Value Engineering Program
Guidance Manual

Value Engineering Program
Quality Assurance Branch
Division of Highway Design
Kentucky Transportation Cabinet

Contents

INTRODUCTION

This document provides information and guidance regarding the implementation of the Value Engineering Program within the Kentucky Transportation Cabinet (KYTC). It is intended to be a reference for KYTC employees who are involved in the Value Engineering Program.

The United States highway network consists of 4 million miles of roads and streets (2,734,102 miles of paved public roads and 1,324,245 miles of unpaved public roads). Each segment of this complex system will probably require repair and/or reconstruction during its lifetime. Public input, environmental considerations, inflation, revenue limitations, and other factors have reduced the availability of funds to meet the ever growing transportation needs. Value Engineering is a tool that can counteract these problems by providing cost reduction while enhancing or maintaining quality, product or process improvement, and alternate means and materials for construction and maintenance.

Value Engineering (VE) is the systematic application of recognized tested techniques which identify the function of a product or service, establish a value for that function, and provide the necessary function reliably at the lowest overall cost. The required function should always be achieved at the lowest possible life-cycle cost that maintains the requirements for performance, maintainability, safety, and aesthetics.

The VE process is not meant to criticize or "second guess" today's designs, processes, or designers. The VE process does not presume that there is intentional overdesign, negligence or unjustifiable error. VE is designed to complement the efforts being made. It recognizes, however, that social, psychological, and economic conditions exist that inhibit good value. These conditions may include:

- Lack of information
- Unidentified or misunderstood project requirements
- Habitual thinking
- Risk of personal loss
- Reluctance to ask for advice
- Time pressures
- Last minute changes in scope
- Changes in scope and/or conditions over time
- Negative attitudes/resistance to change
- Rapidly changing technology
- Strict adherence to "requirements"
- Poor human relations or communications
- Decisions made before costs and/or value of alternates are known

The purpose of the VE program is to achieve design excellence. VE is not a cost reduction program to cheapen or cut corners with the product or service. The overall goal is to improve quality, ensure safety, minimize ownership costs, reduce construction time, and simplify construction processes while adhering to

environmental guidelines and adding to the quality of life for Kentucky's communities.

The United States Congress in the 1970 Highway Act authorized the Secretary of the U. S. Department of Transportation to require VE or other cost reduction analysis on any federal-aid highway projects. FHWA established an office to administer the VE program in 1974. Throughout this time VE was strongly encouraged in the planning, design, and/or construction phases of projects.

The 1991 Intermodal Surface Transportation Enhancement Act (ISTEA) of 1991 required the Secretary of U. S. Department of Transportation to study the benefits of VE for Federal-aid highway projects and report the results to Congress. Concurrently with the passage of ISTEA, the FHWA issued non-regulatory guidance that reiterated the policy strongly encouraging the use of VE.

The FHWA issued a Notice of Proposed Rulemaking in November 1994 that would require application of VE to selected Federal-aid highway projects when funded under FHWA's grant-in-aid process. To comply with this proposed rule, KYTC established a position for a Value Engineering Coordinator in 1995 to develop and implement a VE program. Before the proposed rule became final, the National Highway System Designation Act of 1995 required States to conduct life-cycle cost and value engineering analysis of project segments on the National Highway System with costs of $25,000,000 or more.

Finally, as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, a requirement was added to require a VE analysis on bridge projects with an estimated total cost of $20 million or more.

KYTC VE PROGRAM

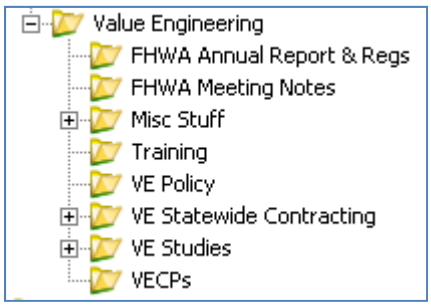
Quality Assurance Branch

The KYTC VE Program is organizationally part of the Quality Assurance Branch within the Division of Highway Design. Within the branch, there is a full time staff member that serves as the VE Coordinator. The Coordinator must achieve, with support from others, the components of the VE Program. The VE Coordinator has six primary responsibilities:

1. Conducting VE studies
2. Tracking and implementing recommendations from VE studies
3. Coordinating and tracking Value Engineering Construction Proposals (VECP)
4. Maintaining electronic (ProjectWise) and hard-copy files
5. Fulfilling federal requirements, including preparation of the annual report
6. Training and certification of KYTC staff

RECORD KEEPING

The VE Coordinator will maintain the electronic (ProjectWise) and physical files for the VE Program.



Projectwise File Structure

The following is a list of the Projectwise file structure and information is stored in each:

- FHWA Annual Report & Regs
  - Federal regulations
  - Each VE Status Annual Report
- FHWA Meeting Notes
  - Notes from the regular VE coordination meetings
- Training
  - Course agendas
  - Certificates of attendance
- VE Policy
  - VE Program Guidance Manual
  - Punch list form
  - Performance evaluations
- VE Statewide Contracting
  - Blank Consultant Evaluation Form
  - Statewide consultant contracts
  - Letter agreements and supporting documentation
- VE Studies
  - Draft, Final Draft, and Final study reports
  - Pertinent study information
  - Database of VE Studies
- VE Construction Proposals (VECP)
  - Compiled documentation for each VECP

The following physical files are established and stored in the high-density filing system:

- Individual VE Studies:
  - Final report (two copies)
  - Miscellaneous but pertinent VE Study information (design project information is not kept after the study is complete)
- Individual Consultants
  - Statewide contract
  - Letter agreements and supporting documentation
  - Performance evaluations

FEDERAL REGULATIONS AND GUIDANCE

Requirements for state value engineering programs are prescribed in the Code of Federal Regulations (CFR), Chapter 23, Part 627. FHWA has also issued policy guidance that clarifies the details of these requirements. The latest FHWA policy guidance was issued on May 25, 2010. Both the CRF and the policy guidance are included below.

Code of Federal Regulations (23 CFR 627)

§ 627.1 Purpose and applicability.

a. This regulation will establish a program to improve project quality, reduce project costs, foster innovation, eliminate unnecessary and costly design elements, and ensure efficient investments by requiring the application of value engineering (VE) to all Federal-aid highway projects on the National Highway System (NHS) with an estimated cost of $25 million or more.
b. In accordance with the Federal-State relationship established under the Federal-aid highway program, State highway agencies (SHA) shall assure that a VE analysis has been performed on all applicable projects and that all resulting, approved recommendations are incorporated into the plans, specifications and estimate.

§ 627.3 Definitions.

Project. A portion of a highway that a State proposes to construct, reconstruct, or improve as described in the preliminary design report or applicable environmental document. A project may consist of several contracts or phases over several years.

Value engineering. The systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project, reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project.

§ 627.5 General principles and procedures.

a. **State VE programs**. State highway agencies must establish programs to assure that VE studies are performed on all Federal-aid highway projects on the NHS with an estimated cost of $25 million or more. Program procedures should provide for the identification of candidate projects for VE studies early in the development of the State's multi-year Statewide Transportation Improvement Program.
1. **Project Selection**. The program may, at the States discretion, establish specific criteria and guidelines for selecting other highway projects for VE studies.
2. **Studies**. Value engineering studies shall follow the widely recognized systematic problem-solving analysis process that is used throughout private industry and governmental agencies. Studies must be performed using multi-disciplined teams of individuals not personally involved in the design of the project. Study teams should consist of a team leader and individuals from different specialty areas, such as design, construction, environment, planning, maintenance, right-of-way, and other areas depending upon the type of project being reviewed. 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.

i. Each team leader should be trained and knowledgeable in VE techniques and be able to serve as the coordinator and facilitator of the team.
ii. Studies should be employed as early as possible in the project development or design process so that accepted VE recommendations can be implemented without delaying the progress of the project.
iii. Studies should conclude with a formal report outlining the study team's recommendations for improving the project and reducing its overall cost.

3. **Recommendations**. The program should include procedures to approve or reject recommendations and ensure the prompt review of VE recommendations by staff offices whose specialty areas are implicated in proposed changes and by offices responsible for implementing accepted recommendations. Reviews by these offices should be performed promptly to minimize delays to the project.
4. **Incentives**. The program may include a VE or cost reduction incentive clause in an SHA's standard specifications or project special provisions that allows construction contractors to submit change proposals and share the resulting cost savings with the SHA.
5. **Monitoring**. The program should include procedures for monitoring the implementation of VE study team recommendations and VE change proposal recommendations submitted by construction contractors.

b. **State VE coordinators**. Individuals knowledgeable in VE shall be assigned responsibilities to coordinate and monitor the SHA's program and be actively involved in all phases of the program.
c. **Use of consultants**. Consultants or firms with experience in VE may be retained by SHAs to conduct the studies of Federal-aid highway projects or elements of Federal-aid highway projects required under § 627.1(a) of this part. Consultants or firms should not be retained to conduct studies of their own designs unless they maintain separate and distinct organizational separation of their VE and design sections.
d. **Funding eligibility**. The cost of performing VE studies is project related and is, therefore, eligible for reimbursement with Federal-aid highway funds at the appropriate pro-rata share for the project studied.
e. In the case of a Federal-aid design-build project meeting the project criteria in 23 CFR 627.1(a), the STDs shall fulfill the value engineering analysis requirement by performing a value engineering analysis prior to the release of the Request for Proposals document.

FHWA Policy Guidance

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION:** Updated FHWA Value Engineering (VE) Policy

Date: May 25, 2010

Reply to Attn. of: HIPA-20

From: King W. Gee
Associate Administrator for Infrastructure

To: Federal Lands Highway Division Engineers
Division Administrators

This memorandum is to inform you of updates to FHWA's VE Policy which has been issued as an FHWA Order dated May 25, 2010. This policy replaces FHWA's VE policy that was contained in the Federal-aid Policy Guide (September 8, 1998, Transmittal 24). The updated policy is attached and is available on FHWA's VE Program Web site at: http://www.fhwa.dot.gov/ve/vepolicy.cfm.

The FHWA's VE Policy reflects the Agency's commitment to continuously enhance the conducting of VE analyses, the quality of State department of transportation VE programs, and FHWA's stewardship and oversight of the VE program. The revised policy also reflects the revisions made to the VE provisions in Federal law (Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users) and address the recommendations contained in the Office of the Inspector General's Audit Report entitled, "Value Engineering in the Federal-Aid Highway Program." Application of this policy is expected to:

- Clarify FHWA's requirements for conducting VE analyses;
- Identify the characteristics of a VE analysis process, including life-cycle cost analyses;
- Influence when VE analyses are conducted to maximize their effectiveness;
- Provide more consistent documentation of the VE analyses;
- Delineate responsibilities for establishing and sustaining VE programs and ensuring VE analysis recommendations receive proper review, approval and are implemented; and
- Ensure the appropriate level of FHWA involvement, monitoring, and oversight.

We appreciate your continued support with advancing the VE program and practices within your State and office. If you have any questions about the changes to this policy, please contact Mr. Jeffrey Zaharewicz at jeffrey.zaharewicz@dot.gov.

Attachment

U.S. DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Order

Subject

FHWA Value Engineering Policy

Classification Code	Date	OPI
1311.1A	May 25, 2010	HIPA-20

Par.

1. **What is the purpose of this directive?** This directive provides policy direction on the integration of Value Engineering (VE) in the Federal-aid highway program (FAHP).

2. **Does this directive cancel an existing FHWA directive?** Yes. This directive cancels Federal-aid Policy Guide (FAPG) non-regulatory non-Code of Federal Regulations (CFR) related guidance, G 6011.9, Chapter 6, Value Engineering, issued via Transmittal 24, on September 8, 1998.

3. **What authorities govern this directive?**

   a. Title 23, United States Code (U.S.C.), Sections 106(e)(2) and (3), and Title 23, Code of Federal Regulations (CFR), Part 627, specify when a State department of transportation (DOT) or public authority (as defined by Title 23 U.S.C., Section 101(a)(23)) shall conduct a

VE analysis or cost reduction analysis on projects that may utilize FAHP funding, as described in Paragraph 5.

b. Paragraph 6b(2) of DOT Order 1395.1A, DOT Value Engineering Program, dated May 8, 1992, provides the following: "Each DOT Operating Administration should strongly encourage the use of VE in its grant awards or Federally assisted programs for major transportation projects throughout the planning, design and/or construction phases. This may include the use of VE proposals as a result of VE studies/analyses as well as VE incentive clauses in construction contracts."

c. Paragraph 9 of the Office of Management and Budget's (OMB's) Value Engineering Circular A-131, dated May 21, 1993, provides the following: "Each agency shall report Fiscal Year results of using VE annually to OMB, except those agencies whose total budget is under $10 million or whose total procurement obligations do not exceed $10 million in a given fiscal year." The Circular also describes what VE data must be submitted and the format for submitting the data to OMB.

4. **What definitions are used in this directive?**

a. **Life-cycle cost.** The total cost of a project or item over its useful life. This includes all of the relevant costs that occur throughout life of a project or item, including initial acquisition costs (such as right-of-way, planning, design, and construction), operation, maintenance, modification, replacement, demolition, financing, taxes, disposal, and salvage value as applicable.

b. **Major Project.** A project receiving Federal financial assistance 1) with an estimated cost of $500 million or more, or 2) that has been identified by the Secretary as being "Major" as a result of special interest.

c. **Project**. A portion of a highway that a State or public authority proposes to construct, reconstruct, or improve as described in the preliminary design report or applicable environmental document. A project may consist of several contracts or phases over several years.

d. **Product or service**. Any element of a project from concept through maintenance and operation. In all instances, the required function

should be achieved at the lowest life-cycle cost based on requirements for performance, maintainability, safety, and esthetics.

e. **Value Engineering analysis**. A systematic process of review and analysis of a project, during the concept and design phases, by a multidiscipline team of persons not involved in the project, that is conducted to provide recommendations for:

(1) providing the needed functions safely, reliably, efficiently, and at the lowest overall cost;

(2) improving the value and quality of the project; and

(3) reducing the time to complete the project.

f. **Value Engineering Job Plan.** A systematic and organized plan of action for conducting a VE analysis and assuring the implementation of the recommendations. The methodology utilized for any VE analysis shall follow widely recognized systematic problem-solving procedures that are used throughout private industry and governmental agencies.

(1) After project selection, the Job Plan consists of the following phases that are conducted during a VE analysis:

(a) Gather information;

(b) Analyze functions, worth, cost, performance and quality;

(c) Speculate using creative techniques to identify alternatives that can provide the required functions;

(d) Evaluate the best and lowest life-cycle cost alternatives;

(e) Develop alternatives into fully supported recommendations; and

(f) Present VE recommendations for review, approval, reporting, and implementation.

(2) Post-analysis Job Plan activities include the implementation and evaluation of the outcomes of the approved recommendations. These post-analysis phases are

conducted in accordance with the policies stated in the State DOTs VE program as described in Paragraph 9a.

g. **Value Engineering Change Proposal (VECP) clause**. A construction contract provision which encourages the contractor to propose changes in the project's plans, designs, specifications, or contract documents that would lower the project's life-cycle cost to the owner agency, or improves the value and/or quality of the project with no increase, or a slight increase in cost of the project. The net savings of each proposal is usually shared with the contractor at a stated reasonable rate.

5. **When does the FHWA require a VE analysis?**

a. The FHWA requires a VE analysis on:

(1) each project on the Federal-aid system with an estimated cost (which includes project development, design, right-of-way, and construction costs) of $25 million or more that uses FAHP funding;

(2) each bridge project located on or off of the Federal-aid system with an estimated total cost of $20 million or more that uses FAHP funding; and

(3) any other Federal-aid projects the Secretary determines to be appropriate.

b. In addition to all projects described in Paragraph 5a, the FHWA strongly encourages State DOTs or public authorities to conduct the VE analysis on other projects where there is a high potential for cost savings in comparison to the cost of the VE analysis, or the potential exists to improve the projects' 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.

c. Any use of FAHP funding on a Major Project requires that a VE analysis be conducted, regardless of the amount of FAHP funding that may be used on the project. The FHWA may require that a State DOT or public authority perform more than 1 VE analysis for a Major Project.

d. The threshold for applicable projects was amended in Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) to include the projects noted in this paragraph. Since the VE regulations in 23 CFR 627 have not yet been updated to reflect this change, the statutory requirements control to the extent there are conflicts between the regulations and the statute.

e. A VE analysis is required if the established scope and estimate of the project costs in the preliminary design report or environmental document meets the criteria noted in Paragraph 5a. After completing the required VE analysis at this stage in the project development process, if the project is subsequently split into smaller projects in final design or is programmed to be completed by the letting 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 of having to conduct a VE analysis.

f. The FHWA may require a VE analysis to be conducted if a State DOT or public authority encounters instances when the design of a project has been completed but the project does not immediately proceed to construction. In accordance with Paragraph 5a(3):

(1) If a project that met the criteria identified in Paragraph 5a encountered a 3 year delay or longer prior to advancing to a letting for construction, and a substantial change to the project's scope or design is identified when the required re-evaluation of the environmental document is performed, the FHWA may encourage or require a new VE analysis or an update to the previously completed VE analysis to be conducted; or

(2) If a project's estimated cost initially fell below the criteria identified in Paragraph 5a but the project advances to a letting for construction, and a substantial change occurs to the project's scope or design is determined to be the basis for an increase in the project cost above the criteria identified in Paragraph 5a when the required re-evaluation of the environmental document is performed, the FHWA will require a VE analysis to be conducted.

g. 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:

(1) A project met the criteria identified in Paragraph 5a and had a VE analysis conducted, and the project advances to a letting for construction without needing any substantial changes in its scope or its design; or

(2) A project's estimated cost initially fell below the criteria identified in Paragraph 5a, but when advancing to letting for construction, falls above the criteria due to inflation, standard escalation of costs, or minor modifications to the projects design or contract.

6. **When should a VE analysis be conducted?**

a. The State DOTs VE program, policies and procedures should provide for the identification of which projects will be subject to a VE analysis early in the process to develop the State's multi-year Statewide Transportation Improvement Program.

b. For maximum benefit, VE analysis should be conducted as early as practicable in the planning or design phase of a project, preferably before the completion of preliminary (30-35%) design. The VE analysis should be closely coordinated with other project development activities, to enable proposed VE recommendations to be accepted and incorporated into the project design without conflicting with or adversely impacting previous agency or project commitments, the project's development, or construction schedule.

c. Design-build projects meeting the requirements described in Paragraph 5a of this directive, the VE analysis shall occur prior to the release of the Request for Proposals document (as specified in 23 CFR 627.5(e)).

7. **What characteristics need to be incorporated in the VE analysis process?** To satisfy the requirement to conduct a VE analysis (as specified in 23 U.S.C. 106(e) and 23 CFR 627), the analysis process will incorporate each of the following characteristics:

a. the use of a multi-disciplinary team of individuals not directly involved in the planning or design of the project, with at least one individual who is trained and knowledgeable in VE techniques and able to serve as the team's facilitator and coordinator;

b. the systematic application of the VE Job Plan described in Paragraph 4(f) of this directive;

c. the production of a formal written report outlining at a minimum:

(1) project information;

(2) identification of the VE analysis team;

(3) background and supporting documentation, such as information obtained from other analyses conducted on the project (e.g., environmental, safety, traffic operations, constructability);

(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) documentation of the proposed and approved recommendations, and related information to support the State DOTs and FHWA's VE program monitoring and reporting;

(8) the formal written report shall be retained for at least 3 years after the completion of the project (as specified in 49 CFR 18.42); and

d. for bridge projects, the VE Analyses must:

(1) include bridge substructure and superstructure requirements based on construction material;

(2) be evaluated based on:

(a) an engineering and economic bases, taking into consideration acceptable designs for bridges;

(b) analysis of life-cycle costs and duration of project construction.

8. **How may consultants be used to conduct VE analyses?** State DOTs may employ qualified VE consultants to conduct VE analyses. Consulting firms should not conduct a VE analysis on projects (as specified in Paragraph 5) where they have an interest in the project. It is strongly recommended that consultants be qualified VE practitioners, experienced in performing and leading VE studies (have participated in several VE studies

as a team member and as a team leader), and have sufficient VE training, education, and experience to be recognized by SAVE International as meeting the requirements for certification.

9. **What are the FHWA responsibilities?**

a. **Federal-aid Division Offices**

(1) Ensure that copies of this directive are provided to the State DOTs.

(2) Designate and develop roles and responsibilities for a Division Office VE coordinator.

(3) Encourage the State DOTs to host VE training provided by the FHWA, a qualified VE consultant, and/or develop their own VE training.

(4) Participate in VE analyses, the review of VE recommendations, and other activities of the State DOT VE programs to the extent practicable, and as detailed in the Office's Stewardship & Oversight agreement and/or standard operating procedures.

(5) Ensure all applicable projects receive a VE analysis and encourage the State DOTs to conduct a VE analysis on other projects that would benefit such an analysis.

(6) Ensure the State DOTs have VE programs that fulfill the requirements of Paragraph 5a of this directive, and support in the development and conduct of their programs.

(7) Encourage the State DOTs to include a VECP clause in their construction contracts.

(8) Summarize the State DOTs VE program accomplishments and VE studies conducted annually and provide this information to the FHWA VE Program Manager as specified in Paragraph 11a of this directive.

b. **Federal Lands Highway Divisions**

(1) Follow the VE guidance established in Subsection 2-E of the Federal Lands Highway Manual.

(2) Summarize the Federal Lands Highway Program's VE accomplishments and VE studies conducted annually, and provide this information to the FHWA VE Program Manager as specified in Paragraph 11a of this directive.

c. **FHWA VE Program Manager**

(1) Promotes VE and serves as the technical expert on VE matters for FHWA, State DOTs, and public authorities.

(2) Provides VE briefings to FHWA, State DOT, and local executives and upper management.

(3) Encourages VE training, sharing of technical expertise, and successful practices among FHWA, State DOTs, and public authorities s, and assists State DOTs develop VE programs.

(4) Coordinates VE with other FHWA activities and initiatives aimed at cost reduction or project performance improvement.

(5) Compiles VE data received from the FHWA Federal-aid and Federal Lands Division Offices and prepares an annual accomplishment report for the DOT as specified in Paragraph 11b of this directive.

(6) Represents FHWA in VE forums with the DOT and other Federal and State government agencies and industry organizations.

(7) Serves as FHWA's representative to the American Association of State Highway and Transportation Officials (AASHTO) VE Technical Committee.

10. **What are the State DOT responsibilities?**

a. As directed in 23 CFR 627.5, each State DOT must establish and sustain a VE program. Generally, an acceptable VE program is one that:

(1) assigns an individual that is knowledgeable in VE with the responsibility to coordinate and monitor the program;

(2) establishes and documents VE program policies and procedures;

(3) includes a training program or initiative that ensures the State DOT has individuals who are capable of facilitating or

participating in a VE analysis that may be conducted in the planning or project development process;

(4) ensures all applicable projects noted in Paragraph 5a of this directive will receive a VE analysis, including analyses for applicable projects being administered by Public authorities;

(5) provides for the timely review, final disposition, implementation, and documentation of the VE analysis recommendations and VECPs;

(6) tracks all VE analyses that are conducted and VE recommendations and VECPs that are implemented; and

(7) monitors, analyzes and disseminates the results of all VE analyses conducted, VECPs implemented, and VE program performance.

b. The State DOTs VE program, policies and procedures should provide for the identification of which projects will be subject to a VE analysis early in the process to develop the State's multi-year Statewide Transportation Improvement Program.

c. The State DOTs are encouraged to include a VECP clause in their construction contracts enabling contractors to propose changes in contract requirements which will reduce project cost(s) or improve value or service at no increase or a minor increase in cost.

(1) The net savings of each proposal should be shared with the contractor at a stated reasonable rate. Reimbursement for such share is eligible for pro-rata reimbursement with Federal-aid funds.

(2) States should retain the right to accept or reject all proposals and acquire all rights to use accepted VECPs when preparing plans, specifications and estimates on future projects without restriction.

11. **What are the reporting procedures?**

a. The results of all of the VE analyses and VECP that are conducted on projects that use FAHP funding or are administered by the Federal Lands Highway Divisions shall be used to prepare an Annual VE Accomplishment Report. At the end of the fiscal year, the FHWA VE Program Manager will issue the call for information for the accomplishment report to each Federal-aid and Federal Lands

Highway Division Office. The call for information will include the format required for submitting the VE data to the FHWA VE Program Manager.

b. The FHWA VE Program Manager shall prepare the Annual VE Accomplishment Report including an assessment of the effectiveness of efforts to encourage VE on Federal-aid and Federal Lands Highway projects. The FHWA VE Program Manager will submit the Annual Accomplishment Report to the DOT Acquisition Oversight Division and post results on the FHWA's VE Web site.

12. **Where can I find additional information?** Additional information about this policy and FHWA's VE program is available at http://www.fhwa.dot.gov/ve, or by contacting FHWA's Office of Infrastructure Pre-Construction Team (HIPA-20).

King W. Gee
Associate Administrator
for Infrastructure

VE STUDIES

As required by federal regulation, each project with a total cost of $25,000,000 or more must have a value engineering study conducted as part of the design process. A "project" is defined as a portion of a highway that a State proposes to construct, reconstruct, or improve as described in the preliminary design report or applicable environmental document. A project may consist of several contracts or phases over several years. Therefore, breaking a project into smaller construction or design projects does not relieve the requirement that these projects be value engineered. Projects that are likely to qualify will be long corridor roadway projects, large bridges, and major urban ramp reconstruction.

The timing of exactly when a study is conducted is flexible. Generally speaking there are two logical opportunities to conduct the study. The first and preferred time is prior to completing preliminary (Phase 1) design. This allows the review of major items such as alternatives, vertical and horizontal alignment, interchange type, intersection type, number of lanes, access control, etc. Rights-of-way have not yet been negotiated and purchased and major environmental or property owner commitments have not been made. The second opportunity is closer to the end of the design process, before the Joint Inspection. At this point, more detailed items such as specific property access, drainage, pavement, etc. can be examined. It is up to the coordinator, working with the project manager**,** to determine the best timing of the VE study. More than one VE study on a project may be conducted. It is also possible to conduct a VE study on other large, complex, or high-impact projects.

VE Phases

Value Engineering uses a multi-disciplinary team approach to achieve the program's objectives. The following is a listing of the phases that comprise the basic VE process.

Pre-Study	Selection of Projects
VE Study	Project Investigation Speculation (Brainstorming) of Alternatives Evaluation and Screening of Alternatives Development of Alternatives Presentation of Recommendations
Post-Study	Implementation of VE Recommendations Evaluation of Results

Selection of Projects and Database Management

The VE Coordinator creates and manages the VE project database. The database is used to identify projects that need a VE study and to track basic project information and information related to the VE study. The VE project database is stored on ProjectWise in the folder: Value Engineering\VE Studies

Determining which projects need a VE study and then prioritizing the order of study can be a challenge. The VE Coordinator must communicate with the Location Engineers, district project managers, and Division of Program Management to determine future VE study needs. It is also recommended that the VE Coordinator attend the monthly Letting Review Meetings and the quarterly District Project Status Meetings to be sure that VE requirements for projects close to construction letting are complete.

VE Study Procedure

VE studies should follow the guidelines presented in NHI Course No. 13405, Value Engineering for Highways or in SAVE Module I courses. Typically, the VE study follows five phases: Investigation, Speculation, Evaluation, Development, and Presentation. The VE study team will complete the VE Study Workbook to document the activities and findings of the study.

VE Study Logistics

The VE Coordinator is responsible for making arrangements for the VE Study. The following preparations are required:

1. Establishing the scope and length of the study and needed expertise based on the type of project and design status.
2. Establishing whether the study is to be conducted using a statewide consultant or with in-house staff.
3. Forming the VE Study Team. When using a statewide consultant, determining what expertise they will provide and what KYTC will.
4. Contracting with the statewide consultant. See details in subsequent section.
5. Setting the dates of the study.
6. Reserving a room location for the study and presentation.
7. Determining and securing other resource needs (i.e. projector, markers, notepads) for the study.
8. Inviting the KYTC team members to participate.
9. Notifying the location engineer and district project manager of the study.
10. Inviting the project team, management, and other KYTC staff to attend the final briefing of the study.
11. Communicating with the project manager(s) to assure project information is transmitted to the VE consultant.

Information Needed

To conduct a VE study, there is information critical to learning about the project and developing recommendations. The VE Coordinator should request the information below from the project manager and/or design consultant. The information should be delivered two to three weeks in advance of the VE study start date.

		# Hard Copies	Electronic Format
1	Design Executive Summary	1	PDF or Word
2	Plans, profiles, cross sections (1/2 or full size)	2 min. more may be requested	Microstation & PDF
3	Roll manuscript (with topo)	1	PDF
4	Roll profile	1	PDF
5	Roll aerial of project area	1	PDF
6	Earthwork quantities	2	Spreadsheet
7	Construction cost estimates (quantities & unit prices for each item)	2	Spreadsheet
	ROW cost estimate, by parcel including business damages (if applicable) or ROW values for area	1	PDF
	Future land use and zoning maps	0	PDF
8	Most recent traffic forecast (roadway & intersections)	1	PDF
	Traffic operational analysis for roadway, intersections, interchange	1	Variable
9	Environmental Study (EA or EIS), if applicable	1	PDF or Word
10	MOT Plans, if applicable	1	PDF
11	Structures layout & profile sheets include bridge types & sizes (if available)	1	PDF
	Structures: Details on decisions (jacking, new bridge, part width, etc.)	1	PDF (Optional)
12	Geotech Information (if available)	1	PDF
13	ROW plans/maps & cost estimates (if available)	1	PDF
14	Pavement design (if available)	1	PDF
	Drainage folder (if applicable)	1	PDF
	Intersection and interchange layouts	1	PDF
15	Other relevant project info and correspondence that may help the VE team better understand the project. This may include meeting summaries, memos, etc.	1	Optional

Presentation of Findings

At the conclusion of the VE Study, the VE Team presents the results. The following persons should be invited to the presentation:

- Director of Design
- Branch Manager of Quality Assurance
- Branch Manager of Location
- Location Engineer
- Construction Liaison
- Maintenance Liaison
- Traffic Operations Liaison
- Deputy State Highway Engineer for Project Development
- Deputy State Highway Engineer for Project Delivery and Preservation
- Chief District Engineer
- Branch Manager for Project Development
- Project Manager
- Branch Manager for Project Delivery and Preservation
- Section Supervisor for Project Delivery and Preservation

Discussion and receipt of comments about the recommendations should be encouraged and documented by the VE Coordinator.

VE Study Report

After each project study is complete, a report documenting the results is prepared. The VE Study Report will contain the following:

1. Cover
    - Project Title, County and Route Number
    - VE Number
    - Item Number(s)
    - Location & Dates of Study
    - Date of Final Report
    - KYTC Logo
    - VE Consultant Name
2. Table of Contents
3. Executive Summary
    - Summary of VE Study Results
    - Punch List
    - Total Project Cost and Estimated Total VE Savings
4. Introduction
    - Description of VE process
    - Specifics about location, dates, VE company, team leader
    - Organization of report
5. Project description
    - Description of the project including purpose and need and estimated total cost
    - Important issues about the project that are important to the design
    - Location map and project map
    - Stage of design & name of design firm
6. VE Recommendations & Design Comments
    - Each recommendation will include;
        i. Descriptive title of VE recommendation
        ii. Description of original design
        iii. Narrative of Recommended Change
        iv. Advantages and Disadvantages of Recommended Change
        v. Justification
        vi. Summary Cost Analysis Table
        vii. Diagram illustrating the Recommended Change
        viii. Calculations
7. Punch List
8. Appendices
    - Participant Sign-in Sheets
    - Cost Model
    - Functional Analysis Model & FAST Diagram
    - Creative Idea List & Evaluation
9. Appendices and as a minimum consist of a cover letter, executive summary, and VE Study Workbook. Other documentation or information may be attached as necessary.

VE Study Implementation Team

Once the VE study report is complete, the VE Coordinator will forward to the Location Engineer and District project manager a copy of study .

When a VE study report is finalized, a decision team will be established. The VE coordinator will send a copy of the VE Punch List and VE study report to the Implementation Team members. The VE Implementation Team meets within two months after a VE study final report is released to discuss and decide which of the VE alternatives will be will recommended for implementation, further review, or rejection. The decision team must document substantial reasons for each of the VE alternatives that are rejected. Actions planned to be taken will be documented for those alternatives listed for further review. These decisions will be forwarded to the Director of Design.

The VE Study Implementation Team may include the following persons or their designees:

- KYTC Project Manager
- VE Coordinator
- Location Engineer
- Chief District Engineer
- KYTC Consultant Project Manager (optional)
- Other KYTC project staff as deemed necessary by the Project Manager. (optional)
- Other KYTC central office staff with technical expertise (optional)
- FHWA Transportation Engineer on full oversight projects as defined in the Stewardship Agreement. (advisory member)

The Location Engineer should monitor the incorporation of all accepted value opportunities from the Punch List into the project plans. Any problems with implementation should be reported immediately to the VE Coordinator so that he may coordinate resolution of these problems with the affected parties.

The Location Engineer will notify the VE Coordinator once the plans are finalized. The VE Coordinator will then verify that the approved value opportunities have been incorporated into the plans. The VE Coordinator will document information about the accepted and rejected value opportunities into the VE Studies database.

Statewide Contract Administration

The VE Program uses the statewide contracting mechanism to retain and use qualified consultants to perform VE studies. The consultants are selected using the normal consultant selection procedure, administered through the Division of Program Management. Currently, there are two consultants that have statewide contract for VE services. There is a $50,000 maximum for each letter agreement and a $350,000 upset limit for each statewide contract. Each began in November 2009 and will last for two years. The current consultants are URS and VE Group. Generally, the use of these consultants is rotated so that the amount of work is roughly equal over the life of the contract.

Each time a VE study is needed using the statewide contract, the VE Coordinator must follow these steps to establish a letter agreement prior to the beginning of work:

1. Decide on the resources (number of people and expertise) and length of study needed to accomplish the goals of the VE study.
2. Notify the VE consultant via email of the study, timeframe, and necessary resources.
3. Schedule a date that works for the VE Consultant, district project manager, project consultant, and location engineer.
4. Request a draft scope of services document and fee proposal. After receiving these documents, review (see notes below), negotiate, and revise, as necessary.
5. Request that the consultant prepare and send minutes of the negotiations.
6. Send the scope of services, fee proposal, and negotiation minutes to [David McGohon and Adrian Wells in the] Division of Professional Services for review of consultant salary and overhead rates.
7. [David McGohon of] Division of Professional Services will draft a letter agreement and send to the VE Coordinator for review. Once the letter agreement is satisfactory, Division of Professional Services sends the document to the VE consultant for signature.
8. Once signed, the VE consultant may begin work on preparing for the VE study.

The fee proposal is normally estimated based on approved (audited) salary rates, man-hours for each person and task, direct costs and the approved overhead rate Man-hours and direct costs should be reviewed for reasonableness to accomplish each task. Math (addition and multiplication) should be checked. For consultants headquartered outside of Kentucky, the overhead rate will likely be adjusted annually. The VE Coordinator should check with the External Audits branch to determine that the latest accepted overhead rate matches the fee proposal. The final negotiated fee will be included in the letter agreement as Lump-Sum.

Upon completion of the tasks outlined in the scope of services, the consultant must submit a Pay Estimate form (TC 61-408) to the VE Coordinator who in turn, reviews for accuracy. The VE Coordinator submits the invoice via email [to David McGohon] for payment. No additional documentation is required for a Lump-Sum payment.

After each final report is finalized, the VE Coordinator must review the performance of that contractor. A Value Engineering Consultant Performance Evaluation form (TC 61-811) is filled out. A letter from the Division Director is prepared, signed, and sent to the consultant. A copy of the form and letter is then stored in the appropriate consultant's file located in ProjectWise under Value Engineering\VE Statewide Contracting.

The statewide contract, fee proposal, scope of services, invoices, and signed letter agreement electronic documents should be filed in the appropriate consultant's file located in ProjectWise under Value Engineering\VE Statewide Contracting. A hard copy should also be printed and placed in the appropriate consultant's file located in the high density files.

ANNUAL VE STATUS REPORT

At the conclusion of each calendar year, the VE Coordinator prepares and submits a VE Status Report to FHWA. The report includes the following:

- VE Study Summary
  - Total number of projects studied.
  - Total number of recommendations and proposed savings
  - Number of recommendations accepted and proposed savings
- List of individual VE study locations
  - Number of recommendations and proposed savings from each project
  - Number of accepted recommendations and proposed savings
  - Cost of the study
- Training Summary
  - Number of persons trained in VE techniques.
  - Number of persons in VE team member pool.
- Program Changes
  - Any changes that happened during the calendar year

TRAINING OF KYTC STAFF

In order to ensure a pool of KYTC staff who are able to participate in VE studies, the VE Coordinator must provide the necessary training and maintain a list of potential participants. The list is part of the VE project database stored on ProjectWise in the folder: Value Engineering\VE Studies.

The VE Coordinator will schedule training for KYTC personnel so as to maintain a pool of persons trained in VE concepts. This training may be provided by NHI or by consultants. Training provided by consultants for team members will be SAVE International Module I certified.

The VE Coordinator will schedule training for KYTC personnel in order to develop a pool of VE study team leaders. Training provided for team leaders will be SAVE International Module II certified.

REFERENCES

The following list of publications is provided for informational purposes:

1. Guidelines for Value Engineering (VE), AASHTO-AGC-ARTBA Joint Cooperative Committee, Task Force #19, US Department of Transportation/FHWA, Pub. No. FHWA-HI-88-048, February 1987 & 88.
2. NHI Course No. 13405, Value Engineering for Highways Textbook, US Department of Transportation, FHWA, Pub. No. FHWA-HI-88-047.

VALUE ENGINEERING CONSTRUCTION PROPOSALS (VECP)

During the construction phase of a project, the contractor has the opportunity to propose changes that will improve the quality of the project and/or reduce the cost. These are called Value Engineering Construction Proposals (VECP). If there is a cost savings from the VECP, the contractor splits the savings with KYTC. Details of the process and requirements are covered under Section 111 of the Standard Specifications for Road and Bridge Construction.

Although VECPs developed during the construction phase are administered by the Division of Construction, there are four roles of the Value Engineering section in this process:

1. Facilitate and participate in discussion with Construction personnel, technical or subject matter experts, project design staff to make the decision to approve or deny the VECP. The purpose of this is to ensure that the VECP is technically sound and that it does not conflict with previous project design or VE decisions.
2. Collect, consolidate and file documentation used in the VECP decisionmaking process. Details of the consolidation and filing process are below.
3. Develop a GIS database of all VECPs that includes the physical limits of the project, PCN and item numbers, whether the VECP was approved or denied, date of the decision, description of the VECP, technical category/subcategory, and cost savings.
4. Use the information to identify VECP trends or process problem areas. This information will be shared with the appropriate divisions to facilitate improvements in internal processes or standards. This information may be used to encourage changes that accept new innovation or technologies not currently in practice.

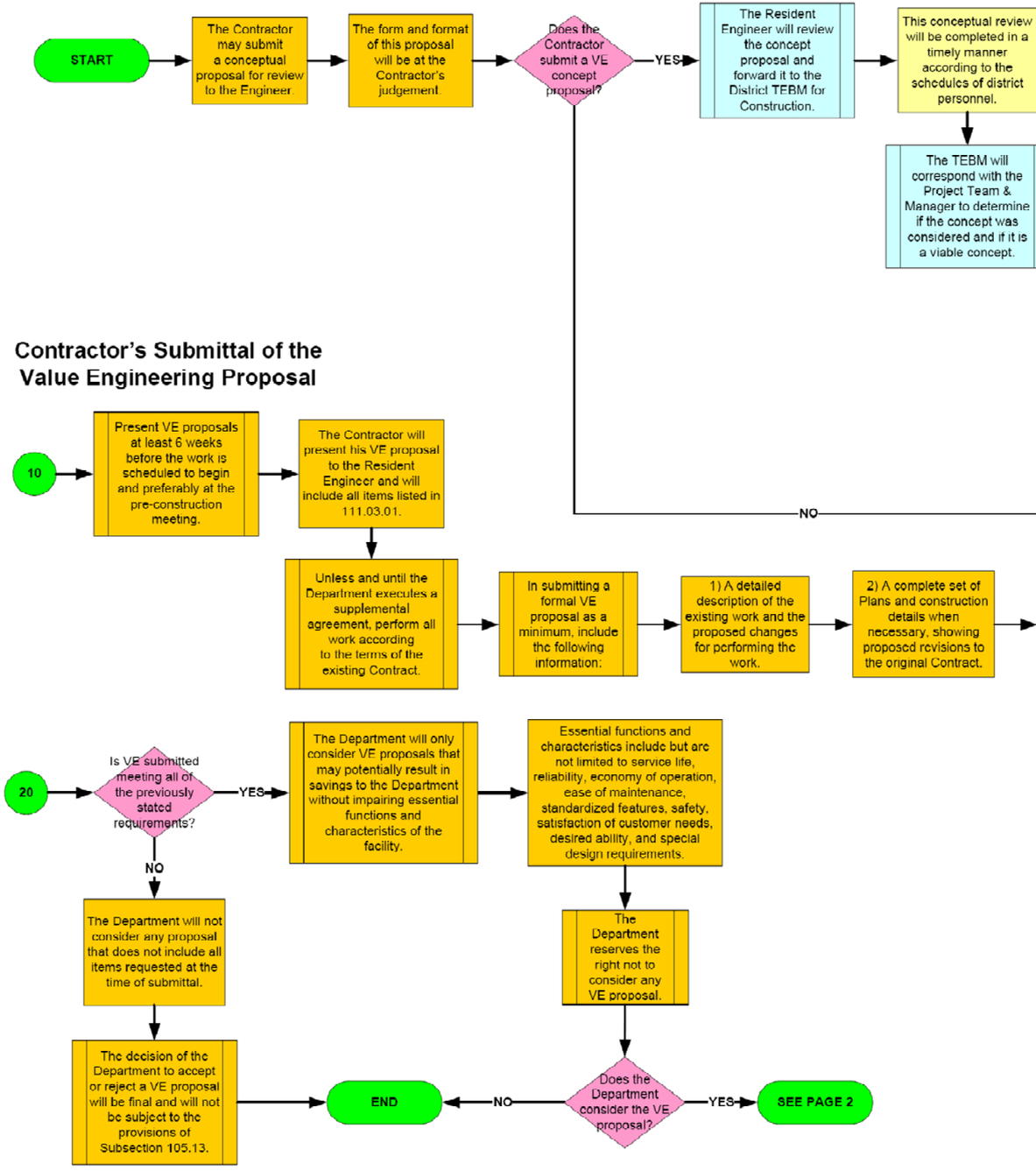
VECP Documentation

The VE Coordinator will obtain documentation including e-mails, decision memos, plan sheets, calculations and other pertinent information to each VECP. All documentation will be converted and merged into a single PDF document. The document will be saved in ProjectWise under the following folder: Value Engineering\VECPs.

The file will follow a standard naming convention that includes the following pieces:

- VECP_
- PCN_ (Project Construction Number)
- County Name_
- Memo Decision Date_ (This includes month and four digit year)
- Letter indicating multiple approvals on the same date (Optional)
- Example: VECP_091317_Grant_11-09
- The Name and File Name will be the same.
- The Description shall include the status (Under Review, Denied, Approved or Approved with Conditions) and date of action.

Value Engineering Concept Proposal



Contractor's Submittal of the Value Engineering Proposal

General Information Concerning the Value Engineering Process

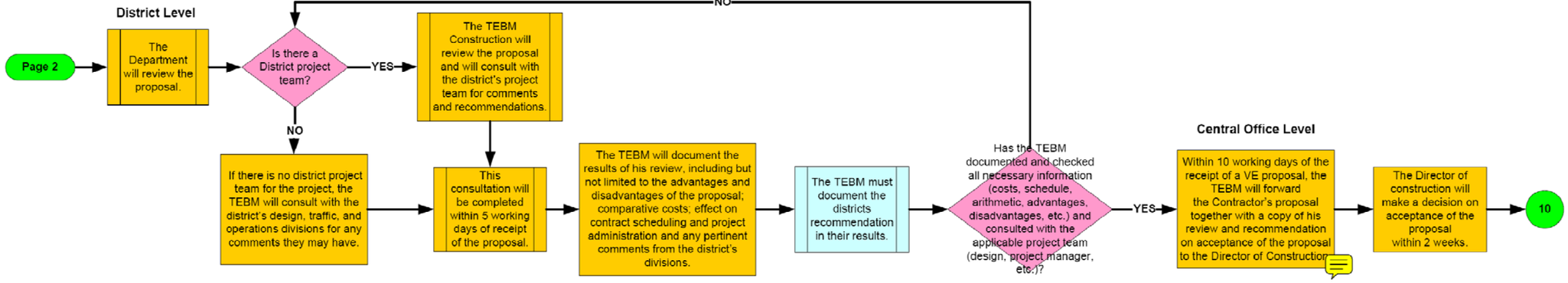
- Value Engineering is addressed in Section 111 of the Standard Specifications.
- Value Engineering provides the Contractor an opportunity to to submit a cost reduction proposal with the incentive of equally sharing in the savings to the Department.
- The Value Engineering proposal should provide an equivalent or better product than that specified in the Contract at a lesser cost.
- The Value Engineering proposal can be denied for many reasons (see section on "Consideration"), in general the proposal should not be an idea the Department has considered or is considering for the project.
- The Value Engineering proposal, if rejected, may still be included in the project by Supplemental Agreement.
- The Department will process Value Engineering Proposals in the same manner as prescribed for any other alterations of the Contract that would require a supplemental agreement.

Symbol Legend

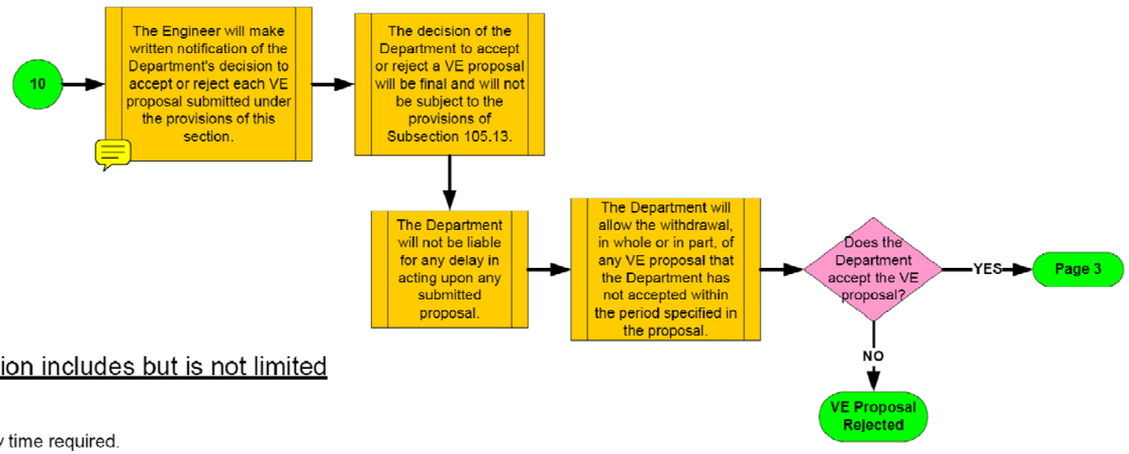
- Informational statement from Section 111 of the Standard Specifications
- Statement from Section 111 of the Standard Specifications concerning an action
- Statement providing information or guidance
- Statement concerning an action
- Decision statement leading the process in one of two directions

Division of Construction VECP Process Flowchart (Page 1 of 3)

Department Review of the Value Engineering Proposal



Department Decision on the Value Engineering Proposal



The Department will only accept VE proposals meeting the following criteria:

- The Department may reject a proposal if it contains certain revisions that the Department has considered, is considering or has already approved for the Contract without obligation to the Contractor.
- The Contractor has no claim to additional costs or delays, including development costs; loss of anticipated profits; or increased material or labor costs if the proposal is rejected.
- The Department has sole authority in determining the acceptance of any VE proposal.
- The Department reserves the right to reject all unacceptable work resulting from an approved proposal and can require that rejected work be removed and reconstructed under the original contract.
- The Department will reject proposals that provide equivalent options to those already in the Contract.
- The proposal will be disqualified if requests for additional information are not immediately met.

Basis for rejection includes but is not limited to:

- Excessive review time required.
- Inconsistent with established Department policies.
- Inconsistent with project design policies or criteria.

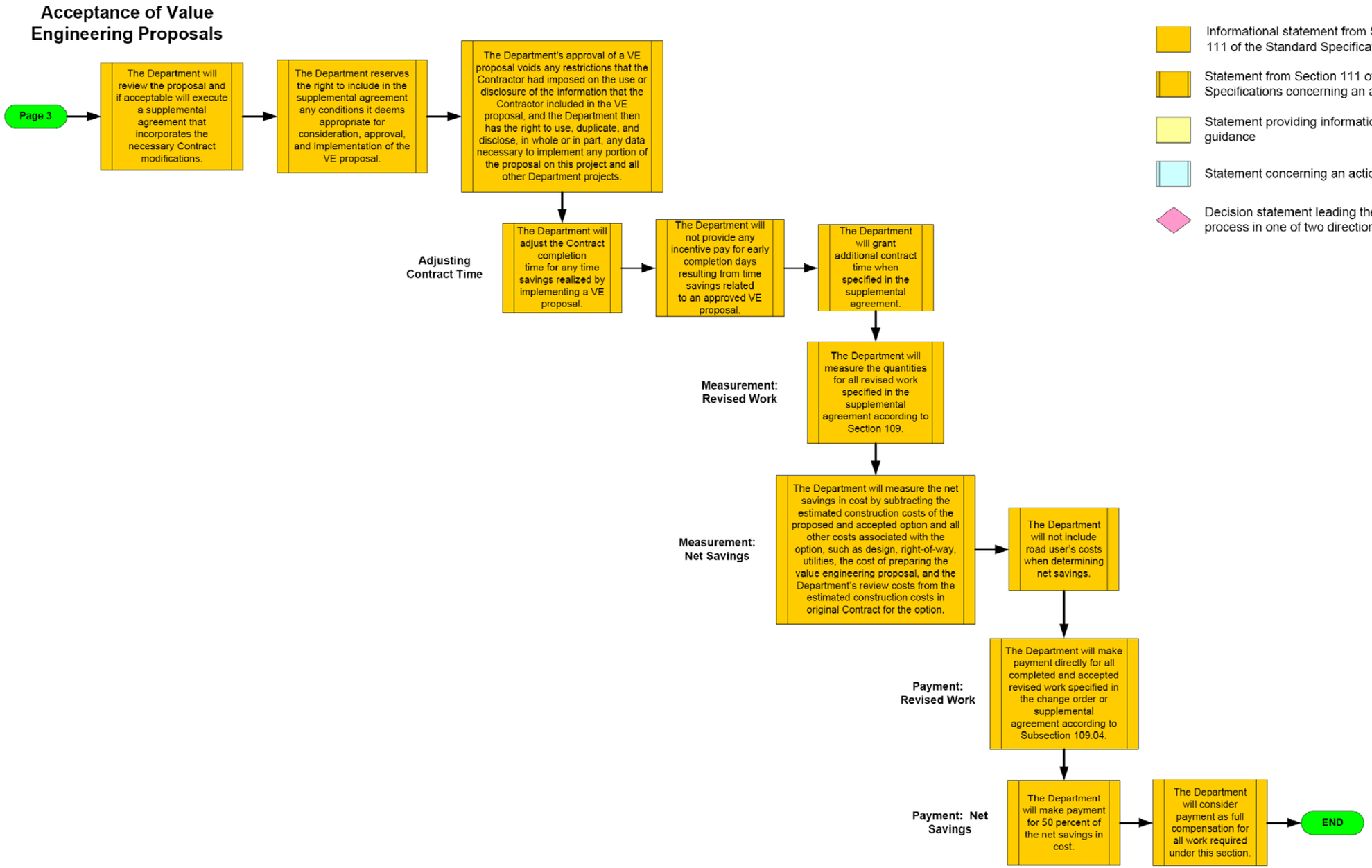
The Department will not consider the following value engineering:

- Elimination or reduction of final product work.
- Changes in Traffic control plans only.
- Reducing only pavement thickness.
- Modification to existing facilities instead of replacing them with new ones.
- Phase changing to accommodate contractor's schedule.

Symbol Legend

- Informational statement from Section 111 of the Standard Specifications
- Statement from Section 111 of the Standard Specifications concerning an action
- Statement providing information or guidance
- Statement concerning an action
- Decision statement leading the process in one of two directions

Division of Construction VECP Process Flowchart (Page 2 of 3)



Division of Construction VECP Process Flowchart (Page 3 of 3)

SECTION 111 — VALUE ENGINEERING

111.01 DESCRIPTION. Value engineering (VE) is producing an equivalent or better option to that specified in the Contract at a lesser cost. The Department may consider as a VE proposal any cost reduction proposal that is initiated, developed, and submitted to the Engineer for modification of the Contract resulting in an immediate net savings to the Department. The Department will share equally the net savings resulting from a VE proposal that the Department approves.

The Department will only consider VE proposals that may potentially result in savings to the Department without impairing essential functions and characteristics of the facility. Essential functions and characteristics include but are not limited to service life, reliability, economy of operation, ease of maintenance, standardized features, safety, satisfaction of customer needs, desired ability, and special design requirements.

The Department will process VE proposals in the same manner as prescribed for any other alterations of the Contract that would require a supplemental agreement.

111.02 MATERIALS AND EQUIPMENT. Reserved.

111.03 PROCESS.

111.03.01 Submittal and Review of the VE Proposal. The Contractor may submit a conceptual proposal for review to the Engineer. The form and format of this proposal will be at the Contractor's judgement.

In submitting a formal VE proposal as a minimum, include the following information:

1) A detailed description of the existing work and the proposed changes for performing the work.
2) A complete set of Plans and construction details when necessary, showing proposed revisions to the original Contract.
3) A detailed cost estimate for performing the work under the existing Contract and under the proposed change. Include pay items, pay units, quantities, and unit prices. Include in the unit prices all costs for labor, materials, supplies, equipment, tools, and all incidentals required for the complete incorporation of the option into the work.
4) A detailed cost estimate for costs other than those in the Contract such as future construction, design, right-of-way, utilities, maintenance, and operations costs, and the cost to prepare the VE proposal.
5) A prediction of any effects the proposed changes would have on Department costs other than construction, such as maintenance and operating costs and life cycle costs.
6) A statement of the effect the proposal would have on the time for completion of the Contract.

The Department will review the proposal. The decision of the Department to accept or reject a VE proposal will be final and will not be subject to the provisions of Subsection 105.13. The Engineer will make written notification of the Department's decision to accept or reject each VE proposal submitted under the provisions of this section. The Department reserves the right not to consider any VE proposal.

The Department will review the proposal and if acceptable will execute a supplemental agreement that incorporates the necessary Contract modifications. Unless and until the Department executes a supplemental agreement, perform all work according to the terms of the existing Contract. The Department reserves the right to include in the supplemental agreement any conditions it deems appropriate for consideration, approval, and implementation of the VE proposal.

The Department's approval of a VE proposal voids any restrictions that the Contractor had imposed on the use or disclosure of the information that the Contractor included in the

VE proposal, and the Department then has the right to use, duplicate, and disclose, in whole or in part, any data necessary to implement any portion of the proposal on this project and all other Department projects.

The Department will not be liable for any delay in acting upon any submitted proposal. The Department will allow the withdrawal, in whole or in part, of any VE proposal that the Department has not accepted within the period specified in the proposal.

111.03.02 Contract Time. The Department will adjust the Contract completion time for any time savings realized by implementing a VE proposal. The Department will not provide any incentive pay for early completion days resulting from time savings related to an approved VE proposal. The Department will grant additional contract time when specified in the supplemental agreement.

111.03.03 Procedure for Reviewing VE Proposals. Present VE proposals at least 6 weeks before the work is scheduled to begin and preferably at the pre-construction meeting.

1) The Contractor will present his VE proposal to the Resident Engineer and will include all items listed in 111.03.01. The Department will not consider any proposal that does not include all items requested at the time of submittal.
2) The TEBM Construction will review the proposal and will consult with the district's project team for comments and recommendations. If there is no district project team for the project, the TEBM will consult with the district's design, traffic, and operations divisions for any comments they may have. This consultation will be completed within 5 working days of receipt of the proposal.
3) The TEBM will document the results of his review, including but not limited to the advantages and disadvantages of the proposal; comparative costs; effect on contract scheduling and project administration and any pertinent comments from the district's divisions.
4) Within 10 working days of the receipt of a VE proposal, the TEBM will forward the Contractor's proposal together with a copy of the District's review and recommendation on acceptance of the proposal to the Director of Construction.
5) The Director of construction will make a decision on acceptance of the proposal within 2 weeks.

The Department will only accept VE proposals meeting the following criteria:

1) The Department may reject a proposal if it contains certain revisions that the Department has considered, is considering or has already approved for the Contract without obligation to the Contractor.
2) The Contractor has no claim to additional costs or delays, including development costs; loss of anticipated profits; or increased material or labor costs if the proposal is rejected.
3) The Department has sole authority in determining the acceptance of any VE proposal.
4) The Department reserves the right to reject all unacceptable work resulting from an approved proposal and can require that rejected work be removed and re-constructed under the original contract.
5) The Department will reject proposals that provide equivalent options to those already in the Contract.
6) The proposal will be disqualified if requests for additional information are not immediately met.

Basis for rejection includes but is not limited to:

1) Excessive review time required.
2) Inconsistent with established Department policies.

3) Inconsistent with project design policies or criteria.
4) Associated with a Design Build project.

The Department will not consider the following value engineering:

1) Elimination or reduction of final product work.
2) Changes in Traffic control plans only.
3) Reducing only pavement thickness.
4) Modification to existing facilities instead of replacing them with new ones.
5) Phase changing to accommodate contractor's schedule.

111.04 MEASUREMENT.

111.04.01 Revised Work. The Department will measure the quantities for all revised work specified in the supplemental agreement according to Section 109.

111.04.02 Net Savings. The Department will measure the net savings in cost by subtracting the estimated construction costs of the proposed and accepted option and all other costs associated with the option, such as design, right-of-way, utilities, the cost of preparing the value engineering proposal, and the Department's review costs from the estimated construction costs in original Contract for the option. The Department will not include road user's costs when determining net savings.

111.05 PAYMENT.

111.05.01 Revised Work. The Department will make payment directly for all completed and accepted revised work specified in the change order or supplemental agreement according to Subsection 109.04.

111.05.02 Net Savings. The Department will make payment for 50 percent of the net savings in cost.

The Department will consider payment as full compensation for all work required under this section.

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