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Department of Transportation

VALUE ENGINEERING PROGRAM

AUTHORITY:

Sections 20.23(3)(a), and 334.048(3), Florida Statutes (F.S.);

REFERENCES:

- 1) American Association of State Highway and Transportation Officials (AASHTO) Guidelines for Value Engineering, AASHTO Bookstore, <https://store.transportation.org/Home/Index>
- 2) Federal Highway Administration (FHWA) Value Engineering web site, www.fhwa.dot.gov/ve/2021/
- 3) FDOT Project Development and Environmental Manual, Topic No. 650-000-001, Part 1: Chapter 4.2.8.3 & 4.2.9 and Part 2: Chapter 3.2.8 <http://www.fdot.gov/environment/pubs/pdeman/pdeman1.shtm>
- 4) FDOT Project Management Guide, Part 2, Chapter 240, <https://www.fdot.gov/designsupport/pm/resourcepage>
- 5) FDOT Employee Recognition Program Procedure, [Topic No. 250-000-007](https://pdl.fdot.gov/Procedures)
- 6) Title 23 Section 106(e) of United States Code, <http://www.fhwa.dot.gov/map21/docs/title23usc.pdf>
- 7) Code of Federal Regulations, Title 23, Chapter I, Part 627, <http://www.ecfr.gov/cgi-bin/text-idx?SID=0f6e5f1ac218c3ab7de98a108842632b&node=23:1.0.1.7.20&rgn=div5>

PURPOSE:

To provide a consistent and uniform process for executing the Value Engineering (VE) Program during the development of a project.

SCOPE:

All Department personnel, consultants, contractors, and others who may be required to participate in the Value Engineering (VE) Program.

BACKGROUND:

Value Engineering is a systematic process used by a multidisciplinary team to improve the value of a project through the identification and analysis of functions.

Congress has authorized the use of Value Engineering on federal-aid projects since 1970. As part of the National Highways Designation Act of 1995, Congress required that VE be performed on certain federal-aid highway projects and modified that requirement in 2005, 2012, and 2014.

The administration of the Value Engineering Program can be broken into the following key processes:

1. Project Selection.
2. Team Selection.
3. Value Engineering study.
4. Recommendation Resolution.
5. Reporting.

The Districts (including Florida's Turnpike Enterprise) are responsible for the Project Selection, Team Selection, Value Engineering study, and Recommendation Resolution processes. The State Value Engineer (SVE) is responsible for the Reporting process. Guidelines for administering these processes are outlined in this procedure.

DEFINITIONS

Certified Value Specialists (CVS): The highest level of certification attainable through SAVE International. Designation is reserved for Value Specialists who have demonstrated expert level experience and knowledge in the practice of the Value Methodology.

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

Commitment: An obligation to an external stakeholder to provide a feature or perform an action related to a project. Some commitments are shown in the NEPA document for the project and are reflected in project Plans, Specifications & Estimates (PS&E) package and implemented during the construction of the project.

Cost: The amount paid or charged for goods and services.

Criteria: The standard that the project was designed to meet.

Design Observation: An observation that the VE team wishes to convey to the design team for consideration. The milestone of the project being reviewed may not have adequate detail to develop a full VE recommendation.

Design-Build: Means combining the design and construction phases of a project into a single contract.

Evaluation Matrix: A method by which competing VE alternatives and the proposed design can be evaluated by the use of weighted objectives.

Function: Value Engineering defines function as "that which makes a product work or sell."

Function Cost: The amount paid or charged to provide a function.

Function Worth: The lowest amount paid or charged to provide a function.

Life Cycle Costs: A method used to evaluate the total cost of ownership over the life of a facility in terms of equivalent dollars. This method uses a discount rate to account for opportunity lost and inflation.

Maintenance Costs: The cost to keep the investment in its current condition. This may include small improvement projects such as Safe Mobility for Life projects, but routinely includes resurfacing, painting, mowing, etc.

Major Project: A project with an estimated total cost of \$500 million or more that receives federal-aid funding.

Operating Costs: These types of costs are what it takes to make the facility function. The expenses are generally associated with toll collections, motor carrier compliance, electricity, etc.

Preferred Alternative: The preferred alternative for a federal-aid project is the alternative that has been approved by the Lead Federal Agency.

FDOT Recommended Alternative: The alternative submitted for approval to the Lead Federal Agency, by FDOT and/or project sponsor (if not an FDOT project) as the

preferred alternative. The FDOT recommended alternative becomes the preferred alternative once it is approved by the Lead Federal Agency.

SAVE International: The premier international society devoted to the advancement and promotion of the value methodology (also called value engineering, value analysis, or value management).

Transportation System Facilities: The fixed assets and control systems that move people and goods in a timely manner.

Value: The relative worth of something as measured by its qualities or by the esteem in which it is held.

Value Index: A ratio that expresses function cost divided by function worth. This ratio is used to determine the opportunity for value improvement.

VE Alternatives: The concepts the VE team identified as solutions that may be substituted for features currently depicted.

VE Job Plan: An established seven-phase approach by which VE studies are performed.

VE Milestone: A point in the development of a project that is appropriate to perform a value engineering study.

VE Recommendation: The team's selected VE alternative or VE alternatives.

Worth: The lowest cost that is required to produce or obtain an essential function of an item or service.

1. PROJECT SELECTION

1.1 REQUIRED PROJECTS

All projects on the National Highway System (NHS) utilizing Federal aid highway funding with an estimated total cost of \$50 million or more for non-bridge projects and \$40 million or more for bridge projects shall have a minimum of one VE study performed during the development of the project prior to the completion of final design.

The estimated total cost shall include all costs associated with all phases of the project, including environment, design, right-of-way, utilities, and construction.

Projects delivered with the Design-Build method of construction are not required by federal regulation to have a VE analysis.

1.2 ADDITIONAL PROJECTS

The districts have the flexibility to study additional projects below the \$50 million threshold except for projects required by FHWA. Projects that provide the highest potential for value improvement include:

- Projects that substantially exceed initial cost estimates.
- Complex projects.
- Capacity projects.
- Interchanges.
- Corridor studies.
- Projects requested for VE by District Management or a Project Manager.
- Projects with high right of way costs.
- Projects and processes with unusual problems.
- Projects approved by Central Office for Design-Build method of delivery.

1.3 SCHEDULING

The VE study should be conducted during one of the following phases of project development: Planning, Project Development & Environmental (PD&E), or Initial Engineering Design. For Design-Build Projects, the VE study shall be conducted prior to the release of the Request for Proposal (RFP). The greatest potential for improvement in a project is during the early phases of development; therefore, it is the Department's objective to schedule studies during these phases of project development.

1.4 VE WORK PLAN

The districts shall have the responsibility of developing and executing the annual Value Engineering Work Plan. The development of this plan shall be completed and submitted to the SVE in Central Office by July 1 of each fiscal year. All required projects that have not had a prior VE study and will have a VE milestone within the project schedule for the year in review shall be considered for inclusion on the work plan.

1.5 LOCAL AGENCY PROGRAM (LAP) PROJECTS

The Department shall ensure that projects delivered by a Local Agency that meet the following requirements have a VE study performed prior to the completion of final design:

- Projects on the National Highway System (NHS) receiving Federal assistance with an estimated total cost of \$50 million or more.
- Bridge projects on the NHS receiving Federal assistance with an estimated total cost of \$40 million or more.

The VE study shall meet the requirements of this procedure.

VE analysis is not required for LAP projects delivered by the Design-Build method of construction, but are encouraged per Section 1.2. Other than projects delivered by the Design-Build method of construction, there is not a process to waive the value engineering requirement for projects described in this section.

2. TEAM SELECTION

2.1 TEAM STRUCTURE

The District Value Engineer or Value Engineering Administrator (DVE/A) shall review potential team members and coordinate the selection of team member disciplines with the Project Manager. Teams should be structured to include appropriate expertise to evaluate the major areas anticipated within the project. At a minimum, team members with expertise in design, construction, and maintenance shall be represented on the team. In the event of specialized projects, individuals with specific expertise necessary to perform a proficient value engineering study should be included in the team makeup. Anyone directly involved in the current planning or design of the project shall not be a team member, but is expected to participate as an information source. The VE study shall be independent of other design reviews.

The districts shall determine whether to utilize Department personnel, consultant personnel, or a mixture of both to form the team.

2.2 DEPARTMENT TEAM LEADER/MEMBER CRITERIA

Department employees serving as team leaders, under the supervision of the DVE/A, shall have the responsibility for conducting the assigned project review in accordance with these procedures. Prior to leading a team, employees must have served as a team member on at least two VE studies, must have attended a VE team member training workshop, and must have attended a team leader training course.

Team members who have not received formal VE training or participated on a previous VE study led by a CVS or DVE/A may participate on a team; however, they should not be the primary team member responsible for one of the required disciplines.

2.3 CONSULTANT TEAM LEADER/MEMBER CRITERIA

Consultant team leaders must meet the following qualifications:

1. A CVS with experience in the value engineering process for transportation system facilities.
2. A Professional Engineer licensed in the State of Florida with proficient knowledge and experience related to the design and/or construction of transportation system facilities.

The role as consultant team leader may be filled by one individual or by two individuals serving as co-team leaders; however, those individuals fulfilling the above qualifications shall be from the contracted consulting firm or their sub-consultants.

A consultant team member shall be a technical person with proficient knowledge and experience in the required discipline.

3. VALUE ENGINEERING STUDY

3.1 VE JOB PLAN

The VE study process shall be conducted in accordance with the following 7 phases of the VE Job Plan:

(1) Information: The team gathers project information including objectives, costs, commitments, and constraints. The team also identifies components and elements of high cost. Tools used during this phrase include: Project Team briefing, Site visit, and Pareto Analysis.

(2) Function Analysis: The team analyzes the project and defines the project functions using a two-word active verb/measurable noun technique. The team analyzes these functions to determine which need improvement, elimination, or combination. Remaining functions are then classified as Basic or Secondary functions. Tools used during this phase include: Random Function Identification, Function Analysis System Technique (FAST), Function Listing, and Value Index.

(3) Creative: The team uses a variety of creative techniques, such as brainstorming, to generate alternative ideas to perform the project functions.

(4) Evaluation: The team evaluates and selects the ideas with the greatest potential for development into fully supported recommendations. Appropriate tools of comparison include advantage and disadvantage comparison and an evaluation matrix with weighted criteria.

(5) Development: Based on the evaluation phase, the team begins to develop in detail the highly rated ideas with the greatest potential value into fully supported recommendations. During this phase it is essential to establish costs and backup documentation needed to convey the alternative solutions. A Life Cycle Costs Analysis should be considered for each recommendation.

(6) Presentation: The VE team presents to management the findings of the study in a written report. This phase may include a verbal presentation.

(7) Resolution: This final phase of the VE job plan occurs after the presentation phase has been completed and department management has begun to make decisions on the

recommendations. The decision to approve or reject each recommendation is documented during this phase.

Once the team has completed phases (1) through (4), the team may determine that no value improvements can be identified for the project and that the team concurs with the current design. Then the team leader may document the study results and disband the team. The DVE/A shall be notified prior to disbanding.

3.2 PROJECT DEVELOPMENT PHASE

The information required for the VE study should be the information already available and/or prepared for the project. The information should not be generated for the sole purpose of the VE study; it should be collected and packaged appropriately for the VE study team.

3.2.1 Planning

The first potential milestone to conduct a VE study of a project should occur immediately following the development of a recommended concept, and/or corridor analysis. Not all transportation system facilities go through this phase during project development; therefore, a VE study may not be applicable at this phase of development. Information that should be made available to the team includes:

- Traffic information (which was utilized in making the conceptual design decisions) consisting of preliminary projections based on historical trend analysis, or volumes taken from urban transportation models. Any other known traffic impacts that are anticipated shall also be included.
- Aerial photo coverage of the project showing corridors or interchange layouts, zoning, and land use designation.
- Information on current right of way values, consisting of such items as square foot market values for areas that are affected by each proposed conceptual design.
- Information concerning the identification of a preferred alternative. Such information should include construction costs, right of way costs, environmental impacts, safety, operation, and relocations.

3.2.2 Project Development & Environmental

A VE study may occur after the alternative analysis is complete. This opportunity for VE gives the project an early review by design and operations. The involvement of construction and maintenance could lead to significant life cycle cost savings. The VE study shall occur prior to the public hearing in order to depict the team's enhancements. This step is critical in building public credibility for the project function.

Alternatives compared at this stage will include those submitted by the consultant and/or PD&E engineer and any additional concepts that were presented and approved

by earlier VE studies. Information or data that should be available to the team at this point in the development of the project include:

- Approved technical traffic memorandum.
- Estimated construction cost breakdown by alternative.
- Estimated right of way cost for each alternative based on actual real estate values in each area.
- Business damage estimates in each alternative.
- Traffic operation analysis through utilization of computer programs.
- Life cycle costs including maintenance costs, operating costs, and periodic improvements for each alternative.
- The number and cost of business and residential relocations for each alternative.
- Environmental impact analysis.
- Preliminary plans.
- Summary of public involvement.
- Information on nearby projects that may impact the construction, performance, or cost of the project.
- Project Commitments Record.

3.2.3 Engineering Design

A final VE study may occur prior to the Phase 2 design submittal. Under extraordinary circumstances, VE studies may be conducted beyond Phase 2 when approved by the District Director of Transportation Development. Elements of the final VE study will center on drainage requirements, vertical grades, and minor horizontal refinements within the established corridor, structures, and utilities. Information and data that should be available to the team include:

- Key Sheet with location map, begin and end stations, equations, and project numbers.
- Drainage Information showing:
 - a. Existing data including ridge lines, elevations, and structures
 - b. High water information
 - c. Drainage areas and direction of flow
 - d. Horizontal alignment
 - e. Proposed water retention areas
- Typical Sections
- Plan and Profile Sheets:
 - a. Baseline survey, roadway alignment, curve data, and bearings
 - b. Existing topography
 - c. Profile grades
 - d. Proposed right of way
 - e. Begin and end project stations, equations, and bridges
 - f. Existing utilities
- Intersection and Interchange Layouts:
 - a. Existing topography
 - b. Basic survey geometry

- c. Profile grades
- Cross Sections:
 - a. Existing ground line
 - b. Partial proposed templates
 - c. Existing utilities
- Drainage Outfall:
 - a. Alignments
 - b. Cross sections showing existing ground line and partial templates
- Conceptual Structure Information:
 - a. Bridge Geotechnical Report
 - b. Bridge Developmental Report
 - c. Plan and elevation sheets
 - d. Cross sections through structure
- Temporary Traffic Control Plans for all alternative schemes or phasing being considered.
- Preliminary Cost Estimate.
- Information on nearby projects that could impact the construction, performance or cost of the project.

These three opportunities for a VE study during project development are general in nature and close coordination is needed between the Project Manager and DVE/A to determine the proper timing for a value engineering study with the greatest potential for success. It is important for project elements to be developed to enough detail for the VE team to comprehend the intent of the design, but not developed to the extent that any proposed change would impact implementation. Teams should focus on features that are being developed during that particular phase of project design.

3.2.4 Design-Build

A VE study performed on a Design-Build project shall be performed prior to the release of the Request for Proposal (RFP). The VE team on these studies should focus on the criteria contained within the proposed RFP.

3.3 VE STUDY REPORT

The VE study report shall be organized in sections by areas of focus consistent with the value engineering job plan. The format of any report should contain, as a minimum, the following:

- Executive Summary.
- VE Team Participant List.
- List of resources contacted during the study.
- Documentation of VE Job Plan phases:
 - Information Phase
 - Project history (including project criteria, commitments, and constraints). The project development phase along with the

- Financial Management number and VE study number shall be identified.
- Existing design description
- Performance criteria
- Cost model of existing design
- Function Analysis
 - Evidence that Function Analysis was performed, including documented basic/secondary functions
- Creative Phase
 - Documented ideas generated
- Evaluation Phase
 - Documented process used to evaluate ideas
- Development Phase
 - VE Alternative/Recommendation Description
 - VE Alternative/Recommendation Cost Calculations
 - Proposed Design
 - Detail Findings or Analysis
 - Design Observations
 - Life Cycle Cost Analysis
- Resolution Phase
- If applicable at the time of finalizing the report, documentation of resolved recommendations.

A draft **Value Engineering Study Report**, including all pertinent data (as proposed and VE alternative concepts), shall be assembled, published, and submitted electronically to the team members and management for their review and comments within two weeks of the study conclusion.

The content, presentation, and professional engineering certification of the final published report are the responsibility of the VE team leader. The purpose of the certification is to ensure that the VE study was conducted according to the principles and practices of the value engineering profession. The professional engineer certifying the report shall have been a team member and full participant in the VE study that is the subject of the report.

The DVE/A and/or team leader shall attempt to resolve any issues that arise from the draft report. If the team leader deems it necessary, the team may be contacted or re-assembled to enhance sketches, make editorial changes, refine cost calculations, etc. This may be needed for complex projects.

The team leader shall submit the final report to the DVE/A. The DVE/A will distribute the report to the Project Manager, District Design Engineer, District Estimates Engineer (preliminary), Director of Transportation Development, Director of Operations, and District Secretary. As directed by District Management, the report can be made available to appropriate authorities.

4. RESOLUTION

The DVE/A shall be responsible for obtaining resolution on the proposed VE recommendations. The DVE/A shall have the responsibility to monitor and report on all recommendations in the resolution process. The DVE/A must be aware of the progress of time critical recommendations and report to management as problems arise or delays occur. The DVE/A's responsibility for recommendation monitoring shall end upon management resolution of each recommendation. The DVE/A should distribute the recommendation resolutions to the VE team.

The Project Manager will be responsible for implementing any approved recommendations, including the modification of project reports, plans, and documentation. Final project savings or cost avoidance shall be calculated based on actual team recommendations or modified recommendations approved by District Management.

5. REPORTING

The SVE shall be responsible for monitoring program compliance and reporting to Central Office and District Management. Value engineering operations will be monitored for compliance with the policies, procedures, and standards identified in the preceding sections. Specific areas to be monitored include:

- District Value Engineering Work Plan and Schedule.
- District Value Engineering accomplishments.
- Documentation of value engineering activities.
- Compliance with the provisions of the value engineering procedures.

Monitoring of program compliance shall conform to the Department's QAR policy, Topic 001-260-001, and may include the following:

- Visits with district personnel.
- Periodic participation in value engineering team meetings.
- Attending VE team presentations.
- Formal program review of all records and VE study reports.

The basis for most reporting will be information contained in the Value Engineering Reporting (VER) System. The Districts are responsible for the initial input and updating of the study information including uploading final VE reports and documenting VE recommendation resolution. The SVE is responsible for reporting and disseminating the results throughout the Department.

The SVE will prepare a monthly performance report detailing the progress made during the current fiscal year. This report will be included as part of the Department's Monthly Performance Report and will reflect the program accomplishments for the fiscal year.

6. VALUE ENGINEERING RECOGNITION AWARDS

6.1 DISTRICT RECOGNITION

AWARD: Inscribed Plaque. Total value up to \$100.

FREQUENCY: Awarded annually

QUALIFICATIONS: Presented to a District in recognition of excellent value engineering program performance as demonstrated by established performance measures.

DOCUMENTATION: Value Engineering Annual Report, Value Engineering Reporting System and Value Engineering Project Files.

TIME FRAME: The State Value Engineer will process for presentation by the last workday in August.

6.2 TEAM RECOGNITION

AWARD: Identified within each category.

FREQUENCY: Awarded annually in each category.

QUALIFICATIONS: There are two award categories at this level:

1. District Team of the Year – A team that most notably demonstrates the utilization of the value engineering team process, exemplifying a thorough understanding of the tools and techniques of the process. Consideration will be given to implemented recommendations that lead to measurable gains in productivity, cost savings, or other project improvement opportunities. Each team member shall receive a certificate.
2. Statewide Team of the Year – The District or Central Office Value Engineering team, identified by Central Office Quality Assurance Section, as exemplifying a thorough understanding of the tools and techniques of Value Engineering. Consideration will be given to implemented recommendations that lead to measurable gains in productivity, cost savings or other project improvement opportunities. Each team member shall receive a certificate.

Presented to value engineering teams in recognition of their respective superior performance within the fiscal year.

DOCUMENTATION: Supportive information from the VER System and the Value Engineering Project File.

TIME FRAME: The DVE/A must submit the District Team of the Year recommendation and supporting data to Central Office Quality Assurance Section by the last workday in July. Central Office Quality Assurance Section will select the Statewide Team of the Year from the District submissions and process for presentation by the last workday in August.

6.3 PROCUREMENT OF AWARDS

Awards must be purchased and tracked in accordance with the Department's *Employee Recognition Program Procedure, Topic No. 250-000-007*.

7. TRAINING

Team member training can be satisfied by participating on a team led by a CVS, the DVE/A, or by completing team member training offered by Central Office. Central Office will also offer training in the following areas on an as needed basis: team leader training, life cycle cost analysis, and advanced value techniques.

8. FORMS

None