

## FY 2010 Value Engineering Accomplishment Report: Best Practices

The following is a presentation of value engineering (VE) best practices as reported by the State Departments of Transportation (DOT) in the FY 2010 Accomplishment Report. Hyperlinks have been inserted in order to assist the reader in further research of a State's VE program.

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### 1. VE Program Management and Monitoring:

Program Management and Monitoring involves a holistic approach towards ensuring the VE program is running efficiently and effectively. This holistic approach actively controls the performance of the program through a focus on the interdependent critical elements of project selection, study timing, study scope, team makeup, recommendation development, resolution, implementation and program reporting. A number of states have developed this holistic approach towards VE Program Management. For instance, according to the 2010 data, the [Georgia DOT](#):

- Has provided training to most of its design and project management staff.
- VE Staff have AVS certifications and actively participate in local SAVE meetings.
- Upper management encourages and supports VE.
- VE staff work with project managers to identify and schedule VE studies.
- Recommendations are implemented within a few months of the VE study.
- Annual reports are prepared for FHWA, the Governor's Office and State Legislature.
- VE is discussed at industry conferences.

Another example of this holistic approach is the [Florida DOT](#). According to their 2010 data Florida best practices include:

- Utilize quarterly teleconferences with district coordinators to discuss VE issues
- Report quarterly on the performance measures.
- Currently integrating VE with Risk Analysis.
- Utilize Certified Value Specialists to lead studies.
- Require Districts to submit an Annual Work Plan at beginning of each fiscal year and monitor % complete.
- Perform quality assurance reviews on district programs to assure federal regulation and department procedures are being followed.
- Annually recognize an outstanding district based on the performance measures.

A number of states identified strong Executive and Upper Management support as a key factor in the success of their VE program.

States continue to move toward gaining better control over their VE program as exemplified by the development of controlling documents, for instance, [Kentucky Transportation Cabinet](#) developed their VE Guidance Manual in 2010 and the [North Carolina DOT](#) Value Management Guidelines were adopted

in September 2010. According to the 2010 performance data nearly 80% of all states have documented VE Program Guidance.

In addition to this comprehensive approach towards program management, many states exhibited exceptional performance within a particular area. The following provides some examples of these high performers as demonstrated in the 2010 VE performance data.

## 2. Scheduling, Planning and Coordinating VE analyses:

The first phase of the VE Job Plan is project selection. States are encouraged to establish processes for the identification and scheduling of candidate VE projects. Most states use the thresholds identified in federal regulations as their requirement for a VE study. However, there are a few states that are capitalizing on the value of VE by lowering the threshold. For example [Arizona](#), [Georgia](#) and [Nevada](#) stated that all projects valued over \$10 million are required to have a VE study. The following are a few examples of states that have identified effective project identification processes intended to capitalize on the value of VE.

- [Arizona](#) VA Section meets quarterly with Statewide and Valley Project Management Units to discuss design projects underway that have potential for future VA Studies.
- [New Jersey DOT](#) has developed Capital Project Procedures in delivering a project from problem statement to final closeout. Performing a VE review is an activity built into the process pipeline.

A number of states identified the need for additional VE studies for Major Projects, those costing \$500 million or greater. The following are just a few examples.

- [California](#) typically conducts VE Studies early in the Environmental process to help to evaluate alternatives and in many cases identify new project concepts. Subsequent studies may occur on major elements of the project where high cost, environmental issues or local issues exist or during the Design Phase.
- [North Carolina](#) conducts multiple VE analyses at different phases in project development. In addition, for smaller projects less than \$500 Million, the Department is also looking to perform multiple VE studies where it is deemed to be advantageous.
- [Wisconsin](#) typically conducts a VE study early in the project during the Environmental Document/preliminary engineering phase, while design is still flexible but after adequate realistic information and constraints has been determined. Subsequent VE efforts are held throughout the remaining design on specific segments or elements of the project.

## 3. Training and Education:

As reported in FY 2010, a total of **496** professionals received training in Value Engineering - **370** State DOT representatives; **20** FHWA representatives; and **106** professionals from other organizations. The most commonly described approach to conducting training was either through the National Highway Institute's VE workshop, or through short-duration orientation presentations for technical staff and short-duration workshops. Several states indicated that these workshops are regularly scheduled (annually or biennially) to maintain a substantial list of trained VE participants.

## 4. Composition of VE Analysis Teams:

Composition of the team is vital for a successful VE study. Several factors need to be considered in the formation of the VE Team. First the Team Leader should be a seasoned VE practitioner experienced in transportation project delivery. Second the team needs to be independent of the project and multi-disciplinary, specifically suited for the project with considerable experience within their field. There are a number of ways states assemble their teams. States identified benefits of using both consultants and in-

house resources to conduct VE analyses, approximately 60% of the analyses conducted nationally in 2010 utilized consultants.

Consultants can provide a host of benefits in the management of a VE program. States contract with consultants to provide experienced VE practitioners to serve as team leaders. A number of states declared they require the VE Team Leader to be a Certified Value Specialist (CVS). Use of consultants can also help to round out a team by providing experienced personnel for disciplines missing from the team. Mixing consultant and state personnel on a team provide further training and exposure to state personnel while ensuring unique state issues are understood by the team. Finally, some states maintain on-going VE consultant contracts to meet the needs of the VE program. In this manner, consultants can be deployed quickly to meet ever changing project schedules and requirements.

[Washington DOT](#) has an on-call consultant list of facilitators so a project request-to-study queue time is decreased. This allows multiple studies to be scheduled based on need.

## 5. Timing of Studies:

Most states identified timing of studies as a critical factor in the success of a VE study. Studies have shown that VE Studies done in the early phases of a project yield higher performance results than those done later in the project delivery cycle. However, there are some drawbacks to studying a project too early. For instance, project costs may not be accurate or available, and project issues may not be defined.

Most states believe that studies should be completed prior to the 30% plans phase. For instance, [North Carolina](#) completed a study on their VE program and concluded: 'The primary lesson learned from a review of VE Studies completed in FY 2010 is the recognition that the NCDOT Value Management Program needs to increase the percentage of VE Studies performed in both the planning and conceptual development phase and the preliminary design phase. By doing so, this will increase the opportunity for recommendations to be implemented into the project design.'

**Pennsylvania DOT** stated, 'One of the findings from the 2009 IOP Review on VE found that the studies were held too late in the process. The Department responded by including a task for VE in their scheduling software right after the NEPA clearance.'

Under certain circumstances and special projects, some states have recorded successful results when conducting VE during later stages in the project delivery cycle. For instance, large resurfacing projects have been studied later than 30% design plans with good results.

## 6. Application of VE in Design-Build Projects:

States provide a wide array of comments regarding the timing and effectiveness of VE on D/B projects. Some states have commented there is not enough information available at the RFP stage to conduct an effective VE study. Others have stated they have had good results and teams have enough information to develop recommendations. Still others have stated they conduct the study and provide the VE report with recommendations to all D/B proposers. The concept is that contractors will further develop VE recommendations and incorporate them into their proposal thus providing project savings to the state.

Probably, the most important factor regarding the effectiveness of D/B VE studies is the amount of information available for the project team. A number of states have modified their VE process to fit in line with the D/B schedule. The following are a few examples of how states are incorporating VE into D/B.

- [Arizona](#) usually conducts the study prior to, but no later than, the selection of the shortlisted firms. The VE Study recommendations are furnished to each shortlisted firm.
- [Massachusetts](#): The State aims to develop the design-build project to a level of about 20% design prior to issuing the RFP. At that stage the project has a defined concept, scope and estimate, as well as, the permitting process nearing final approval. An adequate level of documentation is available at this stage of design to conduct an effective VE analysis.
- [North Carolina](#) typically conducts the VE Study after the issuance of the Industry Draft RFP and before the issuance of the Final RFP. The primary benefit of performing the VE Study during this window of opportunity is that the VE Team has access to the Materials Available that were provided to the short-listed design-build teams and the Industry Draft RFP. By performing VE analyses on the specific engineering disciplines as detailed in the Industry Draft RFP, the VE Team has the opportunity to provide VE recommendations that the Department can incorporate into the Final RFP. The savings as a result of the VE recommendations can be determined by comparing the Industry Draft RFP to the Final RFP. North Carolina also stated that 'A Risk Assessment prior to a VE Study can provide valuable project insight.'
- [Eastern Federal Lands](#) have had great success bringing together larger VE teams that include stakeholders to review all the documents together and resolve all comments together to create a final RFP and agree to VE recommendations that have saved significant costs.

## 7. Project Performance Factors and Measures Evaluated During VE:

The cornerstone of the VE program is to provide the required functions of a project at a reduced cost. There are instances where a project's function can be greatly improved with little to no cost increase. The FHWA's VE Accomplishment Report highlights the number of approved recommendations that directly benefit typical performance indicators such as Safety, Operations, Environment, and Constructability. In 2010 states were asked to tabulate the approved VE recommendations according to their functional benefit. States identified the majority of recommendations, **63%**, improved the operations and construction of the project.

States identified performance monitoring as a key component of their VE program. Additionally, states are looking for better performance measures to capture the value of the program. For example:

- In its Strategic Plan, [Arizona's](#) performance goals are: # of VE studies; # of ideas; % of ideas accepted; & # of new VE participants. In addition to the elements in the FHWA reporting requirements, the Arizona HTD's annual VE report includes Return on Investment, Percent of Project Costs Saved, Recommendation Acceptance Rate, Average Cost Savings per Recommendation, and VECP Acceptance Rate.
- [Florida DOT](#) is about to implement the % project saved measure for VECP's. FDOT requires their Districts to submit a work plan at the beginning of each fiscal year and they monitor the % complete for each quarter and at the end of the fiscal year. The FDOT also tracks pending recommendations by District, this keeps the Districts focused on closing out the recommendations. Outcome measures of Savings, Adoption rate, and % project saved are tracked in trend charts covering multiple fiscal years.
- [North Carolina's](#) Value Management Program has approved performance goals and measures that are tracked as part of the Quality Enhancement Unit's overall program results. The performance measures currently tracked are (1) the percentage of VECPs coordinated and recommendations made within 15 days of receipt from the Contractor is tracked and the target goal is between 70-89%, (2) the percentage of accepted VE Recommendations is tracked and the target goal is between 44-60%, and (3) the percentage of VE projects studied (planned vs. actual) for the year is tracked and the target goal is 70-89%.

A number of states identified a benefit of the VE Process is to 'reign in scope creep'. In a period where funding is not adequate to meet transportation demands, it is of utmost importance to stretch the transportation dollars and reduce unnecessary costs. VE has been proven as an effective tool to meet this need. The following are a few specific examples.

- [New York](#): The Staten Island Expressway (SIE) Bus Lane Re-designation and Extension Project. This project is intended to increase bus ridership and to address extensive transit delays through the SIE corridor by extending HOV lanes. The success of this project can be attributed to reigning in a large degree of scope creep. The VE successfully focused on addressing the primary goals of the project, thereby simplifying the highway realignment scheme and construction staging and ultimately resulting in a savings of \$38M.
- [Virginia](#): A study on a \$25M I-64 lane widening project identified improvements to a highly congested interchange would solve the capacity issue, rather than widening the interstate. It resulted in re-scoping the project to focus on improving the interchange.

## 8. Integration of VE with Other Analysis Techniques:

The FHWA VE Accomplishment Report for 2010 identified a number of states that were integrating the VE technique with other project quality and cost review processes. As was reported at that time, the [Washington DOT](#) continues to experience success with the combining of Cost Risk Assessments and Value Engineering Analyses. Other agencies including the [Florida](#), [Louisiana](#), [North Carolina](#), and [Utah](#) DOTs are each employing risk analyses to support VE analyses.

Two agencies identified unique benefits to integrating VE and Risk Assessments.

- [California](#) often runs risk assessments in conjunction with VA Studies. VA is then used as a vehicle for developing risk response strategies. They also integrate VA studies with Roadway Safety Audits (RSA). The results of this new integrated approach will be evaluated and fine-tuned for future efforts.
- [Eastern Federal Lands](#) conducted a special analysis which included using the VE job plan to create a risk assessment to properly divide risk among the stakeholders.

A controversial issue for VE is in regards to the value of conducting VE studies on simple straight forward projects such as resurfacing or 3R projects. A number of states indicated successful results on these types of projects during the 2010 reporting period. For instance [Nevada](#) reported 'The PM was convinced that no additional value could be obtained from a 3R project. However, many good ideas emerged from the study and this analysis will be used as a prototype for all 3R projects.'

- [Arizona](#): Performed VE Analysis on CMAR 'Construction Manager at Risk' project. Study begins after the contractor is selected. One of the benefits of a CMAR contract is having the contractor's input while preparing the final design. Besides generating many excellent value enhancing ideas, having a VE study as soon as the contractor is selected, starts the interaction between the contractor and designers and develops a process to be used for the remainder of the project. The VA team generated 10 accepted ideas; the project team has since developed 17 more ideas.
- [Florida](#): FDOT District 4 conducted a VE study on a section of SR 710 in Martin County. The current roadway is a 2-lane rural section with 12 foot lanes and 10 foot paved shoulders on each side. The proposed roadway will be 4-lane, divided, rural section with design speed of 65 mph. The project purpose and need are to provide safety, mobility, an evacuation route and emergency services, multi-modal accommodations, corridor capacity, regional connectivity and reduce congestion from anticipated county and regional growth. The total project cost was \$250 million, with \$170 million in construction and \$80 million in right-of-way. The VE team studied this project

during the project development and environmental phase. The team focused on adjusting the footprint of the project to reduce right-of-way costs and mitigation costs. Total savings of the approved recommendations was \$90 million for a percent project saved of 36%.

## 9. Other Process Applications for VE:

Traditionally, FHWA's focus for the VE program is to improve transportation project functions and reduce project costs. However, VE is a proven technique that can be used to evaluate much more than transportation projects. Many states used the VE technique to evaluate and improve State and Federal-aid programs and processes. The 2010 Accomplishment Report provides examples from several states that demonstrated the successful application of VE to a variety of programs, processes and standards. Each of these applications can have a broader positive influence on the successful delivery of the Federal-aid Program.

In 2010, [California](#) conducted several VE analyses to streamline their business practices. VE was used as an effective tool to break down the function of the following processes and find ways to improve communication and streamline their decision making processes.

- Develop 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.
- Develop Design Build proposal templates for the department's new DB jurisdiction.
- Align centralized structures design function to improve partnerships with regional roadway design functional units.
- Define the Department's archiving process of project related documents to improve our environmentally friendly and cost savings process while maintaining our legal obligations.

[Florida DOT](#) used the VE process to study and map the internal process to allow the elimination of a lane or lanes from a state road. There was no formal process for these lane elimination requests to basically convert a lane for another use, and the district was beginning to see an increase in these requests especially on state roads in downtown areas. The desire is to develop a standardized process for handling these applications when they are submitted. The VE study resulted in a documented process that the district can follow to handle these requests.

In 2010, [Kentucky](#) developed a VE lessons learned and tracking database using GIS. FHWA Kentucky Division's VE Coordinator and KYTC's VE Branch meets monthly to work on an ongoing agenda and task list. Items and tasks completed are recommended revisions to the stewardship plan, VE Process Review by FHWA scheduled for spring 2011, development of a formal training plan and approval of performance goals.

States have also conducted programmatic type studies for a group of similar projects. This is an effective application when individually each project doesn't rise to the level of requiring a VE study, however, when added together may result in a significant amount of funding. [Virginia](#) identified one such study where they conducted a special study on culvert replacements throughout the State. The effort included \$52 million in ARRA funding.

## 10. Value Engineering Change Proposals:

In concert with sharing nationwide best practices and success in implementing VE during project development, the States were again asked to share information regarding their successful practices that encourage effective implementation of Value Engineering Change Proposals (VECP) after award of the construction contracts.

- [Missouri](#) contractors are strongly encouraged to engage in the development and submittal of VECP's. The local AGC chapter has an award for the most VECP's approved. There were 100 VECP's submitted for Missouri and 91 were approved.
- [Florida](#) is implementing a Cost Savings Initiative (CSI) workshop on every project. The workshop is held after award, but prior to the Notice to Proceed (NTP). The purpose of the workshop is to discuss potential CSI proposal ideas and give conditional approval to the contractor to develop the viable ideas. Florida has partnered with the Florida Transportation Builders Association and the Florida Institute of Consulting Engineers to develop the changes described above and to encourage more CSI proposals.
- [New York](#) DOT has generally been very successful at encouraging cost effective alternative designs and/or construction methods from our contractors. At the same time, there has been some feedback that the VECP language in the Standard Specifications can appear daunting to some. As a result, this may discourage some smaller value suggestions from being submitted due the perceived amount of time, effort and paperwork required. NYSDOT continues to explore methods by which to encourage the contractors to submit VECPs for smaller value change proposals.