect current ground conditions.

Technical Review Comments: The County notes a no-rise flood depth requirement of 0.1 ft. that supersedes the NFIP 1 ft. criterion.

Project Management Considerations: Consider neighboring properties for any adverse drainage impacts with this alternative and regulatory compliance with the NFIP.

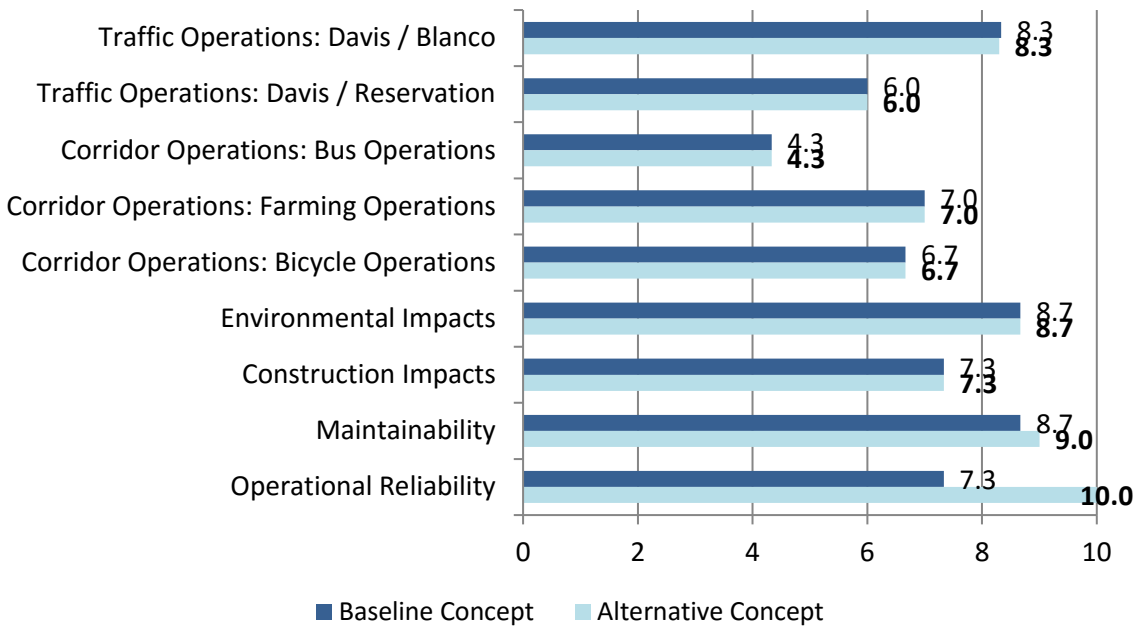
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Comparison of Performance



Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	Improved reliability due to increased height of entire length of Davis Rd. from Reservation Rd. to Blanco Rd. above the 100-year flood level.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Slightly reduced flood cleanup.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	Negligible. Improved flood resistance.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Assumptions and Calculations:

- The proposed low point fills are:
  - STA 71+50 to 74+00, L=250, H = 0.5 ft.
  - STA 83+00 to 85+50, L=250, H = 0.5 ft.

- The volume of fill is approximately:
  - 500 x 0.5 x 78 ft. wide / 27 CF/CY = 720 CY

VA ALTERNATIVE 4.0

Raise roadway elevation of Davis Rd. north of Foster Rd. above 100-year flood

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
Roadway Excavation	CY	64,468	$ 40	$ 2,578,720	65,188	$ 40	$ 2,607,520
Drainage Improvements	LS	1	$ 250,000	$ 250,000	1	$ 300,000	$ 300,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 2,828,720*			*$ 2,907,520*
ROADWAY MARK-UP	*36%*			*$ 1,018,339*			*$ 1,046,707*
ROADWAY TOTAL				*$ 3,847,059*			*$ 3,954,227*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$3,847,059			$3,954,227
TOTAL (Rounded)				$3,850,000			$3,950,000
						SAVINGS	**($100,000)**

VA ALTERNATIVE 5.1a

Reduce median width on roadway

Initial Cost Savings:	$970,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+1 %
Value Change:	+2 %

Description of Baseline Concept: The baseline concept proposes an 8 ft. wide median on the roadway.

Description of Alternative Concept: The alternative concept proposes a 1 ft. wide median with rumble strips.

Advantages:

- Reduces construction costs
- Eliminates potential of drivers trying to use median as a passing lane or queue jump lane
- Reduces amount of pavement maintenance required by about 10%

Disadvantages:

- Eliminates potential of installing concrete barrier in the future without narrowing the lanes closest to the median or widening the road

Discussion: An 8 ft. median could promote misuse as drivers may perceive it to be wide enough to use as a passing lane or queue jump lane. Although it provides a perceived buffer, errant vehicles could still easily and quickly traverse it.

Davis Rd. is straight both horizontally and vertically, and median crossover may be low.

Technical Review Comments: The County requested that this concept provide a median wide enough for rumble strips and standard no passing striping detail.

Project Management Considerations: None noted.

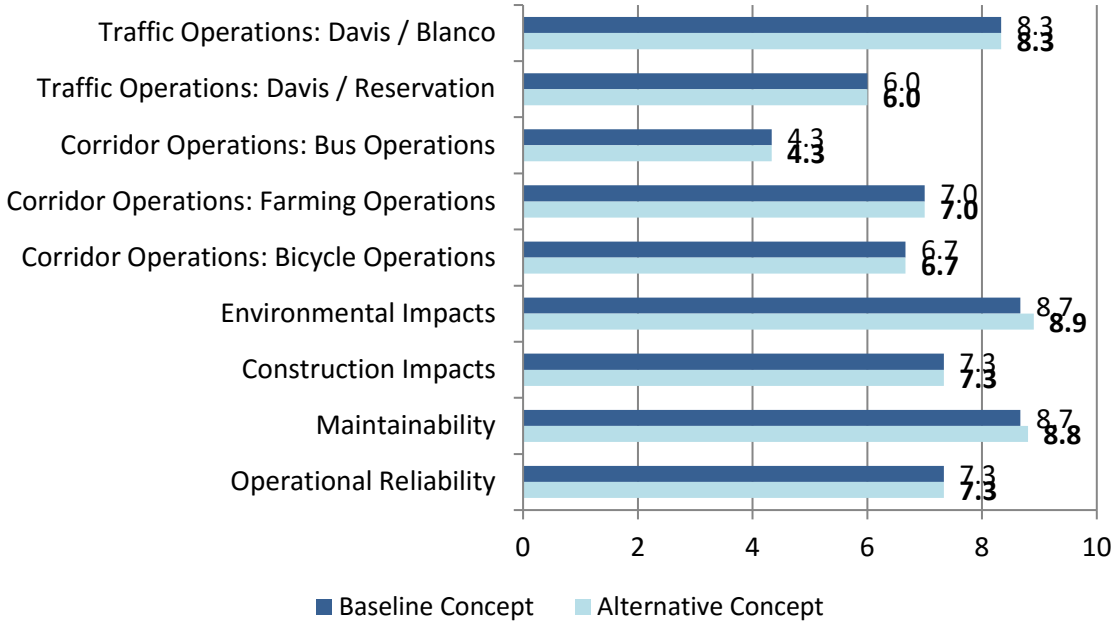
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 5.1a

Reduce median width on roadway

Comparison of Performance



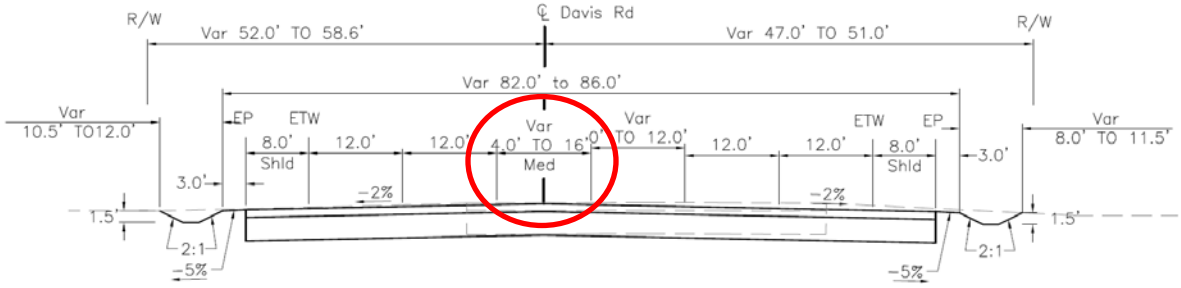
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change. The provision of an 8' wide median buffer could improve safety, but it could also encourage use as a narrow passing lane and/or center turn lane. The VA team felt that overall the 8' buffer was more of a liability.
Maintainability	About 10% less pavement to maintain.
Environmental Impacts	The roadway reduction allows for less right-of way acquisition which reduces the amount of agricultural land impacts and related mitigation, improving the overall environmental impact.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

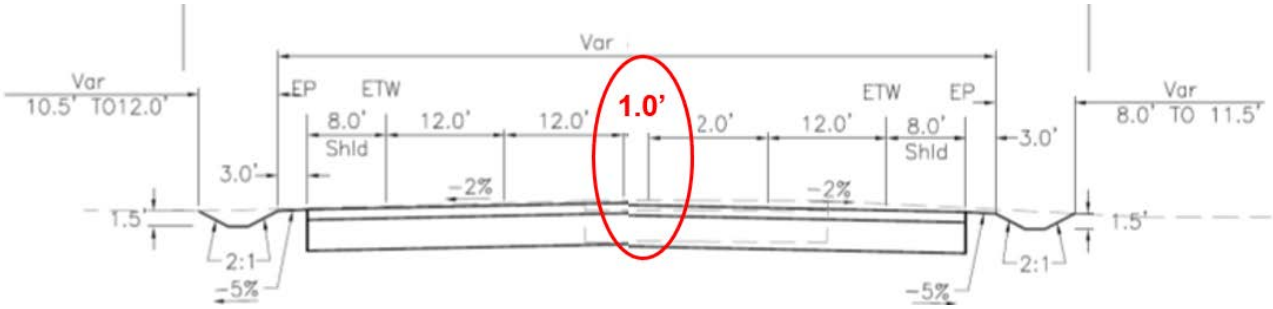
VA ALTERNATIVE 5.1a

Reduce median width on roadway

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations:

- 1 ft. wide rumble strip per Caltrans Revised Standard Plan RSP A40D.

VA ALTERNATIVE 5.1a

Reduce median width on roadway

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
HMA	TON	3,580	$ 105	$ 375,900	450	$ 105	$ 47,250
Class 2 Aggregate Base	CY	2,760	$ 40	$ 110,400	350	$ 40	$ 14,000
Rumble Strips	LF			$ -	9,300	$ 5	$ 46,500
Roadway Excavation	CY	4,140	$ 40	$ 165,600	520	$ 40	$ 20,800
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 651,900*			*$ 128,550*
ROADWAY MARK-UP	*36%*			*$ 234,684*			*$ 46,278*
ROADWAY TOTAL				*$ 886,584*			*$ 174,828*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ -*			*$ -*
STRUCTURE MARK-UP	*30%*			*$ -*			*$ -*
STRUCTURE TOTAL				*$ -*			*$ -*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF	74,400	$ 4	$ 297,600	9,300	$ 4	$ 37,200
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 297,600*			*$ 37,200*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$1,184,184			$212,028
TOTAL (Rounded)				$1,180,000			$210,000
						SAVINGS	**$970,000**

VA ALTERNATIVE 5.1b

Reduce median width on bridge

Initial Cost Savings:	$3,130,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+1 %
Value Change:	+4 %

Description of Baseline Concept: The baseline concept proposes an 8 ft. wide median on the bridge.

Description of Alternative Concept: The alternative concept proposes a 1 ft. wide median with rumble strips on the bridge.

Advantages:

- Eliminates potential of drivers trying to use median as passing lane or queue jump lane
- Reduces amount of concrete deck maintenance required by about 10%

Disadvantages:

- Eliminates potential of installing concrete barrier in the future without narrowing the lanes closest to the median

Discussion: An 8 ft. wide median could promote misuse as drivers may perceive it to be wide enough to use for a passing lane or queue jump lane. Although it provides a perceived buffer, errant vehicles could still easily and quickly traverse it.

Technical Review Comments: The County requested that a median wide enough for rumble strips and standard no passing striping detail be considered.

Project Management Considerations: None noted.

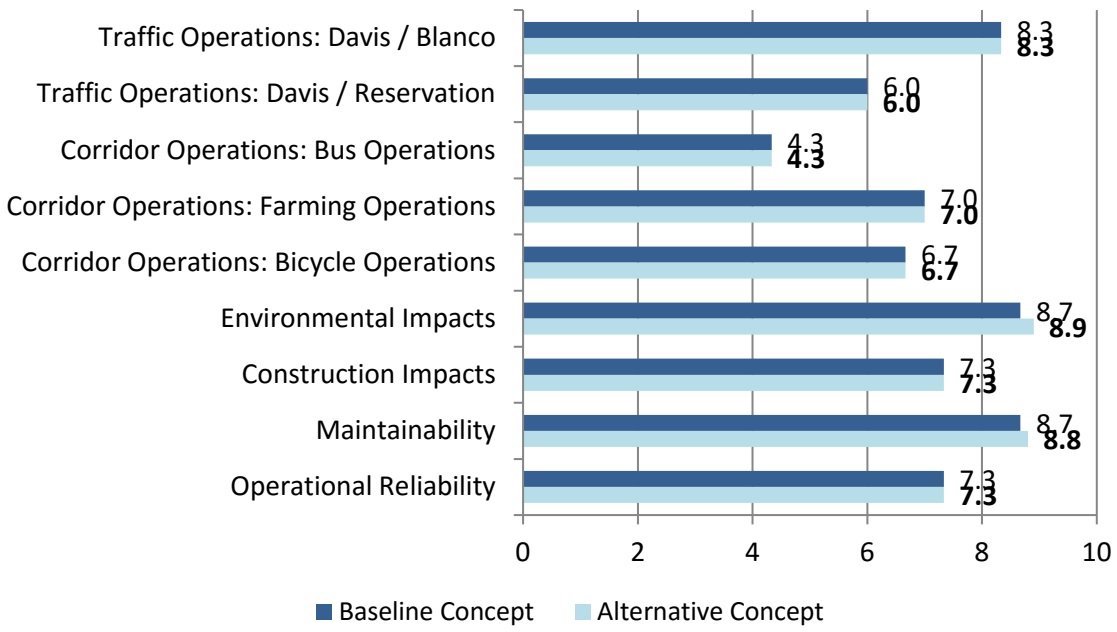
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 5.1b

Reduce median width on bridge

Comparison of Performance



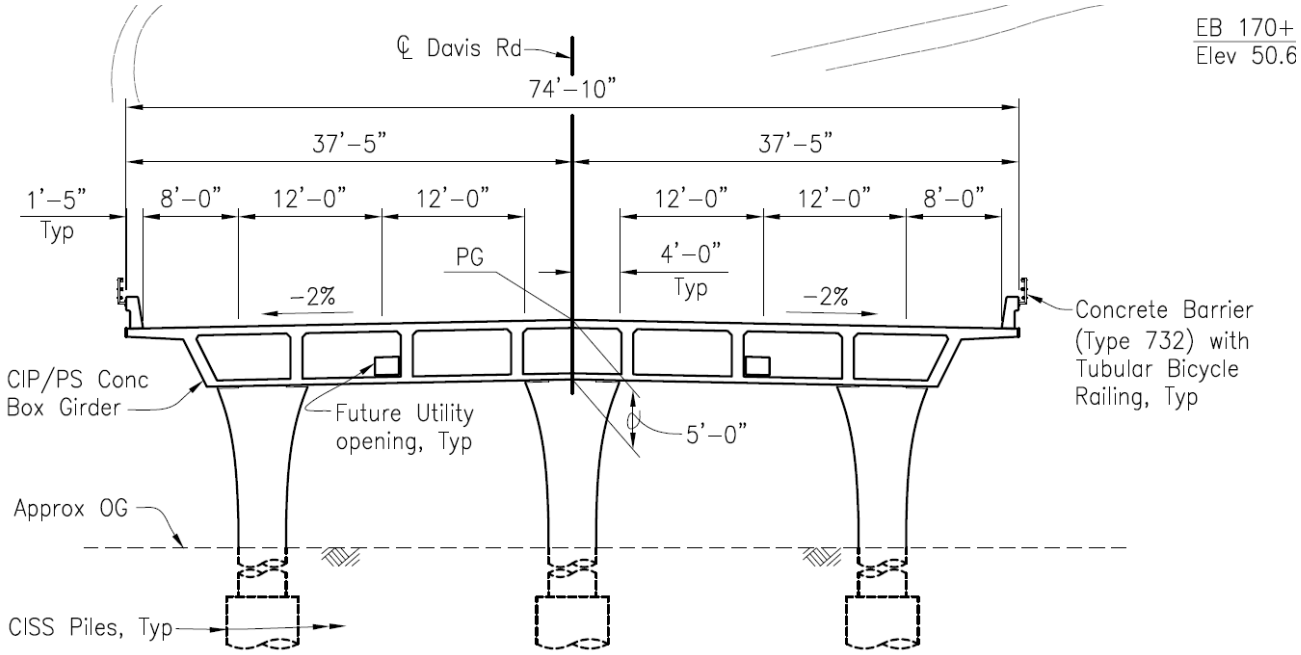
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change. The provision of an 8' wide median buffer could improve safety, but it could also encourage use as a narrow passing lane and/or center turn lane. The VA team felt that overall the 8' buffer was more of a liability.
Maintainability	About 10% less bridge structure to maintain.
Environmental Impacts	The bridge reduction allows for less right-of way acquisition which reduces the amount of agricultural land impacts and related mitigation, improving the overall environmental impact.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

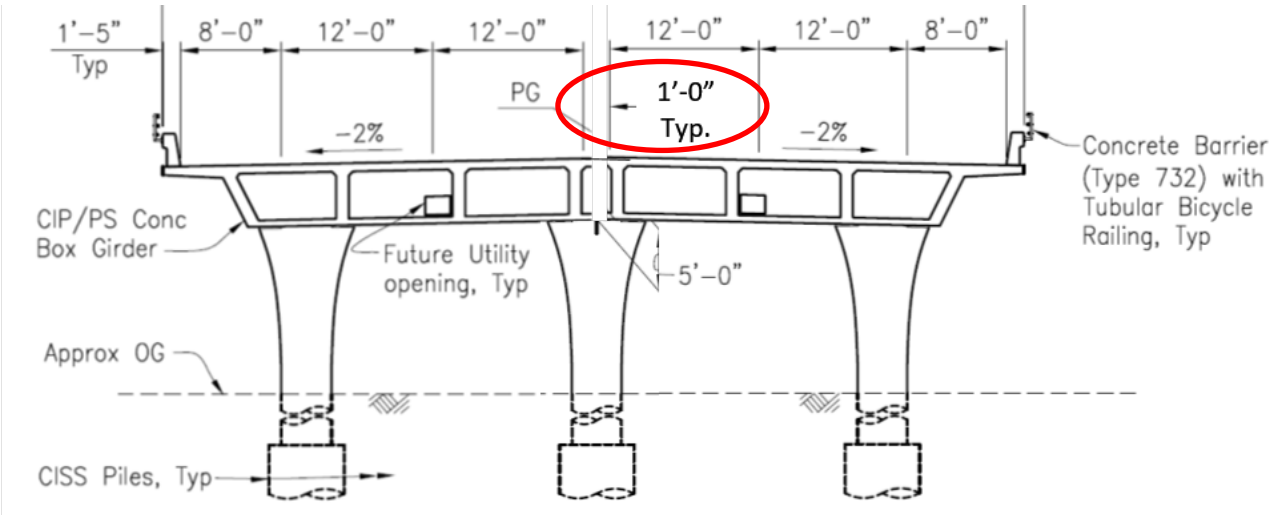
VA ALTERNATIVE 5.1b

Reduce median width on bridge

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations:

- 1 ft. wide rumble strip per Caltrans Revised Standard Plan RSP A40D.

VA ALTERNATIVE 5.1b

Reduce median width on bridge

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
ROADWAY ITEMS							
Rumble Strips	LF			$ -	1,700	$ 5	$ 8,500
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ -*			*$ 8,500*
ROADWAY MARK-UP	*36%*			*$ -*			*$ 3,060*
ROADWAY TOTAL				*$ -*			*$ 11,560*
STRUCTURE ITEMS							
Bridge	SF	13,600	$ 200	$ 2,720,000	1,700	$ 200	$ 340,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 2,720,000*			*$ 340,000*
STRUCTURE MARK-UP	*30%*			*$ 816,000*			*$ 102,000*
STRUCTURE TOTAL				*$ 3,536,000*			*$ 442,000*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF	13,600	$ 4	$ 54,400	1,700	$ 4	$ 6,800
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 54,400*			*$ 6,800*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$3,590,400			$460,360
TOTAL (Rounded)				$3,590,000			$460,000
						SAVINGS	**$3,130,000**

VA ALTERNATIVE 5.1c

Reduce width of travel lanes on bridge to 11 ft.

Initial Cost Savings:	$1,790,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	No change
Value Change:	+3 %

Description of Baseline Concept: The baseline concept proposes 12 ft. travel lanes on the bridge.

Description of Alternative Concept: The alternative concept proposes 11 ft. travel lanes on the bridge.

Advantages:

- Decreases cost with no sacrifice to operations

Disadvantages:

- Stakeholders may perceive this as a safety issue

Discussion: NCHRP 17-53 Evaluation of the 13 Controlling Criteria for Geometric Design performed research on lane widths as one of the controlling criteria. The research concluded that there is very little difference in crash frequency between 11 ft. and 12 ft. lane widths on two-lane and multi-lane rural highways; therefore, the need for design exceptions should apply only for lane widths less than 11 ft. on rural two-lane and multi-lane highways (non-freeways).

The proposed alternative would reduce the overall bridge cross-section by 4 ft., saving cost in the bridge structure.

Technical Review Comments: None noted.

Project Management Considerations: Stakeholders may perceive 11 ft. travel lanes as a safety issue.

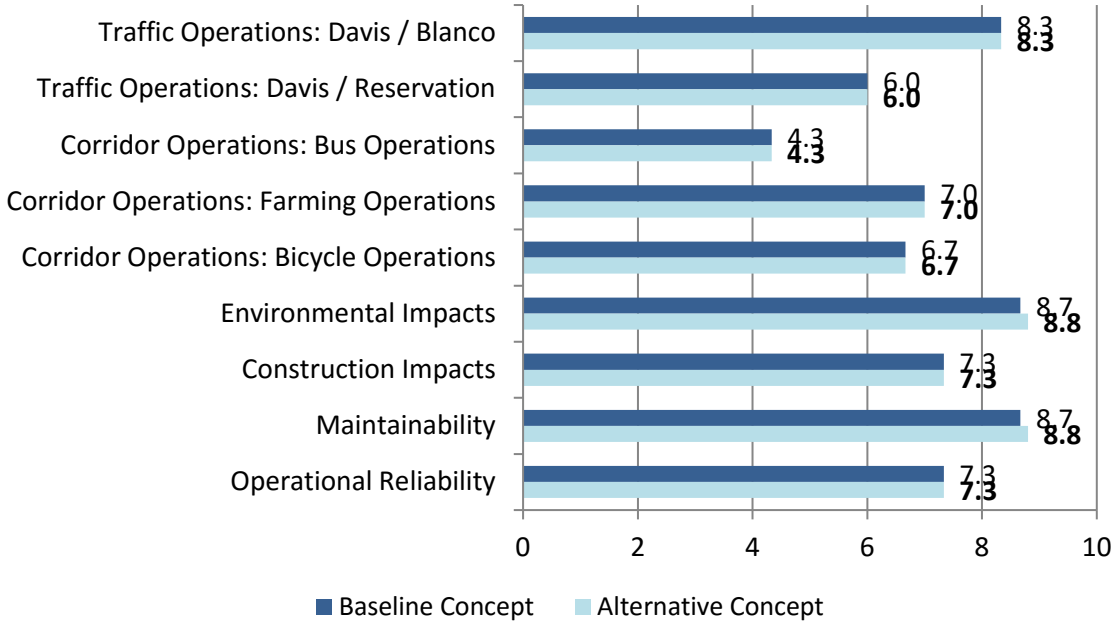
Discussion of Schedule Impacts: Minor decrease in schedule due to less construction.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 5.1c

Reduce width of travel lanes on bridge to 11 ft.

Comparison of Performance



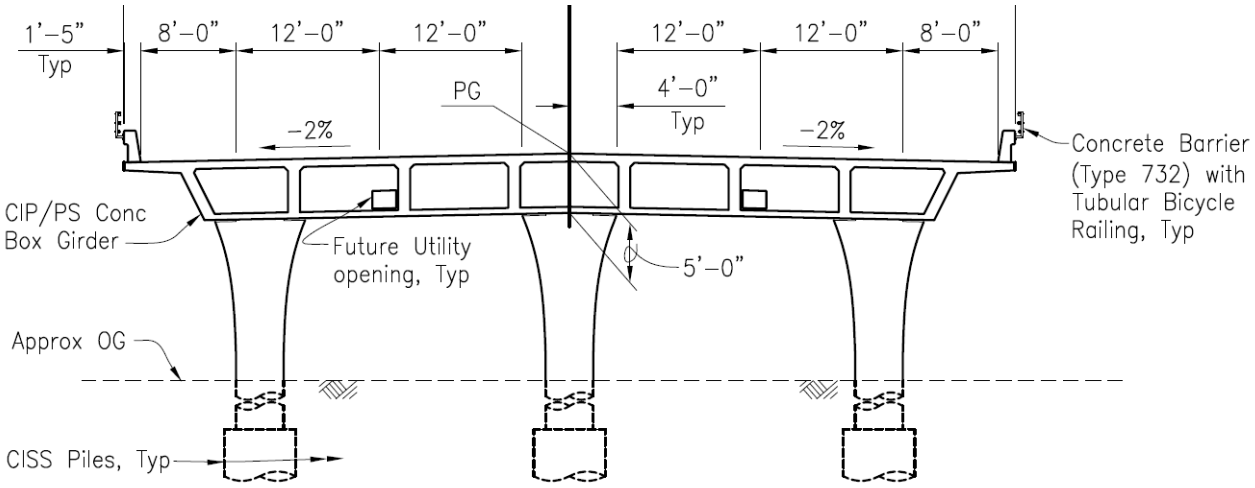
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Results in about 5% less structure to maintain.
Environmental Impacts	The bridge reduction allows for less right-of way acquisition which reduces the amount of agricultural land impacts and related mitigation, improving the overall environmental impact.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

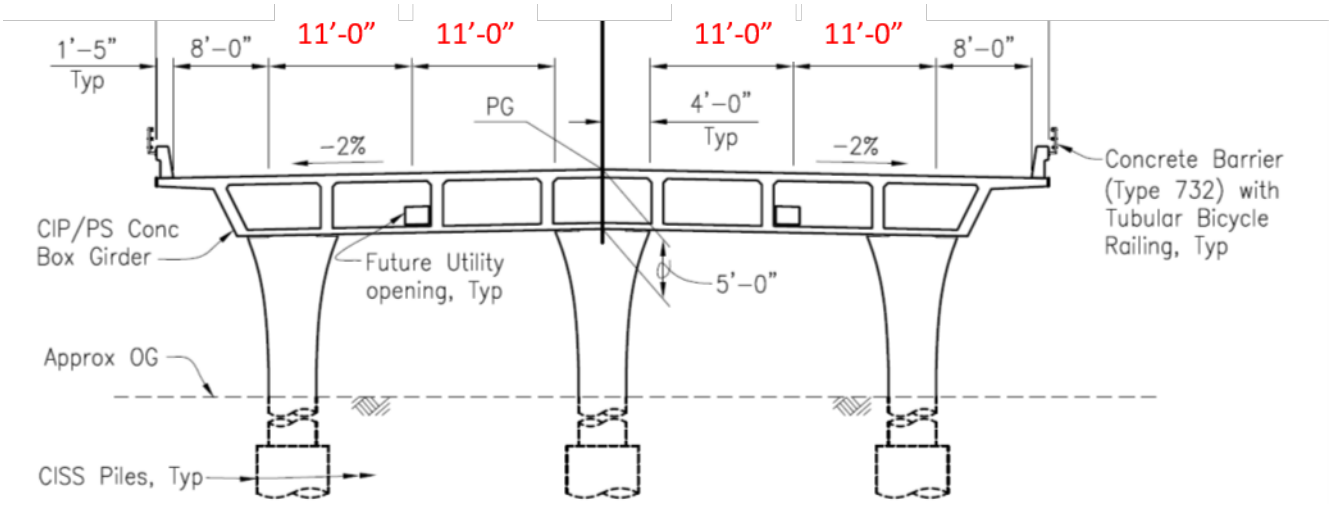
VA ALTERNATIVE 5.1c

Reduce width of travel lanes on bridge to 11 ft.

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations: 1,700' x 4' = 6,800 SF of bridge area reduction.

VA ALTERNATIVE 5.1c

Reduce width of travel lanes on bridge to 11 ft.

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	Unit	Qty	Cost/Unit	Total	Qty	Cost/Unit	Total
ROADWAY ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ -
ROADWAY MARK-UP	*36%*			$ -			$ -
ROADWAY TOTAL				$ -			$ -
STRUCTURE ITEMS							
Bridge	SF	122,400	$ 200	$ 24,480,000	115,600	$ 200	$ 23,120,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ 24,480,000*			*$ 23,120,000*
STRUCTURE MARK-UP	*30%*			*$ 7,344,000*			*$ 6,936,000*
STRUCTURE TOTAL				*$ 31,824,000*			*$ 30,056,000*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF	6,800	$ 4	$ 27,200			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 27,200*			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$31,851,200			$30,056,000
TOTAL (Rounded)				$31,850,000			$30,060,000
						SAVINGS	**$1,790,000**

VA ALTERNATIVE 5.1d

Reduce width of travel lanes on roadway to 11 ft.

Initial Cost Savings:	$590,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	No change
Value Change:	+1 %

Description of Baseline Concept: The baseline concept proposes 12 ft. travel lanes on the roadway.

Description of Alternative Concept: The alternative concept proposes 11 ft. travel lanes on the roadway.

Advantages:

- Decreases cost with no sacrifice in operations
- Reduction in impervious pavement for storm water management
- Reduction in agricultural land impacts and related mitigation

Disadvantages:

- Stakeholders may perceive this as a safety issue

Discussion: NCHRP 17-53 Evaluation of the 13 Controlling Criteria for Geometric Design performed research on Lane Widths as one of the controlling criteria. The research concluded that there is very little difference in crash frequency between 11 ft. and 12 ft. lane widths on two-lane and multi-lane rural highways; therefore, the need for design exceptions should apply only for lane widths less than 11 ft. on rural two-lane and multi-lane highways (non-freeways).

The proposed alternative would reduce the overall roadway cross-section by 4 ft., saving pavement cost.

Technical Review Comments: None noted.

Project Management Considerations: Stakeholders may perceive 11 ft. travel lanes as a safety issue.

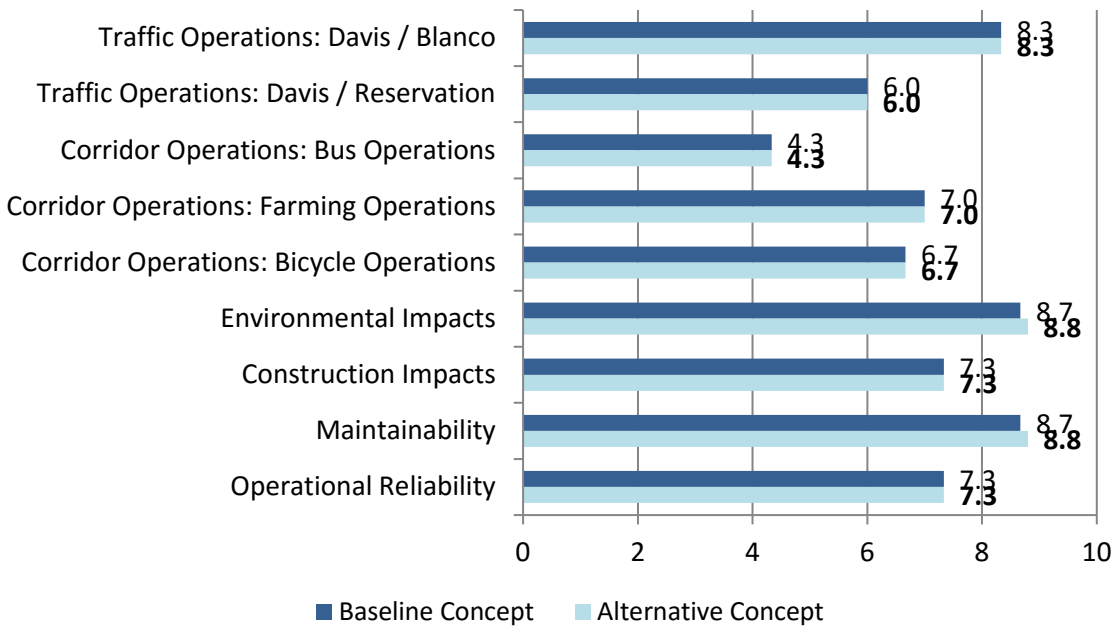
Discussion of Schedule Impacts: Minor decrease in schedule due to less construction.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 5.1d

Reduce width of travel lanes on roadway to 11 ft.

Comparison of Performance



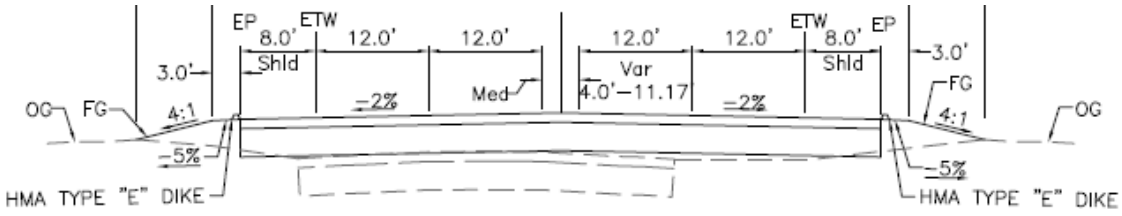
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Less pavement to maintain.
Environmental Impacts	Results in 0.85-acre reduction in impervious area requiring storm water management as well as reduced impacts to adjacent agricultural land.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

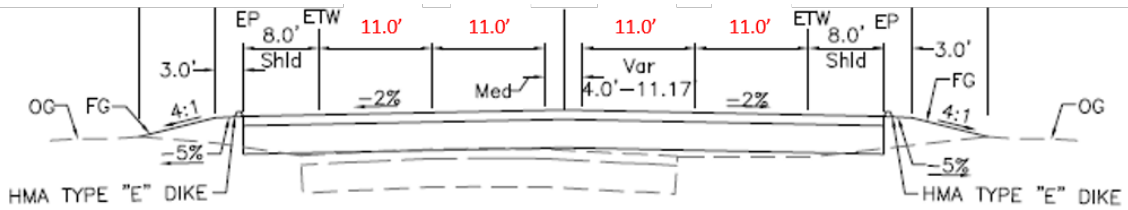
VA ALTERNATIVE 5.1d

Reduce width of travel lanes on roadway to 11 ft.

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations: 9,300 LF x 4 LF = 37,200 SF of roadway reduction.

VA ALTERNATIVE 5.1d

Reduce width of travel lanes on roadway to 11 ft.

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
HMA	TON	21,500	$ 105	$ 2,257,500	19,710	$ 105	$ 2,069,550
Class 2 Aggregate Base	CY	16,540	$ 40	$ 661,600	15,160	$ 40	$ 606,400
Roadway Excavation	CY	24,810	$ 40	$ 992,400	22,740	$ 40	$ 909,600
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 3,911,500*			*$ 3,585,550*
ROADWAY MARK-UP	*36%*			*$ 1,408,140*			*$ 1,290,798*
ROADWAY TOTAL				*$ 5,319,640*			*$ 4,876,348*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF	37,200	$ 4	$ 148,800			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 148,800*			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$5,468,440			$4,876,348
TOTAL (Rounded)				$5,470,000			$4,880,000
						SAVINGS	**$590,000**

VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section

Initial Cost Savings:	($1,140,000)*
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	-1 %
Value Change:	-2 %

**Reflects the true cost to implement a Class IV two-way cycle track without the pavement width reductions of Alternatives 5.1a and 5.1b. Additional details are included in the 5.2 Commentary provided by TRC post-VA Study following VA Alternative 5.2b.*

Description of Baseline Concept: The project baseline roadway cross-section is a 72 ft. paved width with four lanes and bike lanes on each side.

Description of Alternative Concept: This concept would adopt a variation of the Class IV bikeway cross-section identified as part of the TAMC multi-modal corridor concept. The resulting cross-section would include a 1 ft. wide rumble strip in the median; four 11 ft. wide travel lanes; a 5 ft. wide paved shoulder on the southbound side; and an 8 ft. wide Class IV bikeway with a 3 ft. wide buffer adjacent to an 8 ft. wide paved shoulder on the northbound side. This configuration results in a 69 ft. wide paved cross-section.

Advantages:

- The center rumble strip would improve driver feedback over the painted median
- Reduces construction cost

Disadvantages:

- All four travel lanes would be 11 ft. wide instead of three 11 ft. and one 12 ft.
- The center median width would be 1 ft. wide instead of 3 ft. wide
- The roadway cross-section could reduce future flexibility for restriping or adding lanes due to the 3 ft. reduction
- Selection of this alternative would preclude implementation of Alternatives 5.1a - 5.1d

Discussion: The baseline design is a 72 ft. wide paved roadway, per "D" Line Davis Road Typical Section Sta. 170+00 to 174+50. This section is summarized below:

- 8' paved shoulder/Class II bike lane
- 12' travel lane
- 12' travel lane
- 8' center median
- 12' travel lane
- 12' travel lane
- 8' paved shoulder/Class II bike lane

The Alternative Class IV bikeway cross-section that is part of the TAMC multi-modal corridor concept consists of a 72 ft. wide paved configuration that includes:

VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section

- 8' two-way Class IV cycle track on the east side
- 3' buffer
- 8' paved shoulder
- 11' travel lane
- 11' travel lane
- 3' center median
- 11' travel lane
- 12' travel lane
- 5' paved shoulder

The VA team's alternative design results in a 69 ft. wide paved roadway, per the VA alternative sketch:

- 8' two-way Class IV cycle track on the east side
- 3' buffer
- 8' paved shoulder
- 11' travel lane
- 11' travel lane
- 1' center rumble strip* (see sketch for typical detail)
- 11' travel lane
- 11' travel lane*
- 5' paved shoulder

* represents VA alternative modifications

All alternatives also include a 3 ft. wide unpaved shoulder outside of the paved shoulders. In some locations this unpaved shoulder will provide useful utility, in other cases a drainage dike exists at the edge of the pavement and would restrict use of the unpaved shoulder.

Technical Review Comments: Davis Road is very straight both horizontally and vertically and long sight distances are available throughout. There is low occurrence of head-on accidents presented in the traffic study and vehicle crossover is not anticipated to be a significant factor now or in the future. Given the long sight distances available, a 1 ft. center rumble strip seems to be a cost-effective alternative in this setting.

Project Management Considerations: Stakeholders may value the wider center median. This value could be based on experience in winding roads where crossovers are more common.

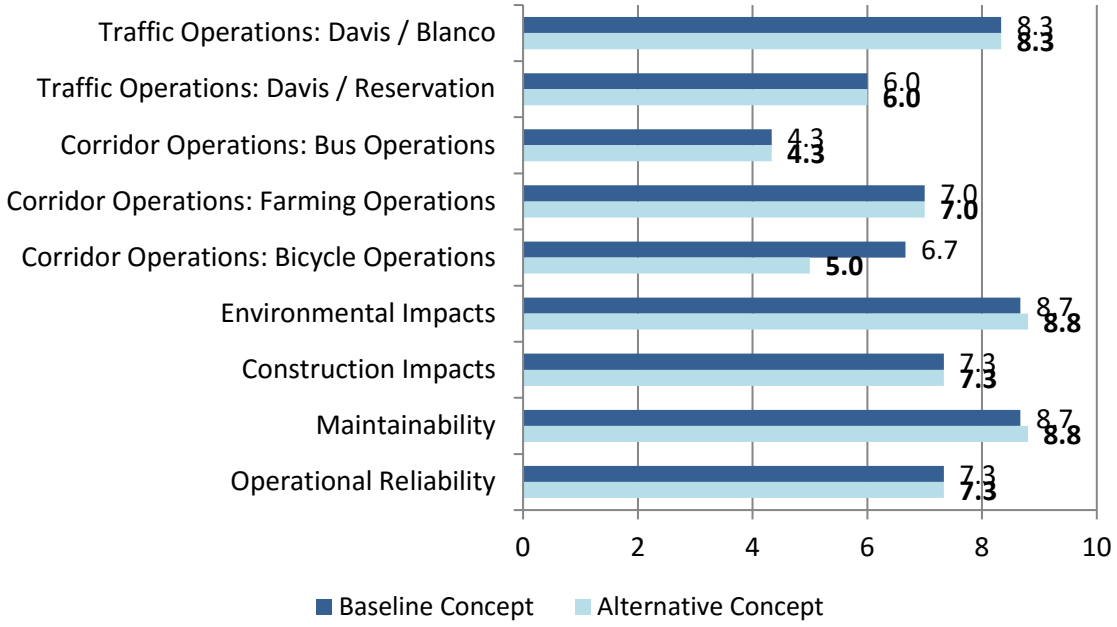
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: There would be a mandatory design exception required for the 5 ft. shoulder on the opposite side in order to fit the cycle track on the bridge. There is some risk in not getting approval, and the entire bridge may not be eligible for reimbursement by FHWA. This implication of the loss of federal funds from FHWA could be around $30 M.

VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section

Comparison of Performance



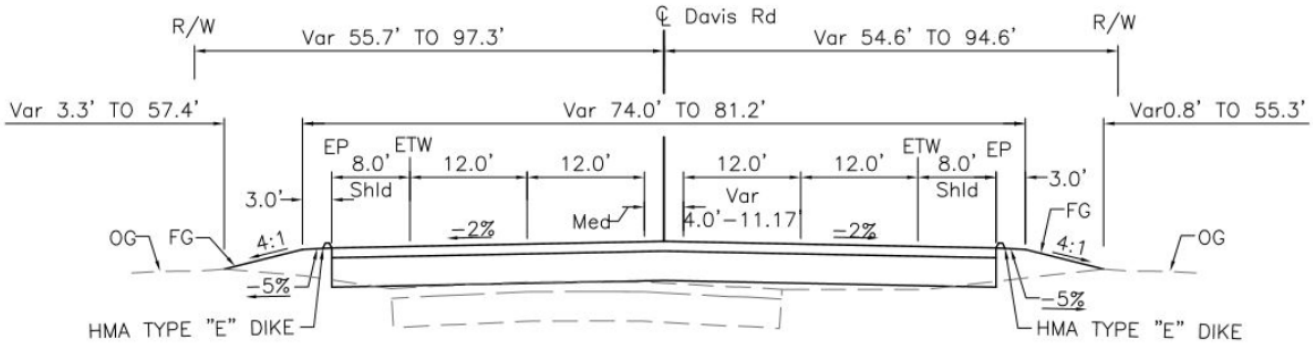
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Slightly more maintenance required for rumble strip during future repaving, yet less maintenance required due to reduced roadway.
Environmental Impacts	Reduces project footprint by about 4% which will result in a slight reduction to agricultural property and related mitigation.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	Decreased. Cyclists are limited to an 8 ft. two-way cycle track compared to the baseline of an 8 ft. shoulder moving with traffic. Riding against traffic is typically not preferred in the cycling community and also makes intersection crossings more difficult.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

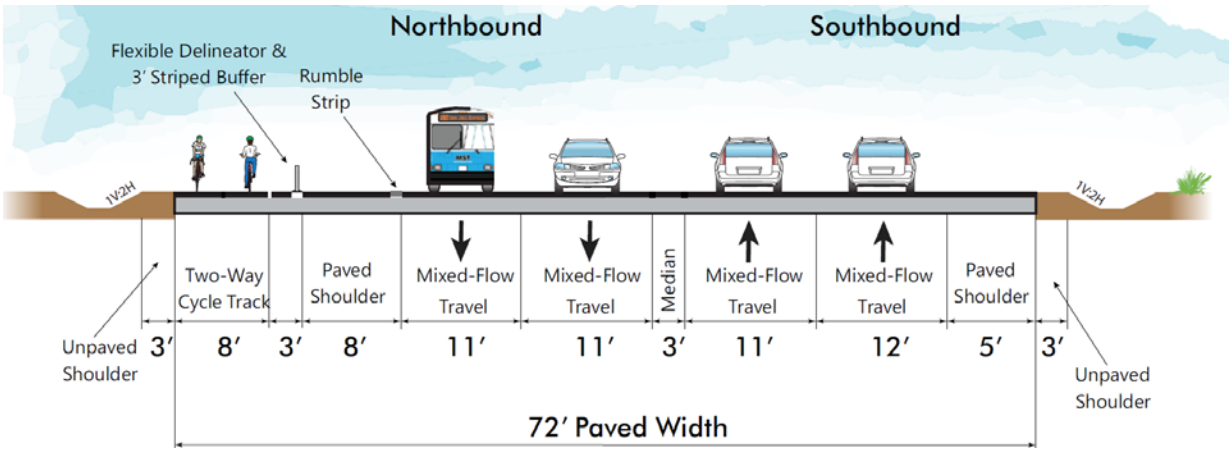
VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section

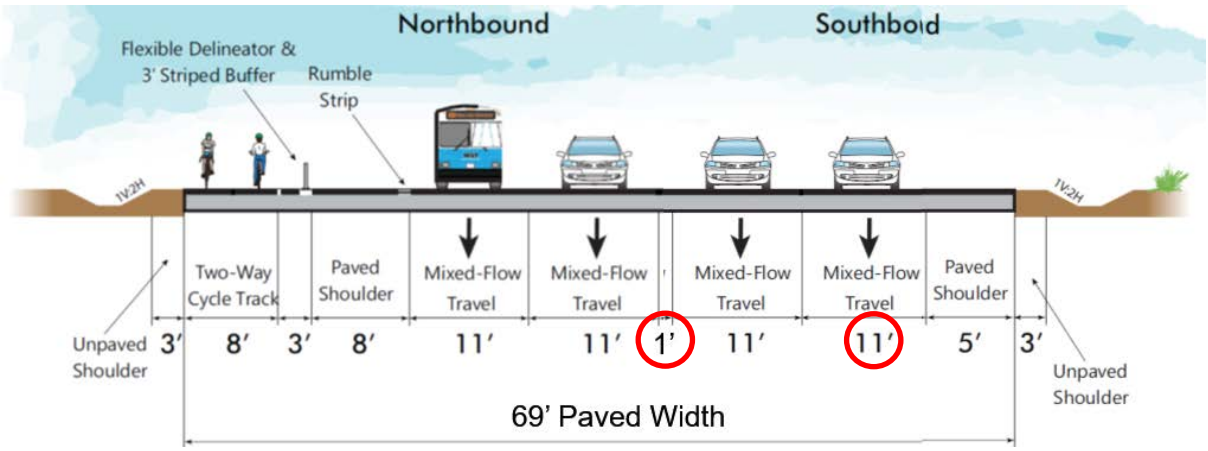
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch

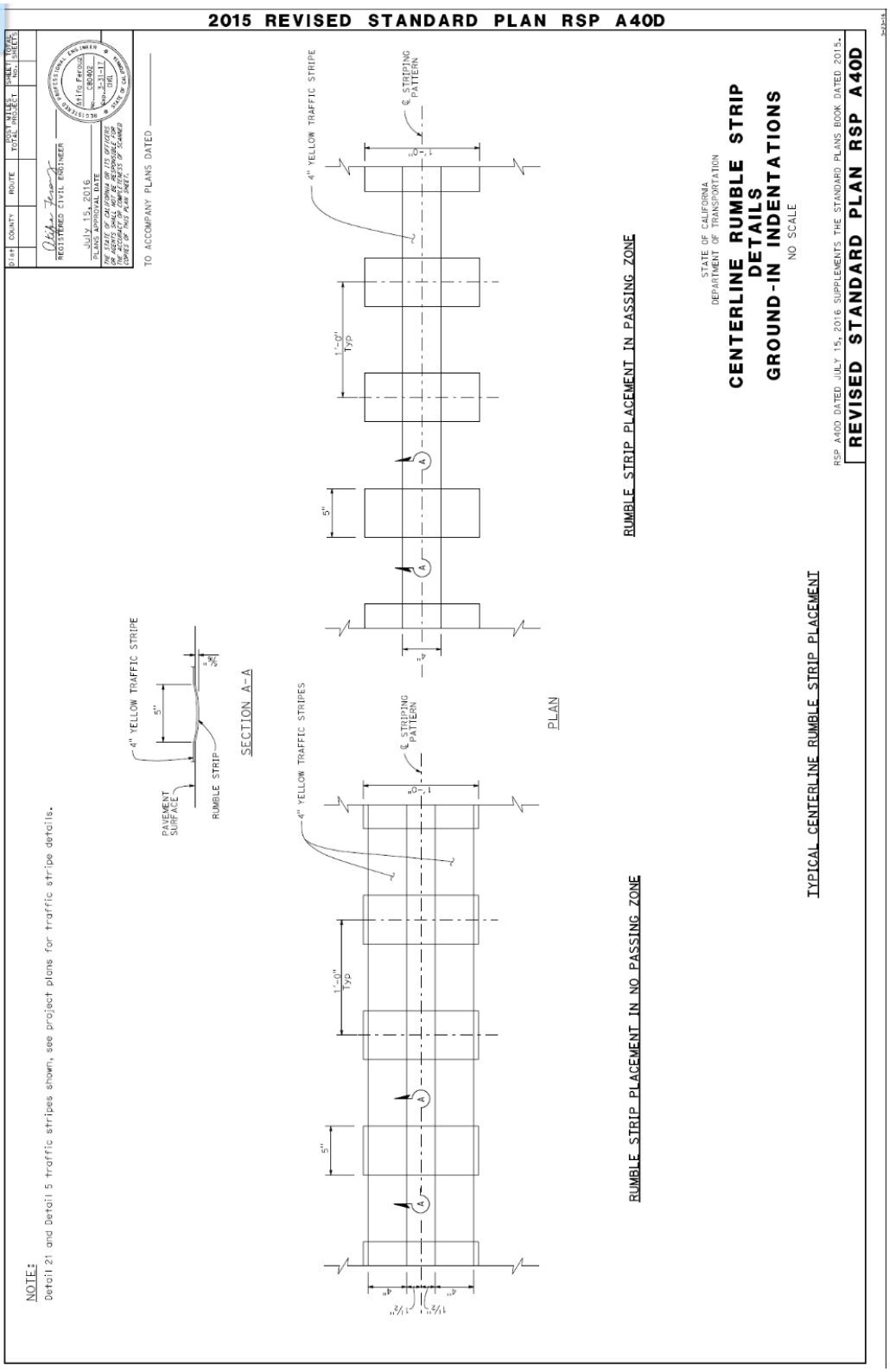


VA ALTERNATIVE 5.2a

Adopt Class IV bikeway cross-section

Assumptions and Calculations:

- 1 ft. wide rumble strip per Caltrans Revised Standard Plan RSP A40D (below).



VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

Initial Cost Savings:	($1,140,000)*
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	-1 %
Value Change:	-2 %

**Reflects the true cost to implement a Class IV two-way cycle track without the pavement width reductions of Alternatives 5.1a and 5.1b. Additional details are included in the following 5.2 Commentary provided by TRC post-VA Study.*

Description of Baseline Concept: The project baseline roadway cross-section is a 72 ft. paved width with four lanes and bike lanes on each side.

Description of Alternative Concept: This concept would adopt a variation of the Class IV bikeway cross-section identified as part of the TAMC multi-modal corridor concept. The resulting cross-section would include a 3 ft. wide median buffer; three 11 ft. wide and one 12 ft. wide travel lanes; a 5 ft. wide paved shoulder on the southbound side; and an 8 ft. wide Class IV bikeway with a 1 ft. wide buffer adjacent to an 8 ft. wide paved shoulder on the northbound side. This configuration results in a 70 ft. wide paved cross-section.

Advantages:

- The low profile curb would be a more durable form of bikeway separation than the flexible posts
- Reduces construction cost

Disadvantages:

- The buffer width for the flexible delineator posts would be 1 ft. instead of 3 ft.
- Selection of this alternative would preclude implementation of Alternatives 5.1a - 5.1d

Discussion: The baseline design is a 72 ft. wide paved roadway, per "D" Line Davis Road Typical Section Sta 170+00 to 174+50. This section is summarized below:

- 8' paved shoulder/Class II bike lane
- 12' travel lane
- 12' travel lane
- 8' center median
- 12' travel lane
- 12' travel lane
- 8' paved shoulder/Class II bike lane

VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

The Alternative Class IV bikeway cross-section that is part of the TAMC multi-modal corridor concept consists of a 72 ft. wide paved configuration that includes:

- 8' two-way Class IV cycle track on the east side
- 3' buffer
- 8' paved shoulder
- 11' travel lane
- 11' travel lane
- 3' center median
- 11' travel lane
- 12' travel lane
- 5' paved shoulder

The VA team's alternative design results in a 70 ft. wide paved roadway, per the VA alternative sketch:

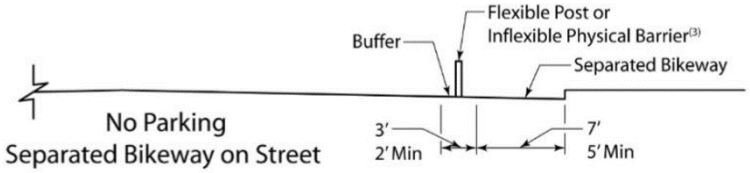
- 8' two-way Class IV cycle track on the east side
- 1' buffer*
- 8' paved shoulder
- 11' travel lane
- 11' travel lane
- 3' center median buffer
- 11' travel lane
- 12' travel lane
- 5' paved shoulder

* represents VA alternative modifications

All alternatives also include a 3 ft. wide unpaved shoulder outside of the paved shoulder. In some locations this unpaved shoulder will provide useful utility, in other cases a drainage dike exists at the edge of the pavement and would restrict use of the unpaved shoulder.

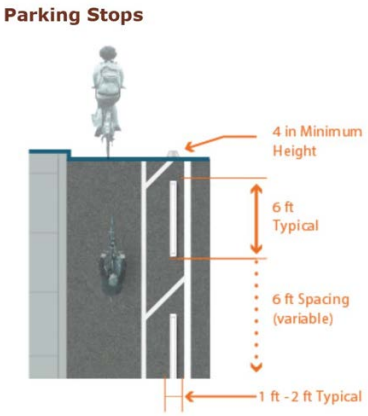
The project alternative calls for a 3 ft. buffer for the flexible delineator post in addition to an 8 ft. shoulder separating cyclists from vehicles; therefore, the total separation between cyclists and traveling vehicles is 11 ft. The VA team's alternative recommends reducing the width of the separation buffer to 9 ft. which includes the 8 ft. shoulder buffer.

Under typical urban conditions where Class IV bikeways have been developed, the travelled way is adjacent to the cycle track; 3 ft. is the preferred separation and 2 ft. is the minimum recommended (see image to the left) per attached DIB 89 Figure 3.0.



VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track



In the case of Davis Road, an 8 ft. shoulder separated the travelled lane and the cycle track, so the separation could be reduced. FHWA recommends a parking stop buffer of 1 to 2 ft. (see right image), per attached Figure 12 from the Separated Bikeway Planning and Design Guide, 2015. The proposed separation is 1 ft. with an intermittent AC dike, recycled plastic parking stop, or recycled rubber channelizer.

During the team's site visit, large accumulations of mud were present on the roadway and agricultural vehicles were frequently using the road. Flexible posts may be damaged more easily by large agricultural equipment and could become a maintenance burden. Instead of the proposed flexible post, a low dike or curb is recommended, with openings to allow for drainage.

An example of the Santa Cruz cycle-track is shown below:

Technical Review Comments: During the VE Technical Review Meeting, the County Project Manager explained the roadway shoulders on Davis Rd. are frequently used by large and slow-moving farm tractors.

Project Management Considerations: Removal of the flexible posts could improve communications with the farming stakeholders during design and operations.

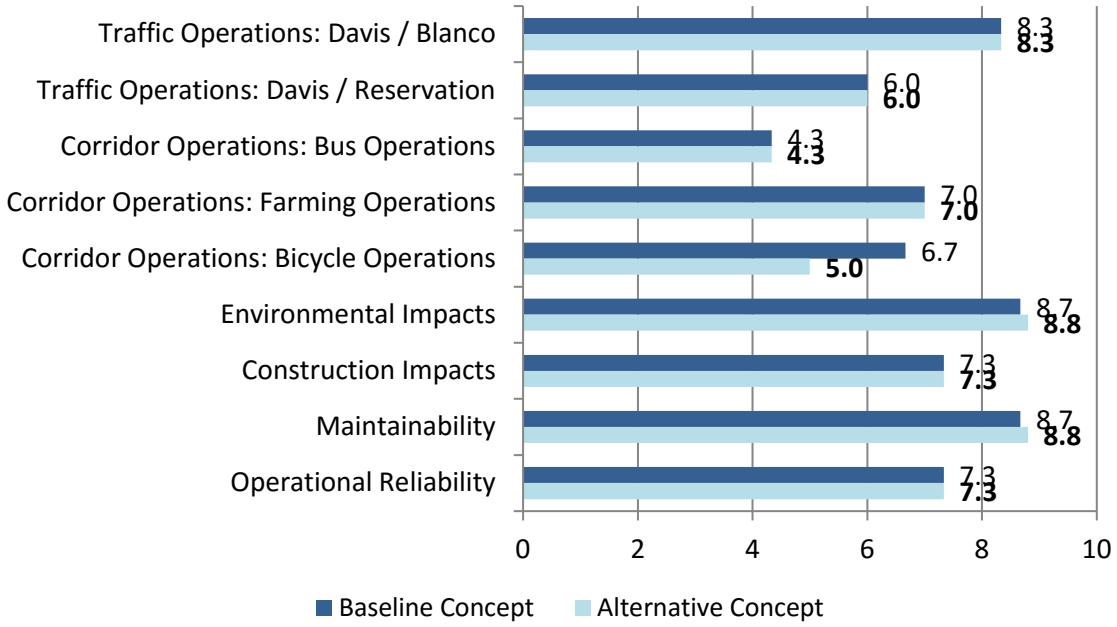
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: There would be a mandatory design exception required for the 5 ft. shoulder on the opposite side in order to fit the cycle track on the bridge. There is some risk in not getting approval, and the entire bridge may not be eligible for reimbursement by FHWA. This implication of the loss of federal funds from FHWA could be around $30 M.

VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

Comparison of Performance



Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Slightly less maintenance – curbs/dikes should be less maintenance than replacing flexible delineator posts.
Environmental Impacts	Reduces project footprint by about 2.5% which will result in a slight reduction to agricultural property and related mitigation.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	Decreased. Cyclists are limited to an 8 ft. two-way cycle track compared to the baseline of an 8 ft. shoulder moving with traffic. Riding against traffic is typically not preferred in the cycling community and also makes intersection crossings more difficult.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

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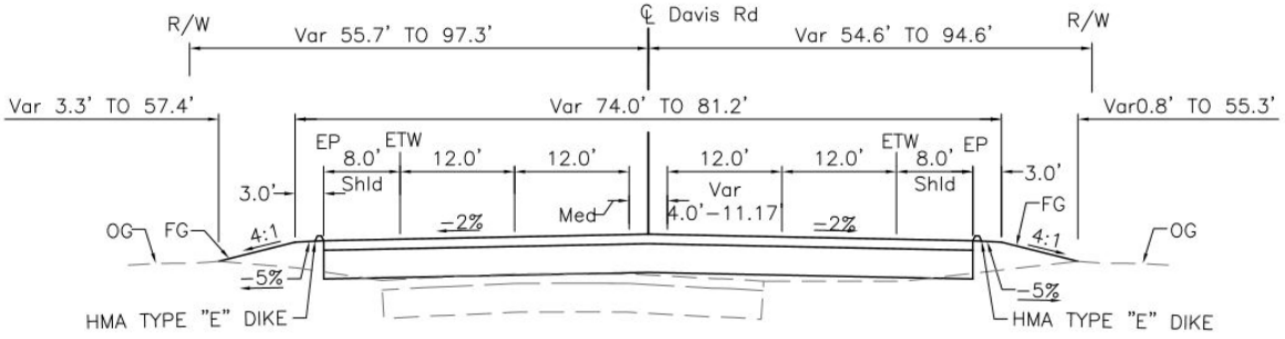
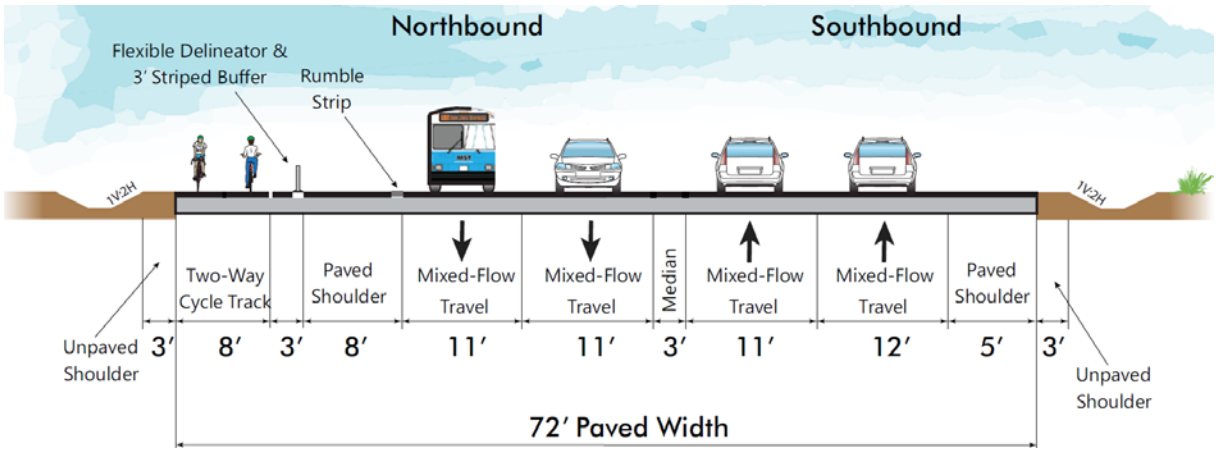
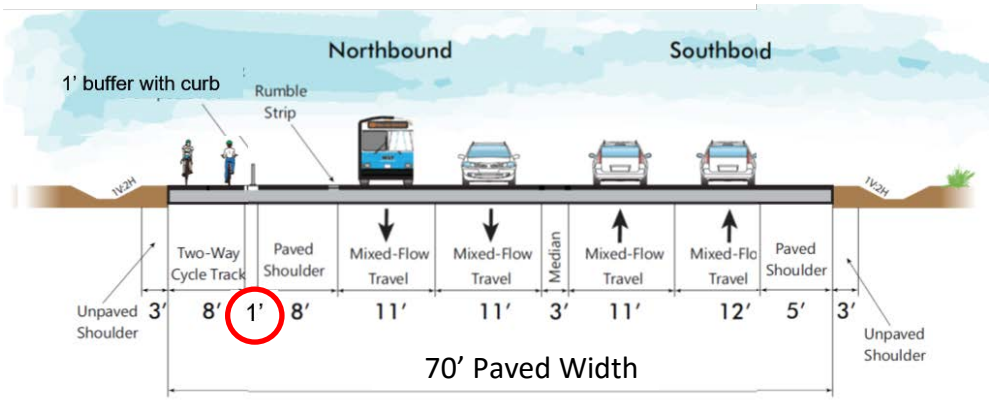
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch



Assumptions and Calculations:

- 1 ft. wide flexible delineator post buffer per Caltrans Standard Plan A73C.

VA ALTERNATIVE 5.2b

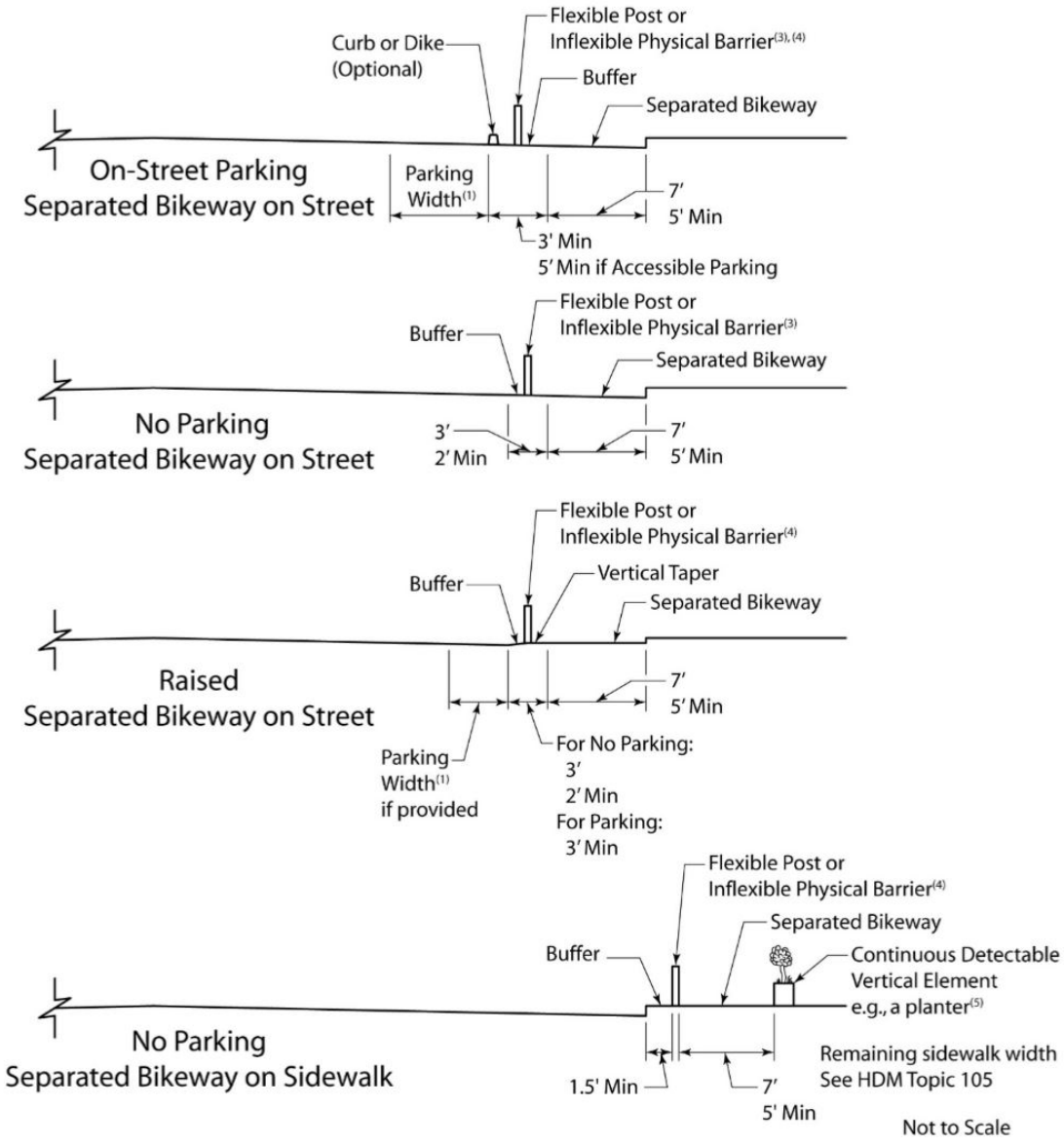
Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

References:

DIB 89 December 30, 2015

Figure 3.0

Typical Class IV Bikeway (Separated Bikeway) Cross Sections

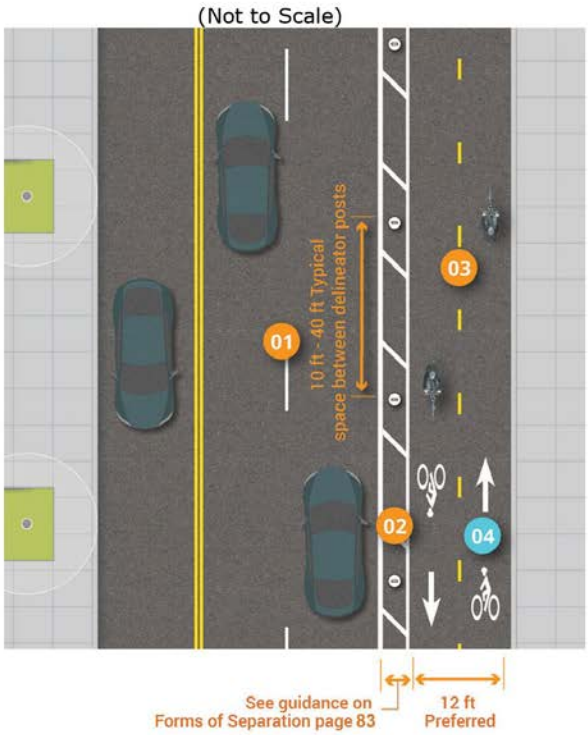


VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

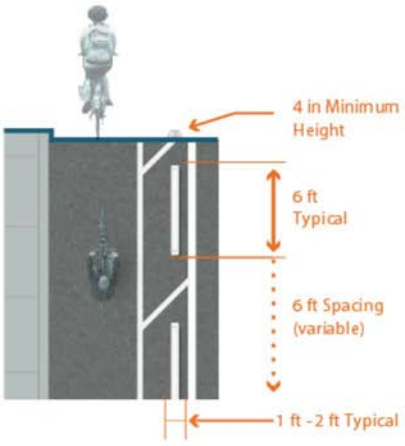
FHWA Separated Bikeway Planning and Design Guide, 2015

Figure 12



1. Due to operational and user expectations, this design is best used when there is no room for separated bike lanes on both sides of the street.
2. For further guidance on buffer selection and installation, see page 83.
3. A centerline to separate the two-way bicycle traffic marked in accordance with the MUTCD (2009).
4. For further guidance on typical signs and markings for separated bike lanes, see page 127

Parking Stops



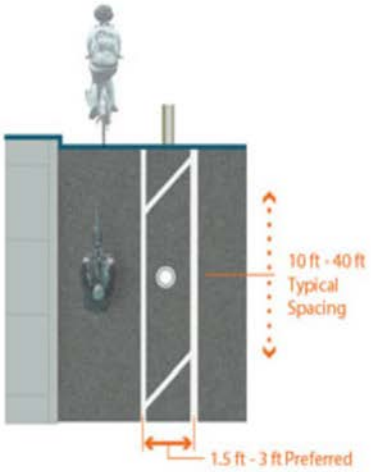
Baseline Road separated bike lane in Boulder, CO. (Source: City of Boulder)

Parking stops and similar low linear barriers are inexpensive buffer solutions that offer several benefits. These barriers have a high level of durability, can provide near continuous separation, and are a good solution when minimal buffer width is available. However, using the minimum width will not provide the same level of comfort and protection due to their low height and bicyclists' proximity to traffic.

VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

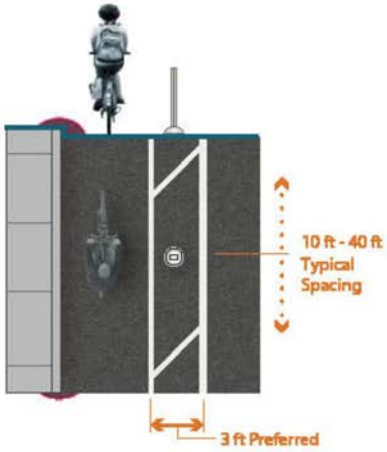
Bollards



Indianapolis, IN (Source: PeopleForBikes)

Bollards are a rigid barrier solution that provides a strong vertical element to the buffer space. Depending on how frequently the bollards are placed, this form of separation may result in an increased cost compared to others, and may not be as appropriate on higher speed streets.

Forms of Separation
Delineator Posts

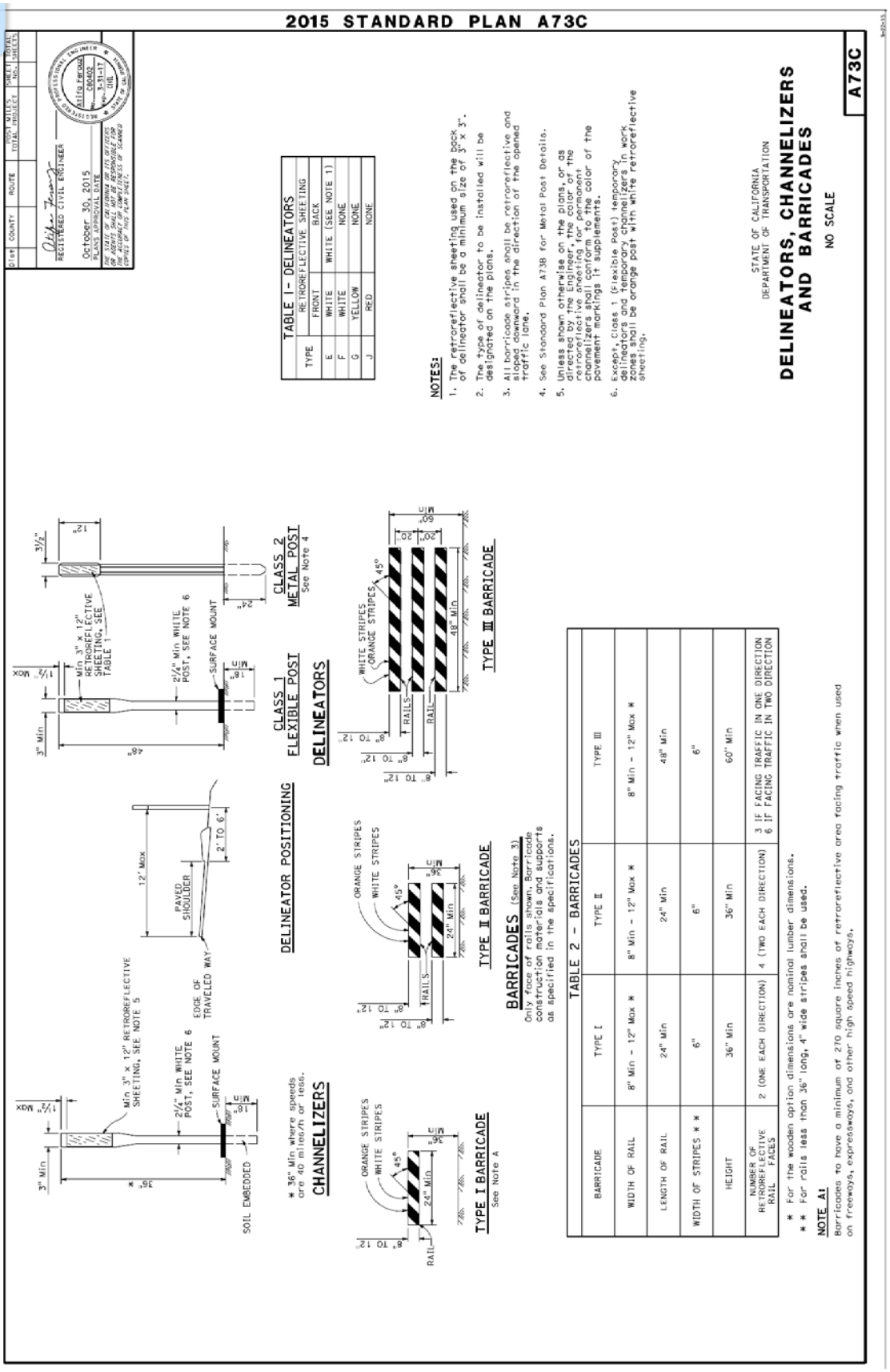


San Francisco, CA. (Source: Dianne Yee)

Flexible delineator posts are one of the most popular types of separation elements due to their low cost, visibility, and ease of installation. However, their durability and aesthetic quality can present challenges and agencies may consider converting these types of buffers to a more permanent style when design and budgets allow. Delineators can be placed in the middle of the buffer area or to one side or the other as site conditions dictate (such as street sweeper width or vehicle door opening).

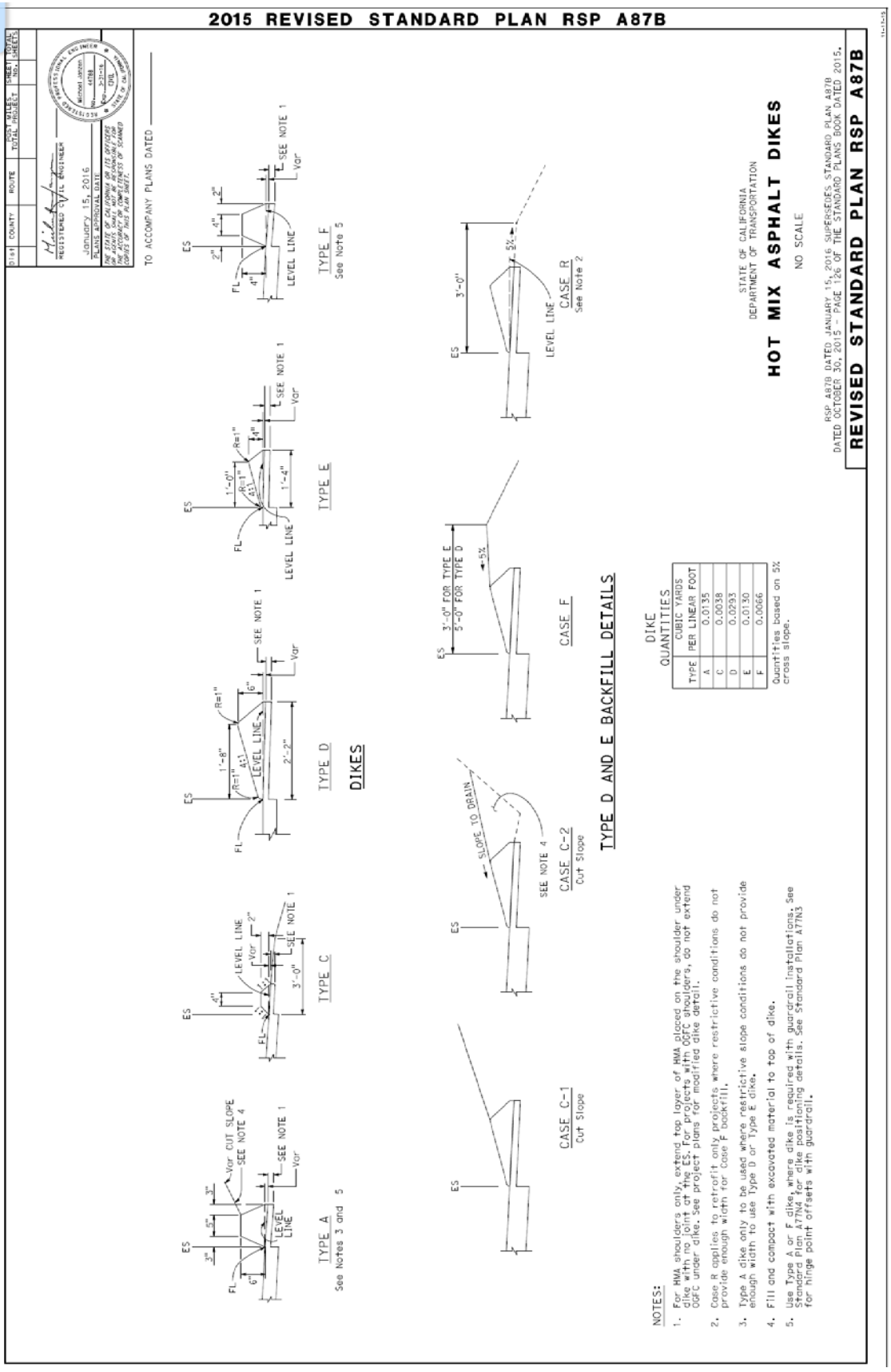
VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track



VA ALTERNATIVE 5.2b

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track



5.2 COMMENTARY – provided by TRC post-VA Study

VA Alternatives 5.2a and 5.2b, Cycle-Track

Introduction: V.A. Alternatives 5.2a and 5.2b propose a reduced traveled way width and the inclusion of a two-way Class IV bikeway (cycle-track) along Davis Road from Reservation Road to Blanco Road as compared to the baseline project roadway configuration of AASHTO minimum lane and shoulder widths and 8' Class II bike lanes/shoulders on each side of Davis Road. The alternatives as proposed incorporate flexible delineators and a reduced buffer width to separate traffic from a dedicated Class IV bikeway. This analysis comments on that configuration and calculates the true cost and value change of incorporating this alternative.

The Alternatives:

- V.A. Alternative 5.2a proposes the use of an 8' wide two-way cycle track with a 3' unpaved shoulder and a 3' striped buffer, separated from vehicular traffic by flexible delineators, per the attached typical section FIGURE 1.

- V.A. Alternative 5.2b proposes the use of a narrower 1' wide buffer separating a two-way cycle track, per the attached typical section FIGURE 2.

Engineering / Traffic Analysis: Although V.A. Alternative 5.2a does adhere to FHWA and Caltrans DIB 89 guidelines for separation (see attached FIGURE 3, DIB 89 Figure 3.0), it would not provide the same level of comfort and safety for bicyclists as would the option of separating vehicular traffic with a concrete barrier.

With regards to the physical separation of the cycle-track, in high speed environments such as Davis Road an inflexible barrier should be used to separate traffic. Specifically, a concrete barrier is recommended here as the design speed along Davis Road is 60 mph, posted at 55 mph. In Caltrans DIB 89 (page 9) it is stated, in the inflexible barrier section, that "in higher speed environments a concrete barrier should be used". Thus, flexible barriers, such as delineators, are not proper in this application.

Further, according to Caltrans Highway Design Manual, the use of a concrete barrier would require the specified minimum 2' clearance from the edge of travel way of a bike path/cycle track to a continuous fixed object, with 3' clearance recommended, in order to avoid bicyclists getting their handlebars hung up on the barrier. A traffic rated concrete barrier typically has a base of 2' width, increasing the minimum buffer width to 4', with 5' being preferred. Thus a 3' or the narrower 1' buffer of V.A. Alternative 5.2b are not acceptable in this application.

We further consider Alternative 5.2b to not be a viable alternative as discussed following. The V.A. Study Report Preview references a picture from the FHWA Separated Bike Lane Planning and Design Guide that uses parking stops to separate the cycle track from the travel way. See attached FIGURE 4 from VA Alternative 5.2b. It shows a 1' – 2' typical width of the parking stop measured from the buffer zone outside edge to the inside edge of the parking stop. It does not allow for a 1' wide buffer zone, nor does Figure 3.0 from Caltrans DIB 89. The Value Analysis Study Report also references pictures representing one way traffic in low speed environments. The minimum specified buffer zone is 2' for this situation with 3' recommended. Thus, we consider this scenario not applicable in our proposed high speed environment.

5.2 COMMENTARY – provided by TRC post-VA Study

VA Alternatives 5.2a and 5.2b, Cycle-Track

In addition, the use of parking stops is not an acceptable inflexible physical barrier. A parking stop does not provide the same level of comfort for the Cycle Track users and may be dangerous for vehicles that strike it at the posted 55 mph speed. Although the use of parking stops in the separation buffer between the cycle track and vehicular traffic does adhere to the intention of section 3.1 of DIB 89, as it discourages the intrusion of motor vehicles into the bikeway, it will not redirect a vehicle that strikes the stop.

Cost Estimates: The construction cost estimate calculated herein for the cycle-track includes traffic striping, pavement markings, a concrete barrier, and traffic signing. It also includes decomposed granite as the shoulder material on the cycle track side of the barrier that would be used as a bicycle shoulder, as typically used with Class 1 bicycle paths. The cost estimate does not include the cost savings attributable to the reduction in the width of the vehicular travelled way, as those cost savings are properly included in V.A. Alternative 5.1a. That is, the median width reduction realized in accepted V.A. Alternative 5.1a and the bridge width reduction in accepted V. A. Alternative 5.1b can be realized without the inclusion of a cycle track. The cost estimate does include the thinner structural section that can be specified in the cycle track area in lieu of the thicker vehicular structural section in the baseline.

The true cost of Alternative 5.2a, using a concrete barrier, is $1,140,000 over the baseline per the cost estimate in Attachment 1. If a flexible barrier is used in lieu of the concrete barrier, the calculated cost is $290,000 over the baseline, per the cost estimate in Attachment 2. Again, however, the use of delineators is not recommended nor warranted in this scenario.

A cost was not calculated for V.A. Alternative 5.2b as again for our scenario that configuration violates the relevant design codes and guidelines regarding buffer widths and barrier types.

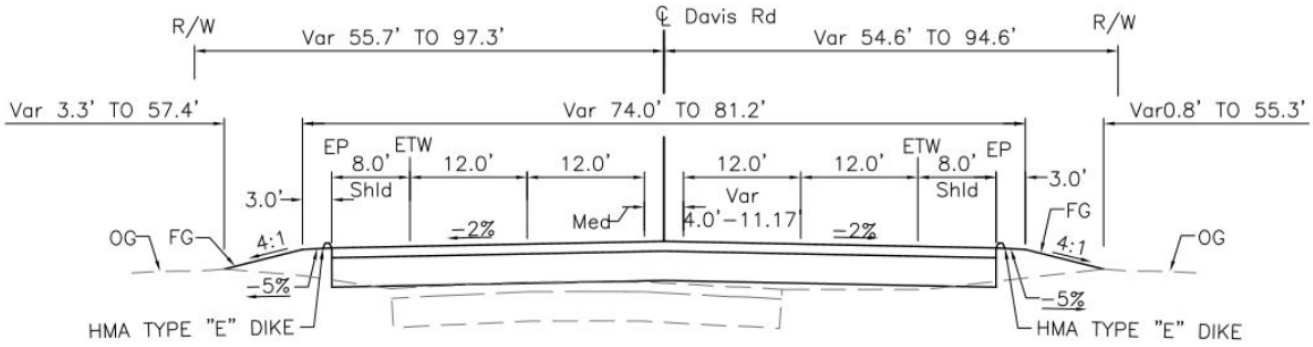
Further Considerations: It is noted that V.A. Alternatives 5.1a and 5.1b, incorporating a 4’ reduction in the median width along the roadway and bridge, cannot be implemented if the cycle-track is added to the project. Thus, the cost savings of $4.1 million and increased value resulting from that reduction in width in accepted V.A. Alternatives 5.1a and 5.1b would not be realized if the cycle-track is incorporated.

VA ALTERNATIVE 5.2a

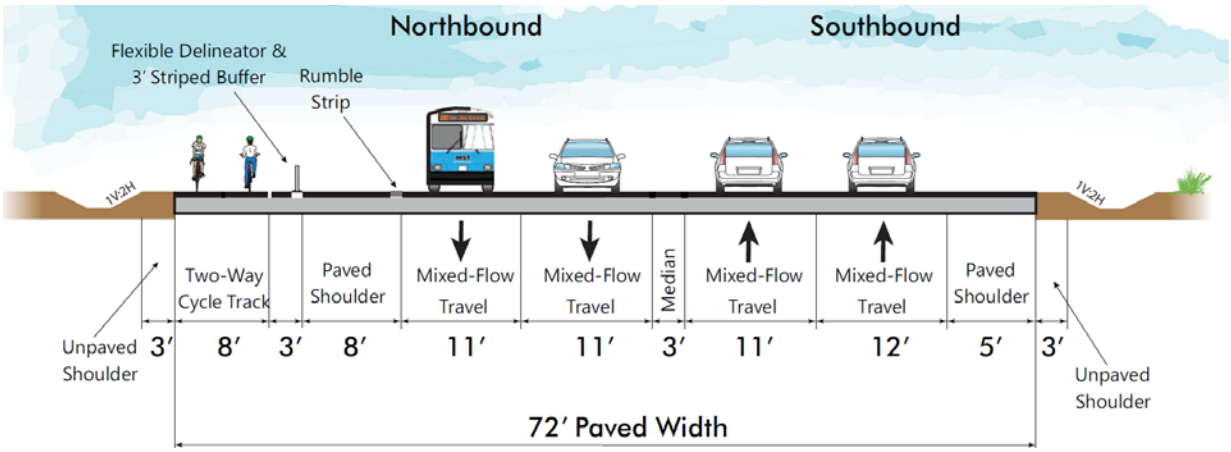
FIGURE 1

Adopt Class IV bikeway cross-section

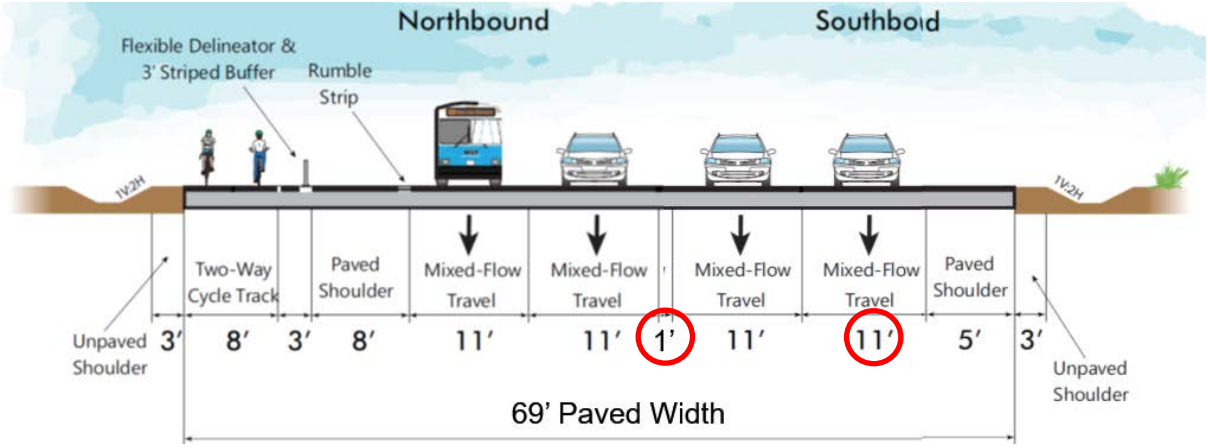
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch

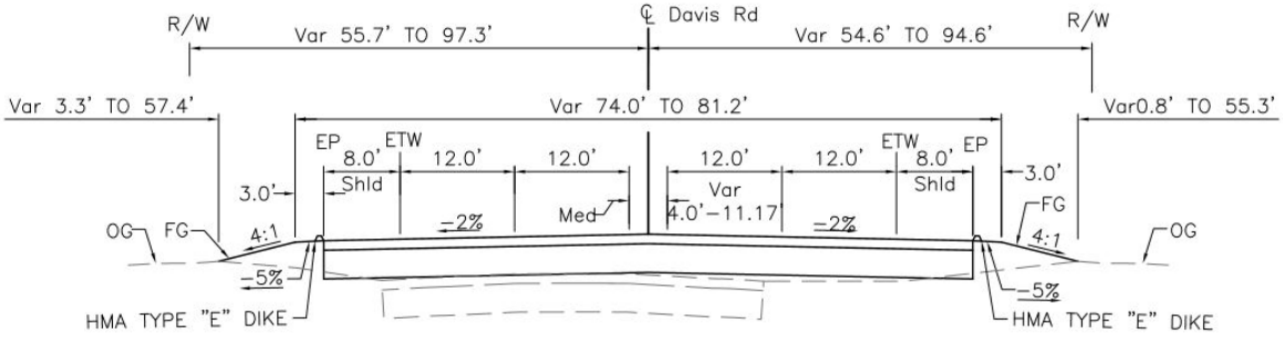


VA ALTERNATIVE 5.2b

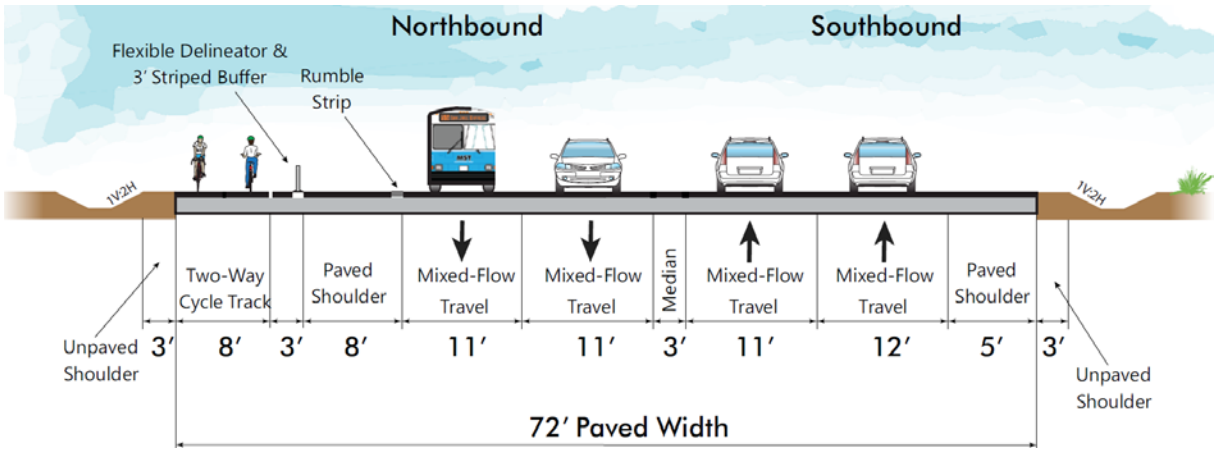
FIGURE 2

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

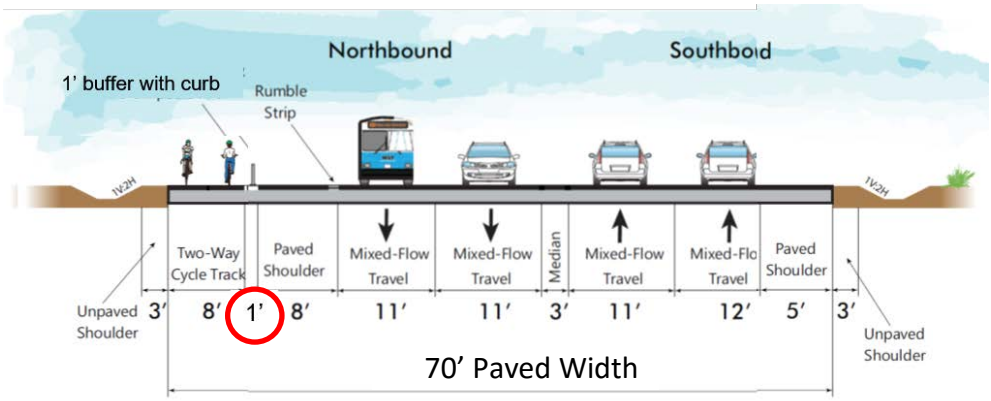
Baseline Concept Sketch



Alternative TAMC Multi-modal Corridor Concept



VA Alternative Concept Sketch



Assumptions and Calculations:

- 1 ft. wide flexible delineator post buffer per Caltrans Standard Plan A73C.

VA ALTERNATIVE 5.2b **FIGURE 3**

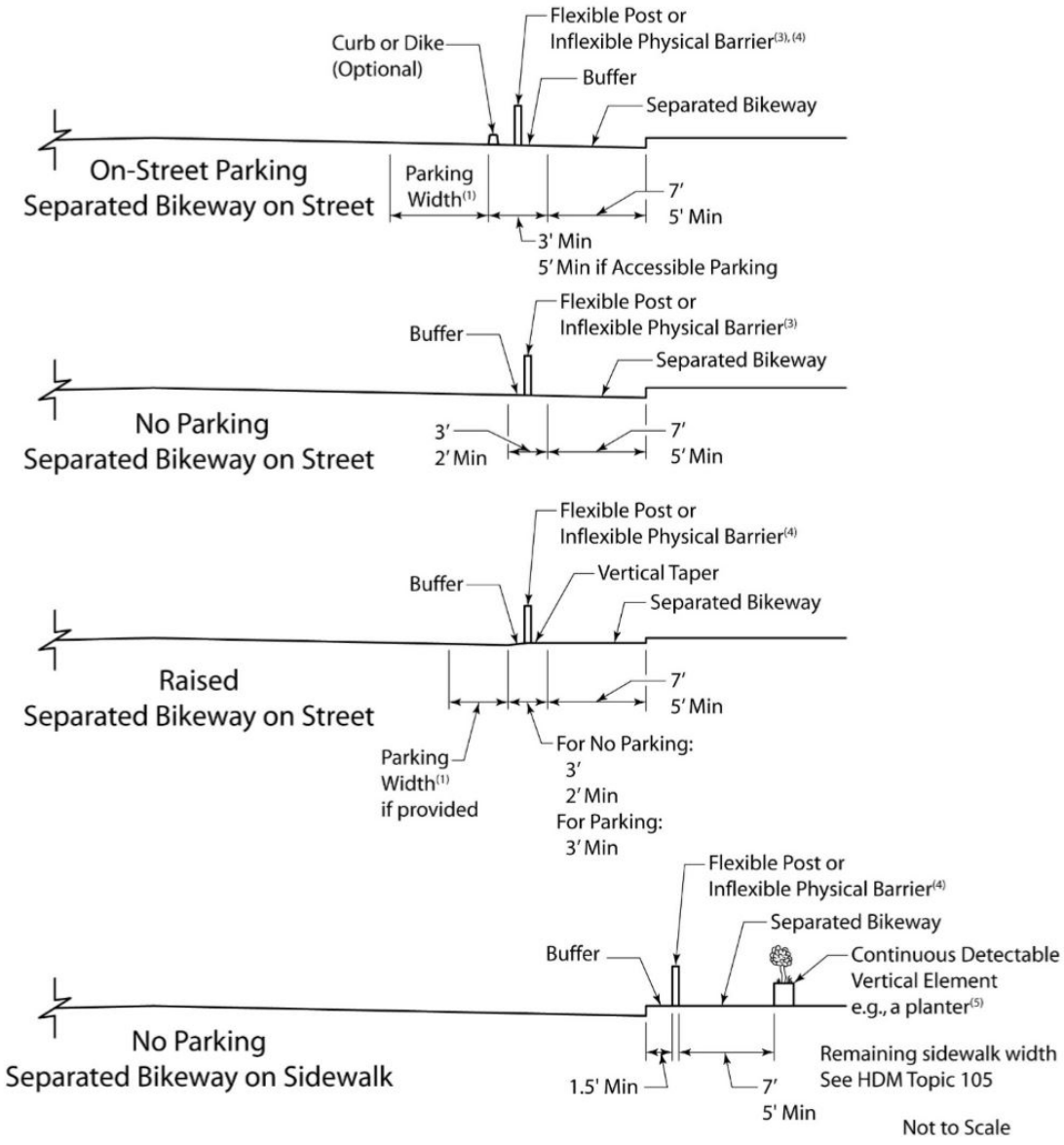
Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track

References:

DIB 89 December 30, 2015

Figure 3.0

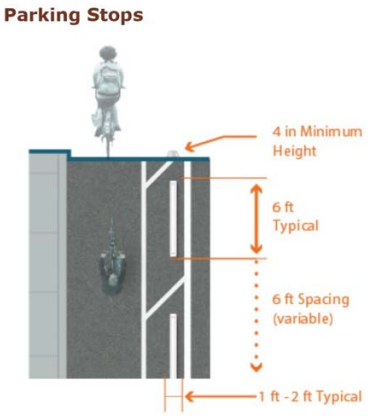
Typical Class IV Bikeway (Separated Bikeway) Cross Sections



VA ALTERNATIVE 5.2b

FIGURE 4

Adopt Class IV bikeway cross-section and modify buffer between shoulder and two-way cycle track



In the case of Davis Road, an 8 ft. shoulder separated the travelled lane and the cycle track, so the separation could be reduced. FHWA recommends a parking stop buffer of 1 to 2 ft. (see right image), per attached Figure 12 from the Separated Bikeway Planning and Design Guide, 2015. The proposed separation is 1 ft. with an intermittent AC dike, recycled plastic parking stop, or recycled rubber channelizer.

During the team's site visit, large accumulations of mud were present on the roadway and agricultural vehicles were frequently using the road. Flexible posts may be damaged more easily by large agricultural equipment and could become a maintenance burden. Instead of the proposed flexible post, a low dike or curb is recommended, with openings to allow for drainage.

An example of the Santa Cruz cycle-track is shown below:

Technical Review Comments: During the VE Technical Review Meeting, the County Project Manager explained the roadway shoulders on Davis Rd. are frequently used by large and slow-moving farm tractors.

Project Management Considerations: Removal of the flexible posts could improve communications with the farming stakeholders during design and operations.

Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: There would be a mandatory design exception required for the 5 ft. shoulder on the opposite side in order to fit the cycle track on the bridge. There is some risk in not getting approval, and the entire bridge may not be eligible for reimbursement by FHWA. This implication of the loss of federal funds from FHWA could be around $30 M.

SHEET NO. 1 OF 1
PROJECT NO. 154189
DATE 11/4/16
BY GWA
CHK'D

SUBJECT Cycle Track True Cost (Concrete Barrier)

Concrete Barrier (Type 60) - Assume $50/LF per Caltrans Contract Cost Data.

Davis Road Length 10,900 LF
(Reservation to Blanco)

∴ 10,900 LF x 50 $/LF = $545,000

Pavement Markings - Cycle Track

Centerline Stripe - 4" Assume $1/LF ∴ 10,900

Inside lane line to separate bicycle traffic from Continuous obstruction.
line 27B - 10,900 Assume $1/LF ∴ 10,900

Paint - Pavement Marking - Bicycle symbols & Special Green Paint @ intersects & driveways.
Assume $20,000

Traffic Signs - Assume $5,000.

Concrete Barrier End Treatments - 25' TRACC System
Assume 6 needed @ 35,000 each = $210,000

Decomposed Granite Shoulder - 3" Thick section @ $5/SF 2' wide
All weather surface for Class IV Bicycle Shoulder - one side only
10,900' x 2' x $5/SF = $109,000

Total Cost = $545,000 + $10,900 + $10,900 + $20,000 + $5,000 + $109,000 + $210,000 =
= $910,800

Contingency = 25% = 227,700

Cycle Track Concrete Barrier True Cost = $1,140,000

A

SHEET NO. _____ OF _____

PROJECT NO. _____

DATE 11/7/16

BY GWA

CHK'D _____

SUBJECT V.A. 5.2A Recommended Cycle Track

True Cost

Flexible Delineators @ 10' Seperation Class 1 Delineator

10,900 ft of Project / 10' = 1090 posts.

Assume #45 each = 49,050

Striping - Centerline - Assume #1/LF ∴ #10,900

Paint Pavement Marking (2) 27B Stripe = 2(10,900 Lf) = 21,800 Lf x #1/LF = 21,800
+ Cross hatch Stripe @ 6' OC

10,900 / 6' ≈ 1816 Stripes

$\cos 45° = \frac{3}{z}$

$z = \frac{3}{\cos 45°} = 4.24'$

Clevron Stripe 1816 x 4.24' = 7699 Lf x #2/LF ≈ #15,400

Paint Pavement Marking - Bicycle Symbols / Special Green Paint @ Intersections & driveways.

Assume #20,000

Traffic Signs - Assume #5,000

2' Decomposed Granite Shoulder - #109,600 - See Concrete Barrier A11 for Calculation

Total Cost = #49,050 + #10,900 + #21,800, #15,400, #20,000 + #5000 #109,6
= #231,150

Contingency 25% = #57,787

V.A 5.2A True Cost ≈ 290,000

A

VA ALTERNATIVE 6.0

Modify frontage road and reduce length

Initial Cost Savings:	$1,270,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+1 %
Value Change:	+3 %

Description of Baseline Concept: The baseline concept includes an 1,100 ft. long frontage road from an existing industrial waste treatment plant road on the west side of Davis Rd. running north to Foster Rd. There is no signalization at Foster Rd.

Description of Alternative Concept: The alternative proposes a 400 ft. long frontage road running north from the industrial waste treatment plant to approximately 250 ft. north of the end of the new bridge and enters Davis Rd. on the west side in a similar fashion as the baseline concept.

Advantages:

- Reduces cost
- Reduces right-of-way take
- Potential for fewer power pole relocations

Disadvantages:

- Decreases access control level by adding driveway to Davis Rd.

Discussion: A frontage road is typically recommended when the number of access openings on one side of the expressway exceeds three in 1,600 ft. (HDM 104.3.1). This road is anticipated to have very few trips per day, approximately 8 trips per day according to the County. Due to the limited number of daily trips to/from the plant and current access to Davis Rd., it's recommended to modify and reduce the length of the frontage road.

By moving the intersection of the frontage road from Foster Rd. to 250 ft. north of the end of the bridge, approximately two-thirds the length of the baseline frontage road is eliminated.

If Foster Rd. is signalized in the future, the frontage road could then be extended north to Foster Rd.

Technical Review Comments: The County noted approximately 8 trips per day to/from the industrial waste treatment plant.

Project Management Considerations: None noted.

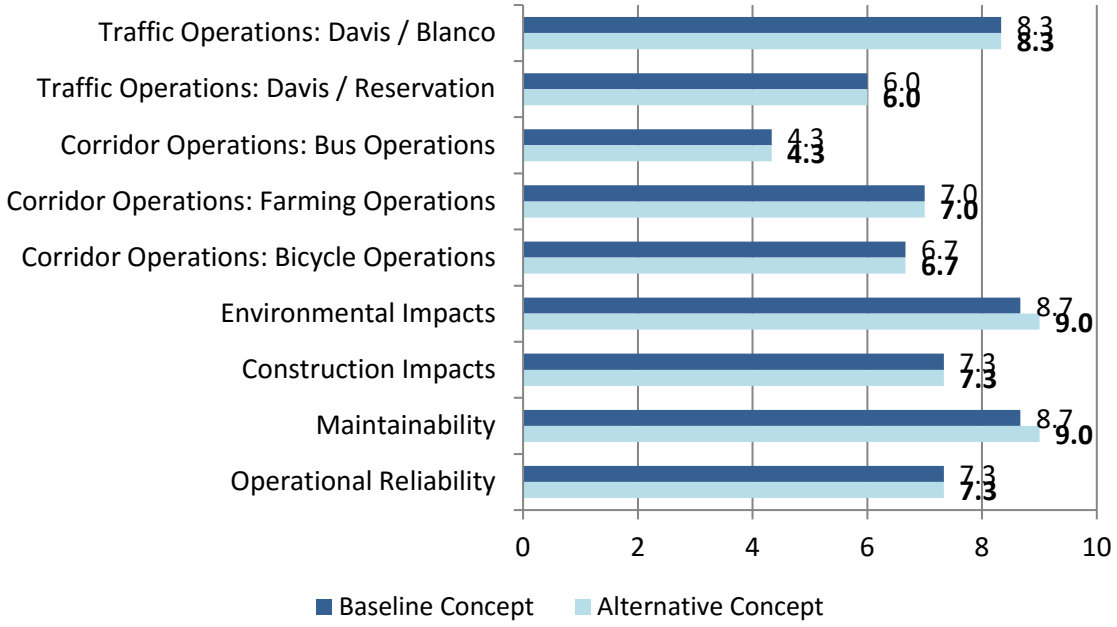
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: Note that left-turners into the plant's driveway would not have a left-turn pocket, and left turns may not be allowed into and out of the driveway, leading to out-of-direction travel. This would lengthen the trips to the plant and to the congestion at other intersections. If a left-turn pocket is constructed to allow left-turns into and out of the driveway, then there would be significant additional costs in roadway and bridge construction.

VA ALTERNATIVE 6.0

Modify frontage road and reduce length

Comparison of Performance



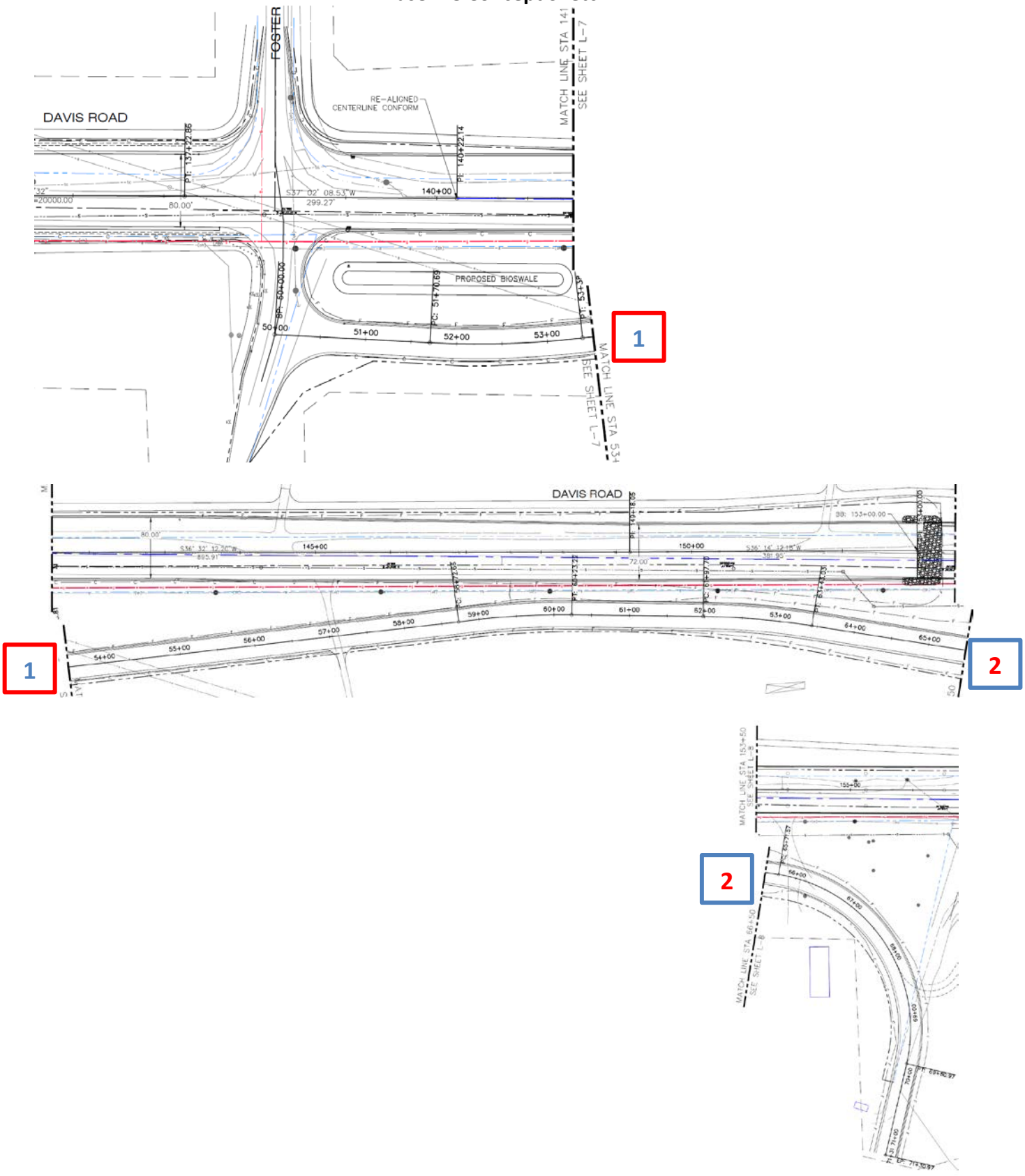
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Improved due to shorter frontage road distance.
Environmental Impacts	Reduced impact due to less right-of way acquisition which reduces the amount of agricultural land impacts and related mitigation, improving the overall environmental impact.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

VA ALTERNATIVE 6.0

Modify frontage road and reduce length

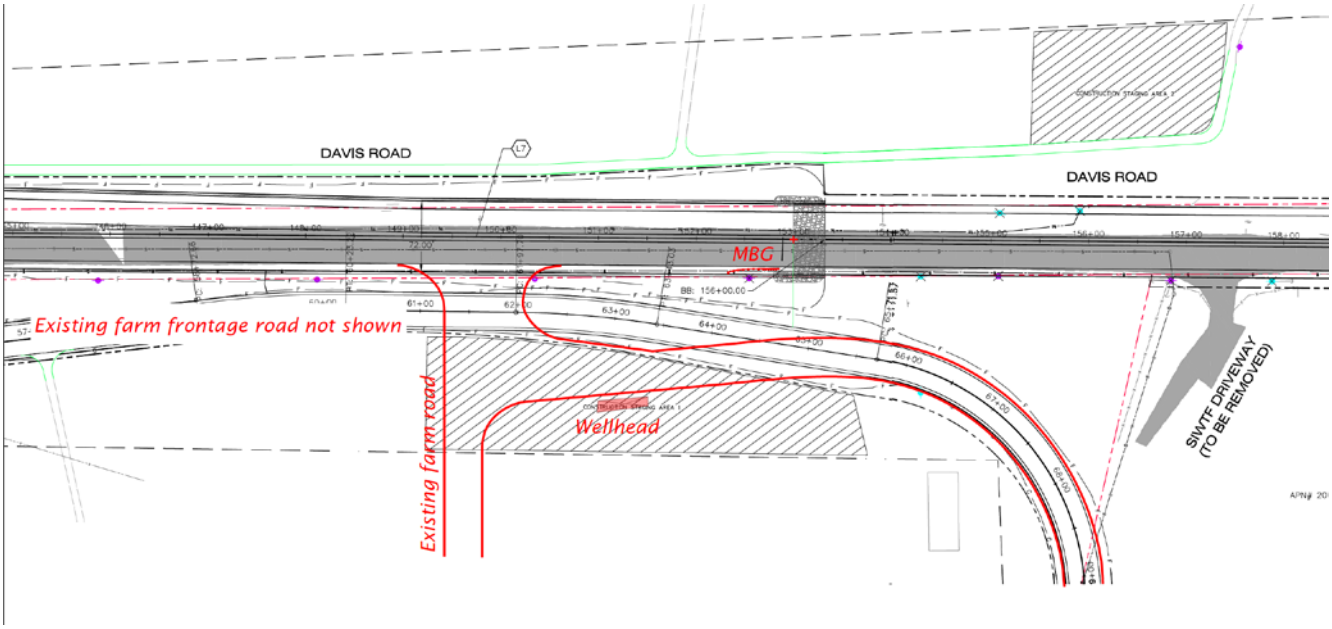
Baseline Concept Sketch



VA ALTERNATIVE 6.0

Modify frontage road and reduce length

VA Alternative Concept Sketch



Assumptions and Calculations:

VA ALTERNATIVE 6.0

Modify frontage road and reduce length

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
1. Roadway thru 10. Roadway Additions	ls	1	$ 339,000	$ 339,000	0.40	$ 339,000	$ 135,600
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 339,000*			*$ 135,600*
ROADWAY MARK-UP	*36%*			*$ 122,040*			*$ 48,816*
ROADWAY TOTAL				*$ 461,040*			*$ 184,416*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				*$ -*			*$ -*
STRUCTURE MARK-UP	*30%*			*$ -*			*$ -*
STRUCTURE TOTAL				*$ -*			*$ -*
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	ls	1	$ 1,360,000	$ 1,360,000	0.33	$ 1,360,000	$ 448,800
Utility Relocation	ea	6	$ 20,000	$ 120,000	2	$ 20,000	$ 40,000
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 1,480,000*			*$ 488,800*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$1,941,040			$673,216
TOTAL (Rounded)				$1,940,000			$670,000
						SAVINGS	**$1,270,000**

VA ALTERNATIVE 7.0

Reduce Type "D" dikes

Initial Cost Savings:	$400,000
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+1 %
Value Change:	+1 %

Description of Baseline Concept: The current baseline concept includes 14,700 linear ft. of asphalt concrete (AC) dike along Davis Rd. and the SIWTF frontage road.

Description of Alternative Concept: The alternative concept would reduce the amount of AC dike by removing all the dikes from the typical roadway cross-section and keeping the dike only at the intersections.

Advantages:

- Reduces cost

Disadvantages:

- None noted

Discussion: The roadway is crowned and drains to roadside ditches on each side. There are no storm drain catch basins or pipe. The banks are relatively low in height and drainage could be allowed to sheet flow from the roadway to the ditches. Dikes are not required in all locations, and eliminating the dikes will reduce the amount of mud, dirt, and dust that accumulates in the shoulders. The below photo shows such accumulation looking north on Davis Road near the Salinas River.

The dikes at the four intersections and adjacent to the bridge can remain to control runoff.

VA ALTERNATIVE 7.0

Reduce Type “D” dikes

The 4 in. high Type “E” dike is easier to construct than the 6 in. high Type “D” dike and has a greater drainage capacity than a Type “C” dike; therefore, the Type “E” dike is the preferred option for most installations per HDM 303.3. Type “E” dike is shown on the project cross-sections and Type “D” is shown in the estimate, so the recommendation removes Type “D” and adds Type “E” for the four intersections.

Technical Review Comments: None noted.

Project Management Considerations: None noted.

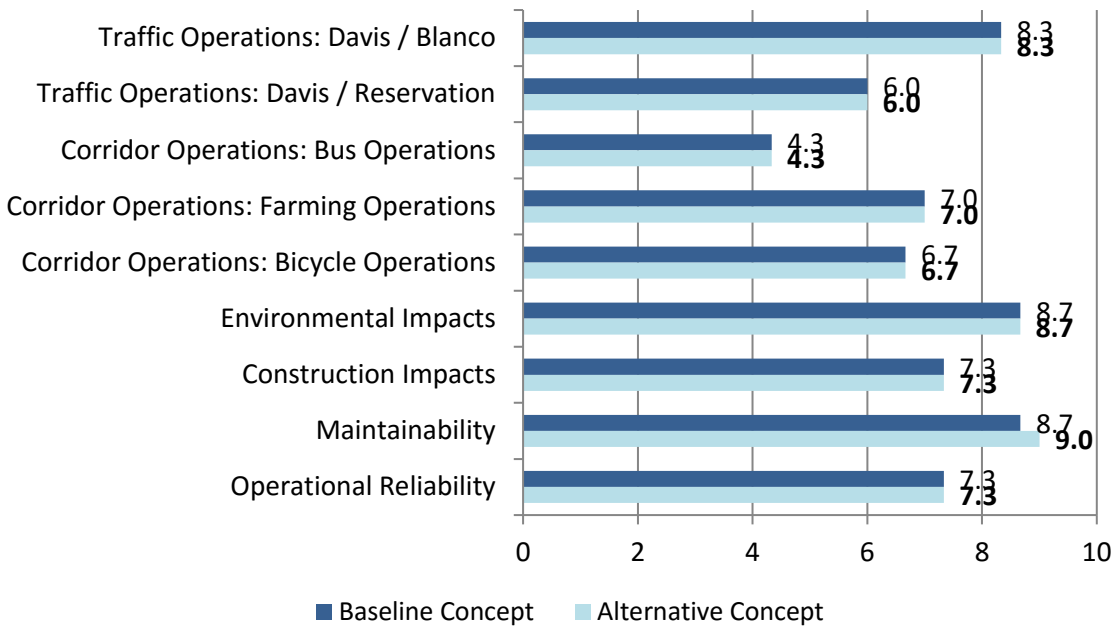
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 7.0

Reduce Type "D" dikes

Comparison of Performance



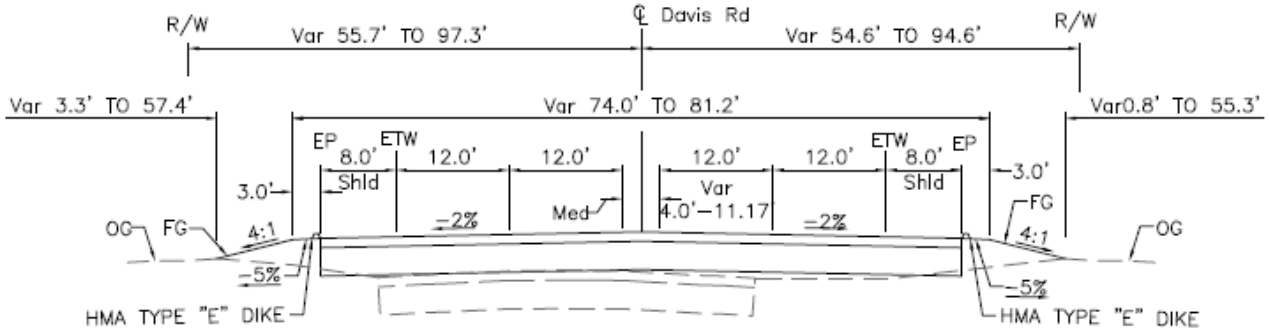
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	Slightly less dike maintenance required.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	Negligible. Slightly improved conditions for large farm vehicles.

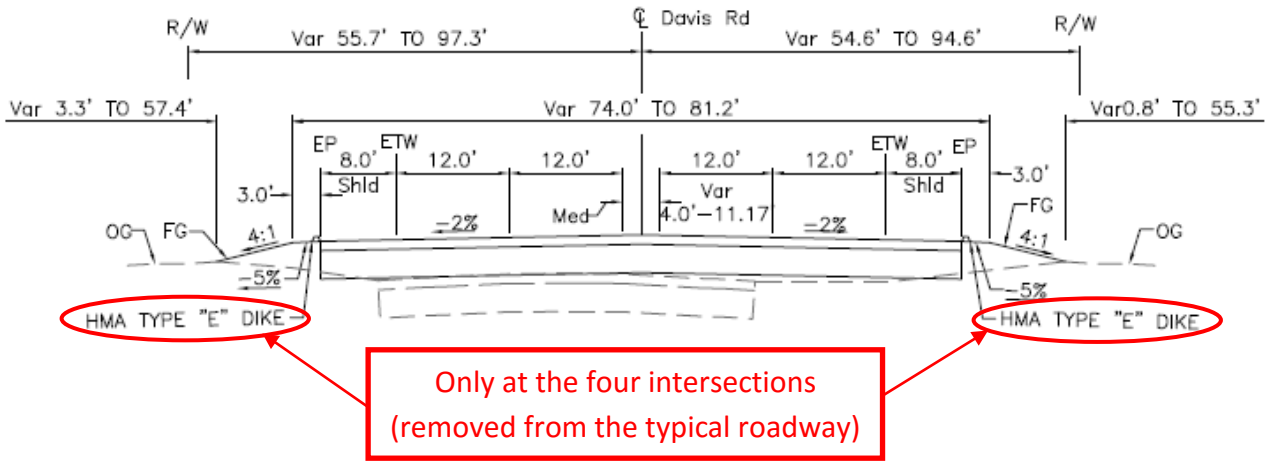
VA ALTERNATIVE 7.0

Reduce Type "D" dikes

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations:

It was assumed dikes would be required at four intersections with eight dike locations each about 125 ft. long for a total of 4,000 ft. of dike. Near the bridge abutments, 1,000 ft. of dike was assumed to provide for embankment drainage control. Total dike required = 5,000 lf.

VA ALTERNATIVE 7.0

Reduce Type “D” dikes

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
Type "D" Dike	lf	14,710	$ 30	$ 441,300	5,000	$ 30	$ 150,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 441,300*			*$ 150,000*
ROADWAY MARK-UP	*36%*			*$ 158,868*			*$ 54,000*
ROADWAY TOTAL				*$ 600,168*			*$ 204,000*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$600,168			$204,000
TOTAL (Rounded)				$600,000			$200,000
						SAVINGS	**$400,000**

VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Initial Cost Savings:	($120,000)
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+3 %
Value Change:	+2 %

Description of Baseline Concept: The baseline concept does not provide any explicit access control along Davis Rd.; however, V-ditches run parallel to the outside shoulders on both sides which will serve as an informal deterrent to agricultural vehicles crossing into Davis Rd. from the adjacent farmland.

Description of Alternative Concept: The alternative concept would install a 6 ft. high field fence along the right-of-way line on Davis Rd. on both sides to provide access control.

Advantages:

- Improves safety by reducing opportunities for traffic conflicts with agricultural vehicles
- Reduces congestion on Davis Rd. by increasing access control
- Does not rely on V-ditches alone to discourage agricultural vehicles from crossing into Davis Rd.
- Reduces damage to and filling of V-ditches from agricultural cross-traffic
- Allows fences to be used by property owners for installation of field screening fabric

Disadvantages:

- Increases construction cost
- Increases future maintenance costs related to maintaining fence

Discussion: The VA team observed during the Site Visit that Davis Rd. is heavily used by agricultural vehicles (e.g., tractors, trucks, field worker vehicles, etc.). Currently, agricultural vehicles have unrestricted access between the fields and Davis Rd. This is a significant concern from both a safety and traffic operations standpoint. Further, the agricultural equipment tends to track a significant amount of mud and debris which creates a safety hazard for vehicles and bicyclists using Davis Rd. Drainage ditches (V-ditches) and bioswales are to be constructed as part of the baseline concept, which will provide some deterrent to agricultural vehicles; however, it is likely that portions of the ditches will be filled in and/or modified by property owners to improve access to Davis Rd. in order to improve the efficiency of their operations.

The VA team considered installing a field fence along the right-of-way lines on either side of Davis Rd. to further restrict access. Additionally, this may be viewed as a betterment by property owners that will facilitate the installation of fabric screening which is frequently used for farming operations to prevent pedestrian and animal access to the crops.

The type of fence could also be Caltrans standard such as barbed wire and mesh (e.g., CSPA86, type BW or WM).

VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Technical Review Comments: The County indicated that the use of a field fence may be preferable to thrie-beam guard rail or chain link and is consistent with agricultural fencing currently used along the corridor.

Project Management Considerations: This could have a very positive impact on the cycling community and farmers.

Discussion of Schedule Impacts: This alternative does not affect the critical path and will not extend the schedule.

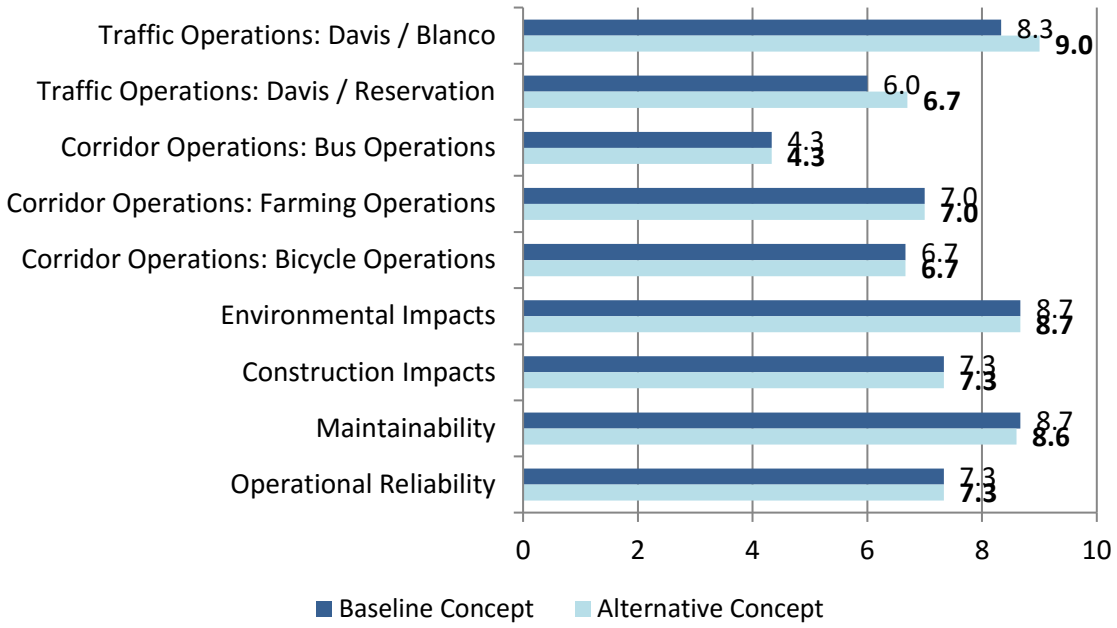
Discussion of Risk Impacts: The field fence is set back sufficiently far enough away from the edge of travel way to not create any additional impacts to the vehicle recovery zone.

Example of Field Fence

VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Comparison of Performance



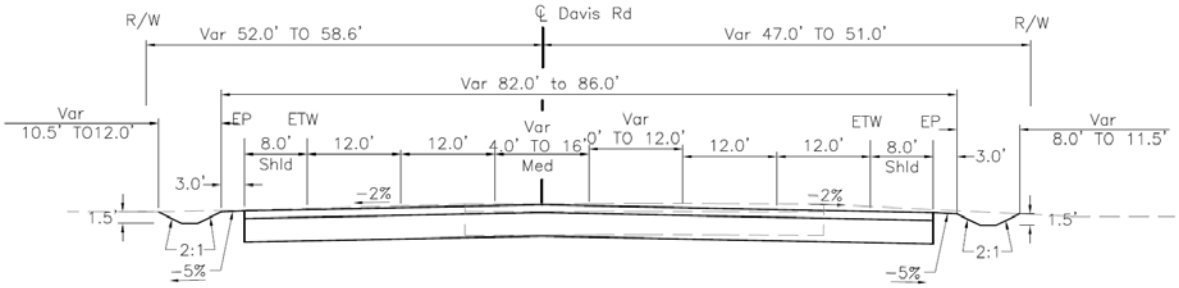
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	This type of fencing will not significantly affect hydraulics during flooding.
Traffic Operations: Davis / Reservation	No significant change at the intersections; however, it will likely reduce congestion throughout Davis Rd. by limiting agricultural vehicles from conflicting with traffic operations.
Maintainability	Potential increase for periodic fence repairs. Also a potential decrease for V-ditch maintenance by controlling access of farm equipment.
Environmental Impacts	No significant change.
Corridor Operations: Bus Operations	No significant change.
Traffic Operations: Davis / Blanco	No significant change at the intersections; however, it will likely reduce congestion throughout Davis Rd. by limiting agricultural vehicles from conflicting with traffic operations.
Corridor Operations: Bicycle Operations	Negligible. This will help in limiting agricultural vehicles, and related mud/debris, in the bicycle lanes.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	This would restrict access for agricultural vehicles; however, it also provides a frame on which to install fabric field screening.

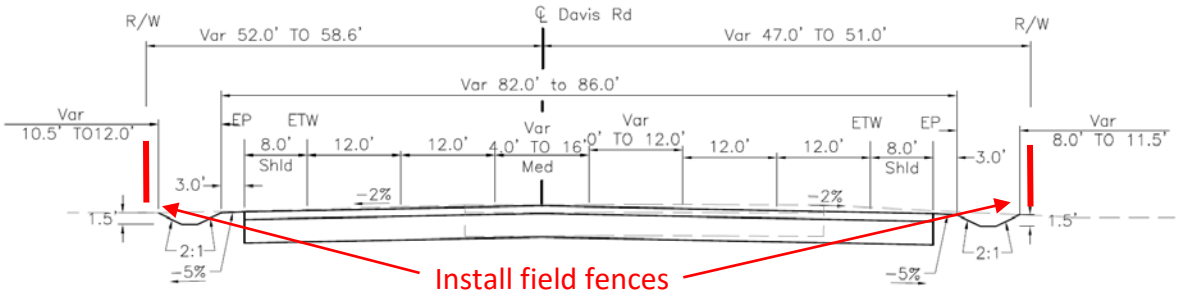
VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations:

- The project is assumed to be approximately two miles long = 10,560 LF
- Bridge is assumed to be 1,700 LF
- Total fence length = (10,560 LF - 1,700 LF) x 2 sides = 17,720 LF
- Assume fences will wrap around corners at intersections somewhat

VA ALTERNATIVE 8.0

Install field fence along Davis Rd. for access control

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
Field Fence	LF	0	$ 5	$ -	17,720	$ 5	$ 88,600
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
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				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ 88,600
ROADWAY MARK-UP	*36%*			$ -			$ 31,896
ROADWAY TOTAL				$ -			$ 120,496
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition				$ -			$ -
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ -
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$0			$120,496
TOTAL (Rounded)				$0			$120,000
						SAVINGS	**($120,000)**

VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Initial Cost Savings:	($170,000)
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+2 %
Value Change:	+2 %

Description of Baseline Concept: The baseline concept for the intersection at Davis Rd. and Blanco Rd. includes channelization improvements and traffic signalization modifications. No special bus transit facilities are included.

Description of Alternative Concept: The alternative concept would add a bus-only free right-turn lane at northbound Davis Rd. to eastbound Blanco Rd.

Advantages:

- Improves bus turning movements
- Reduces bus travel times

Disadvantages:

- Increases cost
- Increases right-of-way take
- Slight increase to agricultural property impacts requiring some additional mitigation

Discussion: Adding a bus-only free right-turn lane from northbound Davis Rd. to eastbound Blanco Rd. will make bus travel faster by minimizing delay at this intersection.

The project currently proposes the following improvements:

- Northbound Davis Rd.: two left-turn lanes, two through lanes, and one right-turn lane
- Southbound Davis Rd.: two left-turn lanes, two through lanes, and two right-turn lanes
- Eastbound Blanco Rd.: two left-turn lanes, two through lanes, and one right-turn lane
- Westbound Blanco Rd.: two left-turn lanes, two through lanes, and one right-turn lane

If constructed with these lane configurations, the intersection would operate at LOS E during the A.M. peak hour and LOS D during the P.M. peak hour. There are three northbound lanes under existing conditions at the intersection. The proposed design includes 5 northbound lanes. The bus lane would create 6 northbound lanes.

The bus lane alternative would have the following configuration:

- Northbound Davis Rd.: two left-turn lanes, two through lanes, one right-turn lane, and one bus-only free right-turn lane

Technical Review Comments: The 2035 P.M. peak is 451 vehicles per hour making a right-turn onto Blanco Rd. from northbound Davis Rd., with 1,003 vehicles through, and 64 vehicles turning left. The percentage of trucks and buses is assumed to be 5% or 23 per hour.

VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

The queuing analysis provided shows a 2040 95th-Percentile Queue Length (P.M.) on Davis Rd. as follows:

- Northbound through: 476 ft., 61 sec. delay
- Northbound right-turn: 360 ft., 36 sec. delay

The approximate length of the bus turn lane would be 500 ft. plus a 200 ft. taper to avoid these queues. Further study is required to determine the most efficient configuration of the bus lane.

Project Management Considerations: Improved transit district and regional transportation stakeholder relations.

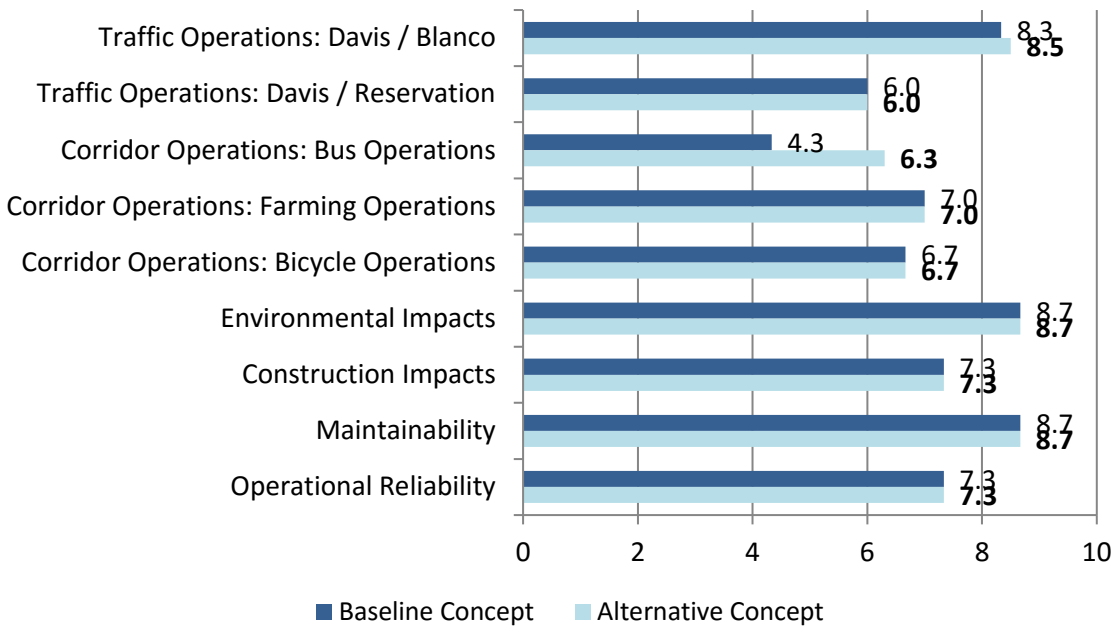
Discussion of Schedule Impacts: Additional time to process extra right-of-way.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Comparison of Performance



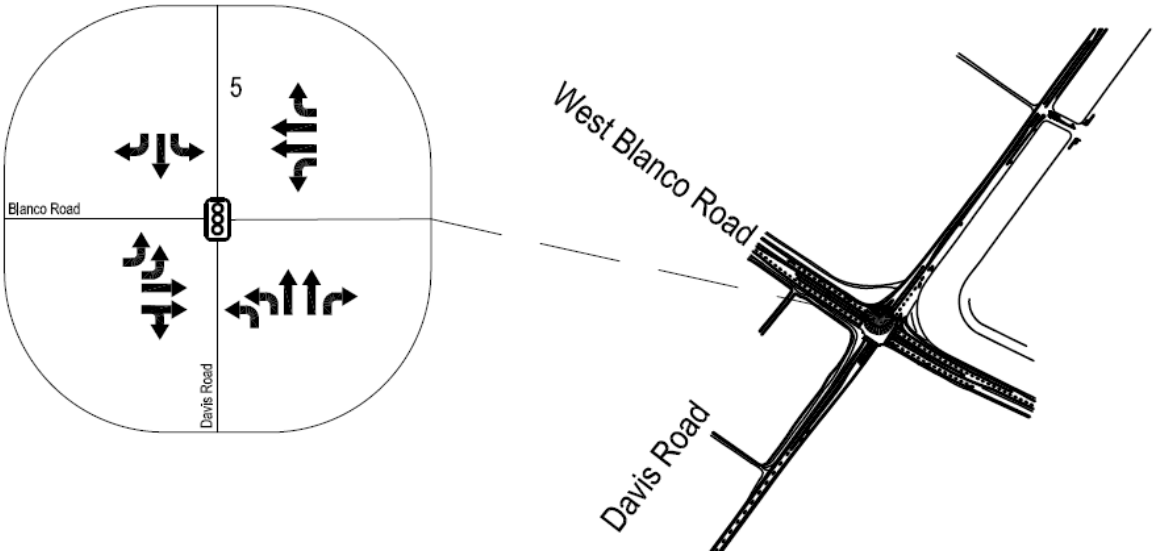
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	No significant change.
Maintainability	No significant change.
Environmental Impacts	Negligible. Project footprint increased by 1%. This will result in a slight increase to agricultural property impacts requiring some additional mitigation.
Corridor Operations: Bus Operations	Improved. Transit delays reduced by approximately 30 seconds per trip.
Traffic Operations: Davis / Blanco	Improved. Adding a right-turn lane for buses will increase the level of service of the intersection by removing buses from one heavy movement.
Corridor Operations: Bicycle Operations	No significant change.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

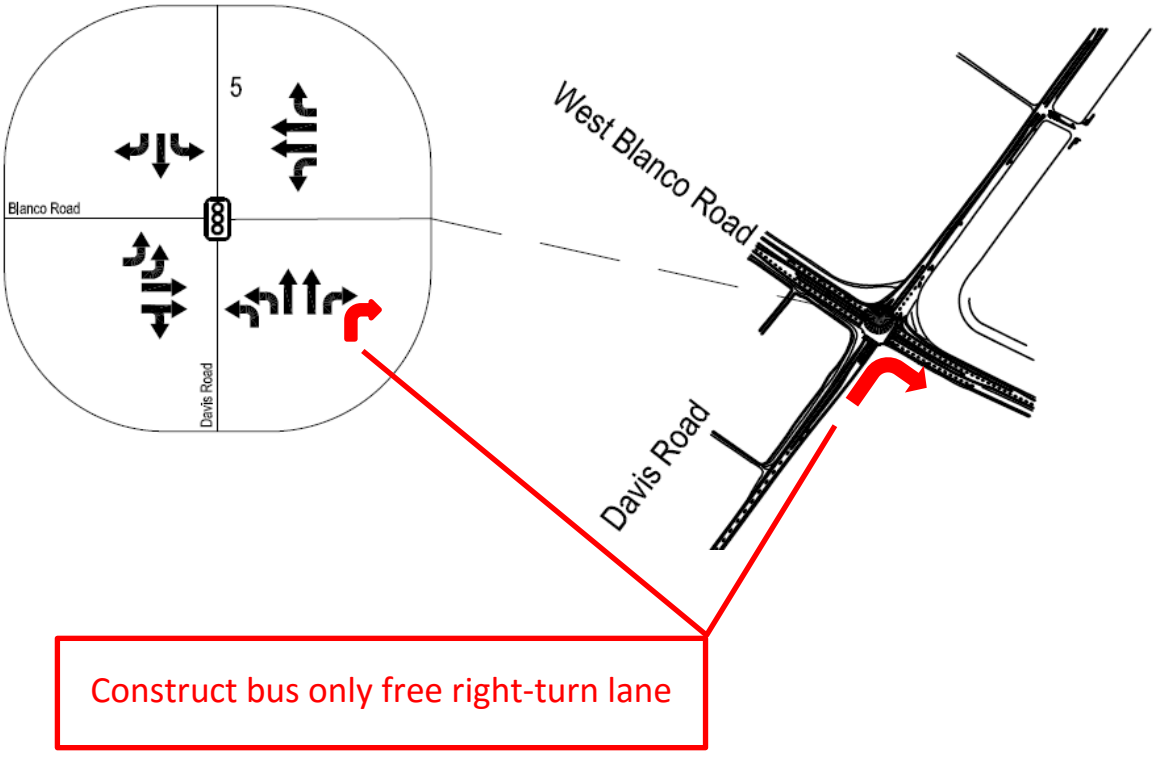
VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Baseline Concept Sketch



VA Alternative Concept Sketch



VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Assumptions and Calculations:

The assumed rectangular bus lane length is 600 ft. on Davis Rd., allowing for tapers, and 200 ft. on Blanco Rd. for a total length of 800 ft. The assumed width is 12 ft. The area would be approximately 9,600 sq. ft.

The approximate project roadway footprint, excluding intersections, is 72 ft. wide and 11,000 ft. long, or 792,000 sq. ft. The bus lanes would add 9,600 sq. ft. of pavement, or 1% to the project footprint.

VA ALTERNATIVE 9.0

Install multi-modal bus turn from NB Davis Rd. to EB Blanco Rd.

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
Roadway Excavation	CY	64,468	$ 40	$ 2,578,720	65,113	$ 40	$ 2,604,507
HMA	TON	42,830	$ 105	$ 4,497,150	43,258	$ 105	$ 4,542,122
Class 2 Aggregate Base	CY	61,187	$ 40	$ 2,447,480	61,799	$ 40	$ 2,471,955
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				*$ 9,523,350*			*$ 9,618,584*
ROADWAY MARK-UP	*36%*			*$ 3,428,406*			*$ 3,462,690*
ROADWAY TOTAL				*$ 12,951,756*			*$ 13,081,274*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition		782,886	$ 4	$ 3,131,544	792,486	$ 4	$ 3,169,944
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				*$ 3,131,544*			*$ 3,169,944*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$16,083,300			$16,251,218
TOTAL (Rounded)				$16,080,000			$16,250,000
						SAVINGS	**($170,000)**

VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

Initial Cost Savings:	($1,140,000)
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+10 %
Value Change:	+9 %

Description of Baseline Concept: The baseline concept maintains the tee intersection at Davis Rd. and Reservation Rd., adding left and right turns at the intersection as required.

Description of Alternative Concept: The alternative concept realigns Davis Rd. and Reservation Rd. to create the new through roadway, favoring the east-north corridor movement. Reservation Rd. to the east will tee into the new alignment.

Advantages:

- Improves operations at intersection of Davis Rd. and Reservation Rd. by changing major turn movements into through movements
- Improves turning movements into and out of The Bluffs
- Improves horizontal sight distance for traffic moving between Reservation Rd. and Davis Rd.
- Improves air quality due to reduction in intersection congestion
- Reduces queueing on Reservation Rd. and southbound Davis Rd.

Disadvantages:

- Requires additional right-of-way
- Requires a minor amount of additional pavement
- Increases prime farmland acquisition and associated mitigation costs

Discussion: The tee intersection of David Rd. and Reservation Rd. is expected to experience high volumes of traffic for the SB Davis Rd. to WB Reservation Rd. movement, and for the EB Reservation Rd. to NB Davis Rd. movement. The baseline concept requires dual right and dual left turns through the intersection for these movements. The alternative concept will make both of these movements through movements, improving operations.

This would create another intersection between the Bluff driveway, Reservation Rd. through traffic and the southbound to eastbound traffic. This new intersection would be in close proximity to the re-aligned intersection and may require non-standard design features to accommodate all movements.

Technical Review Comments: Enhances multi-modal operations.

Project Management Considerations: May be outside of the scope of this project and the original EIR/EA footprint; re-evaluation may be required.

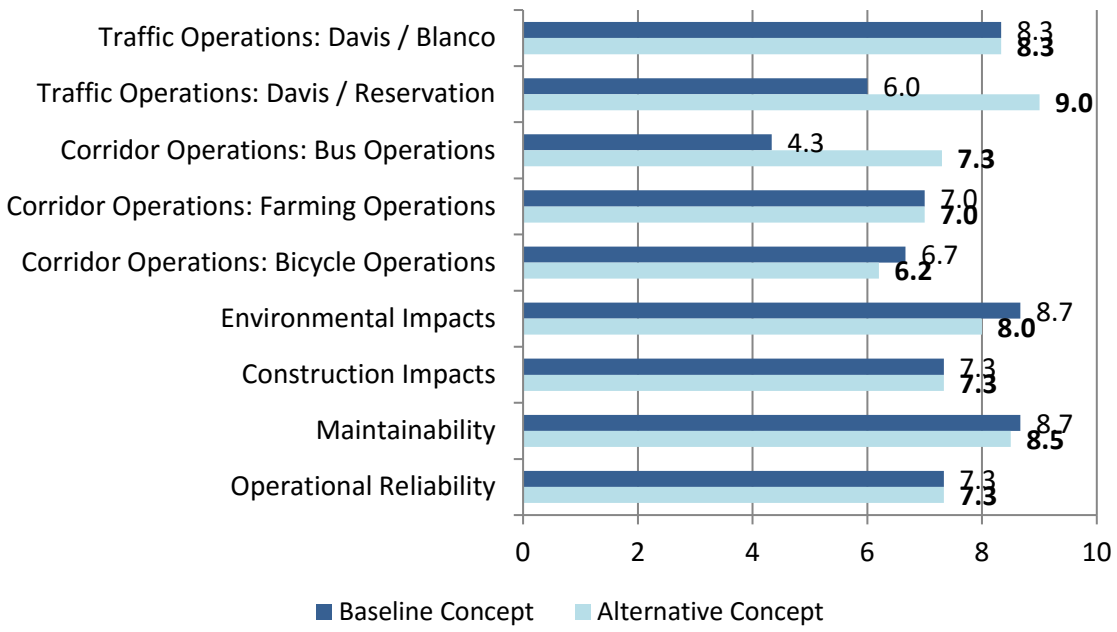
Discussion of Schedule Impacts: No significant impact, unless there's an impact to the EIR/EA and any associated timing.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

Comparison of Performance



Performance Assessment

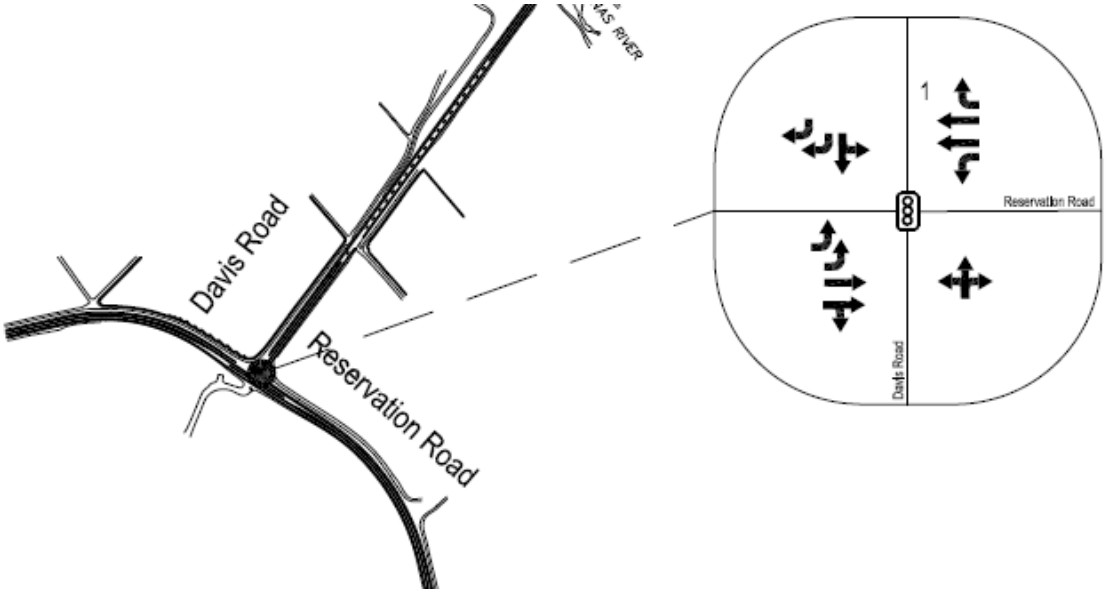
Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	Improved operations by making turn movements through movements between Davis Rd. and Reservation Rd. west of Davis Rd. The new configuration should improve the LOS significantly and provides an improved interim solution prior to the future widening of Reservation Rd. to four lanes. Improves horizontal sight distance.
Maintainability	Would require an additional signal and added roadway to maintain.
Environmental Impacts	Increased farmland impacts due to additional right-of-way need; may require re-evaluation.
Corridor Operations: Bus Operations	Improved multi-modal operations for bus transit.
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	If a Class II bikeway is maintained, the southbound Davis Rd. movement would remain unchanged; however, the eastbound Reservation Rd. to northbound Davis Rd. movement would have potential traffic conflicts with the eastbound movement of Reservation Rd. traffic. If a Class IV

VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

Performance Attribute	Rationale for Change in Performance
	bikeway is adopted whereby it is located on the east side of Davis Rd., bicycle operations would decrease as it would be two-way on that side.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

Baseline Concept Sketch



VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

VA Alternative Concept Sketch

Assumptions and Calculations: Detailed layout completed on tracing paper and shared with Client.

VA ALTERNATIVE 10.1

Realign intersection at Reservation Rd. and Davis Rd.

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
HMA	TON		$ 105	$ -	1,000	$ 105	$ 105,000
Class 2 Aggregate Base	CY		$ 40	$ -	770	$ 40	$ 30,800
Roadway Excavation	CY		$ 40	$ -	1,150	$ 40	$ 46,000
New Signal	EA			$ -	1	$ 250,000	$ 250,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			$ *431,800*
ROADWAY MARK-UP	*36%*			$ -			$ *155,448*
ROADWAY TOTAL				$ -			$ *587,248*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF			$ -	138,000	$ 4	$ 552,000
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			$ *552,000*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$0			$1,139,248
TOTAL (Rounded)				$0			$1,140,000
						SAVINGS	**($1,140,000)**

VA ALTERNATIVE 10.2

Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

Initial Cost Savings:	($270,000)
LCC Savings:	$0
Change in Schedule:	No change
Performance Change:	+3 %
Value Change:	+3 %

Description of Baseline Concept: The baseline concept proposes two right-turn lanes from SB Davis Rd. to WB Reservation Rd. at the intersection signal.

Description of Alternative Concept: The alternative concept proposes one dedicated right-turn lane, similar to a ramp connection, taking right turns out of the signal.

Advantages:

- Improves operations at the intersection
- Eliminates queueing for right turns at the signal
- Improves air quality by reducing emissions

Disadvantages:

- Requires additional right-of-way
- Requires additional pavement
- Increases prime farmland and associated mitigation costs

Discussion: High traffic volumes for the movement from SB Davis Rd. to WB Reservation Rd. necessitate a dual right turn at the intersection to operate at an acceptable LOS. Removing that movement from the intersection will improve signal operations. Only one dedicated right turn lane will be needed in the proposed alternative concept.

Technical Review Comments: None noted.

Project Management Considerations: None noted.

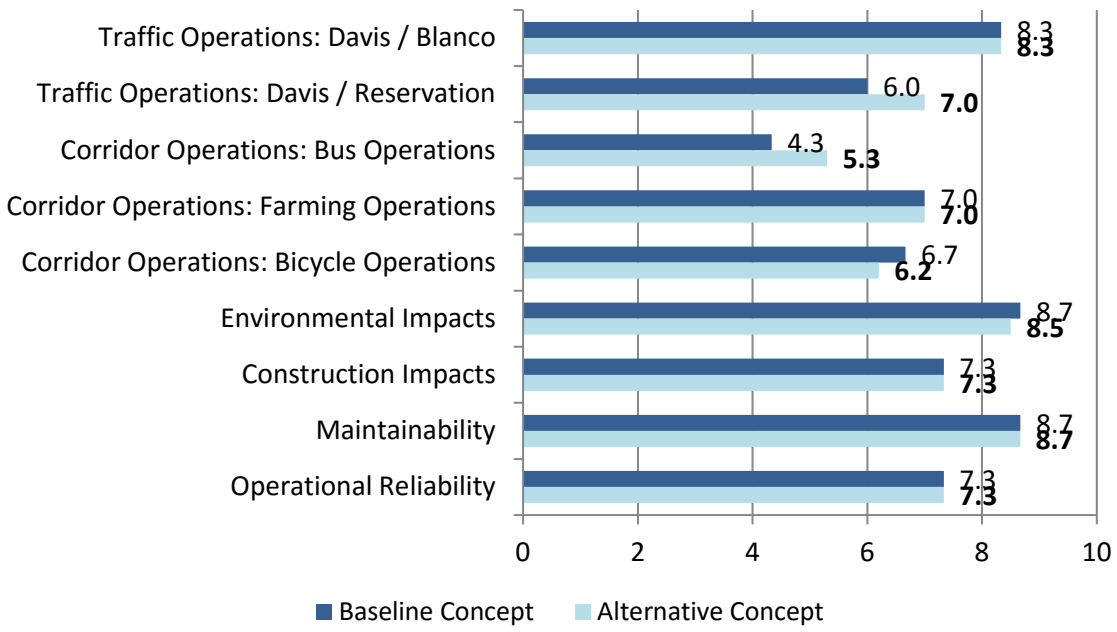
Discussion of Schedule Impacts: No significant impact.

Discussion of Risk Impacts: No significant impact.

VA ALTERNATIVE 10.2

Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

Comparison of Performance



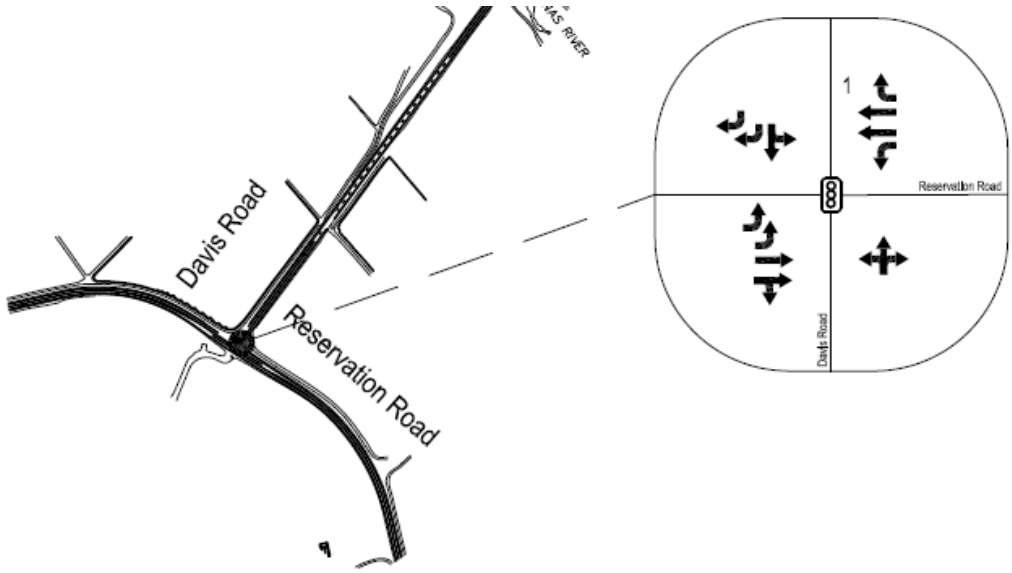
Performance Assessment

Performance Attribute	Rationale for Change in Performance
Operational Reliability	No significant change.
Traffic Operations: Davis / Reservation	Improved operations. Elimination of queueing for right-turn lanes.
Maintainability	No significant change.
Environmental Impacts	Increased farmland impacts due to additional right-of-way need; may require re-evaluation.
Corridor Operations: Bus Operations	Improved operations. Elimination of queueing for right-turn lanes, also the main bus route (SB Davis Rd. to WB Reservation Rd.)
Traffic Operations: Davis / Blanco	No significant change.
Corridor Operations: Bicycle Operations	Decreased due to free turning movement adding risk to cyclists crossing the intersection.
Construction Impacts	No significant change.
Corridor Operations: Farming Operations	No significant change.

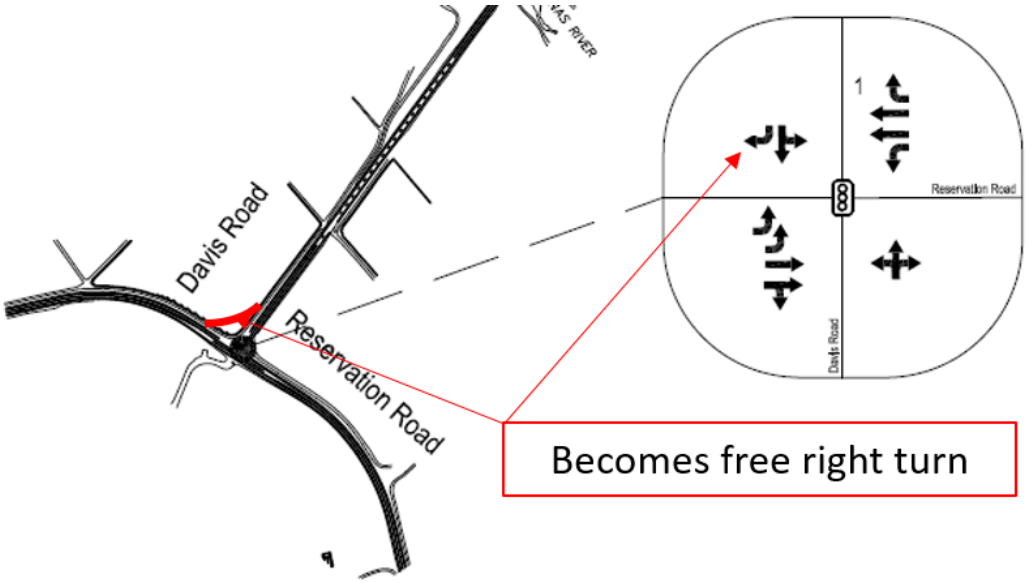
VA ALTERNATIVE 10.2

Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

Baseline Concept Sketch



VA Alternative Concept Sketch



Assumptions and Calculations: Detailed layout completed on tracing paper and shared with Client.

VA ALTERNATIVE 10.2

Add a free-flow right-turn at SB Davis Rd. to WB Reservation Rd.

Initial Cost Estimates

CONSTRUCTION ELEMENT		*BASELINE CONCEPT*			*ALTERNATIVE CONCEPT*		
Description	**Unit**	**Qty**	**Cost/Unit**	**Total**	**Qty**	**Cost/Unit**	**Total**
ROADWAY ITEMS							
HMA	TON		$ 105	$ -	385	$ 105	$ 40,425
Class 2 Aggregate Base	CY		$ 40	$ -	300	$ 40	$ 12,000
Roadway Excavation	CY		$ 40	$ -	450	$ 40	$ 18,000
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
ROADWAY SUBTOTAL				$ -			*$ 70,425*
ROADWAY MARK-UP	*36%*			$ -			*$ 25,353*
ROADWAY TOTAL				$ -			*$ 95,778*
STRUCTURE ITEMS							
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
				$ -			$ -
STRUCTURE SUBTOTAL				$ -			$ -
STRUCTURE MARK-UP	*30%*			$ -			$ -
STRUCTURE TOTAL				$ -			$ -
RIGHT-OF-WAY ITEMS							
Right-of-Way Acquisition	SF		$ 4	$ -	44,000	$ 4	$ 176,000
Utility Relocation				$ -			$ -
Relocation Assistance				$ -			$ -
Demolition				$ -			$ -
Title and Escrow Fees				$ -			$ -
RIGHT-OF-WAY TOTAL				$ -			*$ 176,000*
ENVIRONMENTAL MITIGATION ITEMS							
				$ -			$ -
				$ -			$ -
CAPITAL OUTLAY SUPPORT ITEMS							
Reengineering and Redesign				$ -			$ -
Project Engineering				$ -			$ -
TOTAL				$0			$271,778
TOTAL (Rounded)				$0			$270,000
						SAVINGS	**($270,000)**

PROJECT INFORMATION

PROJECT INFORMATION

BACKGROUND

The Monterey County Public Works Department is proposing to replace the existing two-lane, low-level Davis Road Bridge (Bridge No. 44C-0068) over the Salinas River with a longer bridge that meets current American Association of State Highway and Transportation Officials (AASHTO) requirements. The existing Davis Road Bridge is located approximately 2 miles (mi) south of the City of Salinas in Monterey County. The County is also proposing to widen Davis Road from two lanes to four lanes for a distance of approximately 2.1 mi between Blanco Road on the north and Reservation Road on the south.

PROJECT DESCRIPTION

The primary purpose of the proposed project is to provide an arterial roadway crossing over the Salinas River that: 1) meets current bridge and roadway structural and geometric design standards; 2) provides an all-weather bridge crossing that can accommodate seasonal high flows of the Salinas River; 3) accommodates projected travel demand for the 2040 planning horizon at an acceptable level of service (LOS); and 4) improves traffic safety.

Davis Road is reliably passable only from the months of May through December because floodwaters inundate the existing bridge over the Salinas River during the winter and spring months. In addition, the County has identified Davis Road as a critical link in a countywide transportation system that is needed to handle future increases in traffic between the Cities of Salinas and Monterey as a result of regional population and employment growth. The existing capacity of Davis Road is insufficient to accommodate the projected high traffic demands through the 2040 planning horizon. Furthermore, the structural and geometric design of the roadway must be updated to improve safety. The accident rate along Davis Road corridor is greater than the statewide average.

The following alternatives are being considered. One of the Alternatives includes a design variation.

- **Preferred Alternative:** The Preferred Alternative would replace the existing bridge over the Salinas River with a four-lane, 74 ft. 10 in. wide, cast-in-place (CIP) box girder bridge that would include two 12 ft. lanes in each direction, an 8 ft. painted median, and an 8 ft. shoulder on each side that is striped for a Class II bicycle lane. This Alternative would widen Davis Road from two lanes to four lanes between Reservation Road and Blanco Road, which is approximately 11,164 ft. (2.1 mi).

- **Preferred Alternative – Design Variation:** The Preferred Alternative – Design Variation would replace the northbound and southbound Class II bike lanes with a Class IV two-way cycle track along the east side of Davis Road from Blanco Road to Reservation Road. This Alternative would require changes to the roadway and bridge cross-sections for the Preferred Alternative, but would not change the impact limits (i.e., footprint) of the roadway widening or bridge as currently proposed under the Preferred Alternative.

- **Alternative 2:** Alternative 2 would replace the existing bridge over the Salinas River with a two-lane, 40 ft. 10 in. wide bridge that would include two 12 ft. travel lanes and an 8 ft. shoulder on each side that is striped for a Class II bicycle lane. Under Alternative 2, Davis Road would remain a two-lane road. However, some road improvements would still occur between Foster Rd. and Reservation Rd. This alternative is not being considered as it does not meet the minimum requirements by two of the project's major funding partners, Caltrans or the Fort Ord Reuse Agency (FORA).

The Preferred Alternative served as the baseline for the VA Study. The Preferred Alternative – Design Variation was considered during the VA Study and was included in the VA Alternatives. The No Build and Alternative 2 did not meet the project need and purpose; therefore, they were not included as part of the VA Study. Key project features of the Preferred Alternative include:

- A 1,700 ft. long Caltrans CIP/PS multi-celled box girder bridge supported on reinforced concrete bents with an integral bent cap and three 4 ft. diameter flared columns on CISS piles.
- The 14-span bridge includes two 80 ft. end spans and a 650 ft. vertical curve.
- Widening Davis Road to a four-lane road with an 8 ft. median and 8 ft. shoulders on both sides of the road, striped as Class II bike lanes.
- An all-weather road to accommodate traffic demand through 2040 with improved operational reliability during seasonal flooding with V-ditches and dikes.
- Maintaining access control in a multi-modal corridor with agricultural vehicles.
- A frontage road at SWITF driveway to Foster Rd.
- Minimizing right-of-way impacts to farming operations and the environment.
- Fewer utility relocations and avoidance of high power transmission lines.

PROJECT DESIGN EXCEPTIONS

Listed as follows are the design exceptions at the time of the VA study.

Mandatory Design Exceptions

- None

Advisory Design Exceptions

- 18’ minimum catchpoint
- Clear recovery zone impacts to poles

INFORMATION PROVIDED TO THE VA TEAM

The following project documents were provided to the VA team for their use during the study:

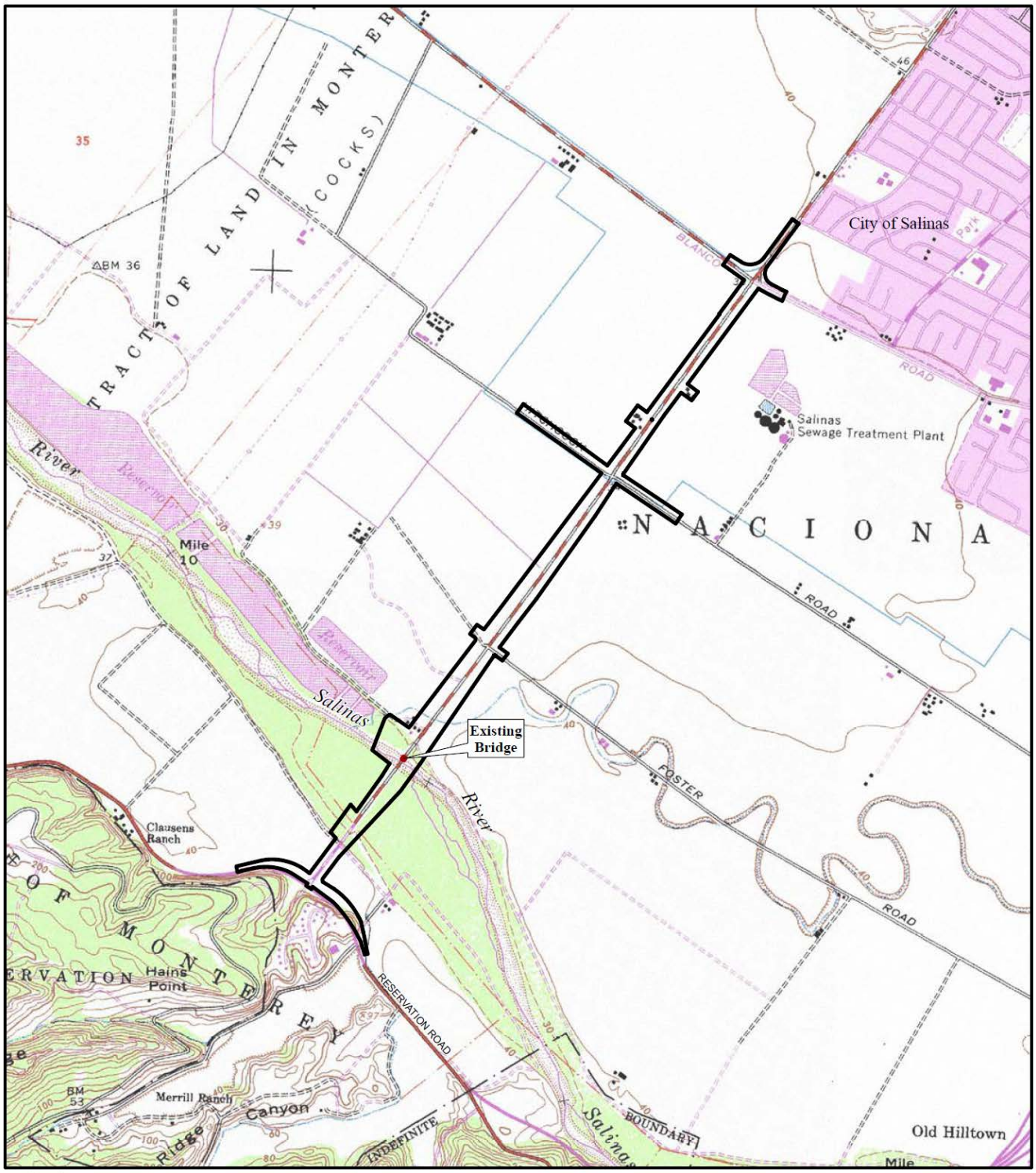
- Project Report & Attachments (February 20, 2014)
- Project Layouts (September 19, 2016)
- Cost Estimates (September 19, 2016)
- Schedule (September 28, 2016)
- Structure Type Selection Report (June 25, 2013)
- Right of Way Exhibit (December 6, 2013)
- Right of Way Estimate Worksheet (September 19, 2016)
- Traffic Analysis Report (May 13, 2014)
- Roundabout Study (May 16, 2016)
- Preliminary Geotech Memo (June 20, 2013)
- Hydraulic Study Report (June 2013)
- Draft Drainage and Hydraulic Info (September 2016)
- Environmental Impact Report/Environmental Assessment (August 2016)
- County Project Study Report (Nov 2001)
- Stakeholder Response Forms (September 2016)
- TAMC Documents (September 2016)
- Photographs

Note: The information presented in this section of the report may have been excerpted either in part or in full from the documents/information provided to the VA team listed above.

PROJECT DRAWINGS

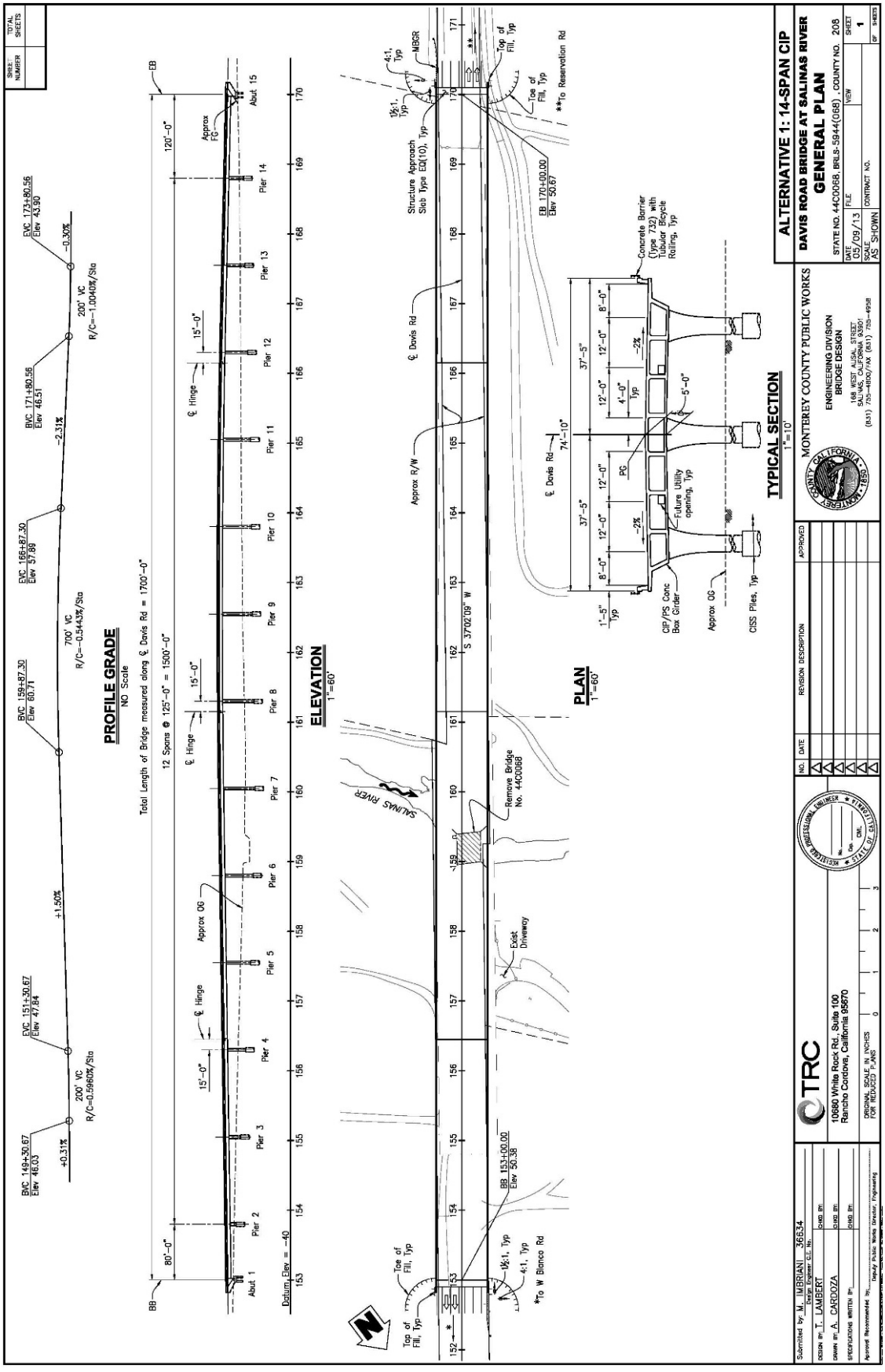
Selected sheets from the project drawings and reports are included on the following pages.

Project Vicinity Map

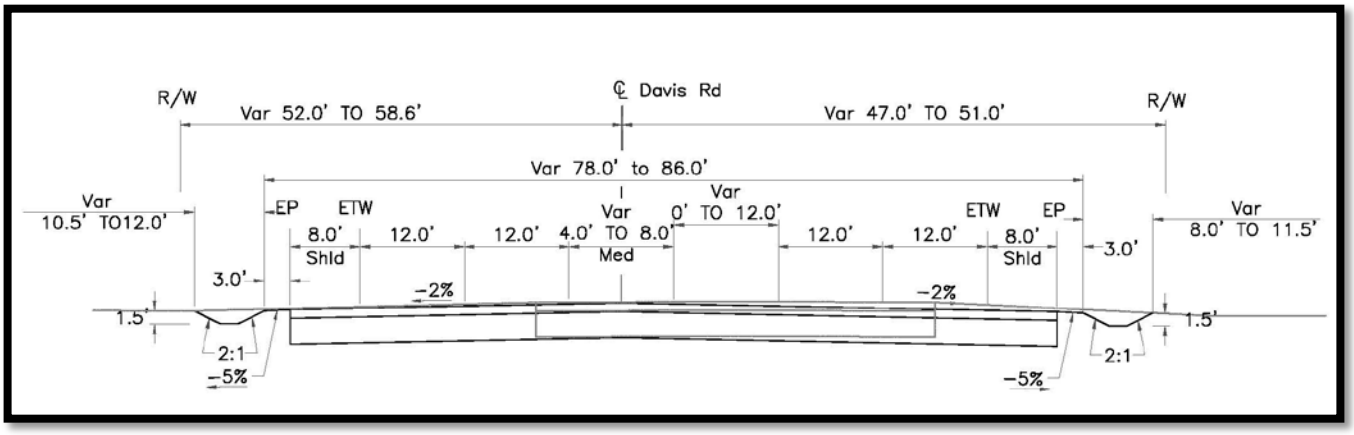


Project Location Map

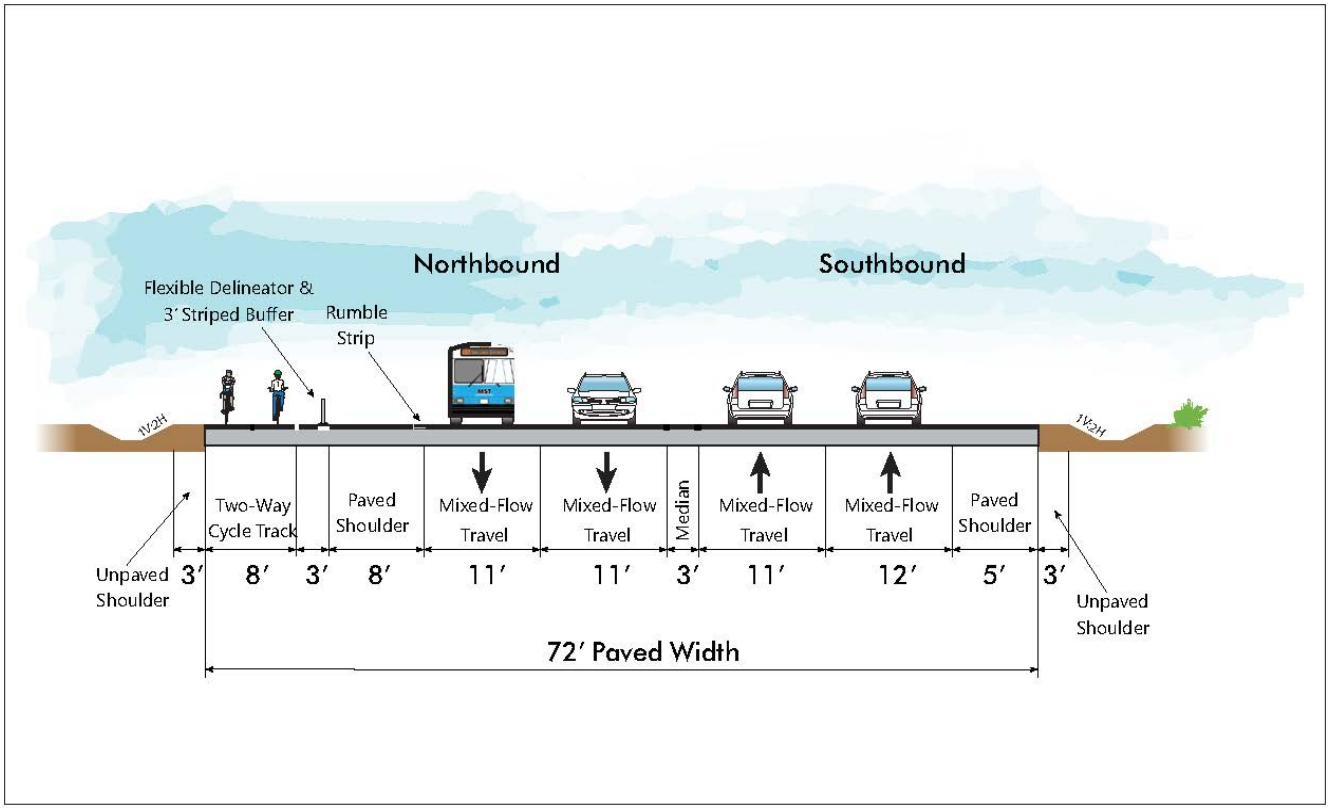
General Bridge Plan



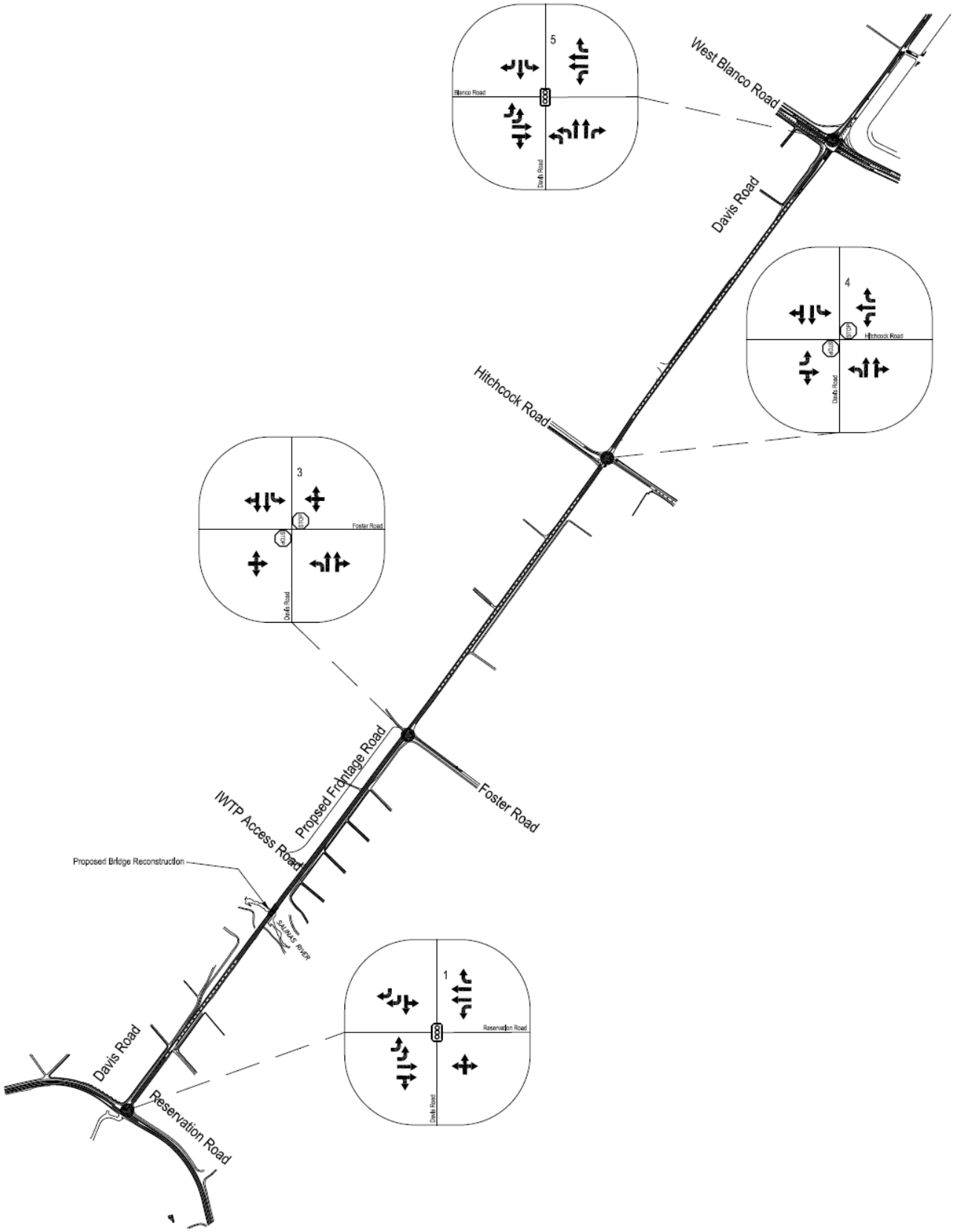
Preferred Alternative (Baseline) Roadway Cross-Section



Preferred Alternative – Design Variation



Project Lane Configurations



PROJECT COST ESTIMATE

The project cost estimate that was used as the baseline for the VA study is included on the following pages.

PRELIMINARY PROJECT COST ESTIMATE SUMMARY
ALTERNATIVE 1

Type of Estimate (Pre-PR, PSR, PR, etc.): PR

Project Description:

Limits: Davis Road Widening - Reservation Road to Blanco Road

Improvement: (Scope) The overall project proposes the widening of an arterial roadway, Davis Road, from Reservation Road to Blanco Road in Monterey County. Davis Road will be widened from the existing 2-lane facility to 4-lanes. The Davis Road cross-section will consist of four 12-foot wide travel lanes, a striped 12-foot wide center median, one 8-foot wide shoulder on each side of the roadway, two 3-foot wide shoulder backings, and 4:1 slopes to match to existing. Other design features include constructing a new 1700.00' long by 74.83' wide bridge over the Salinas River to replace the existing bridge, constructing 10-foot wide Farm Access Roads and SIWTF driveway impacted by the widening adjacent to the new roadway, roadside ditches, and utility pole relocations. The structural section of the roadway is assumed to be 6" HMA over 18" AB. The road is assumed to be closed during the bridge construction. No 18' wide minimum swath would be required. Proposed Lane Configurations are per the approved Traffic Study.

Alternative 1B: **From Reservation Road to Blanco Road**

ROADWAY ITEMS	$16,850,000
STRUCTURE ITEMS	$35,540,000
SUBTOTAL CONSTRUCTION	**$52,390,000**
RIGHT OF WAY	$4,029,000
UTILITY RELOCATION	$120,000
TOTAL ALTERNATIVE COST	**$56,539,000**
TOTAL ESCALATED COST AT 2% ANNUAL INFLATION RATE	**$60,450,000**

Reviewed by Program Manager

(Signature) (Date)

Approved by Project Manager

(Signature) (Phone) (Date)

Sheet: 1 of 7

Attachment B

Today's Date = 9/19/2016

Date of Anticipated Mid-Point of Construction= 2/1/2020

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

I. ROADWAY ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 1 - Earthwork					
Roadway Excavation	64468	CY	$40	$2,578,720	
Imported Borrow	0	CY	$20	$0	
Clearing & Grubbing	1	LS	$200,000	$200,000	
Develop Water Supply	1	LS	$7,000	$7,000	
V-Ditch	833	CY	$30	$24,990	
Retention Basins	5560	CY	$30	$166,800	
Stepped Slopes and Slope	-	-	-	-	
Rounding (Contour Grading)	-	-	-	-	
				Total Earthwork	$2,977,510
Section 2 - Structural Section *					
PCC Pavement	-	-	-	-	
RAC-G	-	-	-	-	
HMA Overlay**					
HMA	42830	TON	$105	$4,497,150	
Lean Concrete Base	-	-	-	-	
Cement-Treated Base	-	-	-	-	
Class 2 Aggregate Base	61187	CY	$40	$2,447,480	
Treated Permeable Base	-	-	-	-	
Aggregate Sub-Base	-	-	-	-	
Pavement Reinforcing Fabric	-	-	-	-	
Relocated SIWTF Access	-	-	-	-	
				Total Structural Section	$6,944,630
Section 3 - Drainage					
Drainage Improvements	1	LS	$250,000	$250,000	
18" Reinforced Concrete Pipe	0	LF	$95	$0	
Box Culvert Extension	0	LF	$1,500	$0	
Remove Inlet/Manhole	0	EA	$1,000	$0	
Drop Inlet	0	EA	$3,900	$0	
Manhole	0	EA	$4,500	$0	
				Total Drainage	$250,000

***** Structural Section based on 6" HMA over 18" aggregate base

Estimate Prepared By: Glenn Armstrong (916) 366-0632 9/19/2016
(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Cost	Section Cost	
Section 4 - Specialty Items					
Resident Engineers Office	1	LS	$75,000	$75,000	
Construction Staking	1	LS	$50,000	$50,000	
Retaining Walls (19'-21' tall)	0	SF	$92	$0	
Relocate RR at grade crossing	-	-	-	-	
MGBR Terminal System End Treatment	4	EA	$5,000	$20,000	
Barriers and Guardrails	1	LS	$25,000	$25,000	
Prepare SWPPP	1	LS	$15,000	$15,000	
Water Pollution Control/Treatment BMP's	1	LS	$100,000	$36,000	
Hazardous Waste Work	0	LS	$50,000	$0	
Environmental Clearance (PEAR)				$0	
Minor Concrete (Curb & Gutter)	0	LF	$22	$0	
Minor Concrete (Median Curb)		LF	$13	$0	
Minor Concrete (Sidewalk)	0	SF	$7	$0	
Minor Concrete (Curb Ramp)	0	SF	$13	$0	
Detectable Warning Surfaces	0	EA	$400	$0	
Type "D" Dike	14,710	LF	$30	$441,300	
				Total Specialty Items	$587,300
Section 5 - Traffic Items					
Lighting and Sign Illumination**	3,400	LF	$45	$153,000	
Traffic Delineation Items	1	LS	$10,000	$10,000	
Traffic Signals (New)	2	EA	$250,000	$500,000	
Traffic Signals (Modification)	2	LS	$150,000	$300,000	
Overhead Sign Structures	0	LS	$50,000	$0	
Roadside Signs	1	LS	$50,000	$50,000	
Traffic Control Systems	1	LS	$300,000	$300,000	
Transportation Management Plan	1	LS	$15,000	$15,000	
Traffic Handling	1	LS	$150,000	$150,000	
				Total Traffic Items	$1,478,000

**Along the Bridge only

SUBTOTAL SECTIONS 1 - 5: $12,237,440

Estimate Prepared By: Glenn Armstrong (Print Name) (916) 366-0632 (Phone) 9/19/2016 (Date)

Sheet: 3 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. ROADSIDE ITEMS

	Quantity	Unit	Unit Cost	Section Cost	
Section 6 - Planting and Irrigation					
Highway Planting	1	LS	$500,000	$500,000	
Replacement Planting				-	
Median Landscape	0	SF	$7	$0	
Landscape Strip in Sidewalk	0	SF	$5	$0	
Irrigation Modification				-	
Relocate Existing Irrigation Facilities	0	LS	$50,000	$0	
Irrigation Crossovers	0	LS	$50,000	$0	
				Subtotal Planting and Irrigation	$500,000
Section 7- Roadside Management and Safety Section					
Vegetation Control Treatments				-	
Gore Area Pavement				-	
Pavement beyond Gore Area				-	
Miscellaneous Paving				-	
Permanent Erosion Control	1	LS	$100,000	$100,000	
Roadside Facilities				-	
			Subtotal Roadside Management and Safety Section		$100,000
				TOTAL SECTIONS 6 & 7:	$600,000

Estimate Prepared By: Glenn Armstrong (916) 366-0632 9/19/2016

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 8 - Minor Items			(5-10%)			
Subtotal Sections 1 - 7		$12,837,440	X	5%	$641,872	
					TOTAL MINOR ITEMS:	$641,880
Section 9 - Roadway Mobilization						
Subtotal Sections 1 - 7		$12,837,440				
Minor Items		$641,880	(5-10%)			
	Sum	$13,479,320	X	5%	$673,966	
					TOTAL ROADWAY MOBILIZATION	$673,970
Section 10 - Roadway Additions						
Supplemental						
Subtotal Sections 1 - 7		$12,837,440				
Minor Items		$641,880	(5-10%)			
	Sum	$13,479,320	X	5%	$673,966	
Contingencies						
Subtotal Sections 1 - 7		$12,837,440				
Minor Items		$641,880				
	Sum	$13,479,320	X	15% *	$2,021,898	
					TOTAL ROADWAY ADDITIONS	$2,695,870
					TOTAL ROADWAY ITEMS	$16,849,160
					(Total of Sections 1 - 10)	

Estimate Prepared By: Glenn Armstrong (Print Name) (916) 366-0632 (Phone) 9/19/2016 (Date)

* Use 25% at the PSR stage or a higher or lower rate if justified.

Sheet: 5 of 7

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3	#4	#5	
Bridge Name	Davis Road Bridge					
Bridge No.	44-C0185					
Structure Type	CIP/PS Box Girder					
Width (Ft) - out to out	74'-10"					
Span Lengths (Ft)	1,700					
Total Area (SF)	127,217					
Footing Type (pile/spread)	Pile					
Cost per SF.	$278.31					
Including:						
Mobilization: 10%						
Contingency: 20%						
Bridge Removal (Portion)	$80,000					
Approach Slabs	$54,000					
Total Cost For Structure	$35,540,000					
				SUBTOTAL STRUCTURES ITEMS		$35,540,000
Railroad Related Costs						
				TOTAL STRUCTURES ITEMS:		$35,540,000

COMMENTS:

Estimate Prepared By: Todd Lambert (Print Name) (916) 366-0632 (Phone) 9/19/2016 (Date)

Sheet: 6 of 7

III. RIGHT OF WAY

Right-of-Way estimates should consider the probable highest and best use and type and intent of improvements at the time of acquisition. Assume acquisition including utility relocation occurs at the right of way certification milestone as shown in the Funding and Scheduling Section of the report. For further guidance see Chapter 1, Caltrans Right of Way Procedural Handbook.

** Right of Way Cost Assumptions as follows: $4/SF for R/W Take/Permanent Easement and $1.5/SF for Temporary Easement	Current Value (Future Use)	Escalation Rate (%/yr)	Escalated Value *
A. Total Acquisition Cost	$164,000	2.00%	$167,280
(Assume $8,000/parcel + $20,000 addtl for every 10 parcels for Acquisition Agent)			
B. Mitigation Acquisition & credits		0.00%	$0
C. Project Development Permit Fees		0.00%	$0
Subtotal (A-C)	$164,000		$167,280
D. Utility Relocation	$0	0.00%	$0
E. RAP	$0	0.00%	$0
F. Clearance/Demolition	$0	0.00%	$0
G. Title and Escrow Fees ($750 x 17 parcels)	$13,500	2.00%	$13,770
H. Total Estimated Right of Way Cost ($4/SF)	$3,131,544	2.00%	$3,288,121
I. Total Estimated Construction Easement ($1.50/SF)	$719,004	2.00%	$754,954
J. Right of Way Support Costs	$0	2.00%	$0
K. Construction Contract Work	$0	2.00%	$0

TOTAL RIGHT OF WAY ** $4,028,048 (CURRENT VALUE)

TOTAL ESCALATED RIGHT OF WAY $4,391,405

Major Utility Relocation - High Transmission Poles $20,000 6 poles $120,000

* - Anticipated date of Right of Way Certification December 2017

Estimate prepared by: Glenn Armstrong (916) 366-0632 9/19/2016
(Print Name) (Phone) (Date)

Sheet 7 of 7

ALTERNATIVE 1 - FOUR-LANE BRIDGE
14-SPAN CIP/PS CONCRETE BOX GIRDER

BRIDGE ESTIMATE

PROJECT NO. 154189 Phase 3 Task 1

__ Advance Planning Estimate
x General Plan Estimate
__ EQ Retrofit Estimate

Est. By T. Lambert 09/19/2016
Chk. By

10680 White Rock Road, Suite 100
Rancho Cordova, CA 95670
Phone (916) 366-0632 Fax (916) 366-1501

2.0% Forecasted Annual Cost Inflation Rate — 02/01/2020 Date for mid-point of construction period

BRIDGE: Davis Road Bridge at Salinas River
TYPE: QB Cast-In-Place Prestressed Concrete Box Girder
CALTRANS BR NO.: 44C0185
COUNTY BR NO.: 208
DISTRICT: 05
COUNTY: Mon
ROUTE: Local
PM: N/A

CU: 05
EA: N/A

DEPTH:	LENGTH:	WIDTH:		AREA:
5.00 ft	1700.00 ft	74.83 ft	=	127,217 sq ft

ITEM NO.		CONTRACT ITEMS	UNIT	QUANTITY	UNIT COST	ADJ	PRICE	AMOUNT
1	157550	Bridge Removal	LS	1	$100,000.00	0.80	$80,000.00	$80,000
2	192003	Structure Excavation (Bridge)	CY	1,408	$110.00	1.00	$110.00	$154,880
3	193003	Structure Backfill (Bridge)	CY	860	$130.00	1.00	$130.00	$111,800
4	495115	Furnish 24" Cast-In-Steel Shell Concrete Piling	LF	2,500	$180.00	1.00	$180.00	$450,000
5	495116	Drive 24" Cast-In-Steel Shell Concrete Pile	EA	50	$8,000.00	1.00	$8,000.00	$400,000
6	495187	Furnish Cast-In-Steel Shell Concrete Piling (NPS 72)	LF	3,900	$1,200.00	1.00	$1,200.00	$4,680,000
7	495188	Drive Cast-In-Steel Shell Concrete Pile (NPS 72)	EA	39	$40,000.00	1.00	$40,000.00	$1,560,000
8	500001	Prestressing Cast-In-Place Concrete	LS	1	$200,000.00	4.90	$980,000.00	$980,000
9	510051	Structural Concrete, Bridge Footing	CY	171	$650.00	1.00	$650.00	$111,150
10	510053	Structural Concrete, Bridge	CY	10,468	$900.00	1.00	$900.00	$9,421,200
11	510085	Structural Concrete, Approach Slab (Type EQ)	CY	40	$1,350.00	1.00	$1,350.00	$54,000
12	519100	Joint Seal (MR 2")	LF	150	$125.00	1.00	$125.00	$18,750
13	519109	Joint Seal Assembly (MR 6 1/2")	LF	225	$1,200.00	1.00	$1,200.00	$270,000
14	520102	Bar Reinforcing Steel (Bridge)	LB	3,920,000	$1.10	1.00	$1.10	$4,312,000
15	720117	Rock Slope Protection (4T, Method A)	CY	995	$150.00	1.00	$150.00	$149,250
16	729012	Rock Slope Protection Fabric (Class 10)	SQYD	498	$5.00	1.00	$5.00	$2,490
17	750497	Miscellaneous Metal (Restrainer - Bar Type)	LB	9,711	$15.00	1.00	$15.00	$145,665
18	750505	Bridge Deck Drainage System	LB	34,640	$9.00	1.00	$9.00	$311,760
19	833091A	Tubular Bicycle Railing	LF	3,490	$170.00	1.00	$170.00	$593,300
20	839720	Concrete Barrier (Type 732)	LF	3,490	$120.00	1.00	$120.00	$418,800
						1.00		
						1.00		
						1.00		
						1.00		
						1.00		
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						1.00		
						1.00		
						1.00		
						1.00		
						1.00		
						1.00		

NOTES:
1. Bridge Removal - See backup info for LS determination.
2. Bar Reinforcement x 1.25 round up to 1000 lb

SUBTOTAL			$24,225,045
TIME RELATED OVERHEAD			$2,422,505
MOBILIZATION	(@ 10%)		$2,960,839
SUBTOTAL BRIDGE ITEMS			$29,608,388
CONTINGENCIES	(@ 20%)		$5,921,678
BRIDGE TOTAL COST			$35,530,066
COST PER SQ. FT.	127,217 sq ft		$279.29
BRIDGE REMOVAL (CONTINGENCIES INCL.)			
WORK BY RAILROAD, UTILITY FORCES, OR OTHERS			
GRAND TOTAL			$35,530,066
FOR PRESENT DAY COST - USE		09/19/2016	**$35,540,000**
FOR FUTURE BUDGET PURPOSES - USE		02/01/2020	**$37,990,000**

PROJECT ANALYSIS

PROJECT ANALYSIS

SUMMARY OF ANALYSIS

The following analysis tools were used to study the project:

- Key Project Factors
- Cost Model
- Function Analysis
- Value Metrics

KEY PROJECT FACTORS

The first day of the VA study included meetings with the project stakeholders and a site visit. The following summarizes key project issues and site visit observations identified during these sessions.

Project Issues

The following are some of the issues and concerns associated with the project.

- Potential for seasonal flooding on roadway segment between Foster Rd. and Blanco Rd.
- Issues with farming access and conflicts with bicycle traffic.
- Addressing bus/bike multi-modal corridor with potential bus bypass (right turn) at Blanco Rd. and Davis Rd.
- Possibility of phasing project elements to meet project funding constraints.
- The in-water work windows for Steelhead and Riparian (assumed: June – October).
- There is a sensitive noise receptor that will be impacted.
- Geotechnical issues with liquefaction and extent of borings.
- There are several documented archaeological sites in the vicinity of the project.

Site Visit Observations

A site visit was conducted in order to visually assess the project site conditions. The following observations were made by the VA team.

- It appears that the local farmers have significantly altered the floodplain (e.g., berms, levees, etc.).

- Stopping site distance on Reservation Rd. at the intersection with Davis Rd. is limited.
- Farm traffic has free access along roadway in the current condition.
- Both the floodplain and floodway have been significantly altered relative to existing FEMA maps.
- There is a significant drainage ditch and culvert under Davis Rd. at Hitchcock Rd.

COST MODEL

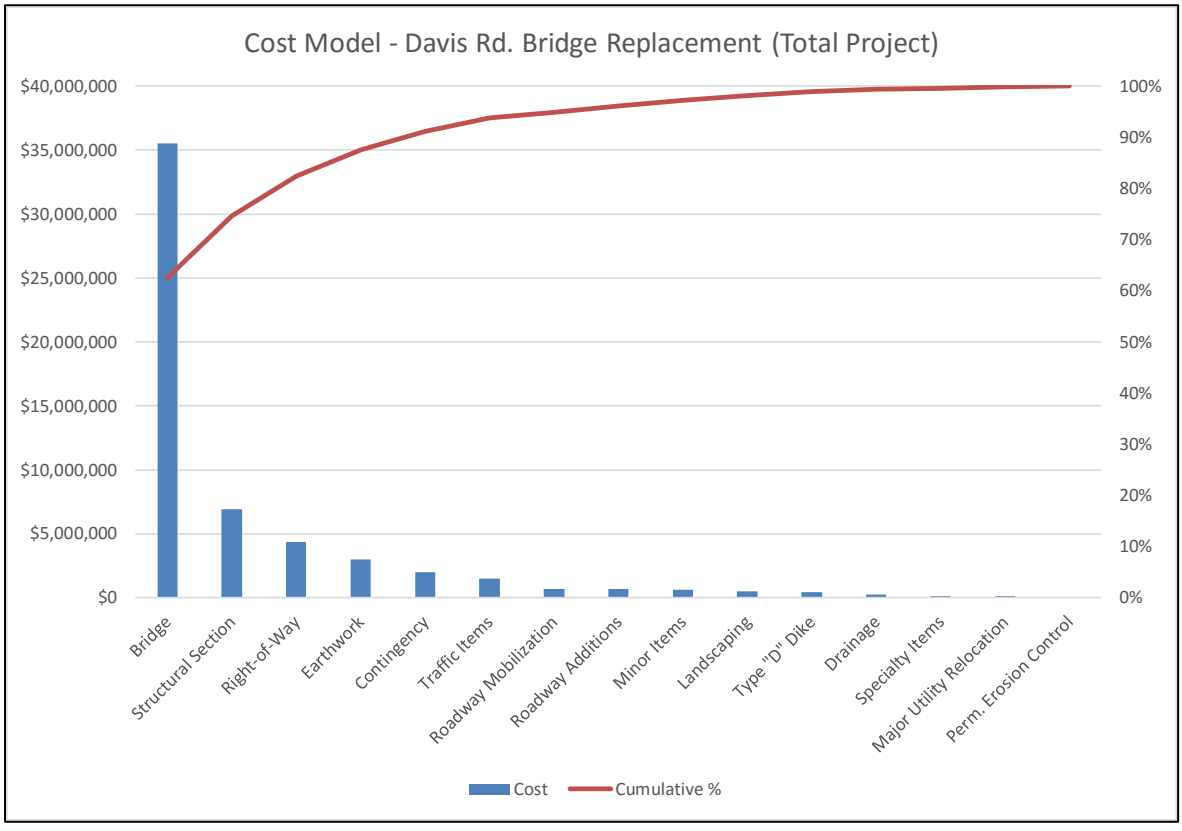
The VA team leader prepared a cost model from the cost estimate presented in the *Project Information* section of this report. The model is organized to identify major construction elements or trade categories, the original estimated costs, and the percent of total project cost for the significant cost items. A cost model specific to the bridge estimate was also prepared.

The cost models clearly show the cost drivers for the project and were used to guide the VA team during the VA study. The following observations were noted by the VA team regarding the project costs:

- The bridge and structural section for the roadway (42,830 ton of HMA and 61,187 Class 2 aggregate base) are the key drivers for the project cost.
- Right-of-Way acquisition is a key driver with associated mitigation costs for prime farmland.
- There is a significant amount of earthwork for roadway excavation of 64,468 CY.
- There are 6 high transmission major utility poles that will need to be relocated.

Cost Model
Davis Rd. Bridge Replacement – Total Project

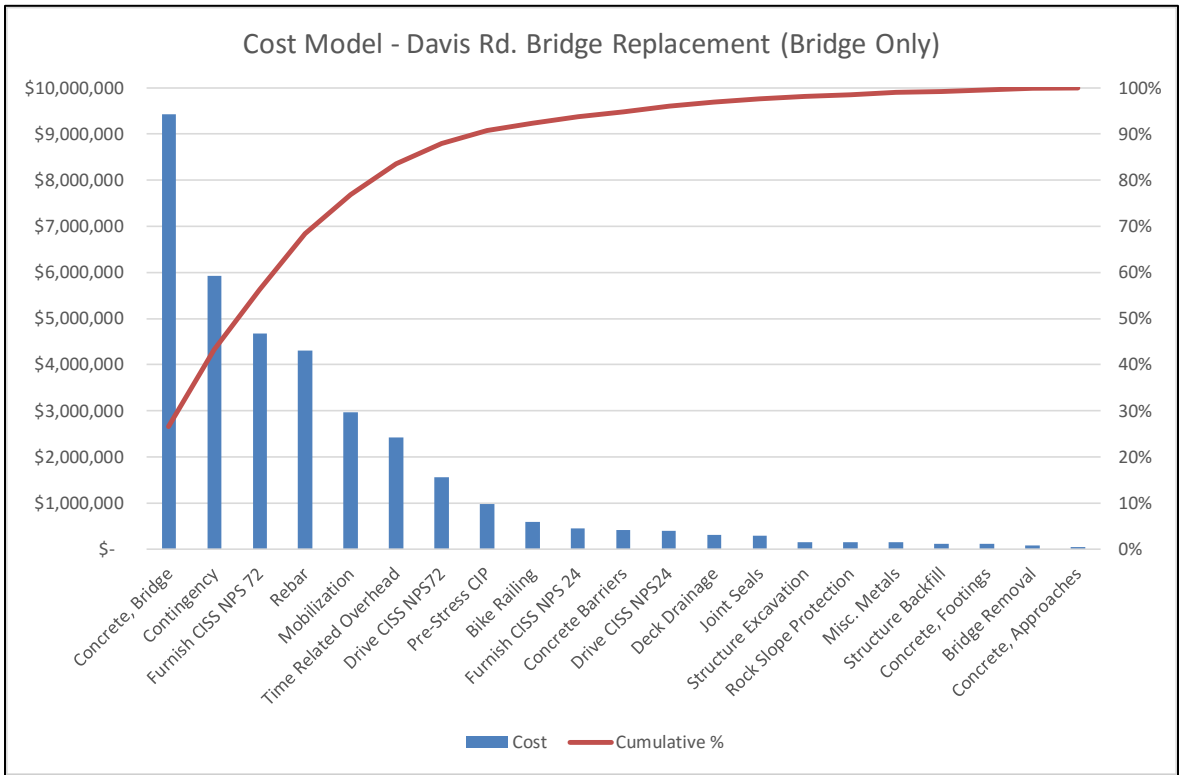
Cost Item	Cost	% of Total	Cumulative %
Bridge	$35,540,000	62%	62%
Structural Section	$6,944,630	12%	75%
Right-of-Way	$4,391,405	8%	82%
Earthwork	$2,977,510	5%	88%
Contingency	$2,021,898	4%	91%
Traffic Items	$1,478,000	3%	94%
Roadway Mobilization	$673,970	1%	95%
Roadway Additions	$673,966	1%	96%
Minor Items	$641,880	1%	97%
Landscaping	$500,000	1%	98%
Type "D" Dike	$441,300	1%	99%
Drainage	$250,000	0%	99%
Specialty Items	$146,000	0%	100%
Major Utility Relocation	$120,000	0%	100%
Perm. Erosion Control	$100,000	0%	100%
TOTAL	$56,900,559	100%	100%



Cost Model

Davis Rd. Bridge Replacement – Bridge Only

Cost Item	Cost	% of Total	Cumulative %
Concrete, Bridge	$9,421,200	27%	27%
Contingency	$5,921,678	17%	43%
Furnish CISS NPS 72	$4,680,000	13%	56%
Rebar	$4,312,000	12%	68%
Mobilization	$2,960,839	8%	77%
Time Related Overhead	$2,422,505	7%	84%
Drive CISS NPS72	$1,560,000	4%	88%
Pre-Stress CIP	$980,000	3%	91%
Bike Railing	$593,300	2%	92%
Furnish CISS NPS 24	$450,000	1%	94%
Concrete Barriers	$418,800	1%	95%
Drive CISS NPS24	$400,000	1%	96%
Deck Drainage	$311,760	1%	97%
Joint Seals	$298,750	1%	98%
Structure Excavation	$154,880	0%	98%
Rock Slope Protection	$151,740	0%	99%
Misc. Metals	$145,665	0%	99%
Structure Backfill	$111,800	0%	99%
Concrete, Footings	$111,150	0%	100%
Bridge Removal	$80,000	0%	100%
Concrete, Approaches	$54,000	0%	100%
TOTAL	$35,540,067	100%	100%



FUNCTION ANALYSIS

Function analysis was performed and a Function Analysis System Technique (FAST) Diagram was produced, which revealed the key functional relationships for the project. This analysis provided a greater understanding of the total project and how the project's performance, cost, time, and risk characteristics are related to the various functions identified.

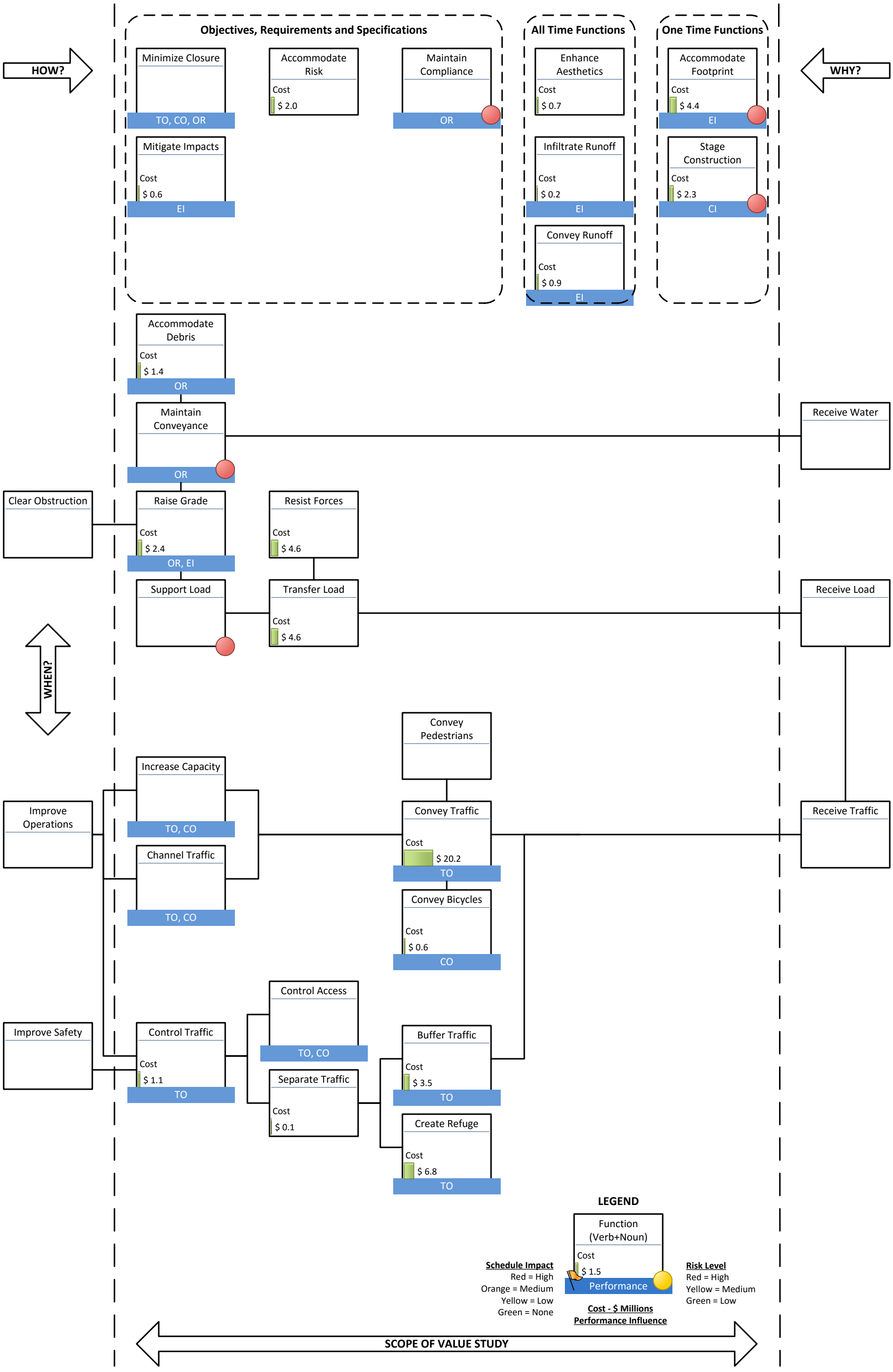
The FAST diagram arranges the functions in logical order so that when read from left to right, the functions answer the question, "How?" If the diagram is read from right to left, the functions answer the question, "Why?" Functions connected with a vertical line are those that happen at the same time as, or are caused by, the function at the top of the column (a "When?" relationship).

Random Function Determination

Project Element	Function
Need	Minimize Closure
Purpose	Increase Capacity
Need	Improve Operations
Purpose	Raise Grade
Need	Improve Safety
Purpose	Control Access
Purpose	Channel Traffic
Bridge	Clear Obstruction
Bridge	Maintain Conveyance
Bridge	Maintain Compliance
Bridge	Avoid Delays
Bridge X-Section	Convey Traffic
Bridge X-Section	Convey Bicycles
Bridge X-Section	Buffer Traffic
Bridge X-Section	Convey Pedestrians
Superstructure	Transfer Load
Substructure	Resist Seismic
Substructure	Raise Grade
Substructure	Accommodate Debris
Substructure	Transfer Load
Substructure	Enhance Aesthetics

Project Element	Function
Foundations	Transfer Load
Foundations	Resist Seismic
Foundations	Resist Scour
Foundations	Resist Liquefaction
Bike Railing	Separate Traffic
Roadway X-Section	Maintain Capacity
Roadway X-Section	Increase Capacity
Roadway X-Section	Convey Traffic
Roadway X-Section	Convey Bicycles
Roadway X-Section	Buffer Traffic
Pavement Section	Support Load
Right of Way	Accommodate Footprint
Contingency	Accommodate Risk
Dikes	Capture Runoff
Ditches	Infiltrate Runoff
Ditches	Convey Runoff
Landscaping	Mitigate Impacts
Traffic Items	Control Traffic
Roadway X-Section	Create Refuge
Mobilization	Stage Construction

Davis Rd. Bridge Replacement – FAST Diagram



VALUE METRICS

Value Methodology (VM) has traditionally been perceived as an effective means for reducing project costs. This paradigm only addresses one part of the value equation, oftentimes at the expense of the role that VM can play with regard to improving project performance. Project costs are fairly easy to quantify and compare; performance is not.

Project performance must be properly defined and agreed to by the stakeholders at the beginning of the VA study. The performance requirements and attributes developed are then used throughout the study to identify, evaluate, and document alternatives. This process, Value Metrics, emphasizes the interrelationship between the elements of performance, cost, and time and can be quantified and compared in terms of how they contribute to overall value. The basic equation for value is:

$$Value = \frac{Performance}{Cost + Time}$$

Value Metrics provides a standardized means of identifying, defining, evaluating, and measuring performance. Once this has been achieved and costs for all VA alternatives have been developed, measuring value is very straightforward.

The following pages describe the steps in the Value Metrics process.

Define Performance Requirements

Performance requirements represent essential, non-discretionary aspects of project performance. Any concept that fails to meet the project's performance requirements, regardless of whether it was developed during the project's design process or during the course of the VA study, cannot be considered as a viable solution. Concepts that do not meet a performance requirement cannot be considered further unless such shortcomings are addressed through the VA study process in the form of VA alternatives. It should be noted that in some cases, a performance requirement may also represent the minimum acceptable level of a performance attribute. The following performance requirements were selected for this project.

Performance Requirement	Definition
Highway Design Standards	Any deviation from the Caltrans Highway Design Manual must be approvable by the District's Design Reviewer.
Structural Design Standards	Any structure on the project must comply with current seismic design standards and meet the Load Resistance and Factor Design Code.
Environmental Review Process	Any concept or design modification considered must comply with state and federal environmental law and be compatible with the environmental review process. Approved EIR/EIS - must stay within this.

Performance Requirement	Definition
Davis Rd. Capacity	Davis Rd. must have four through lanes, two northbound and two southbound.
In-Water Work Window	July 15 - October 15 for steelhead - need to clarify width.
Irrigation Channel Work Windows	Relocation/replacement of irrigation channels must occur during off-peak farming periods.

Define Performance Attributes and Scales

Performance attributes represent those aspects of a project's scope that may possess a range of potential values. For example, an attribute called "Environmental Impacts" may have a range of acceptable values for a project ranging from 1 acre to 20 acres of wetlands mitigation. It is clear that a concept that offered 15 acres of mitigation would perform at a higher level than one that offered 5 acres, but both would meet the project's need and purpose, and their values (i.e., the relationship between performance and cost) could be rationally compared. The following performance attributes were selected for this project.

Operational Reliability

The capacity of the facility to stay in operation during seasonal flooding.

Rating	Label	Description
0.0	Unacceptable	Very poor level of operational reliability, extreme and unacceptably low.
2.0	Poor	Poor level of operational reliability, below the norm for a similar local operation.
4.0	Fair	Fair level of operational reliability, maintains current operational reliability.
6.0	Good	Good level of operational reliability, somewhat improves current operational reliability.
8.0	Very Good	High level of operational reliability, improves current operational reliability.
10.0	Ideal	Highest level of operational reliability, significantly improves operational reliability. Entire project is at an elevation above the 100-year flood event.

Traffic Operations: Davis / Reservation

An assessment of traffic operations at the key intersection of Davis Rd. and Reservation Rd.

Rating	Label	Description
0.0	Unacceptable	Mainline operations equivalent to LOS F during peak hour. Very poor level of traffic operations. May require multiple design exceptions.

Rating	Label	Description
2.0	Poor	Mainline operations equivalent to LOS E during peak hour. Poor level of traffic operations. May require multiple design exceptions.
4.0	Fair	Mainline operations equivalent to LOS D during peak hour. Fair level of traffic operations. May require some design exceptions.
6.0	Good	Mainline operations equivalent to LOS C during peak hour. Good level of traffic operations. Meets all or most design standards.
8.0	Very Good	Mainline operations equivalent to LOS B during peak hour. High level of traffic operations. Meets all mandatory design standards. Meets all or most advisory design standards.
10.0	Excellent	Mainline operations equivalent to LOS A during peak hour. Highest level of traffic operations. Meets or exceeds all design standards.

Maintainability

An assessment of the long-term maintainability of the transportation facility(s). Maintenance considerations include the overall durability, longevity, and maintainability of pavements, structures, and systems; ease of maintenance; accessibility and safety considerations for maintenance personnel. Major maintenance items will be the bridge, roadway and drainage facilities. Bioswales are a concern.

Rating	Label	Description
0.0	Unacceptable	The anticipated level of maintenance for the project will be extreme and unacceptably high.
2.0	Poor	The project is expected to require maintenance that far exceeds the norm for a facility of its kind.
4.0	Fair	The highway facility is expected to require greater than normal maintenance due to existing site conditions or materials selection.
6.0	Good	The project provides a satisfactory level of maintainability and is typical of a highway facility of this kind statewide.
8.0	Very Good	The project provides a high level of maintainability. The facility utilizes many low maintenance features and is better than average in terms of expected maintenance.
10.0	Excellent	The project provides the highest possible level of maintainability and far exceeds expectations when compared to comparable facilities statewide. Examples are the use of long-life pavement, low maintenance water quality facilities, low maintenance structures, etc.

Environmental Impacts

An assessment of the permanent impacts to the environment, including ecological (i.e., flora, fauna, air quality, water quality, visual, noise); socioeconomic impacts (i.e., environmental justice); impacts to cultural, recreational, and historic resources. Also considered under this attribute are drainage and hydraulic issues. Major issues are steelhead, nesting birds, prime agricultural land impacts. Two homes are sensitive noise receptors.

Rating	Label	Description
0.0	Unacceptable	The environmental impacts are severe and the project does not comply with state and/or federal environmental laws.
2.0	Poor	The project introduces environmental impacts that are both significant in number and impact that require extensive mitigation.
4.0	Fair	The project introduces many new environmental impacts that will require extensive mitigation.
6.0	Good	The project introduces some new environmental impacts that can be addressed through standard and accepted mitigation approaches.
8.0	Very Good	The project introduces no new environmental impacts.
10.0	Excellent	The project improves upon the existing environmental conditions while introducing no new environmental impacts.

Corridor Operations: Bus Operations

An assessment of the project's ability to support multi-modal transportation which includes bicycles and buses.

Rating	Label	Description
0.0	Unacceptable	Very poor level of bus operations. Severely impacts existing bus access along Davis Rd.
2.0	Poor	Poor level of bus operations. Significantly impacts existing bus access along Davis Rd.
4.0	Fair	Fair level of bus operations. Somewhat impacts existing bus access along Davis Rd.
6.0	Good	Good level of bus operations. Maintains existing bus access along Davis Rd.
8.0	Very Good	High level of bus operations. Maintains or improves existing bus access along Davis Rd.
10.0	Ideal	Highest level of bus operations. Significantly maintains or improves upon existing bus access; bus bypass lanes at the intersection of Davis Rd. and Blanco Rd.

Traffic Operations: Davis / Blanco

An assessment of traffic operations at the key intersection of Davis Rd. and Blanco Rd.

Rating	Label	Description
0.0	Unacceptable	Mainline operations equivalent to LOS F during peak hour. Very poor level of traffic operations. May require multiple design exceptions.
2.0	Poor	Mainline operations equivalent to LOS E during peak hour. Poor level of traffic operations. May require multiple design exceptions.
4.0	Fair	Mainline operations equivalent to LOS D during peak hour. Fair level of traffic operations. May require some design exceptions.
6.0	Good	Mainline operations equivalent to LOS C during peak hour. Good level of traffic operations. Meets all or most design standards.
8.0	Very Good	Mainline operations equivalent to LOS B during peak hour. High level of traffic operations. Meets all mandatory design standards. Meets all or most advisory design standards.
10.0	Excellent	Mainline operations equivalent to LOS A during peak hour. Highest level of traffic operations. Meets or exceeds all design standards.

Corridor Operations: Bicycle Operations

An assessment of bicycle operations on Davis Rd.

Rating	Label	Description
0.0	Unacceptable	Very poor level of bicycle operations. Severely impacts existing bike access along Davis Rd.
2.0	Poor	Poor level of bicycle operations. Significantly impacts existing bike access along Davis Rd.
4.0	Fair	Fair level of bicycle operations. Somewhat impacts existing bike access along Davis Rd.
6.0	Good	Good level of bicycle operations. Maintains existing bike access along Davis Rd.
8.0	Very Good	High level of bicycle operations. Maintains or improves existing bike access along Davis Rd.
10.0	Ideal	Highest level of bicycle operations. Significantly maintains or improves upon existing bike access along Davis Rd.

Construction Impacts

An assessment of the temporary impacts to the public during construction related to traffic disruptions, detours, and delays; impacts to businesses and residents relative to access, visual, noise, vibration, dust, and construction traffic; environmental impacts related to water quality, air quality, soil erosion, and local flora and fauna. Project assumes that Davis Rd. will be closed south of Foster Rd. for the entire construction duration. Protection of agricultural produce during construction is an issue.

Rating	Label	Description
0.0	Unacceptable	Temporary traffic and/or environmental impacts will be severe and create impacts that are unacceptable to the public.
2.0	Poor	Temporary traffic impacts will be extensive, lengthy, and very disruptive. Temporary environmental impacts will require extraordinary mitigation measures and create major inconveniences to the public.
4.0	Fair	Temporary traffic impacts will be significant and be much greater than what would normally be anticipated for similar projects. Temporary environmental impacts will be more significant in nature and require greater mitigation measures and/or inconveniences to the public.
6.0	Good	There will be some nighttime lane closures and/or temporary ramp closures. There will be some minor to moderate temporary environmental impacts. Impacts will be fairly "typical" for this type of project and can be handled through normal processes and procedures.
8.0	Very Good	There will be some minor temporary traffic and/or environmental impacts expected during construction. Impacts will be less than typical.
10.0	Excellent	There will be no temporary traffic or environmental impacts during construction.

Corridor Operations: Farming Operations

An assessment of the project on existing agricultural operations along Davis Rd. Current includes two additional driveway access points for farming on each side.

Rating	Label	Description
0.0	Unacceptable	Very poor level of farming operations. Severely impacts existing farming access along Davis Rd.
2.0	Poor	Poor level of farming operations. Significantly impacts existing farming access along Davis Rd.
4.0	Fair	Fair level of farming operations. Somewhat impacts existing farming access along Davis Rd.
6.0	Good	Good level of farming operations. Minor impact to existing farming access along Davis Rd.

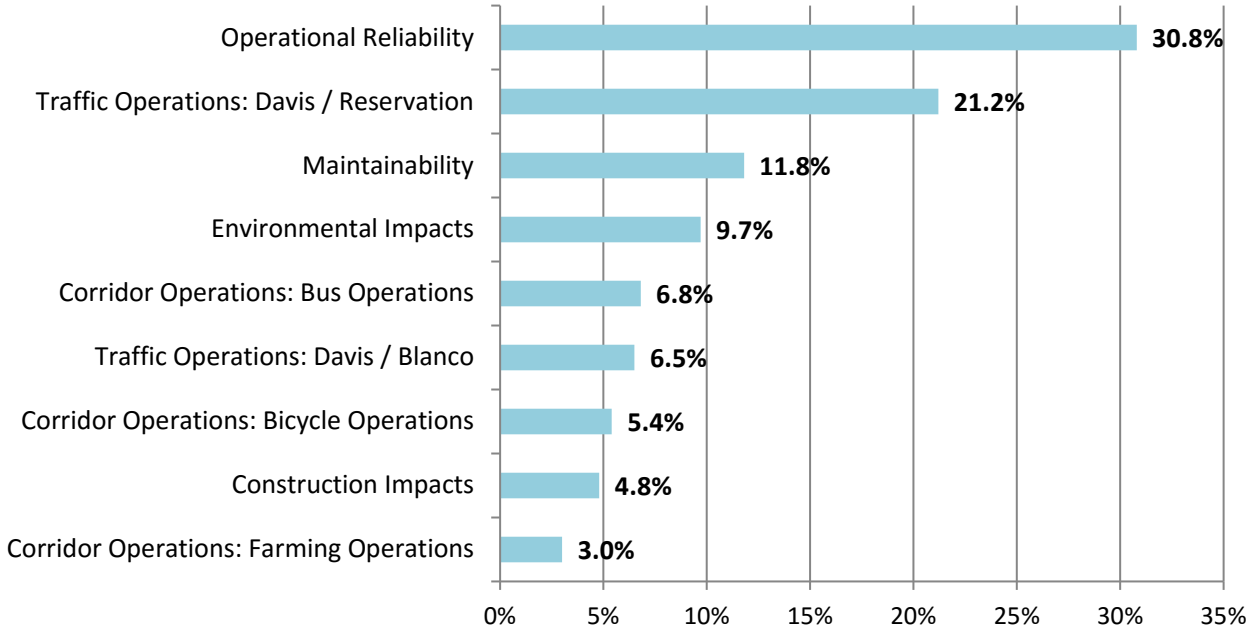
Rating	Label	Description
8.0	Very Good	High level of farming operations. Little to no impact to existing farming access along Davis Rd.
10.0	Ideal	Maintains existing farming access along Davis Rd.

Prioritize Performance Attributes

The performance attributes of a project are seldom of equal importance. Therefore, a systematic approach must be utilized in order to determine their relative importance in meeting the project's need and purpose.

Once the performance attributes were defined and their scales developed, the Project Team and stakeholders prioritized them based on their relative importance to the project. The Analytic Hierarchy Process (AHP) was utilized in the prioritization process. The performance attributes were systematically compared in pairs, asking the question: "An improvement to which attribute will provide the greatest benefit relative to the project's need and purpose?" Participants were then asked to indicate their priorities and the relative intensities of their preferences. The chart below provides the results of this analysis and includes the complete breakdown of the priorities, expressed as a percentage of the whole.

Performance Attribute Prioritization



Measure Performance of Baseline Concept

The project team and stakeholders evaluated the performance of the Baseline Concept relative to the scales previously identified. The information below reflects the performance ratings and associated rationale for each attribute.

Operational Reliability
Rating: **7.3**

Rationale: The bridge structure will be located above the 100-year flood; however, portions of Davis Rd. between Foster Rd. and Blanco Rd. are believed to fall below the 100-year flood level.

Traffic Operations: Davis / Reservation
Rating: **6.0**

Rationale: The operations at the Davis Rd. / Reservation Rd. intersection are good given the two-lane cross-section of Reservation Rd. west of Davis Rd. However, there are opportunities for further enhancing traffic operations at this intersection for the interim condition (e.g., before Reservation Rd. is widened to four lanes west of Davis Rd.).

Maintainability
Rating: **8.7**

Rationale: The project is delivering transportation facilities that are relatively low maintenance and are fairly well optimized.

Environmental Impacts
Rating: **8.7**

Rationale: Environmental impacts are relatively minor given the scope of the project.

Corridor Operations: Bus Operations
Rating: **4.3**

Rationale: No special bus transit facilities are included in the baseline design; however, a bus bypass lane at the intersection of Davis Rd. and Blanco Rd. is desired to support multi-modal operation.

Traffic Operations: Davis / Blanco
Rating: **8.3**

Rationale: The operations at the Davis Rd. / Blanco Rd. intersection have been optimized very well given the two-lane cross-section of Davis Rd. north of Blanco Rd.

Corridor Operations: Bicycle Operations
Rating: **6.7**

Rationale: Current bicycle facilities include a Class II bikeway (8 ft. with no barriers or delineators) on the northbound and southbound shoulders.

Construction Impacts
Rating: **7.3**

Rationale: The current plan is to close Davis Rd. south of Foster Rd. and construct the project in one stage.

Corridor Operations: Farming Operations
Rating: **7.0**

Rationale: Farming operations are limited to Hitchcock, Foster and two additional driveway access points on NB/SB Davis Rd. All other existing access will be restricted by drainage facilities on either side of Davis Rd.

Measure Performance of VA Alternatives

The VA team prepared performance assessments of each of the VA alternatives during the Development Phase of the VA study. For each VA alternative, the VA team rated its performance using the previously defined scale for each performance attribute. The rationale for any change in performance as compared to the Baseline Concept was recorded. Please refer to the individual performance assessments for each VA alternative as presented in the *Value Analysis Alternatives* section of this report.

Define VA Strategies

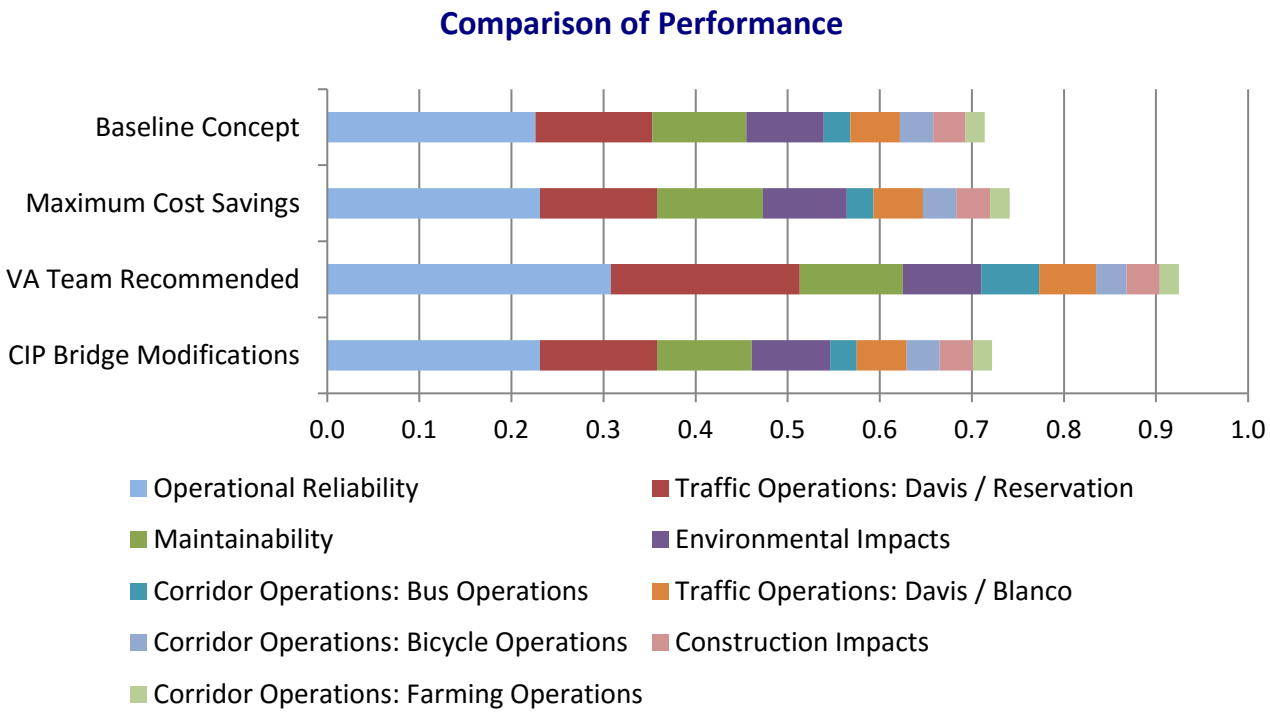
The VA team identified one or more VA strategies for consideration. VA strategies reflect different combinations of complimentary VA alternatives. The VA strategies are summarized in the table below.

Summary of VA Strategies

Strategy Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
Maximum Cost Savings 1.0, 2.0, 3.3, 5.1a, 5.1b, 5.1c, 5.1d, 6.0, 7.0	$14,550,000	-3 months	+4 %	+29 %
VA Team Recommended 1.0, 2.0, 3.3, 4.0, 5.1a, 5.1b, 6.0, 7.0, 8.0, 9.0, 10.1	$10,640,000	-3 months	+29 %	+52 %
CIP Bridge Modifications 1.0, 2.0, 3.2	$5,340,000	-2 months	+1 %	+9 %

Compare Performance – Baseline Concept and VA Strategies

The VA team considered the combined effect of all VA alternatives for each VA strategy. The total performance scores reflect the performance rating for each attribute multiplied by its overall priority (weight) expressed using a ratio scale. A total performance score of "1" would indicate the highest level of desired performance (i.e., "ideal" performance). The chart below compares the total performance scores for the Baseline Concept and the VA strategies.



Rating Rationale for VA Strategies

The rating rationale for the performance of the Baseline Concept was presented previously in this section. The rating rationale for the VA strategies that were developed by the VA team is provided below.

VA Strategy 1 – Maximum Cost Savings

Operational Reliability
Rating: **7.5**

Rationale: VA Alternative 3.3 would increase operational reliability because of the increased design flood conveyance area.

Traffic Operations: Davis / Reservation
Rating: **6.0**

Rationale: No significant change.

Maintainability
Rating: **9.7**

Rationale: VA Alternative 3.3 would increase headroom at approach structures, resulting in easier inspection and more room for cleanup after a flood. VA Alternatives 5.1a, 5.1b, and 5.1c reduce the amount of pavement by 10%, bridge by 10%, and structure by 5%, reducing the overall maintenance. VA Alternative 6.0 shortens the frontage road and VA Alternative 7.0 reduces the amount of dike, improving the overall maintainability.

Environmental Impacts
Rating: **9.4**

Rationale: VA Alternatives 5.1a, 5.1b, 5.1c, 5.1d, and 6.0 all result in less right-of-way take, reducing the impact and mitigation for prime farmland.

Corridor Operations: Bus Operations
Rating: **4.3**

Rationale: No significant change.

Traffic Operations: Davis / Blanco
Rating: **8.3**

Rationale: No significant change.

Corridor Operations: Bicycle Operations
Rating: **6.7**

Rationale: No significant change.

Construction Impacts
Rating: **7.8**

Rationale: VA Alternative 3.3 results in a shorter schedule, reducing overall impacts. VA Alternative 1.0 uses a different method of pile construction that reduces the vibration and noise impacts during construction.

Corridor Operations: Farming Operations
Rating: **7.0**

Rationale: No significant change.

VA Strategy 2 – VA Team Recommended

Operational Reliability
Rating: **10.0**

Rationale: VA Alternative 3.3 increases the design flood conveyance area. VA Alternative 4.0 raises the roadway elevation above the 100-year flood.

Traffic Operations: Davis / Reservation
Rating: **9.7**

Rationale: VA Alternative 10.1 improves operations by realigning the intersection at Reservation Rd. and Davis Rd., making turn movements through movements. VA Alternative 8.0 will likely reduce congestion throughout Davis Rd. by limiting agricultural vehicles from conflicting with traffic operations.

Maintainability
Rating: **9.5**

Rationale: VA Alternative 3.3 increases headroom at approach structures, resulting in easier inspection and more room for cleanup after a flood. VA Alternative 4.0 raises the roadway above the 100-year flood, reducing flood cleanup. VA Alternatives 5.1a and 5.1b reduce the amount of bridge and pavement by 10%, reducing needed maintenance. VA Alternative 6.0 shortens the frontage road and VA Alternative 7.0 reduces the amount of dike, both improving the overall maintainability. VA Alternative 8.0 may increase maintenance as the fence may need periodic repairs.

Environmental Impacts
Rating: **8.7**

Rationale: No significant change.

Corridor Operations: Bus Operations
Rating: **9.3**

Rationale: VA Alternative 9.0 improves bus operations with a free-turn on NB Davis Rd. to EB Blanco Rd. VA Alternative 10.1 realigns the intersection at Reservation Rd. and Davis Rd. to favor the main flow of traffic and improving bus operations through this better aligned intersection.

Traffic Operations: Davis / Blanco
Rating: **9.5**

Rationale: VA Alternative 8.0 installs field fence along Davis Rd. for access control and will likely reduce congestion throughout Davis Rd. by limiting agricultural vehicles from conflicting with traffic operations. VA Alternative 9.0 installs a multi-modal bus turn at the intersection of Davis Rd. and Blanco Rd., improving traffic operations.

Corridor Operations: Bicycle Operations
Rating: **6.2**

Rationale: VA Alternative 10.1 realigns the intersection at Reservation Rd. and Davis Rd. which will have a slight decrease in bicycle operations at this intersection.

Construction Impacts
Rating: **7.6**

Rationale: VA Alternative 3.3 results in a shorter schedule, reducing overall impacts. VA Alternative 1.0 uses a different method of pile construction that reduces the vibration and noise impacts during construction.

Corridor Operations: Farming Operations
Rating: **7.0**

Rationale: No significant change.

VA Strategy 3 – CIP Bridge Modifications

Operational Reliability
Rating: **7.5**

Rationale: VA Alternative 3.2 increases operational reliability because of the increased design flood conveyance area.

Traffic Operations: Davis / Reservation
Rating: **6.0**

Rationale: No significant change.

Maintainability
Rating: **8.7**

Rationale: No significant change.

Environmental Impacts
Rating: **8.7**

Rationale: No significant change.

Corridor Operations: Bus Operations
Rating: **4.3**

Rationale: No significant change.

Traffic Operations: Davis / Blanco
Rating: **8.3**

Rationale: No significant change.

Corridor Operations: Bicycle Operations
Rating: **6.7**

Rationale: No significant change.

Construction Impacts
Rating: **7.5**

Rationale: VA Alternative 1.0 uses a different method of pile construction that reduces the vibration and noise impacts during construction.

Corridor Operations: Farming Operations
Rating: **7.0**

Rationale: No significant change.

Compare Value

The cost and time (i.e., schedule) elements were compared and normalized for the Baseline Concept and the VA strategies using the following tables. These tables illustrate how cost and time (schedule) scores were derived. In this comparison, a lower score is desirable as the project will benefit from lower costs and a shorter schedule.

Strategies		Cost	Score
Baseline Concept		$56,753,900	0.289
Maximum Cost Savings		$42,203,900	0.215
VA Team Recommended		$46,113,900	0.235
CIP Bridge Modifications		$51,413,900	0.262
	TOTAL	**$196,485,600**	**1.000**

Strategies		Time	Score
Baseline Concept		50 months	0.260
Maximum Cost Savings		47 months	0.245
VA Team Recommended		47 months	0.245
CIP Bridge Modifications		48 months	0.250
	TOTAL	**192 months**	**1.000**

Project Management indicated the following preferences in considering trade-offs between cost and time:

Relative Importance	
COST	67.00 %
TIME	33.00 %

Once relative scores for performance, cost and time have been derived, the next step is to synthesize a value index for the Baseline Concept and each of the VA strategies. This is achieved by applying the following algorithm for value:

- V = Value
- f = Function
- P = Performance
- C = Cost
- t = Time
- α = Risk

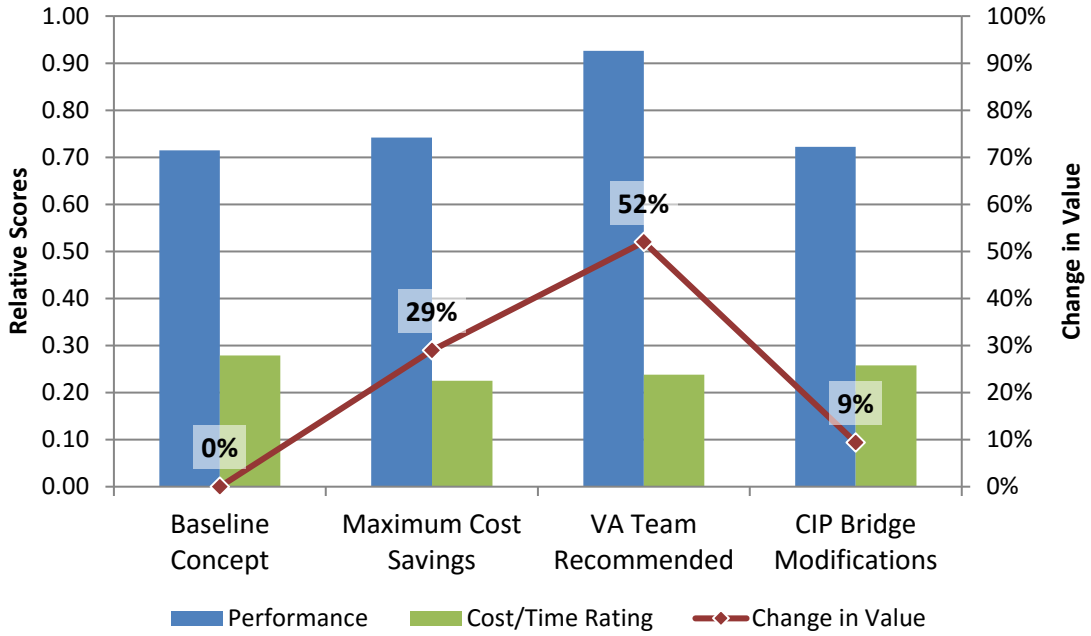
$$V_f(P,C,t)_{total} = \frac{\sum_{n=1}^{\infty} P_n \cdot \alpha}{\sum_{n=1}^{\infty}[(C_n \cdot \alpha) + (t_n \cdot \alpha)]}$$

A Value Matrix was prepared which facilitated the comparison of competing strategies by organizing and summarizing this data into a tabular format. The performance scores for each strategy were divided by the total cost/time scores for each strategy to derive a value index. The value indices for the VA strategies are then compared against the value index of the Baseline Concept and the difference is expressed as a percent (±%) deviation.

Value Matrix
Baseline Concept and VA Strategies

Strategies	Performance Score	Change in Performance	Cost/Time Score	Net Change	Value Index	Change in Value
Baseline Concept	0.715	---	0.279	---	2.560	---
Maximum Cost Savings	0.742	+4 %	0.225	-20 %	3.301	+29 %
VA Team Recommended	0.926	+29 %	0.238	-15 %	3.891	+52 %
CIP Bridge Modifications	0.722	+1 %	0.258	-8 %	2.799	+9 %

Comparison of Value – Baseline Concept and VA Strategies



Rating Rationale for Accepted VA Alternatives

The rating rationale for the performance of the Baseline Concept was presented previously in this section. The rating rationale for the accepted VA alternatives that were developed by the VA team is provided below.

Accepted Value Alternatives

Operational Reliability
Rating: **7.3**

Rationale: No significant change.

Traffic Operations: Davis / Reservation
Rating: **6.7**

Rationale: Improved due to addition of field fence along Davis Road for access control. This will likely reduce congestion throughout Davis Road by limiting agricultural vehicles from conflicting with traffic operations.

Maintainability
Rating: **9.1**

Rationale: Improved due to less pavement, less bridge, and less dike to maintain.

Environmental Impacts
Rating: **9.1**

Rationale: Improved as VA Alternatives 5.1a and 5.1b result in less right-of-way take, reducing the impact and mitigation for prime farmland.

Corridor Operations: Bus Operations
Rating: **6.3**

Rationale: Improved with the addition of a multi-modal bus turn from northbound Davis Road to eastbound Blanco Road.

Traffic Operations: Davis / Blanco
Rating: **9.2**

Rationale: Improved due to addition of field fence along Davis Road for access control. This will likely reduce congestion throughout Davis Road by limiting agricultural vehicles from conflicting with traffic operations. The addition of the multi-modal bus turn will also improvement traffic at this intersection.

Corridor Operations: Bicycle Operations
Rating: **6.7**

Rationale: No significant change.

Construction Impacts
Rating: **7.3**

Rationale: No significant change.

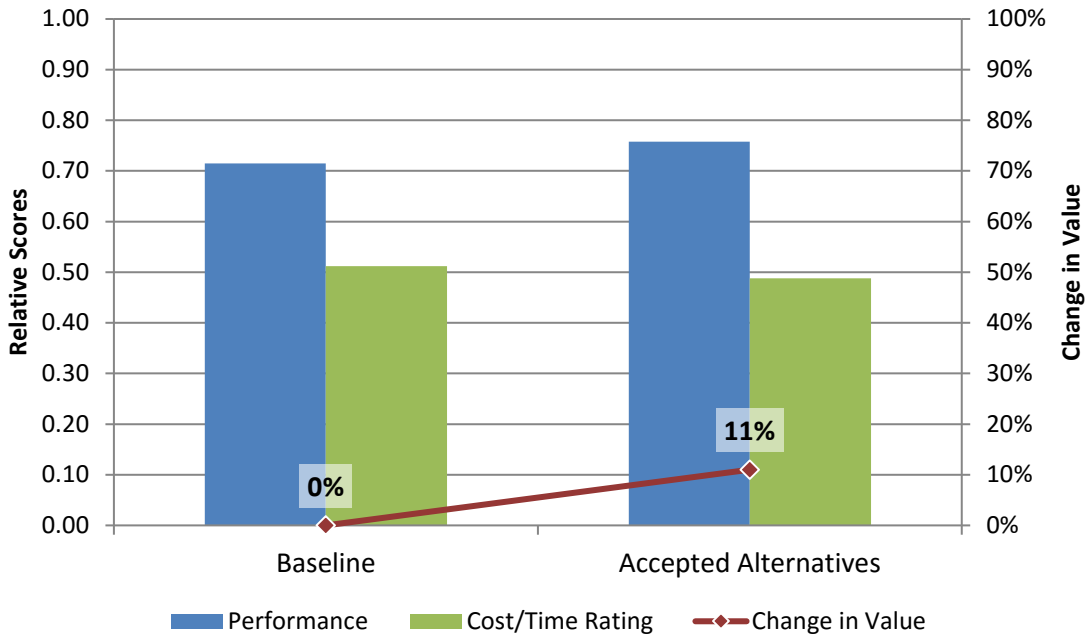
Corridor Operations: Farming Operations
Rating: **7.0**

Rationale: No significant change.

Value Matrix
Baseline Concept and Accepted VA Alternatives

Strategies	Performance Score	Net Change	Cost/Time Score	Net Change	Value Index	Change in Value
Baseline Concept	0.715	---	0.512	---	1.398	---
Accepted VA Alternatives	0.758	+6 %	0.488	-5 %	1.552	+11 %

Comparison of Value -
Baseline Concept and Accepted VA Alternatives



IDEA EVALUATION

IDEA EVALUATION

The ideas generated by the VA team were carefully evaluated, and project-specific attributes were applied to each idea to assure an objective evaluation.

PERFORMANCE ATTRIBUTES

The following are key performance attributes identified for this project and used to assist the VA team in evaluating the ideas:

- Operational Reliability
- Traffic Operations
- Corridor Operations
- Maintainability
- Environmental Impacts
- Construction Impacts

The VA team enlisted the assistance of the stakeholders and project team (when available) to develop these attributes so that the evaluation would reflect their specific requirements.

EVALUATION PROCESS

The VA team generated and evaluated ideas on how to perform the various project functions using other approaches. The idea list was grouped by function or major project element. Each idea was evaluated with respect to the functional requirements of the project. Performance, cost, time, and risk may also have been considered during this evaluation.

Once each idea was fully evaluated, it was given a total rating number. This is based on a scale of 1 to 7, as indicated by the rating index described in the *Value Analysis Process* section of this report. Ideas rated 4 to 7 were developed further and those that were found to have the greatest potential for value improvement are documented in the *Value Analysis Alternatives* section of this report. The rationale for why ideas that were rated highly but were not developed as alternatives is documented later in this section.

IDEA SUMMARY

All of the ideas that were generated during the Creative Phase using brainstorming techniques were recorded on the following pages. Ideas received an idea code based on the function statement under which it was brainstormed. The following table indicates the functions related to each idea code.

Idea Code	Related Function
MACO	Maintain Conveyance
MACM	Maintain Compliance
RG	Raise Grade
ACDE	Accommodate Debris
COTR	Convey Traffic
BT	Buffer Traffic

Idea Code	Related Function
CB	Convey Bicycles
SC	Stage Construction
CRRE	Create Refuge
CHTR	Channel Traffic
CORU	Convey Runoff
MA	Maintain Access

A detailed idea evaluation summary is also included. This summary includes additional information related to how each idea improves or degrades the elements of performance, cost, time (schedule), and risk. Only those elements where the idea differs from the baseline concept are included in this summary.

IDEA SUMMARY LIST

Idea Code and Description	Rating
MACO-1: Enlarge channel to increase conveyance under the bridge – dredge the river	3
MACO-2: Construct box culverts under roadway in lieu of bridge structure	2
MACO-3: Develop a letter of map revision to submit to FEMA to modify the floodplain	DS
MACO-4: Have farmers remove their unpermitted fills to open up the floodplain again	3
MACO-5: Identify acceptable annual closure risk	DS
MACO-6: Remove vegetation in channel	2
MACO-7: Build a bypass to divert the flow	1
MACO-8: Build a reservoir for off-site storage	1
MACO-9: Build two shorter bridges	1
MACO-10: Shorten length of bridge and divert the excess flow	1
MACO-11: Cut the flow down	1
MACO-12: Raise roadway elevation of Davis Rd. north of Foster Rd. to create an all-season facility	7
MACO-13: Add irrigation channel to model	4
MACO-14: Consider clear-spanning the channel with structure (e.g. cable stay)	4
MACO-15: Reduce bridge length and build cross culverts in bridge	2
MACM-1: Widen existing structure over Salinas channel	2
MACM-2: Construct a new bridge at a 10-year flood	4
MACM-3: Construct a new bridge at a 25-year flood	5
RG-1: Consider flat slab bridge on piles	6
RG-2: Consider a precast girder bridge with 125 ft. spans	7
RG-3: Shorten spans of bridge to +/- 100 ft. with a precast structure	7
RG-4: Shorten span of piers to 100 ft. with a different pile type	4
RG-5: Consider a trestle bridge and shortening approach spans to 50 ft.	5
RG-6: Eliminate column flares	7

Idea Code and Description	Rating
RG-7: Construct approaches as flat slabs on piles with precast girders on main span of bridge	7
RG-8: Utilize temporary steel casings in lieu of permanent steel casings	6
RG-9: Replace first 3 spans at each end of bridge with flat slab bridge on precast pile bents	4
RG-10: Replace first 3 spans at each end of bridge with flat slab bridge on precast pile bents (RG-9), and also replace box girder with precast girder bridge	4
ACDE-1: Reduce free board by 50% or more (e.g. 3 ft.) for half the bridge length	7
COTR-1: Reduce travel lanes on bridge to 11 ft.	5
COTR-2: Reduce travel lanes to 11 ft. on roadway	5
BT-1: Eliminate 8 ft. median on roadway	7
BT-2: Eliminate 8 ft. median on bridge	7
CB-1: Route bicycle traffic across existing bridge and reduce shoulder widths of the proposed bridge to 4 ft.	5
CB-2: Construct a separate bike/pedestrian crossing	4
CB-3: Adopt Class IV bikeway/roadway cross-section	DS
CB-4: Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. median buffer	7
CB-5: Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. buffer between shoulder and bikeway	7
CB-6: Adopt Class IV bikeway/roadway cross-section and eliminate 3ft buffer between bikeway and shoulder	7
CB-7: Adopt a Class III bikeway and reduce shoulder widths to 5 ft.	3
SC-1: For the precast girder option, have it built in longitudinal halves and maintain traffic on Davis Rd. throughout construction	6
CRRE-1: Reduce shoulder widths	5
CRRE-2: Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. buffer between bikeway and shoulder and 3 ft. median	4
CHTR-1: Consider roundabout at Blanco/Davis	2
CHTR-2: Consider roundabout at Reservation/Davis	2
CHTR-3: Consider adding a free-flow right-turn at SB Davis to WB Reservation	5
CHTR-4: Extend EB storage capacity at Reservation Rd.	ABD
CHTR-5: Remove vegetation blocking free-right turn out of The Bluffs	DS
CHTR-6: Increase horizontal sight-distance along EB Reservation	4

Idea Code and Description	Rating
CHTR-7: Realign intersection at Reservation Rd. and Davis Rd.	6
CHTR-8: Realign intersection of Davis Rd. and Reservation Rd. to favor main flow traffic – Reservation Rd. East of the existing intersection would tee into the new main road	4
CHTR-9: On grade turn lanes for Ag houses – construct a dedicated left-turn lane between Blanco and Foster	3
CHTR-10: Multi-modal bus turn from NB Davis to Eastbound Blanco	5
CHTR-11: Eliminate private driveways for Ag houses on Davis	3
CHTR-12: Construct fly-over for EB Reservation to NB Davis movement	1
CHTR-13: On grade turn lanes for Ag houses – construct a dedicated left-turn lane between Blanco and Hitchcock	3
CHTR-14: Install thrie-beam guard rails or chain link fencing along Davis Rd. to restrict Ag traffic	5
CORU-1: Line V-ditch with geo-fabric filled with gravel to create an infiltration gallery	2
CORU-2: Eliminate V-ditches and direct run-off to fields	3
CORU-3: Eliminate V-ditches	4
CORU-4: Use open-graded concrete gravel road	2
CORU-5: Buy more ROW and construct detention basins and channel road drainage into them	2
CORU-6: Eliminate Type "D" dikes	6
MA-1: Create new intersection for frontage road and shorten length (ROW take) by 50%	5

DS: Design Suggestion

ABD: Already Being Done [in the Baseline Concept]

DETAILED IDEA EVALUATION SUMMARY

MACO-1: **Enlarge channel to increase conveyance under the bridge – dredge the river**

Overall Rating: **3**

Attributes	*Rating*	*Comments*
Environmental Impacts	Degraded	
Construction Impacts	Degraded	
Maintainability	Degraded	

General comments: Could allow for less bridge and more less-expensive earth work. It will likely require supplemental EIR/EIS and additional permits, which may increase project risk and public outcry. Might require additional O&M funds to maintain the channel.

MACO-2: **Construct box culverts under roadway in lieu of bridge structure**

Overall Rating: **2**

Attributes	*Rating*	*Comments*
Environmental Impacts	Degraded	

General comments: This alternative would require improvements to the channel that would make it not feasible, creating greater impacts to the floodway and environmental habitat.

MACO-3: **Develop a letter of map revision to submit to FEMA to modify the floodplain**

Overall Rating: **DS**

General comments: This action will have to be considered with any alternative (including the baseline design) that modifies the floodway.

MACO-4: **Have farmers remove their unpermitted fills to open up the floodplain again**

Overall Rating: **3**

General comments: An action the county could pursue, but it is outside the scope of this project.

MACO-5: **Identify acceptable annual closure risk**

Overall Rating: **DS**

General comments: None.

MACO-6: **Remove vegetation in channel**

Overall Rating: **2**

General comments: Similar to MACO-1, enlarge channel to increase conveyance under the bridge – dredge the river.

MACO-7: **Build a bypass to divert the flow**

Overall Rating: **1**

General comments: None.

MACO-8: **Build a reservoir for off-site storage**

Overall Rating: **1**

General comments: None.

MACO-9: **Build two shorter bridges**

Overall Rating: **1**

General comments: Similar to MACO-7, build a bypass to divert the flow.

MACO-10: **Shorten length of bridge and divert the excess flow**

Overall Rating: **1**

General comments: Similar to MACO-7, build a bypass to divert the flow.

MACO-11: **Cut the flow down**

Overall Rating: **1**

General comments: None.

MACO-12: **Raise roadway elevation of Davis Rd. north of Foster Rd. to create an all-season facility**

Overall Rating: **7**

Attributes	*Rating*	*Comments*
Maintainability	Improved	
Operational Reliability	Improved	

General comments: This would place all of Davis Rd. above the 100-yr flood.

MACO-13: **Add irrigation channel to model**

Overall Rating: **4**

General comments: This likely won't impact the model significantly.

MACO-14: **Consider clear-spanning the channel with structure (e.g. cable stay)**

Overall Rating: **4**

General comments: Far too expensive to consider.

MACO-15: **Reduce bridge length and build cross culverts in bridge**

Overall Rating: **2**

General comments: Similar to MACO-2, construct box culverts under roadway in lieu of bridge structure.

MACM-1: **Widen existing structure over Salinas channel**

Overall Rating: **2**

General comments: None.

MACM-2: **Construct a new bridge at a 10-year flood**

Overall Rating: **4**

General comments: The elevation of the top of the bridge needs to be at el. 38.5.

MACM-3: **Construct a new bridge at a 25-year flood**

Overall Rating: **5**

Attributes	*Rating*	*Comments*
Operational Reliability	Degraded	

General comments: The elevation of the top of the bridge needs to be at el. 40; assume bridge would be made shorter in length.

RG-1: **Consider flat slab bridge on piles**

Overall Rating: **6**

General comments: None.

RG-2: **Consider a precast girder bridge with 125 ft. spans**

Overall Rating: **7**

Attributes	*Rating*	*Comments*
Traffic Operations	Improved	
Maintainability	Improved	

General comments: Schedule, cost, and traffic maintenance would improve significantly.

RG-3: **Shorten spans of bridge to +/- 100 ft. with a precast structure**

Overall Rating: **7**

General comments: Shorter spans will result in a shorter bridge and shallower girder depth.

RG-4: **Shorten span of piers to 100 ft. with a different pile type**

Overall Rating: **4**

General comments: Same as RG-3.

RG-5: **Consider a trestle bridge and shortening approach spans to 50 ft.**

Overall Rating: **5**

General comments: None.

RG-6: **Eliminate column flares**

Overall Rating: **7**

General comments: None.

RG-7: **Construct approaches as flat slabs on piles with precast girders on main span of bridge**

Overall Rating: **7**

General comments: Combination of RG-1 and RG-2: consider flat slab bridge on piles and a precast girder bridge with 125 ft. spans.

RG-8: **Utilize temporary steel cases in lieu of permanent steel cases**

Overall Rating: **6**

General comments: This will require additional analysis to ensure adequate lateral capacity.

RG-9: **Replace first 3 spans at each end of bridge with flat slab bridge on precast pile bents** — Overall Rating: **4**

General comments: None.

RG-10: **Replace first 3 spans at each end of bridge with flat slab bridge on precast pile bents (RG-9), and also replace box girder with precast girder bridge** — Overall Rating: **4**

General comments: None.

ACDE-1: **Reduce free board by 50% or more (e.g. 3 ft.) for half the bridge length** — Overall Rating: **7**

General comments: Reduces column height of bridge and seismic risk.

COTR-1: **Reduce travel lanes on bridge to 11 ft.** — Overall Rating: **5**

General comments: None.

COTR-2: **Reduce travel lanes to 11 ft. on roadway** — Overall Rating: **5**

General comments: None.

BT-1: **Eliminate 8 ft. median on roadway** — Overall Rating: **7**

General comments: 8 ft. center medians are not a typical design feature of roadways of this type.

BT-2: **Eliminate 8 ft. median on bridge** — Overall Rating: **7**

General comments: 8 ft. center medians are not a typical design feature of roadways of this type.

CB-1: **Route bicycle traffic across existing bridge and reduce shoulder widths of the proposed bridge to 4 ft.**

Overall Rating: **5**

Attributes	*Rating*	*Comments*
Traffic Operations	Degraded	
Corridor Operations	Degraded	
Environmental Impacts	Degraded	
Maintainability	Degraded	

General comments: Narrowing the shoulders would reduce the functionality of getting traffic off the bridge. Would result in additional "fill" in the floodway for hydraulics and likely result in bikeway closures during floods. Keeping the existing bridge would require continued maintenance of it.

CB-2: **Construct a separate bike/pedestrian crossing**

Overall Rating: **4**

Attributes	*Rating*	*Comments*
Environmental Impacts	Degraded	
Maintainability	Degraded	

General comments: In conjunction with CB-1, the additional structure would be in the floodway and an additional facility to maintain.

CB-3: **Adopt Class IV bikeway/roadway cross-section**

Overall Rating: **DS**

General comments: None.

CB-4: **Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. median buffer**

Overall Rating: **7**

Attributes	*Rating*	*Comments*
Traffic Operations	Improved	

General comments: Eliminate the buffer and widen the travel lanes to 12 ft. or the shoulder to 8 ft.

CB-5: **Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. buffer between shoulder and bikeway**

Overall Rating: **7**

General comments: None.

CB-6: **Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. buffer between bikeway and shoulder**

Overall Rating: **7**

General comments: None.

CB-7: **Adopt a Class III bikeway and reduce shoulder widths to 5 ft.**

Overall Rating: **3**

Attributes	*Rating*	*Comments*
Corridor Operations	Degraded	

General comments: Cyclists would share the travel lane with vehicles.

SC-1: **For the precast girder option, have it built in longitudinal halves and maintain traffic on Davis Rd. throughout construction**

Overall Rating: **6**

Attributes	*Rating*	*Comments*
Construction Impacts	Improved	

General comments: This is a construction option should single-stage construction be cost-prohibitive to close Davis Rd. It would allow Davis Rd. to be kept open during construction.

CRRE-1: **Reduce shoulder widths**

Overall Rating: **5**

General comments: None.

CRRE-2: **Adopt Class IV bikeway/roadway cross-section and eliminate 3 ft. buffer between bikeway and shoulder and 3 ft. median**

Overall Rating: **4**

General comments: None.

CHTR-1: **Consider roundabout at Blanco/Davis**

Overall Rating: **2**

Attributes	*Rating*	*Comments*
Traffic Operations	Degraded	

General comments: With uneven traffic volumes from all approaches, a roundabout would not improve traffic operations.

CHTR-2: **Consider roundabout at Reservation/Davis**

Overall Rating: **2**

Attributes	*Rating*	*Comments*
Traffic Operations	Degraded	

General comments: With uneven traffic volumes from all approaches, a roundabout would not improve traffic operations.

CHTR-3: **Consider adding a free-flow right-turn at SB Davis to WB Reservation**

Overall Rating: **5**

Attributes	*Rating*	*Comments*
Traffic Operations	Improved	

General comments: This would reduce queueing at the signal, improving traffic operations.

CHTR-4: **Extend EB storage capacity at Reservation Rd.**

Overall Rating: **ABD**

General comments: None.

CHTR-5: **Remove vegetation blocking free-right turn out of The Bluffs**

Overall Rating: **DS**

General comments: None.

CHTR-6: **Increase horizontal sight-distance along EB Reservation**

Overall Rating: **4**

General comments: None.

CHTR-7: **Realign intersection at Reservation Rd. and Davis Rd.**

Overall Rating: **6**

Attributes	*Rating*	*Comments*
Traffic Operations	Improved	
Corridor Operations	Improved	
Environmental Impacts	Degraded	
Construction Impacts	Degraded	

CHTR-7: **Realign intersection at Reservation Rd. and Davis Rd.**

Overall Rating: **6**

General comments: This alternative could significantly improve intersection operations; however, it will increase cost and ROW takes.

CHTR-8: **Realign intersection of Davis Rd. and Reservation Rd. to favor main flow traffic – Reservation Rd. East of the existing intersection would tee into the new main drag**

Overall Rating: **4**

General comments: Combine with CTHR-7.

CHTR-9: **On grade turn lanes for Ag houses – construct a dedicated left-turn lane between Blanco and Foster**

Overall Rating: **3**

Attributes	*Rating*	*Comments*
Traffic Operations	Degraded	
Corridor Operations	Degraded	

General comments: This raises concerns around increasing congestion and unsafe passing.

CHTR-10: **Multi-modal bus turn from NB Davis to Eastbound Blanco**

Overall Rating: **5**

Attributes	*Rating*	*Comments*
Corridor Operations	Improved	

General comments: This would improve bus turning movements and reduce bus travel times.

CHTR-11: **Eliminate private driveways for Ag houses on Davis**

Overall Rating: **3**

General comments: None.

CHTR-12: **Construct fly-over for EB Reservation to NB Davis movement**

Overall Rating: **1**

General comments: None.

CHTR-13: **On grade turn lanes for Ag houses – construct a dedicated left-turn lane between Blanco and Hitchcock**

Overall Rating: **3**

General comments: None.

CHTR-14: **Install thrie-beam guard rails or chain link fencing along Davis Rd. to restrict Ag traffic**

Overall Rating: **5**

Attributes	*Rating*	*Comments*
Traffic Operations	Improved	
Maintainability	Degraded	

General comments: May also consider field fence. This would improve access control, yet it would be an added feature to maintain.

CORU-1: **Line V-ditch with geo-fabric filled with gravel to create an infiltration gallery**

Overall Rating: **2**

General comments: None.

CORU-2: **Eliminate V-ditches and direct run-off to fields**

Overall Rating: **3**

General comments: This may require approval by Regional Quality Water Board and property owners.

CORU-3: **Eliminate V-ditches**

Overall Rating: **4**

General comments: Same as CORU-2.

CORU-4: **Use open-graded concrete gravel road**

Overall Rating: **2**

General comments: This would likely plug up and not allow for appropriate drainage.

CORU-5: **Buy more ROW and construct detention basins and channel road drainage into them** Overall Rating: **2**

Attributes	*Rating*	*Comments*
Maintainability	Degraded	

General comments: Adding detention basins would add another element to properly maintain.

CORU-6: **Eliminate Type "D" dikes** Overall Rating: **6**

General comments: None.

MA-1: **Create new intersection for frontage road and shorten length (ROW take) by 50%** Overall Rating: **5**

Attributes	*Rating*	*Comments*
Traffic Operations	Degraded	

General comments: Creating a new intersection for the frontage road adds an access point on Davis Rd. and may negatively impact traffic operations.

VALUE ANALYSIS PROCESS

VALUE ANALYSIS PROCESS

The Caltrans VA process involves 16 activities needed to accomplish a VA study, organized in three parts: Pre-study, VA Study, and Report. Integral to Caltrans' VA process is the Value Metrics process. Value Metrics offers the cornerstone of the Caltrans VA process by providing a systematic and structured means of considering the relationship of a project's performance and cost as they relate to value.

Value Analysis has traditionally been perceived as an effective means for reducing project costs. This paradigm only addresses one part of the value equation, oftentimes at the expense of the role that VA can play with regard to improving project performance. Project costs are fairly easy to quantify and compare; performance is not.

Project performance must be properly defined and concurred by the stakeholders at the beginning of the VA study. The performance attributes and requirements developed are then used throughout the study to identify, evaluate, and document alternatives. This process, Value Metrics, emphasizes the interrelationship between cost and performance and can be quantified and compared in terms of how they contribute to overall value.

Value Metrics provides a standardized means of identifying, defining, evaluating, and measuring performance. Once this has been achieved, and costs for all VA alternatives have been developed, measuring value is straightforward.

Value Metrics can improve VA studies by:

- Building consensus among project stakeholders (especially those holding conflicting views)
- Developing a better understanding of a project's goals and objectives as they relate to purpose and need
- Developing a baseline understanding of how the project is meeting performance goals and objectives
- Identifying areas where project performance can be improved through the VA process
- Developing a better understanding of an alternative concept's effect on project performance
- Developing a deeper understanding of the relationship between performance and cost in determining value
- Using value as the basis for selecting the best project or design concept

The following provides an overview of the Caltrans approach to VA. The Caltrans VA Study Activity Chart at the end of this narrative identifies the steps in each activity, which are detailed as follows.

PRE-STUDY

Meaningful and measurable results are directly related to the pre-study work performed. Depending on the type of study, all or part of the following information needs to be determined during the pre-study phase:

- Clear definition of the current situation and study objectives
- Identification of study team members
- Identification of project stakeholders
- Definition of how stakeholders are impacted by the project
- Identification of key issues and concerns
- Identification of project's performance requirements and attributes
- Status of project cost estimate
- Project data gathered to be distributed to VA team

In preparation for the VA study, the team leader confers with owners and stakeholders to outline the VA process, initiate data gathering, refine project scope and objectives, structure the scope and team members and technical specialists, and finalize study plans. Specific deliverables are provided.

Following the initial planning meeting, the team leader reviews the data collected for the project and develops a cost model. The team leader also consults with the technical specialists to prepare them for the VA study.

VA STUDY

The VA Job Plan guides the VA team in their search to enhance value in the project or process. Caltrans follows a seven-phase VA Job Plan:

1. Information Phase
2. Function Phase
3. Creative Phase
4. Evaluation Phase
5. Development Phase
6. Presentation Phase
7. Implementation Phase

Information Phase

At the beginning of the VA study, the design team presents a more detailed review of the design and the various systems. This includes an overview of the project and its various requirements, which further enhances the VA team's knowledge and understanding of the project. The project team also responds to questions posed by the VA team.

The project's performance requirements and attributes are discussed, and the performance of the baseline concept is evaluated.

Function Phase

Key to the VA process is the function analysis techniques used during the Function Phase. Analyzing the functional requirements of a project is essential to assuring an owner that the project has been designed to meet the stated criteria and its need and purpose. The analysis of these functions in terms cost, performance, time, and risk is a primary element in a VA study, and is used to develop alternatives. This procedure is beneficial to the VA team, as it forces the participants to think in terms of functions and their relative value in meeting the project's need and purpose. This facilitates a deeper understanding of the project.

Creative Phase

The Creative Phase involves identifying and listing creative ideas. During this phase, the VA team participates in a brainstorming session to identify as many means as possible to provide the necessary project functions. Judgment of the ideas is not permitted in order to generate a broad range of ideas.

The idea list includes all of the ideas suggested during the study. These ideas should be reviewed further by the project team, since they may contain ideas that are worthy of further evaluation and may be used as the design develops. These ideas could also help stimulate additional ideas by others.

Evaluation Phase

The purpose of the Evaluation Phase is to systematically assess the potential impacts of ideas generated during the Creative Phase relative to their potential for value improvement. Each idea is evaluated in terms of its potential impact to performance, cost, time, and risk. Once each idea is fully evaluated, it is given a total rating number. This is based on a scale of 1 to 7, as indicated by the following rating index:

7 = Major Value Improvement 6 = Moderate Value Improvement 5 = Minor Value Improvement 4 = Possible Value Improvement	These ratings represent the subjective opinion of the VA team regarding the potential benefits of the concepts in order to prioritize them for development.
3 = Minor Value Degradation	Concept results in a minor cost or performance improvement at the expense of the other.
2 = Moderate Value Degradation	Concept reduces cost but creates an unacceptable degradation to performance.
1 = Major Value Degradation	Concept is not technically feasible or does not meet project need and purpose.

Ideas rated 4 to 7 are developed further and those found to have the greatest potential for value improvement are documented in the *VA Alternatives* section of this report. The rationale for why

ideas were rated highly but not developed as alternatives is documented in the *Idea Evaluation* section of the report.

Development Phase

During the Development Phase, the highly rated ideas are expanded and developed into VA alternatives. The development process considers the impact to performance, cost, time, and risk of the alternative concepts relative to the baseline concept. This analysis is prepared as appropriate for each alternative, and the information may include a performance assessment, initial cost and life-cycle cost comparisons, schedule analysis, and an assessment of risk. Each alternative describes the baseline concept and proposed changes and includes a technical discussion. Sketches and calculations are also prepared for each alternative as appropriate.

Presentation Phase

The VA study concludes with a preliminary presentation of the VA team's assessment of the project and VA alternatives. The presentation provides an opportunity for the owner, project team, and stakeholders to preview the alternatives and develop an understanding of the rationale behind them.

Implementation Phase

After the stakeholders have had an opportunity to review the alternatives identified by the VA team, the team leader conducts an implementation meeting to discuss the alternatives and resolve appropriate action for each VA alternative. If necessary, any other VA report edits requested by the representatives are also made by the VA team leader and a final report is issued.

This implementation meeting helps to ensure that savings or process improvements are not lost due to lack of communication, and that those VA alternatives that are accepted are properly integrated into the project design.

VA REPORT

Preliminary Report

Following the completion of the VA study, the team leader compiles the information developed during the VA study into the *Preliminary Value Analysis Study Report*. This report, documenting viable alternatives, is provided to the customer within the timeframe requested (usually within two weeks). The preliminary report also contains a *VA Study Summary Report – Preliminary Findings*, designed to highlight critical elements of the VA study, including detailed documentation of VA alternatives, in a concise manner for the use of parties without the opportunity to review the report in its entirety. More details can be found in the complete preliminary report, which consists of the following documentation: Executive Summary, VA Alternatives, Project Information, Project Analysis, Idea Evaluation, and VA Process.

Written Report – VA Implementation Action Memo

If the disposition of all VA alternatives cannot be determined at the Implementation Meeting, then a *VA Implementation Action Memo* is submitted. This memo states which alternatives are accepted, which are rejected and the rationale for rejection, and which VA alternatives are conditionally accepted with further study required. For these alternatives, the memo states what action must be completed so that a decision can be made as to the disposition of this VA alternative, when that action is expected to be completed, and who is responsible to complete this action. If all VA alternatives are either accepted or rejected, then this memo is not required.

Written Report – Final Report

Once all VA alternatives have been either accepted or rejected, the team leader updates the *Preliminary Value Analysis Study Report* to show the final results of the study in a *Final Value Analysis Study Report*. In addition, a Value Analysis Study Summary Report (VASSR) is sent to Caltrans HQ to permit easy documentation into the Caltrans Annual Report to FHWA.

The following Caltrans VA Study Activity Chart describes each activity.

CALTRANS VA JOB PLAN & STUDY ACTIVITY CHART

PREPARATION

INITIATE STUDY 1
- Identify study project
- Identify study roles and responsibilities
- Define study goals
- Select team leader
- Prepare draft Study Charter

ORGANIZE STUDY 2
- Conduct Pre-Study Meeting
- Select team members
- Identify stakeholders, decision-makers, and technical reviewers
- Identify data collection
- Select study dates
- Determine study logistics
- Update VA Study Charter
- Identify and define performance requirements

PREPARE DATA 3
- Collect and distribute data
- Develop construction cost models
- Develop highway user benefit / life cycle cost (LCC) model (if required)

VA STUDY WORKSHOP

INFORM TEAM 4
- Review study activities and confirm reviewers
- Present design concept
- Present stakeholders' interests
- Review project issues and objectives
- Discuss Design Exceptions
- Rate performance of baseline concept
- Visit project site

ANALYZE FUNCTIONS 5
- Analyze project data
- Expand project functions
- Prepare FAST diagram
- Determine functional cost drivers and performance
- Assess Risk (if needed)

CREATE IDEAS 6
- Focus on functions
- List all ideas
- Apply creativity and innovation techniques (group and individual)

EVALUATE IDEAS 7
- Apply key performance attributes to rate idea
- List advantages and disadvantages
- Consider cost impacts
- Rank all ideas
- Assign alternatives for development

DEVELOP ALTERNATIVES 8
- Develop alternative concepts
- Prepare sketches and calculations
- Measure performance
- Estimate costs, LCC benefits/costs

CRITIQUE ALTERNATIVES 9
- VA Alternatives Technical Review
- VA Alternatives Team Consensus Review
- Identify mutually exclusive groups of alternatives
- Identify VA strategies
- Validate performance

PRESENT ALTERNATIVES* 10
- Present findings
- Document feedback
- Confirm pending reviews

**Interim presentation of study findings*

DETERMINE DISPOSITION

DOCUMENT VA STUDY 11
- Document process and study findings
- Develop and Distribute *VA Study Summary Report - Preliminary Findings and VA Study Preliminary Report*
- Distribute electronic report to HQ VA Branch

ASSESS ALTERNATIVES** 12
- Review Study Summary Report
- Assess alternatives for project acceptance
- Prepare draft implementation dispositions

***Activities performed by PDT, Technical Reviewers, and Stakeholders*

RESOLVE ALTERNATIVES 13
- Review implementation dispositions
- Conduct Implementation Meeting
- Resolve implementation actions with decision-makers and stakeholders
- Document VA Alternative Disposition
- Develop Implementation Action Memo (If Conditionally Accepted (CA) Alternatives remain)

FINALIZE ALTERNATIVES 14
- VA Team Leader follow up with PM on CA Alternatives
- Resolve Conditionally Accepted Alternatives
- Develop Implementation Plan with PM
- Design Manager Sign off on VA Implementation Plan Authorization
- Final presentation of study results (if needed)

REPORTING RESULTS

PUBLISH RESULTS 15
- Document process and study results
- Incorporate all comments and implementation plan
- Distribute *Final VA Study Report* in PDF format
- Submit *VA Study Summary Report* (VASSR) and two-page summary to HQ VA for FHWA Auditing
- Include Implementation Plan Authorization in Final VA Report

Davis Rd. Bridge Replacement Project
VALUE ANALYSIS STUDY AGENDA
October 3-7, 2016

VA Workshop Meeting Location: Monterey County Resource Management Agency
Department of Public Works
168 W. Alisal Street, 2nd Floor
Salinas, CA 93901

October 3, 2016 Monday

8:00	***VA Opening Comments***	
	• ***Welcome***	***Mark Imbriani, TRC***
	• ***Introductions***	***Rob Stewart, VMS***
	• ***VA Overview and Schedule***	
8:30	***Goals, Issues and Constraints***	***Mark Imbriani, TRC***
9:00	***Designer's Detailed Presentation***	***Project Team***
	• ***Project Overview***	
	• ***Bridge***	
	• ***Roadway***	
	• ***Hydraulics***	
	• ***Environmental***	
10:30	***Discussion***	
	• ***Project Cost, Schedule and Risk***	***Rob Stewart***
	• ***Project Performance***	
12:00	Lunch	
1:00	Site Visit	VA Team & Project Team
3:00	Function Analysis	VA Team
5:00	Adjourn	

October 4, 2016	**Tuesday**	
8:00	Creative Phase - Team Brainstorming	VA Team
12:00	Lunch Break	
1:00	Evaluation Phase	VA Team
5:00	Adjourn	
October 5, 2016	**Wednesday**	
8:00	***Technical Review Meeting***	***VA Team & Project Team***
9:00	Assign Ideas for Development Discuss Write-Up Requirements	
9:30	Development Phase	VA Team
12:00	Lunch Break	
1:00	Development Phase (Continued)	VA Team
5:00	Adjourn	
October 6, 2016	**Thursday**	
8:00	Development Phase (Continued)	
12:00	Lunch Break	
1:00	Development Phase (Continued)	VA Team
5:00	Adjourn	
October 7, 2016	**Friday**	
8:00	Development Phase (Continued)	VA Team
1:00	***VA Team Presentation***	***VA Team and Project Team***
2:30	Adjourn	

VA STUDY MEETING ATTENDEES

Davis Road Bridge Replacement – Value Analysis Study

10/3	10/4	10/5	10/6	10/7	Name	Organization	Position/Role	Phone	E-mail Address
X	X	X	X	X	Robert Stewart	VMS, Inc.	VA Team Leader	503-957-9642	rob@vms-inc.com
X		X		X	Mark Imbriani	TRC	Project Manager	916-366-0632	mimbriani@trcsolutions.com
X					Justina Conklin	TRC	Project Engineer	916-508-1506	jconklin@trcsolutions.com
X		X		X	Enrique Saavedra	Monterey County RMA-Public Works	Project Manager	831-755-8970	saavedraem@co.monterey.ca.us
X				X	Peter Said	FORA	Project Specialist	831-883-3672	peter@fora.org
X		X		X	Hank Myers	TAMC	Transportation Planning	831-775-4412	hank@tamcmonterey.org
X		X			Reinie Jones	Caltrans, District 5	Engineer	805-542-4686	reinie.jones@dot.ca.gov
				X	Heidi Borders	Caltrans, District 5	Engineer	805-549-3120	heidi.borders@dot.ca.gov
X	X	X	X	X	Jodie Puzio	VMS, Inc.	VA Team Assistant	815-735-7060	jodie@vms-inc.com
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X	X	X	X	X	Heidi Ouren	HQE, Inc.	Traffic and Roadway Design	925-367-3363	ouren@hqeinc.net
X	X	X	X	X	Chuck Anderson	Schaaf & Wheeler	Hydrology & Hydraulics	408-246-4848	canderson@swsv.com
X	X	X	X	X	Rodney Cahill	Mesiti-Miller Engineering, Inc.	Civil, Utilities & Drainage	831-426-3186	rodney@m-me.com

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**Offices in Escondido California; Grand Junction, Colorado; Chicago, Illinois; Merriam, Kansas;
Las Vegas, Nevada; Portland, Oregon; San Antonio, Texas; Charlottesville, Virginia; Seattle, Washington**

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