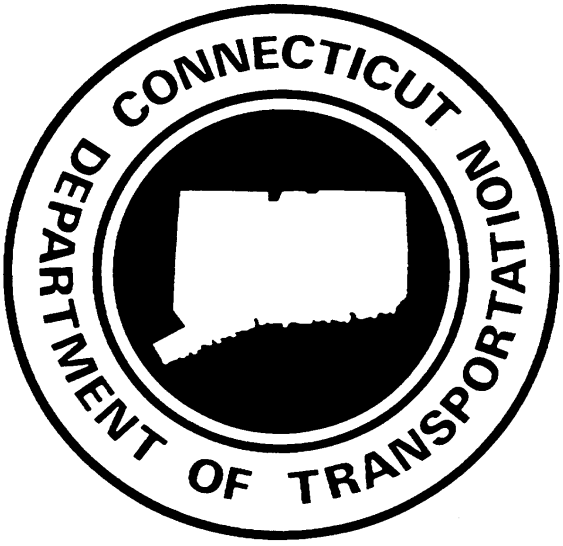
# VALUE ENGINEERING PROGRAM




~ Updated February 2013 ~

**CONNECTICUT DEPARTMENT OF TRANSPORTATION**
**BUREAU OF ENGINEERING AND CONSTRUCTION**
**Office of Construction - Quality Assurance Section**

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# STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:


March 7, 2013

Ms. Amy Jackson-Grove
Division Administrator
Federal Highway Administration
628-2 Hebron Avenue, Suite 303
Glastonbury, Connecticut 06033

Dear Ms. Jackson-Grove:

Subject: Value Engineering Manual Update

The Department of Transportation's (Department) Office of Quality Assurance recently completed updating the Value Engineering Program document, previously adopted in November, 2009. This update reflects changes outlined in 23 CFR Part 627 and MAP-21. The document also now includes guidance from other Federal Agencies relative to Value Engineering protocols for projects receiving funds under their programs. This update was developed in consultation with Mr. Timothy Snyder of your staff.

The Department endorses this document for the management of our Value Engineering program and requests your concurrence. Please indicate your approval on the line below and return to the Department. If you have any questions, please contact the Department's Value Engineering Coordinator, Mary Baier at 860-594-3256. Please indicate your approval on the signature line below and return to Ms. Baier.

Very truly yours,

Thomas A. Harley
Bureau Chief
Bureau of Engineering and Construction

Enclosure
cc: Timothy Snyder - FHWA

FHWA Approval: _____ 3/26/13

for Amy Jackson-Grove
Division Administrator — Date

# Introduction

Value Engineering (VE) is a systematic process using a team from a variety of disciplines to improve the value of a project through the analysis of its functions. The functional values of Transportation projects are usually determined through initial planning and scoping process leaving the improved value of a project to be realized through the VE process. The VE process incorporates, to the extent possible, the values of design, construction, maintenance, contractors, state, local and federal approval agencies, other stakeholders, and the public.

The US Department of Transportation (USDOT) directs all administrations within USDOT to establish and assign responsibilities for the use of VE within its direct construction and grant programs. The Connecticut Department of Transportation (CTDOT) receives federal aid or grants for projects from agencies under USDOT which have the following criteria:

| | |
|---|---|
| Federal Highway Administration (FHWA) | Highway projects on the NHS of $50 million or more<br>Bridge projects on the NHS of $40 million or more<br>Major projects on or off the NHS of $500 million or more |
| Federal Transit Administration (FTA) | Major Projects - FTA requires VE on major capital projects, and encourages the application of VE techniques to all construction projects. A major capital project is usually identified during the grant review process. This may include bus maintenance and storage facilities over $2 Million. |
| Federal Railroad Administration (FRA) | Construction projects of sufficient size to offer reasonable opportunities for cost reductions |
| Federal Aviation Administration (FAA) | Unusually large and/or complex projects are possible candidates for VE analysis. |

Projects meeting the selection criteria as stated above must have a documented VE analysis performed in a timely manner. Failure to conduct a required VE analysis as stipulated by federal requirements may result in delays in authorization of construction funds and could also jeopardize the eligibility of the entire project for federal reimbursement.

CTDOT will communicate with the appropriate Federal funding agency to identify and implement VE analyses on additional projects with characteristics or factors that may offer significant value. Factors may include more than one alternative, complexity, fast track scheduling, controversial components, innovation, traffic impacts or scope creep.

Design project characteristics or factors may include but not be limited to cost effective and efficient modes of transportation, material availability, constructability and mitigation of environmental issues.

The oversight of the Value Engineering program is administered by the Office of Construction - Quality Assurance Section (OOC/QA). The Supervising Engineer for the Quality Assurance Section is designated at the Department's Value Engineering Program Coordinator. The VE Program Coordinator is responsible for monitoring, assessing and reporting on the various projects in conjunction with the Design Project Manager for which VE Analyses are planned and/or conducted.

This document will serve as a guideline to maintain the Value Engineering Program within the CTDOT. As such, the document itself will be subject to revision and maintenance as needed. Any modifications/updates to this document should be coordinated by the VE Program Coordinator in

cooperation with the various Design Project Managers. This update incorporates the 23 CFR Part 627 Final Rulemaking on Value Engineering for the FHWA, effective April 16, 2012, and 2012 MAP-21 Authorization Law, effective October 1, 2012. And the document now includes guidance from other Federal agencies, including 49 CFR Part 633 pertaining to FRA and Advisory Circular No. 150/5300-15A pertaining to FAA. The update also addresses administrative changes and additions made by the Department.

## Value Engineering Program Overview

The OOC/QA Section will administer a Value Engineering Program wherein certain projects in design will be systematically reviewed for potential value and quality improvements. A Value Engineering Team will meet for a period ranging from one day to one week and present their recommendations to the Department's designer(s) for evaluation and, if acceptable, implementation.

The VE analysis will have the following objectives:

- Increase value
- Maintain function
- Minimize life cycle costs
- Encourage innovation
- Highlight potential cost reduction on transportation improvement projects
- Produce a higher quality, more efficient transportation project

## Project Selection

Value Engineering analyses may be warranted at the planning and design stages of the project. This may be first evident at Project Scoping when the Department's design team estimates that the preliminary total project costs, including Environmental studies, Preliminary Engineering, Final Design, ROW, Utilities, and Construction costs of the project, will exceed the identified cost criteria (see below). At any time prior to final processing (FDP) that the total project costs are estimated to exceed the identified cost criteria, the Design Project Manager is to notify OOC/QA that a VE analysis should be implemented. (See Appendix D for a copy of the VE Analysis Request Form.)

**The minimum criteria for a VE analysis are as follows:**

**FHWA:**

Federal-aid highway projects on the NHS: **$50 Million or more** estimated total project cost
Federal-aid bridge projects on the NHS: **$40 Million or more** estimated total project cost
Federal-aid projects not on the NHS: **$500 Million or more** estimated total project cost

When deciding whether to conduct a VE Analysis, the designers should consider the complexity of the project including whether the project contains critical constraints, difficult technical issues, expensive or unique solutions, external influences, or complicated functional requirements. The types of projects that usually provide the highest potential for value improvements are:

- Projects with alternate solutions which vary the scope and cost
- New alignment or by-pass sections
- Widening existing highways for capacity improvements
- Major structures

- Interchanges on multi-lane facilities
- Projects with extensive or expensive environmental or geotechnical requirements
- Difficult materials requirements or inferior material sources
- Major reconstruction of existing highways
- Projects with major traffic control
- Projects with multiple stages

**FTA:**

It is recommended that **the Design Project Manager overseeing FTA funded projects coordinate with the FTA Liaison** during the Selection Phase **for a major capital project.** The objective of this phase is to select the project to be studied and assemble the VE team. Some projects involve large sums of money but are relatively straight forward with little opportunity for alternatives. Other projects may involve expensive environmental commitments that may preclude value engineering judgments. Therefore open communication between the Project Manager and the FTA Liaison is extremely important during the Selection Phase.

**Major capital project** is defined as:

A project under FTA based on criteria defined in 49 CFR, Part 633, as follows:

1) Involves the construction of a new fixed guideway or extension of an existing fixed guideway;

2) Involves the rehabilitation or modernization of an existing fixed guideway with a total project cost in excess of $100 million; or

3) The Administrator determines is a major capital project because the project management oversight program will benefit specifically the agency or the recipient. Typically, this means a project that:

   i) Generally is expected to have a total project cost in excess of $100 million or more to construct;

   ii) Is not exclusively for the routine acquisition, maintenance, or rehabilitation of vehicles or other rolling stock;

   iii) Involves new technology;

   iv) Is of a unique nature for the recipient; or

   v) Involves a recipient whose past experience indicates to the agency the appropriateness of the extension of this program.

Other FTA Projects: Grantees are encouraged to conduct VE on all construction projects including bus maintenance and storage facilities whose costs are estimated to exceed $2 million, and on revenue railcar acquisition and rehabilitation

**FAA:**

**Airport Improvement Program grant funded projects or those receiving revenue from the Passenger Facility Charge Program are VE candidates, as are unusually large and/or complex FRA projects of sufficient size to offer reasonable opportunities for cost reduction.**

**Selected FAA projects might include one or more of the following features:**

- Terminal buildings
- Security systems with many interactive devices and redundancies
- Bridges
- Large-scale paving projects and/or those with complex drainage patterns and structures
- Foundation or embankment conditions requiring preconsolidation
- Large retaining walls
- Installation of lighting and navigational aid (NAVAID) systems

Airport paving projects may or may not benefit from VE analysis, depending on the complexity of the project. There is a point of diminishing returns that will be reached when the cost to perform a VE study exceeds the overall life cycle cost savings. It is imperative the project characteristics that would require a VE study be determined at the outset. VE studies should only be undertaken when there is a good possibility of obtaining substantial life cycle savings or improved design.

**For all types of funding,** it is important to note, Design Project Managers play a major role in identifying candidate projects for VE analyses, and are ultimately responsible for ensuring that any VE analysis is conducted as required. Whenever a VE analysis is required, the project's budget and schedule should be adjusted by the Design Project Manager to reflect the additional resources necessary to complete the analysis.

OOC/QA personnel will track and monitor all potential projects due for VE analyses using a variety of tools including the Department's "Working Schedule of Federal-Aid Obligations" compiled by the Office of Capital Services and the plan review process. OOC/QA maintains a list of potential projects meeting the criteria for Value Engineering analyses, adding or removing projects as estimates go through refinements.

OOC/QA shall ensure that a listing of all federally funded highway or bridge projects planned for VE analyses is forwarded to FHWA, as requested, on a semi-annual basis (1st of January and July).

## VE Analysis Levels

A systematic and structured action plan is required for conducting and documenting the results of a quality VE Analysis. To accomplish this, the Department has established two (2) levels of Value Engineering analyses: **Level A** and **Level B**. Through the implementation of these two (2) Levels, the Department is able to reduce the costs of conducting the VE analyses on certain project by crafting a VE analysis that is proportional to the complexity of the project. The level of VE analysis will be chosen by the VE Program Coordinator, in coordination with the Design Project Manager, based on the scope and complexity of the individual project to be analyzed.

The **Level A VE Analysis** is the most comprehensive type of VE analysis and should be considered for complex projects, new construction, capacity improvements, and major reconstruction. This level will typically be led by task-based VE consultant engineers with particular expertise relating to the type of project under analysis. A Level A VE Analysis will generally require one week to complete the Information Phase thru Presentation Phase efforts as detailed later in this document.

The **Level B VE Analysis** is intended to be conducted on "maintenance" type projects (i.e., pavement preservation and guiderail upgrade projects) and replaced-in-kind work where no additional capacity is gained. These projects typically include fewer work items/operations but the work is more repetitive in nature and applied over a longer length of roadway. For these projects, the Department has found that the Level B VE analysis provides a more economical approach to conducting the required VE analysis while still obtaining the benefits of the multi-disciplined analysis. A Level B analysis will typically be completed by in-house staff and will require a period of 1-2 days to complete the Information Phase thru Presentation Phase efforts as detailed later in this document.

Later sections of this document contain more specific information about the personnel and procedures to be utilized in Level A versus Level B analyses.

## Timing

The timing of when to conduct the VE analysis is important. Per federal regulations, a required VE analysis must be completed and all approved recommendations incorporated prior to completing the final design. The Department has completed VE analyses at various times in the project schedule. Many projects have gone all the way to final design before a VE analysis is done. When a VE analysis is done at that late of a stage, it is costly and difficult to implement any recommendations from the VE analysis. VE is considered more effective and influential on performance, quality, and cost of a project when done relatively early in the project schedule.

The Department's policy is to conduct a required VE analysis on a project when the 30% plans (Preliminary Design) are available. Due to the potential for the VE analysis to recommend significant changes to the project's design, the VE analysis and the Final VE Report should be completed prior to the Department's formal Design Approval.

## Analysis Team

The Value Engineering Analysis Team, either Level A or Level B, must be totally independent of the design team and will typically consist of a Team Leader and five to seven other members with expertise in various specialties related to the project. OOC/QA will coordinate with the Design Project Manager to determine the engineering disciplines that should be represented on the VE Analysis Team. When necessary or appropriate the OOC/QA may also utilize a consultant engineering firm specifically contracted by the Department for VE services to assemble the Team. For each VE effort initiated, OOC/QA shall ensure the Federal funding agency is offered the opportunity to attend and participate.

To ensure a productive and focused VE effort, the Team Leader should be a Certified Value Specialist (CVS), certified by SAVE International, or a Professional Engineer registered in the State of Connecticut, with a minimum of ten years of experience and appropriately trained in leading Value Engineering analyses. For a Level A analysis the Team Leader should be a CVS who has experience with VE analyses. Level B analyses can be led by either a CVS or a CT registered Professional Engineer trained in leading Value Engineering analyses.

The other team members shall have diverse areas of expertise with concentration on the major challenges/problem areas anticipated within the project (traffic, structures, soils, paving, etc.) and

general knowledge in design, construction, rights-of-way, maintenance and/or traffic operations. Level A team members will typically be staff from a consultant engineer firm specifically contracted by the Department to conduct VE services. Level B team members may be in-house or VE consultant engineers or a combination of the two. Due to the unique and multidisciplined approach of the VE process, the Department recognizes the inherent benefits achieved by having in-house engineering staff participate on a VE Team. Through their roles on the VE team, participants are able to expand their knowledge base of other units' operations and their areas of concern. Based on these benefits the Department encourages the use of in-house staff on VE Teams whenever feasible and appropriate.

The project designers (Department and/or consultant), will also participate in the VE as required to provide plans, special provisions and estimates, as well as to present the project overview and/or conduct project site field reviews. The project designers will be expected to attend the initial session (Information Phase) and final session (Presentation Phase). The designers will also be expected to be available, throughout the time the VE Team is meeting, by telephone, email or in person to answer specific design questions.

The OOC/QA Section will coordinate the activities of the VE analysis team, including providing manuals and reference materials, providing access to a conference room with any needed electronic equipment, arranging for site visits and any other materials that may be considered necessary. OOC/QA will be responsible for scheduling the location(s) and necessary personnel, both Department and Consultant, to conduct the VE analysis. Level B analyses will most likely occur at the DOT Newington Headquarters building. Some Level A analyses may be held at a consulting engineer's office within the state.

A Value Engineering Analysis Requirements Checklist is included in Appendix A.

## Suggested Analysis Procedures

## A: VE Job Plan FHWA

1. **Selection Phase:** The VE Analysis Team will use the following VE Job Plan to complete the VE analysis. Due to the limited resources available for the Level B type studies, many of the phases within the VE Job Plan must be completed in a short period of time. The VE Analysis Team, and supporting personnel, must stay focused on each task, utilize technologies available to streamline data collection, and rely upon the VE Team Leader to move effectively through each phase in a timely manner. Specific opportunities for streamlining the Level B VE analysis are presented below.

2. **Information Phase:** Gather project information including project commitments and constraints. Includes presentation by design team. Consideration of the overall project intent, its location, existing conditions, scope of improvements, project purpose and need statements, etc. Begin to understand the design philosophy used.

    - For Level A – This phase includes a site visit to project site
    - For Level B – Instead of site visit, VE Team can use Google Maps, Department's Digital Highway, and other electronic media to review the location/existing conditions.

3. **Function Analysis Phase:** Analyze the project to understand the required functions. Investigate the background information, technical input, reports (such as traffic, soils, hydraulic, environmental, accidents) and field data, function analysis, team focus, and objectives.

4. **Creative Phase:** Generate ideas on ways to accomplish the required functions which improve the project's performance, enhance its quality, and lower project costs. Be creative and brainstorm alternative proposals and solutions.

   - **For Level B** – This phase can occur rapidly with minimal discussion of each idea.

5. **Evaluation Phase:** Evaluate and select feasible ideas for development.

   - **For Level A -** Consideration of life cycle costs, detailed analysis of alternates, and documentation of logic should be comprehensive.
   - **For Level B** – Brief discussions of pros and cons of various alternates can be used to select feasible ideas.

6. **Development Phase:** Develop the selected alternatives into fully supported recommendations. Includes development of technical and economic supporting documentation.

   - **For Level B** – Documentation can be simplified to capture effectiveness of ideas for implementation and costs associated with them. Break-up team into small teams or individuals to develop support documentation.

7. **Presentation Phase:** Present the VE recommendations to the project stakeholders.

   - **For Level A –** This phase can include a PowerPoint presentation and/or oral presentation. All the recommendations, along with documentation of the entire VE analysis process, shall also be presented in a comprehensive written report following the completion of the analysis.
   - **For Level B –** This phase can be limited to an informal oral presentation to the design team of the developed recommended ideas.

8. **Resolution Phase:** Evaluate, resolve, document and implement all approved recommendations. The draft report should be submitted within two weeks of the VE Presentation Phase for a Level A analysis and about 2-3 days for a Level B analysis.

## B: VE Job Plan FAA

1. **Selection Phase**. The objective of this phase is to select the project to be studied and assemble the VE team. This phase is one of the most difficult aspects of VE. Not every project requires a VE study. Some projects involve large sums of money but are relatively straight forward with little opportunity for alternatives. Other projects may involve expensive environmental commitments that may preclude value engineering judgments.

   Unusually large and/or complex projects are possible candidates for VE analysis. Complex projects might include one or more of the following features:

   - Terminal buildings
   - Security systems with many interactive devices and redundancies
   - Bridges
   - Large-scale paving projects and/or those with complex drainage patterns and structures
   - Foundation or embankment conditions requiring preconsolidation

- Large retaining walls
- Installation of lighting and navigational aid (NAVAID) systems

Airport paving projects may or may not benefit from VE analysis, depending on the complexity of the project. There is a point of diminishing returns that will be reached when the cost to perform a VE study exceeds the overall life cycle cost savings. It is imperative the project characteristics that would require a VE study be determined at the outset. VE studies should only be undertaken when there is a good possibility of obtaining substantial life cycle savings or improved design.

- Project Selection. In the selection of the project to be studied consideration should be given to the size of the project, the amount of life cycle savings feasible, and the cost of the study. Commonly, the most cost-effective application of VE is against the highest cost components of a facility or project. Typically, VE programs set a minimum target of 3 to 5 percent and often more for savings over the cost of the study. The decision to use VE, and its application to a specific project, should be discussed at the predesign conference.

- VE Team. A team consisting of five to seven persons usually produces the best results. The team should be structured so there is appropriate expertise to evaluate the major problem areas anticipated within the project, e.g., building components, lighting, foundations, soils, drainage, environment, etc.

2. **Information Phase**. The objectives of this phase are to gather pertinent information, analyze function and cost, and identify greatest opportunities for life cycle savings. This approach breaks down the item to its fundamental functions or purpose, such as what is it, what does it do, and how much does it cost? Data such as that relating to design criteria, plans and specifications, design restrictions, codes, standards, quantities, operations, and maintenance should be assembled. These are needed to familiarize the team on the project scope, to establish constraints for function and cost evaluation, and to isolate the items of major costs.

3. **Speculation Phase**. The objective of this phase is to identify the maximum number of alternatives that will perform the intended function. This is sometimes referred to as the "brainstorming phase." This phase identifies alternatives for evaluation, development, and refinement. It asks the question, "what else will do the job and how much does it cost?"

4. **Evaluation Phase**. The objective of this phase is to evaluate the suggested alternatives, eliminate unsuitable ideas, and select the most promising alternatives. This is a key element of the process—the determination of those ideas that will provide the required function(s) with the mandatory degree of reliability, safety, impact on operations, and other design criteria. Here the question of will it work is asked, and the total costs are compared along with intangible factors.

5. **Development Phase**. The objective of this phase is to develop specific details about each promising alternative and prepare recommendations. A fully developed alternate is often called a value engineering proposal (VEP).

6. **Recommendation and Approval Phase**. The objectives of this phase are to recommend VEPs developed in the study and to obtain the approval of the sponsor for their inclusion in the final design. Prior to presenting the VEPs to the sponsor, the VE team must make recommendations to the original design team or the project management team. Recommendations should include the

following: results of the function analysis, technical and cost data supporting the alternatives, problems and costs of implementation, and estimated life cycle savings. At this point, the most logical and feasible alternatives are selected by mutual agreement between the original design team and the VE team. The agreed upon alternatives are then recommended to the sponsor for final approval.

7. **Implementation Phase**. The objective of this phase is to put the accepted recommendations into practice. After the VEP has been approved by the sponsor, it is incorporated into the final design and construction schedule. The responsibility to incorporate and implement the change rests with the design team or the project management team. Action should be taken to ensure it is fully coordinated and applied.

8. **Audit Phase**. The objective of this phase is to ensure the desired results have been attained, documented, and reported. The results of the VE effort should be incorporated in the engineers' report showing what VEPs were adopted and the life cycle savings associated with each VEP. The content and format of the Value Engineering Report will be in accordance with FAA guidance. The report should be sent to the local FAA Airports District or Regional Office.

## Draft and Final Report

To initiate the Resolution or Audit Phase, the VE Analysis Team will prepare and submit to OOC/QA a draft written report summarizing all the developed recommendations along with all the supporting documentation utilized to support these recommendations. The draft written report can be 'rough,' sometimes including handwritten notes, etc.

OOC/QA will distribute the draft report to the Design Project Manager for their review of the recommendations and for further distribution as appropriate for the project. The reviewers will include, but not be limited to, the project's designers, DOT personnel from Consultant Design, Hydraulics and Drainage, Soils and Foundations, Environmental Planning, Traffic, Construction, Maintenance and the Federal funding agency. The Design Project Manager shall ensure each recommendation receives an objective review and the length of time for the review may vary depending on project complexity, but should be limited to one month. There may be some discussion between the reviewers and the VE team to resolve any issues that arise regarding the recommendations. The various reviewers will submit their comments concerning implementation or rejection of the individual VE analysis recommendations to the Design Project Manager, similar to a plan review process.

Ultimately the Design Project Manager, in consultation with the various Department Units/Sections involved with the project, will determine which VE recommendations will be developed into the project, as well as documenting the rationale for not progressing the other VE recommendations. Due to the potential for significant cost savings and improvements to existing design/construction practices, VE recommendations should be thoroughly considered for acceptance, even when the recommendations are considered to be outside normal CTDOT practices.

The Resolution Phase concludes when the Design Project Manager submits a Memorandum to OOC/QA summarizing their rationale for accepting or rejecting each individual recommendation. The Design Project Manager shall be responsible for implementing all accepted recommendations into the projects contract documents as appropriate.

OOC/QA will then compile the draft written report with the Design Project Manager's summary Memorandum to create the Final Value Engineering Report. The Final VE Report will be forwarded by OOC/QA to the appropriate Federal agency and the design team and the project records.

OOC/QA notifies the Federal agency by letter (See Appendix B for sample letter to FHWA) outlining all the VE recommendations, and detailing the approved VE recommendations which will be incorporated into the design of the project, and the estimated cost savings from the approved recommendations. The recommendations which have been rejected must also be justified in the letter. The Department shall document the date of the letter and reference the VE analysis completion when transmitting the PS&E document for approval.

The Office of Construction - Quality Assurance Section will review subsequent project plans to verify inclusion of approved recommendations and to track information for the Annual Report to the FHWA.

## VE During Construction

The Department has a Value Engineering provision within Division I of its *Standard Specifications for Roads, Bridges and Incidental Construction* (Form 816) wherein a Contractor may propose changes to a project of any size for potential cost savings. Article 1.09.02 outlines the steps necessary for a Value Engineering Change Proposal (VECP) to be approved by the Department. Generally, the process is carried out by the Office of Construction with input from the project Designer(s). (See Appendix E for a copy of the VECP Request Form and checklist.)

The Office of Construction - Quality Assurance Section maintains a database where VECP's are tracked for future reference, Lessons Learned information and for inclusion in the yearly report to the FHWA.

## Program Monitoring and Reporting

OOC/QA prepares the Annual Report to FHWA outlining the numbers of projects that have undergone Value Engineering analyses and Value Engineering Change Proposals. The format changes from year to year but generally requests the information outlined in Appendix C. The Office of Construction - Quality Assurance Section shall be responsible for all VE data management, including the annual FHWA reporting form.

Beyond the necessary reporting, the information obtained from the various VE analyses helps all involved to think about alternative ways to look at problem solving and design methods. The knowledge and experience of the Department's various engineering disciplines has been, and will continue to be, a great resource to be tapped for Value Engineering. Additionally, the cooperative spirit and contacts made between units will continue to reap rewards in all Department endeavors.

# Appendix A: VE Analysis Requirements Checklist

**Project-Related Input* (Analysis Package)**

- Design File
- Quantities
- Estimates
- Right of Way Plans
- Geotechnical Reports
- Plan Sheets
- Environmental Documents
- Cross Sections and Profiles
- Land Use, Contour and/or Quadrant Maps
- Accident Data
- Traffic Data
- Large-Scale Aerial Photographs
- Vicinity Map
- Hydraulic Report
- Aerial Photos
- Existing As-Built Plans

**Analysis-Related Facilities and Equipment**

- Room with a large table and adequate space for the team
- Telephone
- Network computer access (if available)
- Vehicle or vehicles with adequate seating to transport the VE team for a site visit**
- Easel(s) and easel paper pads
- Marking pens
- Computer projector
- Masking and clear tape
- Design Manual
- AASHTO Design Book
- Standard Plan Sheets
- Standard and Supplemental Specifications
- MP Log
- Bridge List
- Scales, straight edges and curves
- Field Tables
- Calculators
- Power strip(s) and extension cords

* Not all information listed may be available to the team, depending on the stage of the project.
** If a site visit is not possible, provide video of the project, access to Google Maps and/or e-Highway.

# Appendix B: Sample Letter to FHWA

Date_____

Division Administrator
Federal Highway Administration
628-2 Hebron Avenue, Suite 303
Glastonbury, Connecticut 06033

Dear_____:

Subject: Value Engineering Analysis
State Project No. _____
FAP No. _____
Description_____
Town(s) _____

Enclosed is a copy of the Value Engineering (VE) Report, together with a copy of the responses to the VE proposals, for the subject project. These documents are the culmination of the VE workshop conducted _____ through _____.

Three (3) recommendations were generated by the VE Team and further developed into proposals. The advantages, disadvantages, and cost savings of each proposal were evaluated, as follows.

| VE Proposal Number | VE Proposal | Estimated Savings | Comments |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Of the three (3) proposals, the following one (1) proposal will be incorporated into the final contract documents:

- _____

The potential cost savings of implementing this proposal is estimated to be $ .

If you have any questions concerning this material, please contact _____ at 860-594-____.

Very truly yours,

Signature
Title
Office of Construction
Quality Assurance Section

Enclosures

# Appendix C: FHWA Annual Report Information

Part 1 - ConnDOT's Value Engineering Program

VE Policy documented and adopted
VE Coordinator: Office of Construction - Quality Assurance Section
Reporting conducted includes semi-annual spreadsheet sent to District FHWA contact
Tracking and monitoring by OOC/QA
Link to related web site:
www.ct.gov/dot/lib/dot/documents/dconstruction/qa/ve_manual_nov_12.pdf
Practices include OOC/QA sign off on Stewardship checklist and periodic monitoring of the Funding Obligation List for projects meeting monetary criteria for VE analysis
VE Change Proposals described in Standard Specification Section 1.09.02
Training method used was NHI VE Workshop (most recently conducted September 2009)

Part 2 - Summary of VE Analyses

Total number of VE Analyses completed in last fiscal year, In-House / Consultant (note: fiscal year is October 1 to September 30)
Number of Analyses anticipated for next fiscal year (In-House / Consultant)
Estimated costs for conducting VE analyses in last fiscal year
Estimated costs of the projects studied
Total number of recommendations proposed by VE analyses and estimated value
Number of recommendations approved and estimated value
Total number of VECP's submitted in last fiscal year and total value
Number of VECP's approved and total value

Part 3 - Benefits of VE Analyses and VE Change Proposals

Tabulation of approved VE recommendations and VECP's according to functional benefit
Categories include Safety, Operations, Environment, Construction and Other

## Appendix D - VE Request Form

# Value Engineering Request

## Submit To The CT DOT Value Engineering Coordinator

Date of Request: _____

Name of Person Requesting: _____ Phone No. _____

Project No. (s): _____Town (s) _____District (s)_____

VE Study Requested by?

☐ **Design** or ☐ **FHWA** ☐ **FRA** ☐ **FTA** ☐ **FAA** **% Design Complete: _____**

Project designed by: ☐ State ☐ Consultant (Company name)_____

Design contact person: _____ Phone No. _____

Project Description:

_____
_____
_____
_____
_____
_____

**Type of Project**: (Please check all that apply)

☐ Highway Construction ☐ Bridge Construction ☐ Drainage Construction

☐ Vertical Construction ☐ Paving Preservation ☐ Other (Various, Facility, Rail, Airport, Bus, etc.)

Projected FDP Date: _____

Total estimated cost (include all phases i.e. ROW, Const, and Design): _____

# Value Engineering Request continued

**SPECIAL EXPERIENCE –** If the VE team will be required to have additional or specialized experience in certain areas, please provide details below. This may include the need for experience in mechanical, electrical, plumbing, airports, marine, traffic and or other types of necessary special requirements, certifications' or licenses:

**Will railroad property be involved?** Yes ☐ No ☐ If yes, which RR?: _____

**Are insurance requirements greater than normal?** Yes ☐ No ☐

**If so, what are they?** _____

**Any Additional Comments**:

## Appendix E - VECP Request Form and Checklist

### CONNECTICUT DEPARTMENT OF TRANSPORTATION
### CONSTRUCTION VALUE ENGINEERING
### (VE) CONCEPTUAL PROPOSAL FORM

PROJECT:_____ DATE: _____/_____/_____

TOWN:_____, ROUTE:_____ ORIGINAL BID COST:_____

CONTRACTOR: _____BY:_____ PHONE: (___)- ____-____

1. DESCRIPTION OF EXISTING REQUIREMENTS AND PROPOSED CHANGE(S), ADVANTAGES/ DISADVANATAGES.

2. ESTIMATE OF REDUCTION IN CONSTRUCTION COSTS.

3. PREDICTION OF ANY EFFECTS THE PROPSED CHANGE(S) WILL HAVE ON OTHER DEPARTMENT COSTS, SUCH AS MAINTENANCE AND OPERATIONS.

4. EFFECTS WHICH CANNOT BE READILY DETERMINED BY COSTS (TIME, LENGTH OF DETOUR, ETC.)

5. ANTICIPATED DATE FOR SUBMITTAL OF DETAILED CHANGE(S) OF REQUIRED ITEMS.

6. DEADLINE FOR ISSUING A CHANGE ORDER TO OBTAIN MAXIMUM COST REDUCTION, NOTING THE EFFECT ON CONTRACT COMPLETION TIME OR DELIVERY SCHEDULE.

7. DATES OF ANY PREVIOUS OR CONCURRENT SUBMISSIONS OF THE SAME PROPOSAL.

Checklist Attached. _____
ADDITIONAL COMMENTS:

******FOR CONSTRUCTION ADMINISTRATION USE ONLY BELOW THIS LINE******

**The VE package is complete and conforms to the VE specifications of the Standard Specifications Form _____ Supplement Dated _____.**

Comments:

Submitted By: _____
PROJECT ENGINEER DATE

.....

☐ **APPROVAL- The VE proposal has been reviewed and is approved as noted.**

Recommended By: _____
DISTRICT ENGINEER DATE

Approved By: _____
CONSTRUCTION ADMINISTRATOR DATE

___Full Oversight project- Requires review and approval by Federal Highway Administration (FHWA).

Concurrence By: _____
FEDERAL HIGHWAY ADMINISTRATION DATE

☐ **REJECTION: The VE proposal has been rejected for the following reason(s).**

Comments**:**

By: _____ _____
Name / Title DATE

cc: Construction Administrator – Const. Division Chief
District Engineer - Asst. District Engineer
Office of Quality Assurance - CRU
Project Designer
Project Engineer

## Value Engineering Change Proposal Checklist

Date: _____

Project # _____ Description: _____

Contractor: _____ NTP: _____

Date VECP Received: _____ By: _____
Chief Inspector or Project Engineer (circle one)

Brief Description of VECP: _____

Has the contractor provided:

____ A statement that the proposal is submitted as a Value Engineering Proposal?

____ A description of the difference between the existing contract requirements and the proposed change?

____ A comparative of the advantages and disadvantages, including considerations of service life, economy of operations, ease of maintenance, desired appearance and safety?

____ When an item's function or characteristics are being altered, a justification of the effect of the change on the end item's performance must be included.

____ A life cycle cost analysis must be included for items involving alteration of function characteristics. Factors for future worth will be provided by the Department.

____ A complete set of plans and specifications sealed by a licensed Professional Engineer in the State of Connecticut showing the proposed revisions, if applicable.

___ The proposal incorporates the same design criteria and restrictions relative to the original contract features and requirements.

____ The revisions are in the department's change order format consisting of reproducible or pdf format plans, quantity increases and decreases by item number with associated cost, new items with estimated quantity and proposed unit cost, and specifications in contract format.

____ A complete analysis of the cost effects of the proposed changes on operations, maintenance, durability, and other considerations as appropriate.

____ A statement of the time in which the proposal must be executed so as to obtain the maximum cost reduction. This date must be selected to allow the Department ample time for review and processing.

____ A statement as to the effect the proposal will have on the time for completion of the contract.

The District has reviewed and complied with the following:

____ Proposal applies only to the ongoing contract.

____ Proposal provides savings of more than $200,000 and involves no increase in calendar days. (Math has been checked by Inspection Staff?)

____ Immediate notification to the Office of Construction when the potential for R.O.W. impacts exist.