The Value Engineering Program (VEP)

The purpose of the VEP is to meet the expectations set forth by the Code of Federal Regulations (CFR) Title 23, Chapter 1, Part 627. The CFR requires State Transportation Agencies (STA) to utilize a "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." The Value Engineering (VE) process is completed during the design phase with experts looking specifically at ways to add value to the design. In addition, the VEP is dedicated to upholding the NCDOT policy to design, construct, and maintain the State Highway System in the most cost-effective and efficient manner possible. The VEP is the responsibility of the NCDOT Value Management Office (VMO) currently.

The Value Engineering Program Website is located here: https://connect.ncdot.gov/projects/Value-Management/Value-Engineering-Program/Pages/default.aspx

I. Personnel

The following Value Management (VM) Program Engineer is principle on this program:

Lead	**Andrew Folz**	**afolz@ncdot.gov**	**919-707-6683**

II. Process

A. Potential Project List Development

To determine which VE studies should be completed during the upcoming Federal Fiscal Year (FFY), the VM Program Engineer develops a potential project list based on projects in the Statewide Transportation Improvement Program (STIP) that will be in the early phases of design during the current and following FFY. The VM Program Engineer reviews projects on the current STIP for those meeting CFR requirements for a study. The potential project list is developed based on CFR requirements for estimated cost, location, and features.

- The VM Program Engineer filters projects to determine those that meet the cost threshold of $40 Million with a structure or $50 million without a structure.
    - Cost information can be found on the STIP and verified if necessary, using SAP (NCDOT project database) or estimates on the project Connect Site.
    - Bridges or structures are determined based on the definition in 23 CFR 650.305.

- For filtered projects, the VM Program Engineer confirms whether the project is on or intersects the National Highway System (NHS) (for projects under $500M).
    - Current routes on the NHS are identified using an ArcGIS layer. The ArcGIS Layer for NHS routes in NC was developed by NCDOT GIS Unit in accordance with FHWA guidance and is updated quarterly.
    - Project documents including plans and maps are used to determine project extents.

- If the project is over $500 Million, it needs to be included even if not on the NHS.
- Design-Build Projects are not required to have a VE Study but can if recommended.
- Projects that do not meet federal requirements may also be added to the list.
    - Projects with added complexity in the design can be referred to VMO for evaluation for the potential project list. These complexities may include, but are not limited to critical constraints, complex technical issues, expensive solutions, challenging or unusual circumstances, complicated functional requirements or projects experiencing scope creep.
    - A project that would benefit from a VE Study due to complexity may be submitted by the project manager to the VM Program Engineer for review.

B. Study Timing

If the project meets the CFR requirements, the VM Program Engineer contacts the designated project manager to review the project and determine the appropriate time to schedule the VE Study. As the list of projects is determined, tentative dates for the VE Studies are selected. The date selected is based on project manager feedback and the Project development schedule and should provide time to address developed recommendations. The intent is to conduct all VE Studies prior to the project's Right-of-Way (ROW) Plan Completion Date and ideally before the 30% design development. Per the Federal Highway Administration (FHWA), VE Studies should not be completed after the 60% final design milestone.

C. The VE Study Team Selection

Based on the needs of the NCDOT and the characteristics of the project, a VE Study can be accomplished internally to the NCDOT or given to an experienced consultant for execution. External consultants are required to have the prerequisite experience and training per the CFR. Whether internal or external, the selected facilitator will gather information from the project manager and project documents. The information will include basic project background, a current cost estimate, current project location information, and other information that can be helpful in determining complexity or potential issues. Based on this information, the facilitator will determine the appropriate disciplines to include in the VE Study. Members of the VE Study team will be screened to disqualify anyone who was directly involved in the planning or design of the project.

D. Study Steps

At the VE Study, the team members will be led through the VE Study process by the facilitator. The facilitator shall ensure the study is conducted in accordance with the phases of the CFR-defined VE Job Plan. To complete the study, a report or presentation is compiled, and the developed recommendations are submitted to the project manager. The report or presentation can be developed by an external consultant. After the study, the Resolution phase is completed by VMO staff (typically the VM Program Engineer). The steps accomplished during the study include:

Information Phase: This phase includes gathering information about the project including scope, cost, and constraints. The project manager or their designated Private Engineering Firm (PEF) representatives will provide this information to the study team during this portion of the Study.

Function Analysis Phase: During this phase, the functions of the project or its elements are defined. Time is spent exploring the purpose and need of the project.

Creative Phase: This stage is a brainstorming phase to generate alternative solutions to enhance the project. It can also determine solutions to issues shared during the information phase. These proposed solutions are identified as Value Opportunities.

Evaluation Phase: The team refines and combines ideas, develops functional alternatives, and completes comparison from the ideas listed in the Creative Phase to determine which to take forward. The opportunities selected for development are now identified as Recommendations. Design suggestions can also be identified here. Design suggestions or considerations are opportunities supported by the study team where not enough information is known to determine feasibility and cost savings.

Development Phase: Based on the Evaluation Phase, the team begins to develop the recommendations carried forward. During this phase recommendations are explained in detail to include specific application, advantages to implementing, and costs or savings. The information will be documented in a way and with sufficient detail to enable the project manager to easily determine the intent.

Presentation Phase: The findings of the study are presented to project managers either in the form of a written report or visual presentation. Each recommendation is documented on individual Recommendation Forms. If a consultant is facilitating the study, the report and recommendation forms will be developed by that consultant and given to the VM Program Engineer. The report and recommendations are typically posted on the project Connect site and an email is sent to the project manager by the VM Program Engineer.

The project manager is instructed to review the report/presentation and recommendations with the appropriate project design disciplines and record any comments on the provided recommendation forms. The project manager will then evaluate each recommendation and determine if it will be Accepted, Accepted with Modifications, or Rejected. After the project manager signs off, the recommendation forms will be returned and posted onto the Project Connect site. All recommendations with an Accepted or Accepted with Modifications status are then incorporated into the project by the project manager and design team.

Resolution Phase: This last phase occurs once design plans are at 100% design. The VM Program Engineer and project manager will review the recommendations with an Accepted or Accepted with Modifications status and verify that they were incorporated into the project. The project manager and the State VM Engineer will then sign the Recommendation Form confirming the implementation.

III. Outputs

A. VE Study Report or Presentation

All VE Studies will be conducted according FHWA guidelines. The VE Study Report or presentation will adhere to the memorandum with the subject “Part 627 – Value Engineering”.

The VMO team has a goal of submitting the VE Study Report or presenting the VE Study information to project managers within 15 calendar days from the end of the VE Study. The VM Program Engineer requests receipt of the final disposition within 60 days. 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).

B. VE Annual Report

The State VM Engineer and the VM Program Engineer will be responsible for preparing the annual VE Report and providing it to FHWA upon request. This report provides a summary of the VEP during the previous FFY.

C. VE Training

The VMO provides training and outreach to consultants, study participants, and project managers for the VEP regularly. Training for study participants will ensure a diverse and experienced group that is knowledgeable about VE concepts and expectations. To reach a broader audience, training may also be recorded and distributed virtually. Training and outreach activities could include project managers or other Pre-Construction staff to familiarize the NCDOT with CFR and VEP requirements on projects.