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310.01 General

Value engineering (VE) is a systematic review of a project by a multidisciplinary team. The VE process can include consideration of design; construction; maintenance; contractor; state, local, and federal partner agencies; other stakeholders; and the public.

Value Engineering is one of the most effective techniques to identify and eliminate unnecessary costs in design, testing, manufacturing, construction, operations, maintenance, data, procedures, and practices.

Value analyses are typically conducted early in project development to improve project value by identifying ideas that improve function, offer efficiencies, reduce cost and refine scope. Section [310.02\(3\) VE Analysis Timing](#), of this chapter offers additional information about timing.

A VE analysis² 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.

Value Engineering (VE) is a critical part of good project management practices. Project managers are accountable for ensuring that, at a minimum, projects needing VE include VE activities in the project schedule. Project managers should carefully plan the timing of the VE analysis for optimum benefit. 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, located in the Development division, coordinates annually with the Capital Program Development & Management division and region VE Coordinators to prepare an annual VE Plan.

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 and the regions to keep it updated and projects on schedule.

² The terms “value management”, “value engineering”, and “value analysis” are used interchangeably.

310.02(2) Selecting Projects for VE Analysis

310.02(2)(a) Requirements

WSDOT requires VE analyses for Design-Bid-Build (DBB) projects in accordance with FHWA requirements of 23 CFR Part 627 that meet the following thresholds:

- A total estimated cost (includes project development, design, right of way, and construction costs) of \$50 million or more.
- A bridge project located off of the federal-aid system with an estimated total project cost of \$40 million or more.
- A Major Project with Federal-Aid Highway Program (FAHP) funding. 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.
- Any other project the Secretary or FHWA determines to be appropriate.

After completing the required VE analysis, if the project is 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.

Design-build projects are not required to perform Value Engineering. Even if a project is not required to conduct a VE study there may be benefits realized from the process.

310.02(2)(b) Recommendations

Some projects that are not required to perform VE may find it beneficial—the following recommends considering a VE for projects having certain characteristics.

WSDOT strongly recommends a VE analysis for projects:

- Bridge projects over \$20 million and other projects over \$25 million.
- Projects of any size, having the potential for significant cost savings or improved project performance or quality.
- Projects involving complex technical issues, challenging project constraints, unique requirements, or competing community and stakeholder objectives.
- Encountering a three-year or longer delay prior to advertisement for construction, and a substantial change to the project's scope or design is identified.

Project Managers and teams should strongly consider value engineering for projects having a total estimated cost exceeding \$5 million and one or more of the following:

- Significant risks
- Alternative solutions that vary the scope and cost
- New alignment or bypass sections
- Capacity improvements that widen the existing highway
- Major structures
- Interchanges
- Social justice concerns and inclusion of underserved communities
- Possible or likely presence of cultural/archaeologic resources
- Geotechnical or geographical challenges

- Extensive or expensive environmental or geotechnical requirements
- Materials that are difficult to acquire or that require special efforts to acquire, transport, or store
- Inferior materials sources
- New/Reconstruction projects
- Major traffic control requirements or multiple construction stages
- Existing or expected high pedestrian and/or bicyclist use
- Existing or expected use by other modes (trucks, rail, etc.)
- No transportation demand management elements

310.02(3) VE Analysis Timing

310.02(3)(a) Best time to Conduct a VE Analysis

Timing is a key to the success of the VE analysis. A VE analysis must be coordinated with other project development activities. For example, a project requiring an Access Revision Report (ARR), NEPA and a VE must consider how to best integrate processes. Conducting VE analyses in conjunction with these efforts ensures VE outcomes are considered during environmental documentation and avoids the necessity to re-evaluate NEPA.

Although VE is not required for design-build projects, in some cases there are benefits, including:

- Enables WSDOT to be a better informed owner in procurement and selection of the design builder
- Allows focusing the VE analysis effort on response actions to identified risks and allocating risk ownership
- Promotes innovation in specific areas of interest or concern identified by the project manager or team
- Identifies possible improvements to procurement process documents, and in particular the request for proposal (RFP)

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

Benefits can be realized by performing a VE analysis at any time during project development; however, the following typical windows of opportunity are identified for performing a VE analysis.

310.02(3)(a)(i) Planning / pre-scoping

An early Value Engineering study can be conducted to refine scope and evaluate alternative actions. VE analysis in planning and pre-scoping promotes identification of performance attributes that can be carried forward to future more focused and in-depth VE analysis during design.

This early effort could be a Value Engineering / Practical Design peer review and used as a forum for community engagement with major stakeholders. Value Engineering in Planning can inform the project with respect to possible risks that need to be examined more fully at a future Cost Risk Assessment or Cost Estimate Validation Process workshop.

Coordinate timing to complement NEPA and Access Revision Report activities. Optimize the VE process so that it integrates naturally with these processes and can utilize or inform project need statements.

310.02(3)(a)(ii) Scoping Phase

Scoping is a good time for value analysis. This is a time to consider alternatives or design solutions. At the conclusion of the VE study, the project scope, preliminary costs, and major design decisions are informed by the recommendations.

During the scoping phase the VE analysis focuses on project drivers. This stage often provides an opportunity for community engagement and building consent with stakeholders.

310.02(3)(a)(iii) Start of Design

During pre-design, or at the start of design, the project scope, and preliminary costs are being 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 design elements.

310.02(3)(a)(iv) 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. At this point “ease of implementation” may be a driving consideration for project managers as they consider VE recommendations to approve for implementation.

A VE analysis late in the project development phase may be useful if 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 (for 12 to 36 months into the future) for the annual VE plan
- Collaborates with HQ and the project team to optimize timing of the VE analysis
- Identifies potential team facilitators and members for participation statewide
- Provides assistance in planning and conducting the VE study.

310.02(4)(b) State VE Manager

- Reviews regional VE Plans regarding content and schedule.

310.02(4)(c) State VE Coordinator

- Incorporates the region’s VE Plan into 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.
- Maintains a statewide list of qualified VE team leaders.

310.02(4)(d) VE Team Leader

The quality of a VE analysis relies on the skills of the VE team leader. The VE team leader guides the team's efforts from preparation, through the VE job plan and any follow-up actions. 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 and follows the job plan.
- Guides the team through pre-study activities, the VE study, and the post-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 SAVE International as a Value Methodology Associate or Certified Value Specialist (CVS). 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 a current SAVE International Certified Value Specialist.

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.

VE team members are selected based on the expertise needed to address major issues and functions the project is to deliver. All team members must be committed to the time required for the study. It is desirable for team members to have attended Value Methodology Fundamentals 1 training before participating in a VE study. It is useful to have some team members who are not involved in the project.

310.03 VE Procedure

The WSDOT VE analysis uses the 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. This document can be downloaded at the SAVE website: https://cdn.ymaws.com/www.value-eng.org/resource/resmgr/standards_documents/vmstd.pdf

310.03(1) Pre-Analysis Preparation

To initiate a VE study, the project manager completes the Request form and emails to the [HQ Engineering Analysis Office](#), Region VE Coordinator, and Assistant State Design Engineer at least 10 to 12 weeks before the proposed study date. The Project Manager, Region VE Coordinator and State VE Coordinator collaborate to determine dates, VE team leader and team members for the VE study. The Request Form and Contacts are found at: [Value engineering | WSDOT \(wa.gov\)](#).

The design team prepares project information for the VE team—see [Exhibit 310-2](#). 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 organized. The VE team members should receive a link or the information at least one week prior to the study so they have time to review the material.

The project manager and state VE Coordinator determine if the VE study should be conducted virtually or in-person.

310.03(2) VE Analysis Requirements

Value Engineering is a tool to serve the project, project manager and project team. Great flexibility is used to tailor the VE study to the needs of the project, project manager, and project team. Many project managers may desire to use VE, even if it is a smaller project and a VE study is not required. VE studies can be used to refine project scope, improve design, or engage stakeholders. VE is a process that can be easily adapted to such projects and may involve a brief one- or two-day event.

For projects that require a VE analysis, the time required varies commensurate to project complexity and size, typical studies are 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 short description of the VE process;
- a narrative description of project information;
- the background, history, constraints, and controlling decisions;
- a list of VE team members;
- the VE team's focus areas;
- a discussion of the team's creative 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 of approved recommendations.
 - Documentation of reasons recommendations were not implemented.

310.03(3) Implementation Phase

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 and signs the VE Recommendation Approval form and returns it to the Statewide VE Manager for inclusion in the final report.

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 Job Plan for VE Studies

| VE Study Phase | Job Plan |
|----------------------|---|
| 1. Preparation | Identify projects needs; schedule prep meeting(s); identify and invite VE workshop team members; obtain and distribute project information to VE team members; project manager reserves meeting venues; develop plan for site visit (virtual or actual) |
| 2. Information | Goal: Project understanding Discuss, review, and assess project information, including commitments and constraints. Investigate technical reports and field data. Organize information for ease of access and clarity. Review project management plane and risk management plan Develop team focus and objectives Identify and define performance requirements |
| 3. Function Analysis | Goal: Determine functions the project must deliver, and those that are not needed. Analyze the project to understand the required functions. Define project functions using active verb/measurable nouns Review and analyze functions to determine which need improvement, elimination, or creation to meet project goals |
| 4. Creative | Goal: Prommote innovation Generate ideas on how to accomplish the required functions that improve project performance, enhance quality, and lower costs. Be creative Brainstorm alternative proposals and solutions to lower project costs, improve performance, and enhance quality |
| 5. Evaluation | Goal: Identify ideas having the most potential for value enhancement Evaluate and select feasible ideas for development. Analyze design alternatives, technical processes, and life cycle costs |
| 6. Development | Goal: Transform the best ideas from the evaluation phase into specific recommendations Develop ideas as fully as possible and provide technical and economic data to prove the benefits and feasibility of the desirable concepts. Develop team recommendations (long-term and interim) |
| 7. Presentation | Goal: Clearly and concisely communicate recommendations to project sponsors and stakeholders Provide a dynamic, upbeat presentation of the VE recommendations. Presentations can be an oral presentation with exhibits, provided virtually or in person or provided in the report. |
| 8. Implementation | The decision to implement or not implement recommendations is documented in the signed VE Recommendation Approval form. The Project Manager implements approved recommendations. |

Note: Phases 2-7 are performed during the study; see Value Standard and Body of Knowledge for procedures during these steps.

Exhibit 310-2 VE Analysis Team Tools

| Project-Related Input* and Design Resources (Study Package) | |
|---|--|
| Project Management Plan | Basis of Estimate |
| Vicinity map | Estimates |
| Aerial photos | Risk Assessments |
| Large-scale aerial photographs | Geotechnical reports |
| Pertinent maps - Land use, contours, quadrant, etc. | Hydraulic Report |
| Speed study data | Plan sheets |
| Vehicle volumes | Quantities |
| Bicyclist volumes | Right of way plans |
| Pedestrian volumes | Bridge List/Bridge condition report |
| Crash data with collision analysis | Design Manual |
| Transit data | Field Formulas and Field Tables |
| Existing as-built plans | Standard Plans |
| Design file | Standard Specifications |
| Cross sections and profiles | State Highway Log / Roadway data |
| Environmental documents | Basis of Design |
| Environmental constraints, and commitments | Cost Estimating Manual |
| Utility Locations | Cultural resources / Archeological surveys |
| Other manuals as needed | |

| Study-Related Facilities and Equipment |
|---|
| AASHTO Green Book |
| Calculators |
| Computer (with network if available) / projector |
| Easel(s) and easel paper pads |
| Marking pens |
| Pencils and erasers |
| 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 |
| Vehicle or vehicles with adequate seating to transport the VE team for a site visit** |

*Not all information may be available. Work with your Region VE Coordinator or the State VE Coordinator to verify that all needed information is available.

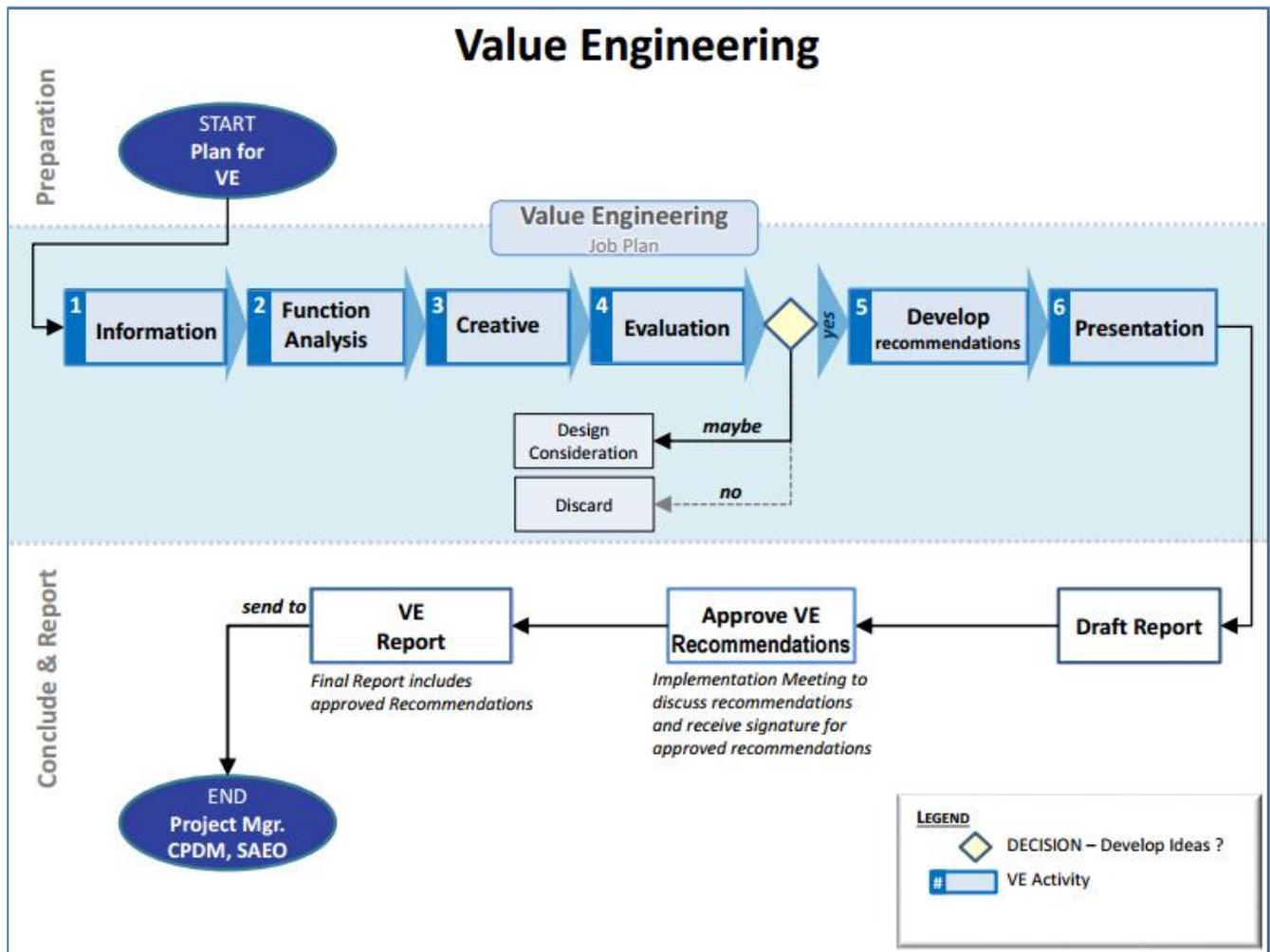
**If a site visit is not possible, perform a “virtual” tour of the project.

310.04 Value Engineering Job Plan

The VE process is now comprised of an eight step Job Plan. The eight step plan reflects a recent change from [SAVE International](#) by simply adding a preparation phase and an implementation phase.

Exhibit 310-3 depicts the process for Value Engineering. An interactive version of this exhibit is available at: 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 decide to accept or reject each VE recommendation. To that end, project managers, in consultation with their project teams, support staff, other management support, and subject matter experts, determine 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 to be included in:

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

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

FHWA Value Engineering Policy www.fhwa.dot.gov/legsregs/directives/orders/13111b.cfm

Value Engineering for Highways, Study Workbook, U.S. Department of Transportation, FHWA

310.07(2) Guidance and Resources

WSDOT Value Engineering website:

<https://wsdot.wa.gov/engineering-standards/project-management-training/project-management/value-engineering>

SAVE International

www.value-eng.org/

Miles Value Foundation

www.valuefoundation.org/