

2010 FHWA Annual Report Questions and Answers:

1a.	<p>Does your DOT have a formalized VE Program that includes: <i>(Select all that apply):</i></p> <ul style="list-style-type: none"> • 	
<p>Answer:</p> <ul style="list-style-type: none"> • Agency VE Policy documented and adopted • A VE Coordinator established • A VE Training Plan or sustained initiative established • VE Program performance goals & measures approved - % of mandated projects studied, % savings, % accepted • VE Program evaluation and reporting conducted • VE analysis procedures and guidelines developed 		

1b	<p>If your DOT's VE Program has an official VE Policy, indicate which of the following items are included in the policy: <i>(Select all that apply):</i></p>	
<p>Answer:</p> <ul style="list-style-type: none"> • Processes to identify projects for VE analyses • Processes to assure that required VE analyses are completed • Processes to conduct VE analyses • Timing of VE analyses • Processes to review/accept/reject VE recommendations • Processes for tracking and monitoring VE analyses • VE coordinator roles and responsibilities established 		

2.	<p>Provide links to any of your DOT's currently available, VE-related web sites, such as:</p>	
<p>Answer:</p> <p>General VE Program Information http://www.dot.ca.gov/hq/oppd/value/index.htm Official VE Policy – DD92 http://www.dot.ca.gov/hq/oppd/value/index.htm General VE Processes and procedures http://www.dot.ca.gov/hq/oppd/value/guides.htm</p>		

3a.	<p>Describe any practices your DOT uses to make the VE Program, and VE analyses conducted, more successful</p>	<p>Briefly describe individual practices or policies that enable VE analyses to be conducted in a successful manner. Examples for discussion include but are not limited to:</p> <ul style="list-style-type: none"> • Program Coordination and Communication • Planning, coordinating and conducting VE analyses • Integrating VE within Project Development • Coordinating VE with other project cost and quality review techniques
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		<ul style="list-style-type: none"> • Reviewing/Accepting/Rejecting recommendations • Monitoring and tracking activities • Other practices and policies
<p>Answer:</p> <p>The Caltrans VA Program has instituted a number of innovations that have contributed to its success. In terms of coordinating VA with other cost and quality review techniques, Caltrans has implemented the following procedures:</p> <ul style="list-style-type: none"> • The utilization of performance measures to quantify the relative level of impact to performance as a result of the VA alternatives. Performance, cost and time are quantified to derive a value index, which is used to compare the relative level of total value improvement of the alternative concepts to the baseline concept. • The integration of VA studies with risk assessment. VA is often run in conjunction with quantitative risk assessments. VA is then used as a vehicle for developing risk response strategies. • The integration of VA studies with Roadway Safety Audits (RSA). Caltrans has piloted the first joint RSA/VA Study effort in cooperation with the FHWA. The results of this new integrated approach will be evaluated and fine-tuned for future efforts. 		

3b	<p>Describe any practices your DOT uses to encourage more successful implementation of VECPs during construction.</p>	<p>Briefly describe individual practices or policies that enable VE Change Proposals to be implemented in a successful manner. Examples include but are not limited to:</p> <ul style="list-style-type: none"> • Encouraging submittals of VECPs • Reviewing/approving/rejecting VECPs • Monitoring and tracking the implementation of VECPs • Implementing VECPs on design-build projects
<p>Answer:</p> <p>Caltrans has a CRIP (Cost Reduction Incentive Program) rather than a VECP as contractor proposals do not generally use the VE process. We do have in our contracts a VE clause that does allow for a VE study if they want to identify cost saving changes.</p>		

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4a	<p>Identify the typical project factors and associated measures that your DOT requires to be analyzed on VE Analyses.</p> <p>Examples:</p> <table border="1"> <thead> <tr> <th>Factor</th> <th>Measure</th> </tr> </thead> <tbody> <tr> <td>Safety</td> <td>Crashes</td> </tr> <tr> <td>Traffic flow</td> <td>Delay</td> </tr> <tr> <td>Cost</td> <td>\$\$\$</td> </tr> </tbody> </table>	Factor	Measure	Safety	Crashes	Traffic flow	Delay	Cost	\$\$\$	<p>Identify and briefly describe how project functions (e.g., traffic flow, safety) are typically addressed during the Investigation, Speculation, and Evaluation phases of your VE analyses; explain the typical level of effort expended in analyzing these critical project functions.</p>
Factor	Measure									
Safety	Crashes									
Traffic flow	Delay									
Cost	\$\$\$									

Answer:

Performance Attributes

Caltrans has developed a “standard” set of performance attributes (referred to by some as Performance Measures). These represent those aspects of a project’s scope that may possess a range of potential values. In addition, Performance Requirements, which are characteristics of the project that must be met, are identified and managed during the VA Study. The standard performance attribute are summarized below.

- **Mainline Operations**
An assessment of traffic operations and safety on the mainline facilities, including off-ramps and collector-distributor roads. Operational considerations include level of service relative to the 20-year traffic projections, as well as geometric considerations such as design speed, sight distance, lane widths, and shoulder widths.
- **Local Operations**
An assessment of traffic operations and safety on the local roadway infrastructure, including on-ramps and frontage roads. Operational considerations include level of service relative to the 20-year traffic projections; geometric considerations such as design speed, sight distance, and lane widths; bicycle and pedestrian operations and access.
- **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.
- **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.
- **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.
- **Phasing**
An assessment of how easily a transportation facility can be improved or expanded upon at some future date. This attribute considers the degree of “throwaway work” involved, as well as future traffic and public impacts when the planned future improvements are made.
- **Land-Use Compatibility**
An assessment of the overall compatibility of transportation facilities with existing and

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planned land uses. This attribute considers how a transportation facility will directly affect the quality and viability of the land uses around it.

- **Schedule**

An assessment of both the impact to the remaining design and construction time of the project from the point in time of the VA Study.

The use of these performance attributes are integrated into each step of the Caltrans VA Process.

How Performance Attributes are used during the Study:

- **Preparation**

During the preparation for the VA Study, the CVS team leader works with the Project Manager, key PDT team members and other project stakeholders (including local agency representatives) to identify the key Performance Requirements and appropriate Performance Attributes for the project. Rating scales for each Performance Attribute is developed. Over time standard scales have been developed due to the vast number of studies where Performance Attributes have been used, but these can be subject to customizing for any project.

- **Information**

During the information phase, typically at the kick-off meeting the CVS team leader has the PM, PDT and other Project Stakeholders 1) verify that the current design or design options are meeting the Performance Requirements, then Rating the baseline design (and other design options as necessary) to determine how well the current design(s) are meeting the performance attributes. Note that the VA Team DOES NOT rate the baseline design, this is the role of the key project stakeholders. This information is then used by the VA Team to compare Value alternatives that are developed by the VA Team.

- **Function Analysis**

After the FAST Diagram has been completed on the project the team 1) assigning cost to the functions, 2) identifying which functions have the greatest impact on the project Performance Attributes, and 3) when Risk has been included in the VA Study, identify which functions have the greatest impact on Project Risk.

- **Creativity**

Based on an analysis of the FAST Diagram, that has been dimensioned with Cost, Performance Attributes and Risk; the Functions are Prioritized for Creativity Sessions. Basically Cost and Performance hold equal importance when seeking how to improve the project.

- **Evaluation**

During Evaluation, each idea is tested with respect to how it impacts the Performance Attributes – better, worse or no significant change. The rationale for the decision is also recorded. The potential impact on cost is also recorded, but the impact on Performance is evaluated first. This furthers in keeping the team on identifying Project Improvements and not just Cost Reduction. Based on this preliminary evaluation, the ideas are prioritized for development.

- **Development**

During the development and documentation of each alternative, a narrative is developed discussing the impact that the VA Alternative has on each performance characteristic as

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well as the cost. Documentation developed by the VA Team during Evaluation, provides a starting point for this documentation. Frequently at the end of Development the team reviews the entire alternative and rates the performance for each Value alternative.

- **Presentation**

In preparation for the Presentation the VA Team reviews all alternatives and identifies their recommended strategy for the project. This permits the cumulative impact of the recommended VA Alternatives to be evaluated for Performance and Cost and compared to the baseline design. Ultimately this reveals which approach has the best Value to the public. Frequently the VA Team will develop several strategies for the Project Stakeholders and decision makers to consider. Organizing these strategies helps the decision makers better understand to potential cumulative impact of the various VA Alternatives.

- **Implementation**

At the implementation meeting, for those items that are accepted, the project decision makers and PDT are asked to respond to the Performance and Cost ratings, to ensure the costs and performance that is reported represents the perspective of these critical project representatives and are not just the opinion of the VA Team.

In addition, Caltrans considers initial costs, life cycle costs, highway user cost, and risk for each alternative where appropriate. Most Caltrans studies are 6-day efforts, and an appropriate amount of time is applied in considering the performance requirement, performance attributes, and cost to ensure the best value project results and Value Based decisions are made.

4b.	Describe how your DOT incorporates life-cycle cost analyses in VE analyses.	Summarize your DOTs use of life cycle cost analyses while conducting VE analyses; indicate whether they are conducted as part of the study directly, if the study incorporates an independently conducted life cycle cost analysis, etc.
<p>Answer:</p> <p>Life cycle costs are calculated during VA studies where appropriate in terms of pavement life, long-term O&M considerations, etc. Caltrans regularly conducts VA studies that focus on pavement rehabilitation projects. In these cases, life cycle cost analysis plays a significant role. In addition, Caltrans considers highway-user benefits when evaluating construction schedule phasing and detours on all projects where VA Alternatives impact on these factors. Highway user benefits have also been used in VA Studies to help identify and resolve the best transportation solution for a project or where a VA Alternative has significant impact on operations.</p>		

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4c.	What percentage of VE analyses completed in FY 10 occurred in during the following stages of project development:	
<p>Answer:</p> <p>4 studies - Planning and concept development phase 27 studies - Up to 30% Design Phase 9 studies - 30-60% Design Phase (i.e., final design) 14 studies - 60% or later Design Phase (i.e., final plans complete, PS & E)</p> <p>Provide comments describing your experience regarding the timing of the VE analyses:</p> <p>Our data clearly shows that when performing VE early, results are significantly better. Studies in the Planning phase produce excellent ROI and Project Saving (13%), but in most cases, it's because the project is not clearly defined and baselines are being assumed and defined. During early design, we typically reach a 5% savings and decent ROIs. As the project progresses savings are reduced. Late design projects actually could have a negative ROI due to no savings. However, the numbers don't always reflect the true benefits of VE. On all projects there are always some performance benefits that are achieved. If it's consensus building, validating, risk mitigation, etc... all studies bring value to the project.</p> <p>This year, the high number of late studies was attributed to one thing, the economy. Due to the economy, federal fund issues, stimulus uncertainty and demand for shovel ready projects, many pavement rehabilitation projects were quickly initiated. This creates a situation for VE where results are very difficult to achieve. An exception process for these types of situations should be considered.</p>		

4d.	For design-build projects, identify the timetable that best describes when VE analyses are typically conducted by your DOT. Select one of the following:	
<p>Answer:</p> <p>Prior to Issuance of RFP</p>		

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4e.	If your DOT conducts multiple VE analyses on Major Projects, describe the points in the project development process where the analyses occur.	Identify the common points in the project development process when VE analyses typically occur for Major Projects (\$500 Million or greater). If the DOT does not conduct multiple analyses for Major Projects, proceed to Question 5.
<p>Answer:</p> <p>On major projects, VA Studies are typically conducted early in the Environmental process to help to evaluate alternatives and in many cases identify new concepts to consider in the evaluation phase. The next potential study may occur on major elements of the project where either high cost, environmental issues, or local issues exist and the VA Study can assist in resolving these concerns and getting agreement with project stakeholders. While there is no formal requirement for further studies on large project. Studies have been performed in the Design Phase to further resolve issues or address construction phasing and staging issues. Further studies may be warranted if project costs have risen and exceed the budget. Studies have also been performed to assess contract documents on complex or unique major projects.</p>		

5.	Briefly describe any special analyses conducted by your DOT in FY 2010.	
<p>Answer: During 2010, we conducted several studies to streamline our business practices. VE is an effective tool to break down the function of our processes and finding ways to improve communication and streamline the decision making process. Many of our studies were at a very high level in the organization to address functional duties and processes. These studies included:</p> <ul style="list-style-type: none"> - Developing internal GIS governance structure to align with global demand of the Geo Spatial world. Alternatives include the introduction of a Geospatial Information Officer (GIO) to coordinate efforts with other State, Federal, public, private, etc...entities that gather information important to the Department. - Developing Design Build proposal templates for the department's new DB jurisdiction. - Aligning centralized structures design function to improve partnerships with regional roadway design functional units. - Defining the Department's archiving process of project related documents to improve our environmentally friendly and cost savings process while maintaining our legal obligations. <p>Many of these studies are a continuous effort to improve these important areas of interest. VE is used to define roadmaps and ideas to reach our Department's goals and strategies.</p>		

6.	Briefly describe a successful VE analysis that was completed by your DOT in FY 2010.	Briefly describe a successful VE analysis or "lesson learned" from conducting a VE analysis that is an agency "best practice".
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Answer:

Sacramento Riverfront Reconnection

In terms of the long-lead project, the accepted VA alternatives eliminate the decking supporting commercial buildings and an urban park as proposed in the original concept, and instead simply enhance vehicular/ pedestrian connectivity.

This project was initiated at the request of the City of Sacramento in an effort to reconnect the riverfront with Downtown Sacramento, a loss experienced when I-5 was constructed in the early 1970s. The City of Sacramento proposes to construct an overcrossing at N Street, along with other improvements, including two potential decking structures across I-5 in Downtown Sacramento from O Street to Capitol Mall to reconnect the Downtown area with the Sacramento River riverfront and Historic Old Sacramento. The proposed project would improve regional multi-modal mobility between Capitol Mall (M Street) and O Street, and therefore complement planned riverfront development, the Crocker Art Museum expansion, and Downtown revitalization.

The VA study recommended that the decking over the freeway be delayed until such time that development costs can support the large financial investment and for now concentrate on enhancing motorized and non-motorized connectivity. Particularly, the VA Team felt that pedestrian connectivity between the Capitol Campus/State Offices and the Riverfront should be better exploited in the current project. Of key concern to the VA team was that Capitol Mall, the main roadway connection between Sacramento and West Sacramento that passes over Tower Bridge and near Old Town Sacramento, two important Sacramento landmarks, were not being improved for pedestrians and bicyclists. The implemented VA alternatives significantly widened the sidewalks along Capitol Mall (particularly over the freeway). This included using the unused roadbed associated with two abandoned roadway diagonals (Capitol Mall to 3rd Street). Also the O Street Overcrossing and N Street Overcrossing sidewalks were widened to improve access between the Crocker Museum / Crocker Park area and the riverfront. Finally, the VA recommendations included adding pedestrian access between Old Sacramento to the riverfront.

The lesson learned from this study is that the Caltrans approach of anchoring the Project Need and Purpose to the Project's Basic and Higher Order Function on the FAST Diagram clearly shows which functions are necessary to support the Project's Need and Purpose and where added functions considered for the project may or may not be valuable to the project and project stakeholders. In this case a function desired by some was found to be not cost effective and not required to support the Need and Purpose of the project.

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SR 99 Interchange at Elverta Road

Close Off Access to Elverta Road West of SR 99 During Construction Via an Elkhorn Boulevard/Metropark Detour and Construct the Elverta Road Detour within the Northeast Quadrant

Savings and Value improvement - \$1,130,000 +15%

The VA Study, conducted midpoint in the PA&ED Phase, was intended to focus on alternatives that would help to finalize the scope of the Project Report and identify cost-saving alternatives that would lower the costs to the project stakeholders. In addition, any alternatives that would help reduce or mitigate the project risks would be beneficial.

The alternative concept will detour traffic bound for the west side of SR 99 on Elverta Road via an Elkhorn Boulevard – Metropark detour. It will relocate Elverta Road in the northeast quadrant of the proposed interchange in order to begin the interchange construction (T intersection).

This alternative will increase the General Contractor's efficiency by making three of the four quadrants available for equipment and reducing the amount of time to build the roadway. The current design only offered the contractor the utilization of two of the four quadrants. The location of the new detour would impact the lowest volume ramp and deliver it as the last order of work. In addition, the ease of construction available to the contractor in this proposal should allow lower bids to be received.

Note: This alternative was able to take advantage of a newly constructed, parallel municipal roadway serving a residential development. The development had been stalled due to the economy. Normally a residential road would not be a viable detour for a freeway. The VE Team recognized that this was NOT a restriction due to the stalled development and the roadway was being underutilized.

The lesson learned from this study is to pay attention to opportunities unique circumstances – such as economic situations and stalled development.

I-10 HOV Lane Ontario to Redlands

Replace the Utility Towers in the Freeway Median with a Steel Pole just East of Etiwanda Avenue Overcrossing

The lesson learned from this study is to pay attention to project constraints for value opportunities. In this case everyone assumed that the utility company had prior rights for their easement of the high voltage towers in the median of the freeway, as a result the project was designed around that constraint as the cost to relocate was too high. The VA Team challenged this assumption and eventually it was found that Caltrans had prior rights

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so it is the responsibility of the utility company to relocate the tower.

As a result, it eliminated the replacement of the Etiwanda Avenue overcrossing, construction of outside pavement widening along I-10, reconstruction of approximately 2000 feet of Etiwanda Avenue, reconstruction of seven interchange ramps and a portion of the WB on-ramp from Valley Boulevard would be required. Besides reducing the almost \$14 million in capital costs, this alternative will greatly reduce the impacts to the mainline and Etiwanda Avenue motorists during construction. The impetus behind this alternative was that the project’s widening to the inside was impeded at this location by the presence of high voltage towers located in the freeway median. The relocation of the towers, as proposed by the VA Team, avoided interchange work that was not necessary to accomplish the need and purpose of this project. There were concerns that the decision to not replace the structure would not be a good life cycle cost decision, but the condition of the bridge was favorable.

Cross Town Freeway- Bridge Project - Use Precast Girders in lieu of CIP Box Superstructure

This alternative is quite simple – to use precast girders in lieu of a cast-in-place concrete box superstructure. In California, the highway bridge industry is geared towards using cast-in-place concrete boxes. One of the key reasons that cast-in-place is so prevalent, and more cost effective, is that in California contractors prefer to retain the labor and profit margin “in-house” available in CIP concrete box superstructures in lieu of sharing these with casting yard fabricators – as is the case in precast girders. The technology to cast girders is not difficult and Most bridge projects do not have the amount of space.

In the case of this project- located within the Port of Stockton- there was plenty of nearby space that could be used allowing the possibility for a contractor to provide precast girders more economically than CIP box girders, which is normally not the case in California.

The lesson learned from this study is to vet all the assumptions towards the selection of major construction items based on project conditions.

7.	Describe a unique or innovative VE recommendation or VE Change Proposal that provided significant benefit to the project on which it was implemented	Describe an implemented recommendation or VE Change Proposal that could potentially find application in other projects or by other DOTs.
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Answer:

Most Value Alternatives are the result of the specific design, constraints, environment, etc. of a specific project and are therefore unique solutions, which are seldom transferable to a wide range of projects unless it is something that changes a design standard.

What might be considered an application that could benefit other State DOT’s was the use of VE with the selected Contractor and State DOT personnel to identify possible CRIP (aka

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VECP) proposals shortly after contract award. This was done on the Doyle Drive project in San Francisco.

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8a.	Enter the number of State DOT, FHWA, and other individuals receiving VE training in FY 2010	
<p>Answer: 8 - DOT 0 - FHWA 75 - Other (overview seminars for City and County officials)</p>		

8b.	Identify the method(s) that best describe(s) your DOT's approach to conducting VE training and education (Select all that apply):	
<p>Answer:</p> <ul style="list-style-type: none"> • Short-duration orientation presentations for agency leadership • Short-duration orientation presentations for technical staff • Short-duration workshops/analyses 		

9a.	Total # of Analyses Completed in FY 2010	
<p>Answer: 0 - In-House 54 - Consultant</p>		

9b.	# of Analyses Completed in FY 2010 that were required by Federal Law	
<p>Answer: 0 - In-House 45 - Consultant</p>		

9c.	# of Analyses Completed in FY 2010 that were specially designated by the Secretary.	
<p>Answer: 0 - In-House 0 - Consultant</p>		

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9d.	# of Analyses Completed in FY 2010 for Projects that received funding from American Recovery and Reinvestment Act (ARRA) of 2009	
Answer: 0 - In-House 1 - Consultant		

9e.	# of specially designated Analyses for projects that received ARRA funding.	
Answer: 0 - In-House 0 - Consultant		

9f.	Anticipated # of Analyses to be Completed during FY 2011 and 2012.	
Answer: FY 2011 # In-House - 0 FY 2011 # Consultant - 40 FY 2012 # In-House - 0 FY 2012 # Consultant - 40		

10a.	Estimated costs associated with conducting the VE analyses \$	
Answer: \$2,415,000		

10b.	Estimated costs of the projects studied \$	
Answer: \$4,875,600,000		

11a.	Enter the total number of recommendations proposed	
Answer: 260		

11b.	Enter the total number of recommendations approved	
Answer: 119		

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12a.	Enter the value of recommendations proposed	
Answer: \$484,600,000		

12b.	Enter the value of recommendations approved	
Answer: \$305,000,000		

13a.	Enter the total number of VECP Submitted	
Answer: Not tracked		

13b.	Enter the total number of VECP approved	
Answer: 33		

14a.	Enter the total value of VECP submitted	
Answer: Not tracked		

14b.	Enter the total value of VECP approved	
Answer: \$2,900,000		

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15.	Tabulate the approved VE recommendations according to functional benefit	
Answer: #safety - 0 #operations - 24 #environment - 37 #construction - 57 #other - 41		
16.	Tabulate the approved VECs according to functional benefit	
Answer: Not Tracked #safety #operations #environment #construction #other		