DESIGN VALUE ENGINEERING
STANDARD PROCEDURES

PROCEDURAL STATEMENT:

The purpose of this document is to provide uniform and consistent processes and procedures for performing Design Value Engineering based upon the Society of American Value Engineers (SAVE) Methodology and Federal Highway Administration guidelines. The Value Engineering (VE) criteria contained herein are based on the Federal Highway Administration’s (FHWA) Title 23 Code of Federal Regulations.

AUTHORITY:

23 U.S.C. Sections 106 (e), 106(f), 106(g), 106(h), 112(a) and (b), 302, 315; 23 CFR 627, 49 CFR part 18, 77 FR 15254, March 15, 2012

REFERENCES:

NHI Course No. 134005 “Value Engineering Workshop”
The AASHTO “Guidelines for Value Engineering”
Society of American Value Engineers (SAVE) Methodology
The NCHRP Synthesis “Value Engineering Applications in Transportation”

SCOPE:

This Policy requires Design Value Engineering be performed for projects on the Federal-aid Highway System [National Highway System and the Dwight D. Eisenhower National System of Interstate and Defense Highways (the “Interstate System”)] with an estimated construction cost in excess of $45 million for any project type and $36 million for bridge projects. Cost estimate thresholds include the cost of design, right of way and construction costs. Design Build projects are excluded from this policy.
In addition, Value Engineering will be used on other projects, where in the estimation of the Department, its employment has high potential for cost savings as determined by the Central Office Value Engineering Coordinator and the District.

REFERENCES:

NHI Course No. 134005 “Value Engineering Workshop”
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DEFINITIONS:

Basic Function: The needed performance characteristic(s) of a product or service which is required in order to make it perform.

Bridge Project: A bridge project shall include any project where the primary purpose is to construct, reconstruct, rehabilitate, resurface, or restore a bridge.

Central Office Value Engineering Coordinator (COVEC): Located in the Central Office Division of Engineering; this person establishes VE policy and procedures, and oversees the VE program for ODOT. The COVEC coordinates all VE studies, attends and participates in all VE studies as well as assures that VE recommendations are fully and fairly evaluated. Finally, the COVEC ensures that accepted recommendations are implemented.

Certified Value Specialist (CVS): CVS is the highest level of certification attainable through the SAVE International accreditation program. Designation is reserved for Value Specialists and Value Program managers who have demonstrated expert level experience and knowledge in the practice of the VE methodology.

Constraint: A limit or restriction to the number of potential solutions available to a specific facet of a project. It may involve permitting, environmental restrictions, access, or geometrics, to name a few.

Cost Model: A financial representation such as a spreadsheet, chart, and/or diagram used to illustrate the total cost of families of systems, components, or parts within a total complex product, system, structure or facility.

Design Suggestion: An observation that the VE team wishes to convey to the design team for consideration. The project may not be developed to a point where benefit can easily be determined.

Function: Any performance characteristic that a product or service accomplishes.

Function Analysis System Technique (FAST) Diagram: A method for analyzing, organizing, and graphically displaying the interrelation of the basic and secondary functions of a system, product, design, process, procedure, facility, etc.

Life Cycle Cost: Total cost of an item’s ownership. This includes initial costs (planning, utilities, design, right-of-way, and construction), operation, maintenance, modification, replacement, demolition, financing, taxes, and disposal, as applicable.

Project: A portion of a highway that a State Transportation Agency or public authority proposes to construct, reconstruct, or improve as described in the preliminary design report or applicable environmental document. A project is defined as the logical termini in the environmental document and may consist of several contracts, or phases of a project or contract, which are implemented over several years.

Secondary Function: An additional performance characteristic of a product or service.

Total Project Costs: The costs of all phases of a project including environment, design, right-of-way, utilities and construction.

Unnecessary Costs: Those costs which are not required for the performance of the necessary functions.

Value Engineering Analysis: The systematic process of reviewing and assessing a project by a multidisciplinary team not directly involved in the planning and development phases of a specific project that follows the VE Job Plan.

Value Engineering Job Plan: A systematic and structured action plan for conducting and documenting the results of the VE analysis. While each VE analysis shall address each phase in the VE Job Plan, the level of analysis conducted and effort expended for each phase should be scaled to meet the needs of each individual project. The VE Job Plan shall include and document the following seven phases:

1. Information Phase  
2. Function Analysis Phase  
3. Creative Phase  
4. Evaluation Phase  
5. Development Phase  
6. Presentation Phase  
7. Resolution Phase

Value Engineering Team: Usually five or more persons aware of various aspects of the item being studied. Teams should be structured so there is appropriate expertise to evaluate the major
problem areas anticipated within the project, e.g., traffic, right-of-way, structures, highway safety, soils, environmental, storm water, paving, etc.

**PROCEDURE:**

I. VALUE ENGINEERING PROJECT SELECTION

A. In December of each year, the COVAC will generate a draft list of potential projects meeting the above criteria, from Ellis. This list shall forecast potential VE sessions for the next two years and include project costs, milestone dates and time frames to conduct a VE analysis session. The District Value Engineering Coordinators (DVEC) shall verify the information included in the draft list and recommend changes within 30 days.

B. The final two year VE analysis schedule will be sent to the District Value Engineering Coordinators and FHWA in January of each year.

C. A VE analysis should be conducted as early as practicable in the planning or development of a project. The Project Development Process (PDP) manual details when a VE session should be held for a project that meets the aforementioned criteria.

D. PDP tasks 2.3.H.H, Value Engineering and 3.2.A Value Engineering Study and Report illustrate the need for a VE session to occur as well as the required plan and cost documentation required to conduct an effective session. A project will not necessarily require two VE sessions. Most projects that qualify for VE analysis will require only one VE session. The COVEC can clarify the need for specific plan and cost documentation required for all VE sessions.

E. The District Planning & Engineering Administrator, the COVEC and FHWA will collaboratively decide if a project warrants a second VE study during the detailed design phase.

F. As additional projects are programmed or entered into the detailed design phase, they are to be evaluated under the above criteria by the District Value Engineering Coordinator. If they are found to be candidates for VE analysis, their development schedules shall include appropriate time for VE studies and related activities.

G. The District Value Engineering Coordinator should coordinate as soon as practical with the COVAC if it becomes necessary to change the date of a planned VE session or if an additional project requiring VE analysis is identified.
II. VALUE ENGINEERING STUDIES

A. Each VE study shall be assigned to a multidisciplinary study team. The team leader shall be either a Certified Value Specialist (CVS) recognized by the Society of American Value Engineers (SAVE) or an ODOT employee trained and knowledgeable in VE techniques and able to serve as the coordinator and facilitator of the team. The team shall have a minimum of five members including the leader. VE study teams should be primarily composed of district personnel including the project manager, when feasible.

B. The District VE coordinator should notify the COVEC four (4) weeks prior to the VE study if central office personnel are needed. Individuals from the public and other agencies may also be included on the team when their inclusion is found to be in the public interest. The team members shall collectively have expertise in the following areas:

1. Subject matter experts representing the major facets of a project (ex. structures, geometrics, maintenance of traffic, pavements, environmental, right-of-way, traffic, etc.)

2. For highly specialized areas, it may be appropriate to utilize the assistance of an expert in the field who is not normally part an assigned team (ex. consultants, material suppliers or contractors). Care should be exercised to not introduce bias into the process.

3. Knowledge of the practices and costs of construction, operation and maintenance of the project.

4. The team should not normally include persons involved with the day-to-day design of the project, with the exception of the district project manager. However, it is permissible to have a design member in attendance to provide support during the VE session. This individual will not be considered a team member.

C. The team shall be provided a suitable room for the duration of the study (normally one week or less) and sufficient relief from normal duty assignments to allow at least eight hours per day during which the entire team is assembled. Depending on the complexity of the project, studies may last from one to five days. The study may continue for a longer period as deemed necessary.

D. The team shall be afforded access to all design information for the project at least two (2) weeks prior to the VE Session, which would include a set of plans, detailed cost analysis and any other pertinent information. Information contained in study documents should meet the requirements of Section 1400 of L&D Manual, Volume III for preliminary engineering and/or Stage 1 submittals. A computer and projector shall be provided for the team’s use during the VE session for access to CADD files, cost estimates, real estate acquisition and utility reimbursement information, bridge inspection reports, etc.
E. A field review by the VE team may be conducted on complex projects at the discretion of the district project manager. The project manager will be responsible for leading the field review or delegating to an alternative resource.

F. The team shall perform a VE study in conformance with the SAVE methodology by developing and implementing a VE job plan. The study shall be documented in a VE report for each project studied, and shall include Life Cycle Cost Analysis (LCCA) as appropriate.

G. To open the VE analysis session, the design team shall make a brief detailed presentation of the project to the VE analysis team for informational purposes. This presentation should make use of audio-visual aids to give the team a more informative view of the project, its location, constraints, and any other pertinent information.

H. Following the opening presentation by the design team, the VE team continues to work through the VE job plan information, function analysis, creative, evaluation and development phases.

I. The VE workshop is closed by the presentation phase which may include a brief presentation of the VE Alternatives/Recommendations to the design team, the District Planning & Engineering Administrator, and the district project manager. This allows those individuals not present during the VE session to receive a detailed explanation of the alternatives developed by the VE team.

J. A draft report of the VE session will be completed by the VE facilitator and sent to the COVEC for dissemination to the VE team. The members of the VE team will review the draft report providing comments and corrections to the COVEC. The COVEC will consolidate comments to the VE facilitator for final editing and completion of the final report.

K. A final VE report shall be distributed to the VE team and all other pertinent personnel as deemed necessary by the COVEC and the project manager. This report should contain, at a minimum:
   1. Project information
   2. Identification of the VE analysis team
   3. Background and supporting documentation, such as information obtained from other analysis conducted on the project
   4. Documentation of the stages of the VE job Plan which would include documentation of the life-cycle costs that were analyzed
   5. Summarization of the analysis conducted
   6. Documentation of the proposed recommendations and approvals received at the time the report is finalized
   7. For bridge projects, in addition to the requirements listed above, the VE analysis should include:
i. Bridge substructure and superstructure requirements that consider alternative construction materials

ii. An analysis of life-cycle costs and duration of project construction

L. After reviewing the final VE report, a Value Engineering Review Board meeting shall be held within sixty (60) calendar days of the VE session. The sixty (60) calendar day limit may be waived due to extenuating circumstances surrounding the project. The Value Engineering review board shall consist of:

- District Planning & Production Administrator
- Central Office Value Engineer Coordinator
- FHWA VE Coordinator/Area Engineer
- District Construction Engineer
- Project Design Team Leader
- District Project Manager
- District VE Coordinator
- Others at the discretion of the District (ex. District Deputy Director)

M. The Value Engineering Review Board shall be provided complete study documentation including workbooks, figures, computations and visual aids for use when considering individual VE recommendations. VE recommendations may be:

1. Accepted - Remanded to the District Planning & Engineering Administrator for implementation.

2. Rejected - The Board shall offer detailed observations on the reasons for rejection. Rejection with no valid reason is unacceptable.

3. Pending - Referred to the district for further analysis of one or more alternative(s) to help determine their disposition(s). In the event that the Board selects this action, they shall also establish a time to review the additional analysis.

A record of the Value Engineering Review Board meeting will be taken by the District VE Coordinator using the “Summary of Potential Cost Savings” form provided by the COVEC. The record should be forwarded to the COVEC within fourteen (14) calendar days from the date of the review board meeting. The record will include the disposition of all VE study proposals. If the proposals are not to be implemented, the record will identify the reasons why in detail.

N. The District Project Manager shall provide a set of Stage 3 plans to the district VE Coordinator and the COVEC for verification that recommendations have been incorporated into the plans.
III. VALUE ENGINEERING DATA REPORT

At the conclusion of the Federal Fiscal Year (September 30), the COVEC shall prepare a summary of VE efforts as required by FHWA. This annual report shall be provided to the following personnel:

- Deputy Director of Engineering
- Federal Highway Administration (VE Coordinator)
- Deputy Director of Planning

IV. VALUE ENGINEERING STUDIES NOT RELATED TO A PROJECT

A VE study may be performed on processes, specifications, standard drawings or operations as deemed necessary by the Director, Assistant Director, or Deputy Director within one of the Districts or Central Office.

V. LIMITATIONS OF VALUE ENGINEERING RECOMMENDATIONS

Limitations to the type and extent of VE recommendations include:

A. The use of geometrics and/or safety criteria which do not meet design standards is normally not acceptable.

B. Any proposals which would not meet current design standards will be considered only if:

   - It can be shown the assumptions leading to the use of those design standards do not apply to the specific project in question.

   - An analysis of the change, as compared to the standard requirement, shows no measurable loss of safety and indicates that overall cost savings will outweigh any sacrifices in operation and maintenance costs.

C. Pavement design shall be determined by the Pavement Selection Committee.

VI. VALUE ENGINEERING STRUCTURE WITHIN ODOT

A. Central Office

   1. The Value Engineering Coordinator (COVEC) will:
a. Establish a statewide VE schedule in accordance with Section I of this procedure.

b. Support District Value Engineering Coordinators (advice, referral of “experts,” scheduling, etc.).

c. Publish the annual VE report.

d. Champion Value Engineering within ODOT and in conjunction with ODOT administered projects.

e. Review VE recommendations to ascertain trends that may necessitate changes to design standards.

f. Arrange facilities, plans, and other information required by the study. This would also include any support documents needed to be previewed by the VE team members. Coordinate with the District VE Coordinator to verify the location of the VE session.

g. Arrange for one or more persons from the original design team (consultant staff, if appropriate) to work with the review team and answer questions, provide background and decision criteria utilized in the design, and provide additional information as needed (this will be done at the design team presentation portion of the VE session). Monitor program and verify implementation of VE recommendations.

B. District Office

1. District Value Engineering Coordinator will:

   a. Routinely screen district programmed and planned projects to identify those requiring or would be good candidates for Value Engineering.

   b. Coordinate with project managers to ensure projects are properly scheduled and ready for upcoming VE sessions. Confirmation of the project’s readiness for the VE session should be confirmed 2 months prior to the scheduled VE start date.

   c. In conjunction with the COVEC, select members of the Value Engineering study teams and arrange for them to perform studies at appropriate stages within targeted projects. This will include:

      (1) Contacting study team member’s supervisors to arrange for the team member’s time. The intent is that Value Engineering study
teams will be primarily composed of district personnel. Notify the COVEC if central office personnel are needed.

(2) Notify the COVEC if a location other than ODOT Central Office is desired for the Value Engineering session.

(3) Request the participation of experts (external) from the COVEC.

(4) Arrange for presentation facilities, support equipment and attendance by the District Value Engineering Review Board.

(5) Provide summaries of Value Engineering target lists, studies, recommendations, implementation, and acceptance for use by the COVEC.

(6) Report to the District Planning & Engineering Administrator and District Deputy Director on the successes, failures, future goals, and other pertinent aspects of the district’s Value Engineering program.

d. The District VE Coordinator should coordinate with the district project manager to gather information from the design consultant at least four (4) weeks ahead of the scheduled VE session for distribution to the VE team members.

e. Verify that the distribution of information from the design consultant is in the hands of the team a minimum of two (2) weeks prior to the VE session.

f. Monitor recommended alternatives for implementation by reviewing stage 3 plan submissions.

**TRAINING:**

The Division of Engineering will provide training for District, Central Office and LPA personnel as necessary to implement the policy and procedures.

**FISCAL ANALYSIS:**

There are two primary costs associated with the application of a Value Engineering program: the cost of the study which includes the VE Facilitator(s) and the costs of ODOT and Consultant staff participation. Typically, even if only a portion of the recommendations are implemented, the sum benefit of VE recommendations will be greater than the cost of the VE Program.