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## 310.01 General

Value engineering (VE) is a systematic review of a project by a multidisciplinary team not directly involved in the planning and development phases of the project. The VE process includes consideration of design; construction; maintenance; contractor; state, local, and federal approval agencies; other stakeholders; and the public.

Properly timing a Value analysis influences its benefits. Value analyses are typically conducted fairly early in project development to identify ideas to reduce cost and; refine scope. Section 310.02(3) VE Analysis Timing, of this chapter offers additional information about timing.

A VE analysis <sup>1</sup> may be applied as a quick-response study to address a problem or as an integral part of an overall organizational effort to stimulate innovation and improve performance characteristics.

Project managers are accountable for ensuring their projects meet all applicable value engineering requirements. In addition, local programs projects are accountable for ensuring they comply with Local Agency Guidelines requirements. In all cases, when a VE study is completed, the project manager is accountable for completing, signing, and submitting the VE Recommendations Approval Form.

## 310.02 Statewide VE Program

### 310.02(1) Annual VE Plan

The State VE Manager coordinates annually with the Capital Program Development and Region VE Coordinators to prepare an annual VE Plan, with specific projects scheduled quarterly. The VE Plan is the basis for determining the projected VE program needs, including team members, team leaders, consultants, and training. The Statewide VE Plan is a working document that reflects coordination between Headquarters (HQ) and the regions to keep it updated and projects on schedule.

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<sup>1</sup> The terms “value management”, “value engineering”, “value study” and “value analysis” are used interchangeably.

## 310.02(2) Selecting Projects for VE Analysis

### 310.02(2)(a) Requirements

WSDOT projects for VE studies may be selected from any of the categories identified in the Highway Construction Program, including Preservation and Improvement projects, depending on the size and/or complexity of the project. In addition to cost, other issues adding to the complexity of the project design or construction are considered in the selection process. These include projects that have critical constraints, difficult technical issues, expensive solutions, external influences, and complicated functional requirements, regardless of the estimated project cost. These include projects that have critical constraints, difficult technical issues, expensive solutions, external influences, and complicated functional requirements, regardless of the estimated project cost.

WSDOT may conduct VE analyses on any projects the project manager determines will benefit from the exercise. In addition, WSDOT conducts VE analyses for all projects as required by the criteria set forth in Federal Highway Administration (FHWA) Value Engineering Policy Order.

1. WSDOT policy requires a value engineering analysis for:
  - Any project with an estimated cost (which includes project development, design, right of way, and construction costs) of \$25 million or more, regardless of funding;
  - Each bridge project located on or off of the federal-aid system with an estimated total cost of \$20 million or more (WSDOT policy is to conduct a VE analysis regardless of funding source); and
  - Any other projects the Secretary or FHWA determines to be appropriate.
2. In addition to the projects described above, WSDOT strongly encourages a VE analysis on other projects where there is a high potential for cost savings or improved project performance or quality. Projects involving complex technical issues, challenging project constraints, unique requirements, and competing community and stakeholder objectives offer opportunities for improved value by conducting VE analyses.
3. Any use of Federal-Aid Highway Program (FAHP) funding on a Major Project<sup>2</sup> requires that a VE analysis be conducted. In some cases, regardless of the amount of FAHP funding, a project team may be required to perform more than one VE analysis for a Major Project.
4. After completing the required VE analysis, if the project is subsequently split into smaller projects in final design or is programmed to be completed by the advertisement of multiple construction contracts, an additional VE analysis is not required. However, splitting a project into smaller projects or multiple construction contracts is not an accepted method to avoid the requirements to conduct a VE analysis.
5. WSDOT may require a VE analysis to be conducted if a region or public authority encounters instances when the design of a project has been completed but the project does not immediately proceed to construction.
  - a. If a project meeting the above criteria encounters a three-year or longer delay prior to advertisement for construction, and a substantial change to the project's scope or

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<sup>2</sup> Based on the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, signed into law on August 10, 2005, a Major Project is defined as "a project with a total estimated cost of \$500 million or more that is receiving financial assistance." FHWA also has the discretion to designate a project with a total cost of less than \$500 million as a Major Project.

- design is identified, WSDOT may require a new VE analysis or an update to the previous VE analysis; or
- b. If a project's estimated cost was below the criteria identified above but the project advances to construction advertisement, and a substantial change occurs to the project's scope or design, causing an increase in the project cost so that it meets the criteria identified above and results in a required re-evaluation of the environmental document, WSDOT requires that a VE analysis be conducted.
6. When the design of a project has been completed but the project does not immediately proceed to construction, the requirement to conduct a VE analysis is considered to be satisfied, or not necessary, if:
- a. A project met the criteria identified above and had a VE analysis conducted, and the project advances to advertisement for construction without any substantial changes in its scope or its design; or
  - b. A project's estimated cost initially fell below the criteria identified above, but when advancing to advertisement for construction, falls above the criteria due to inflation, standard escalation of costs, or minor modifications to the project's design or contract.

Other projects that should be considered for value engineering have a total estimated cost exceeding \$5 million and include one or more of the following:

- Alternative solutions that vary the scope and cost
- New alignment or bypass sections
- Capacity improvements that widen the existing highway
- Major structures
- Interchanges
- Extensive or expensive environmental or geotechnical requirements
- Materials that are difficult to acquire or that require special efforts
- Inferior materials sources
- New/Reconstruction projects
- Major traffic control requirements or multiple construction stages

### **310.02(3) VE Analysis Timing**

#### **310.02(3)(a) When to Conduct the VE Analysis**

Timing is very important to the success of the VE analysis. A VE analysis should be coordinated with other project development activities. For example, a project requiring an Access Revision Report (ARR), NEPA and a VE should consider how to best integrate the processes with development of project need statements.

Optimizing the timing of a VE analysis minimizes impacts of approved recommendations on previous commitments (agency, community, or environmental) and project's scope. VE analyses can also be coordinated with project risk assessments.

See [www.wsdot.wa.gov/design/saeo/](http://www.wsdot.wa.gov/design/saeo/)

Benefits can be realized by performing a VE analysis at any time during project development; however, the WSDOT VE program identifies the following three windows of opportunity for performing a VE analysis.

### 1. Scoping Phase

Early in preliminary engineering is a good time for value analysis consideration. This is a time to consider alternatives or design solutions with a high potential for implementing VE recommendations. At the conclusion of the VE study, the project scope, preliminary costs, and major design decisions are informed by the recommendations.

When conducting value engineering during the scoping phase of a project, the VE analysis focuses on project drivers. This stage often provides an opportunity for community engagement and building consent with stakeholders.

### 2. Start of Design

At the start of design, the project scope and preliminary costs have been established and major design decisions have been made. Some Plans, Specifications, and Estimates (PS&E) activities may have begun, and coordination with support groups and subject matter experts is underway. At this stage, the project scope, costs, and schedule define the limits of the VE analysis. There is opportunity to focus on the technical issues of the design elements.

### 3. Design Approval

After Design Approval, most of the important project decisions have been made and the opportunity to affect the design is limited. Provided there is time to incorporate VE recommendations, the VE analysis may likely focus on constructability, construction sequencing, staging, traffic control, and significant design issues.

An additional VE analysis may be beneficial late in the development stage when the estimated cost of the project exceeds the project budget. The value engineering process can be applied to the project to lower the cost while maintaining the value and quality of the design.

## 310.02(4) *VE Program Roles and Responsibilities*

### 310.02(4)(a) **Region VE Coordinator**

- Identifies region projects for VE analyses (from Project Summaries and available planning documents).
- Makes recommendations for timing of the VE analysis for each project.
- Presents a list of the identified projects to region management to prioritize into a regional annual VE Plan.
- Identifies potential team facilitators and members for participation statewide.

### 310.02(4)(b) **State VE Manager**

- Reviews regional VE Plans regarding content and schedule.

### 310.02(4)(c) **State VE Coordinator**

- Incorporates the regional annual VE Plans and the Headquarters Plan to create the Statewide VE Plan.
- Prepares annual VE Report.
- Maintains policy documents for the department.
- Coordinates studies.

- Arranges training for future VE team leaders and members.

#### **310.02(4)(d) VE Team Leader**

The quality of the VE analysis largely depends on the skills of the VE team leader. This individual guides the team's efforts and is responsible for its actions during the analysis. The VE team leader should be knowledgeable and proficient in transportation design and construction and in the VE analysis process for transportation projects.

The VE team leader's responsibilities include the following:

- Plans, leads, and facilitates the VE study.
- Ensures proper application of a value methodology.
- Follows the Job Plan.
- Guides the team through the activities needed to complete the pre-study, the VE study, and the post-study stages of a VE study.
- Schedules a pre-workshop meeting with the project team and prepares the agenda for the VE study.

Team leaders from within WSDOT are encouraged, but not required, to be certified by the Society of American Value Engineers (SAVE) as an Associate Value Specialist, Certified Value Specialist (CVS) or as a Value Methodology Practitioner (VMP). Team leadership can be supplied from within the region, from another region, or from Headquarters. A statewide pool of qualified team leaders is maintained by the State VE Coordinator, who works with the Region VE Coordinator to select the team leader.

Consultants who lead VE teams are required to be SAVE certified.

#### **310.02(4)(e) VE Team Members**

The VE teams are usually composed of six to ten people with diverse expertise relevant to the project under study. The team members may come from regions; Headquarters; other local, state, or federal agencies; or the private sector.

Team members are not directly involved in the planning and development phases of the project. They are selected based on the expertise needed to address major functional areas and critical high-cost issues of the study. All team members must be committed to the time required for the study. It is desirable for team members to have attended Value Engineering Module 1 training before participating in a VE study.

### **310.03 VE Procedure**

The WSDOT VE analysis uses the Seven-Phase Job Plan shown in Exhibit 310-1. A detailed discussion of how each phase is supposed to be conducted can be found in the document, Value Methodology Standard and Body of Knowledge, developed by SAVE International, The Value Society. This document can be downloaded at the SAVE website: [www.value-eng.org/](http://www.value-eng.org/)

### 310.03(1) Pre-Study Preparation

To initiate a VE study, the project manager submits a Request for Value Engineering Study form to the Region VE Coordinator at least two months before the proposed study date. The form is located on the WSDOT value engineering website:

🔗 [www.wsdot.wa.gov/design/valueengineering/tools/](http://www.wsdot.wa.gov/design/valueengineering/tools/)

The Region VE Coordinator then works with the State VE Coordinator to determine the team leader and team members for the VE study. Contacts are listed on the WSDOT value engineering website: 🔗 [www.wsdot.wa.gov/design/valueengineering](http://www.wsdot.wa.gov/design/valueengineering)

The design team prepares a study package of project information for each of the team members. (A list of potential items is shown in Exhibit 310-2). Work with the State VE Coordinator for the best/most concise list of materials to send to the team members. If the package is provided via a network drive or FTP site, make sure the materials are well titled and sorted in a well-titled file structure. The VE team members should receive this information or a link to this information at least one week prior to the study so they have time to review the material.

The region provides a facility and the equipment for the study (see Exhibit 310-2).

### 310.03(2) VE Analysis Requirements

The time required to conduct a VE analysis varies with the complexity and size of the project, but typically ranges from three to five days. The VE team leader working with the project manager will determine the best length of time for the study.

The VE analysis Final Report includes an executive summary; a narrative description of project information; the background, history, constraints, and controlling decisions; the VE team's focus areas; a discussion of the team's speculation and evaluation processes; and the team's final recommendations. All of the team's evaluation documentation, including sketches, calculations, analyses, and rationale for recommendations, is included in the Final Report. A copy of the Final Report is to be included in the Project File. A copy of the report is also provided to FHWA for projects on the National Highway System or federal-aid system.

Post-VE analysis activities include:

- The Project Manager and Project team are responsible for:
  - Implementation and evaluation of the approved recommendations.
  - Documentation of reasons recommendations were not implemented.

### 310.03(3) Implementation (Phase 7 of VE)

As soon as possible, preferably no more than two weeks following the VE analysis, the project manager reviews and evaluates the VE team's recommendation(s). The project manager completes the VE Recommendation Approval form included in the Final Report and returns it to the Statewide VE Manager.

Recommendations not approved or modified by the project manager require a brief justification in the VE Recommendation Approval form.

The project manager sends the completed VE Recommendation Approval form to the State VE Manager following receipt of the Final Report and not later than September 1 of each year, whichever comes first, so the results can be included in WSDOT's annual VE Report to FHWA.

## Exhibit 310-1 Seven-Phase Job Plan for VE Studies

VE Study Phase	Job Plan
1. Information	Gather project information, including project commitments and constraints. <ul style="list-style-type: none"> <li>• Investigate technical reports and field data</li> <li>• Develop team focus and objectives</li> </ul>
2. Function Analysis	Analyze the project to understand the required functions. <ul style="list-style-type: none"> <li>• Define project functions using active verb/measurable noun context</li> <li>• Review and analyze these functions to determine which need improvement, elimination, or creation to meet project goals</li> </ul>
3. Creative	Generate ideas on ways to accomplish the required functions that improve project performance, enhance quality, and lower project costs. <ul style="list-style-type: none"> <li>• Be creative</li> <li>• Brainstorm alternative proposals and solutions to lower project costs, improve project performance, and enhance quality</li> </ul>
4. Evaluation	Evaluate and select feasible ideas for development. <ul style="list-style-type: none"> <li>• Analyze design alternatives, technical processes, and life cycle costs</li> </ul>
5. Development	Develop the selected alternatives into fully supported recommendations. <ul style="list-style-type: none"> <li>• Develop technical and economic supporting data to prove the benefits and feasibility of the desirable concepts</li> <li>• Develop team recommendations (long-term as well as interim solutions)</li> </ul>
6. Presentation	Present the VE recommendation to the project stakeholders. <ul style="list-style-type: none"> <li>• Present the VE recommendation to the project team and region management in an oral presentation</li> <li>• Provide a written report</li> </ul>
7. Implementation	The decision to implement or not implement recommendations is documented in the signed VE Recommendation Approval form. <u>The Project Manager implements approved recommendations.</u>
<p><b>Note:</b> Phases 1–6 are performed during the study; see <i>Value Standard and Body of Knowledge</i> for procedures during these steps.</p>	

## Exhibit 310-2 VE Analysis Team Tools

Project-Related Input* and Design Resources (Study Package)
Project Management Plan
Vicinity map
Aerial photos
Large-scale aerial photographs
Pertinent maps - Land use, contours, quadrant, etc.
Crash data with collision analysis
Existing as-built plans
Design file
Cross sections and profiles
Environmental documents Environmental constraints, and commitments
Estimates (and associated Basis Of Estimate)
Geotechnical reports
Hydraulic Report
Plan sheets
Quantities
Right of way plans
<a href="#">Bridge List</a> /Bridge condition report
<a href="#">Design Manual</a>
<a href="#">Field Formulas</a> and <a href="#">Field Tables</a>
<a href="#">Standard Plans</a>
<a href="#">Standard Specifications</a>
<a href="#">State Highway Log</a>
Other <a href="#">manuals</a> as needed

Study-Related Facilities and Equipment
AASHTO <i>Green Book</i>
Calculators
Computer (with network if available) / projector
Easel(s) and easel paper pads
Marking pens
Masking and clear tape
Power strip(s) and extension cords
Room with a large table and adequate space for the team
Scales, straight edges, and curves
Telephone
Vehicle or vehicles with adequate seating to transport the VE team for a site visit**

\*Not all information listed may be available to the team, depending on the project stage. Work with your Region VE Coordinator or the State VE Coordinator to verify that all needed information is available.

\*\*If a site visit is not possible, perform a “virtual” tour of the project.

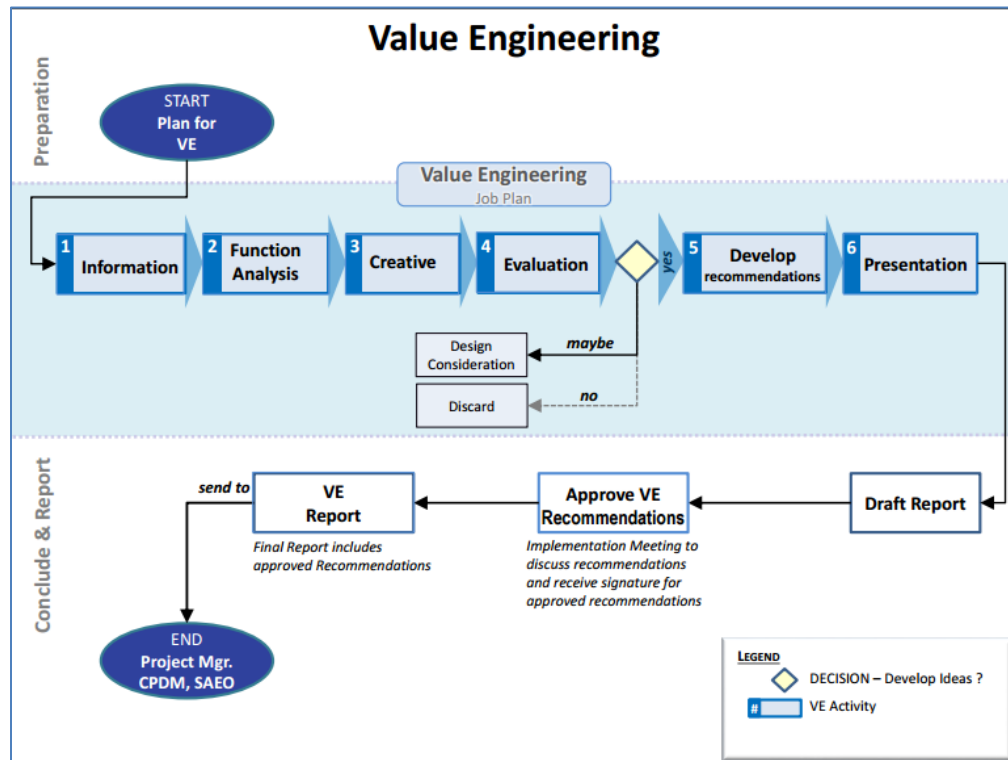


## 310.04 Value Engineering Job Plan

The VE process is comprised of a 6-step Job Plan. FHWA adds a “7th” step known as implementation. Exhibit 310-3 depicts the process for Value Engineering. An interactive version of this exhibit is available at:

[http://www.wsdot.wa.gov/publications/fulltext/CEVP/VE\\_JobPlan.pdf](http://www.wsdot.wa.gov/publications/fulltext/CEVP/VE_JobPlan.pdf)

Exhibit 310-3 Value Engineering Job Plan



## 310.05 Project Management Accountability

Project Managers are required to make a determination for each VE recommendation. To that end, project managers, in consultation with their project teams, support staff, other management support, and subject matter experts, decide the action to be taken for each recommendation.

## 310.06 Documentation

Refer to [Chapter 300](#) for design documentation requirements.

The following value engineering documentation is required:

- **Project File** – Value Engineering Final Report
- **Design Approval** – Design Documentation Package for Approval – the Value Engineering Recommendation Approval Form
- **Project File** – Value Engineering Recommendation Approval Form

## 310.07 References

### 310.07(1) Federal Laws and Codes

Title 23 U.S.C. Section 106(e) – Value Engineering Analysis

Title 23 CFR Part 627 – Value Engineering

MAP-21 (Moving Ahead for Progress in the 21st Century), Section 1503

Circular A-131, Office of Management and Budget (OMB)

🔗 [http://www.whitehouse.gov/omb/circulars\\_a131](http://www.whitehouse.gov/omb/circulars_a131)

FHWA Value Engineering Policy

🔗 <https://www.fhwa.dot.gov/legregs/directives/orders/13111b.cfm>

### 310.07(2) Design Guidance

Value Engineering for Highways, Study Workbook, U.S. Department of Transportation, FHWA  
Value Standard and Body of Knowledge, SAVE International, The Value Society:

🔗 <http://www.value-eng.org/>

WSDOT Value Engineering website:

🔗 [www.wsdot.wa.gov/design/valueengineering/](http://www.wsdot.wa.gov/design/valueengineering/)