

Nebraska Department of Roads

Roadway Design Division – Policy Letter

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Approval Date: 8/17/15 By:  _____ Construction Engineer

Approval Date: 8/21/15 By:  _____ Materials & Research Engineer

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VALUE ENGINEERING

Purpose

Federal Regulations require that State Transportation Agencies (STAs) develop a policy for governing a Value Engineering (VE) Program. The purpose of this document is to create the required policy establishing the Nebraska Department of Roads' (NDOR) Value Engineering Program. This policy provides guidance for conducting a VE analysis on applicable Federal-aid highway projects.

NDOR establishes this policy along with procedures, functions, and guidance to monitor, assess, and report on the performance of the VE program. The NDOR shall ensure that its sub-recipients conduct VE analyses as indicated in this policy.

Definitions

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

Final design. Any design activities following preliminary design and expressly includes the preparation of final construction plans and detailed specifications for the performance of construction work.

Major Project. Based on the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, signed into law on August 10, 2005, a Major Project is defined as "a project with a total estimated cost of \$500 million or more that is receiving financial assistance." The FHWA also has the discretion to designate a project with a total cost of less than \$500 million as a Major Project. The FHWA may choose to do so in situations where the projects require a substantial portion of the STA's program resources; have a high level of public or congressional interest; are unusually complex; have extraordinary implications for the national transportation system; or are likely to exceed \$500 million in total cost.

Project. The term "project" means any undertaking eligible for assistance under Title 23 of the United States Code. The limits of a project are defined as the logical termini in the

environmental document and may consist of several contracts, or phases of a project or contract, which may be implemented over several years.

Total project costs. The estimated costs of all work to be conducted on a project, including the environment, design, right-of-way, utilities and construction phases.

Value Engineering (VE) analysis. The systematic process of reviewing and assessing a project by a multidisciplinary team not directly involved in the planning and development phases of a specific project that follows the VE Job Plan and is conducted to provide recommendations for:

- Providing the needed functions, considering community and environmental commitments, safety, reliability, efficiency, and overall lifecycle cost;
- Optimizing the value and quality of the project; and
- Reducing the time to develop and deliver the project.

Value Engineering (VE) Job Plan. A systematic and structured action plan for conducting and documenting the results of the VE analysis. While each VE analysis shall address each phase in the VE Job Plan, the level of analysis conducted and effort expended for each phase may be scaled to meet the needs of each individual project.

Value Engineering Program

The NDOR hereby establishes, and through this policy, sustains a VE program under which VE analyses are identified conducted and approved VE recommendations implemented on applicable projects. NDOR has designated the Roadway Design Engineer in general and the Roadway Design Standards Engineer in particular as NDOR's VE Program Coordinator to coordinate VE program activities and functions. The VE Coordinator's responsibilities include establishing and maintaining the NDOR's VE policies and procedures; facilitating VE training; ensuring VE analyses are conducted on applicable projects; monitoring, assessing, and reporting on the VE analyses conducted and VE program; participating in periodic VE program and project reviews; submitting the required annual VE report to the FHWA; and supporting the other elements of the VE program.

Applicable Projects

A VE analysis shall be conducted prior to the completion of final design on each applicable project that utilizes Federal-aid highway funding. The applicable Assistant Roadway Design Engineer (ADE) shall notify the Roadway Design Standards Engineer when an applicable project has been identified.

Applicable projects requiring a VE analysis include the following:

- Each project located on the National Highway System (NHS) with an estimated total project cost of \$50 million or more that utilizes Federal-aid highway funding;
- Each bridge project located on the NHS with an estimated total project cost of \$40 million or more that utilizes Federal-aid highway funding;
- Any major project, located on or off of the NHS, that utilizes Federal-aid highway funding in any contract or phase comprising the major project;
- Any project where a VE analysis has not been conducted and a change is made to the project's scope or design between the final design and the construction letting which

results in an increase in the project's total cost exceeding the thresholds identified in this section; or

- Any other project FHWA determines to be appropriate that utilizes Federal-aid highway program funding.

An additional VE analysis is not required if, after conducting a VE analysis required under this part, the project is subsequently split into smaller projects in the design phase or the project is programmed to be completed by the letting of multiple construction projects. However, the NDOR may not avoid the requirement to conduct a VE analysis on an applicable project by splitting the project into smaller projects, or programming multiple design or construction projects.

NDOR may recommend a VE analyses to be conducted for projects falling below the required thresholds identified in this section where there is a high potential for the project to benefit from a VE analysis. Applicable projects may include the following:

- Complex projects on or off the NHS that have a total project cost of \$25 million or more;
- Complex Bridge Projects on or off the NHS with an estimated total project cost of \$20 million or more;
- Any other complex, difficult, or high cost project as determined by NDOR.

The ADE shall review projects where a delay occurs between when the final plans are completed and the project advances to a letting for construction to determine if a change has occurred to the project's scope, design, or estimate where a VE analysis would be required to be conducted.

Conducting the VE analysis

A VE analysis should be conducted as early as practicable in the planning or development of a project, preferably before or during the Plan-In-Hand field review. The VE analysis should be closely coordinated with other project development activities to minimize the impact approved recommendations might have on previous agency, community, or environmental commitments; the project's scope or schedule; and the use of innovative technologies, materials, methods, plans or construction provisions. At a minimum, the VE analysis shall be conducted prior to completing Final Design.

The ADE, in coordination with the VE Coordinator and the NDOR Divisions and Districts, shall put together a multidisciplinary VE team not directly involved in the planning or design of the project, with at least one individual who has training and experience with leading VE analyses. NDOR or local public agencies may employ qualified consultants to conduct a VE analysis. The consultant shall possess training and experience with leading VE analyses. A consulting firm or individual shall not be used to conduct or support a VE analysis if they have a conflict of interest. VE team members would generally include members from Roadway Design, Traffic Engineering, Environmental (PPD), Pavement Design (M&R), Central Office Construction Division, District Construction Office, Bridge Division, Federal Highway Administration (FHWA), and potentially Bridge or Roadway Design Hydraulics. VE Team members shall be selected

based on their ability to add value to the analysis. Typically, the VE Team will consist of Section heads, and other individuals with the experience and knowledge to discern practicable cost effective proposals.

The VE Analysis will result in a formal written report. The report will consist of at least the following:

- A summary of necessary project information which includes the purpose and need for the project, a project description, location map, and overview of the geographic features of the area
- Identification of the VE analysis team including members of the VE team, contributing individuals, the Standards Engineer, and the other project stakeholders.
- Background and supporting documentation, such as information obtained from other analyses conducted on the project (e.g., environmental, safety, traffic operations, and constructability); these documents may include project time allowance, accident report, pavement condition report, DR-73 Scoping Report, and project estimates.
- Document the stages of the VE Job Plan including life-cycle cost analysis, if appropriate, that were analyzed which includes and documents seven phases:
 1. *Information Phase:* The VE Team will gather project information including project commitments and constraints. This may also include a site visit, orientation meeting, and/or a presentation of the current state of design. This meeting is held prior to the start of the VE Study to acquaint the team members with the project.
 2. *Function Analysis Phase:* The VE Team will analyze the project to understand the required functions for the project. Required functions could vary based on the project, but may include the designated purpose and need for the project, NDOR goals, and project based goals.
 3. *Creative Phase:* The VE Team will generate ideas on ways to accomplish the required functions which improve the project's performance, enhance its quality, and lower project costs. Ideas generated from this phase may not qualify for future evaluation, but may provide additional insight or project enhancements to consider prior to final design.
 4. *Evaluation Phase:* The VE team will evaluate ideas from the Creative Phase and select feasible alternatives for development based on their apparent advantages and disadvantages.
 5. *Development Phase:* The VE Team will develop the feasible alternatives into fully supported proposals. These proposals are developed through technical analysis. This can be performed by functional areas of the VE team (Roadway, Earthwork, Environmental, etc.), and supported through cost-effectiveness analysis.
 6. *Presentation Phase:* The VE Team will present VE proposals to the project stakeholders. Project Stakeholders would typically include the Director, Deputy Director – Engineering, Deputy Director – Operations, District Engineer,

Roadway Design Engineer, Construction Engineer, and those Divisions or Sections affected by the VE Proposal or delivery of the project.

7. *Resolution Phase:* The project stakeholders shall evaluate all presented proposals for acceptance, rejection, or require further study by the VE Team. For proposals requiring further study, the VE Team, or other subject matter experts, shall further evaluate until the Project Stakeholders can either, approve or reject the proposal. A second VE presentation for review and to vote at the VE Final Recommendation meeting is recommended to occur at least one week after the Presentation Phase.

- Summary of the analysis conducted;
- Document the proposed recommendations and approvals received at the time the report is finalized; and

For bridge projects, in addition to the requirements above, the VE analyses shall:

- Include bridge substructure and superstructure requirements that consider alternative construction materials; and
- Be conducted based on:
 1. An engineering and economic assessment, taking into consideration acceptable designs for bridges; and
 2. An analysis of life-cycle costs and duration of project construction.

The final report will be provided to the Design Standards Engineer and the appropriate ADE, and placed in the NDOR document management database to be retained for at least three years after the project has been completed.

The ADE shall coordinate the VE analysis for applicable projects and ensure that approved practicable recommendations be included in the project's plans, specifications and estimates prior to FHWA authorizing the project for construction. Since the VE recommendations and analysis are reviewed at a cursory level during the VE study, additional study and review of the assumptions and practicability during final design may show that the approved recommendation is not practicable or prudent. If it becomes apparent that the recommendation cannot be incorporated into the project, a decision document stating the reasons why it cannot be incorporated shall be attached to the final VE study report for the subject project.

VE Change Proposal (VECP)

A VECP is a construction contract change proposal submitted by the construction contractor based on a VECP provision in the contract. These proposals may improve the project's performance, value and/or quality, lower construction costs, or shorten the delivery time, while considering their impacts on the project's overall lifecycle cost and other applicable factors.

NDOR's Standard Specifications for Highway Construction provide for the contractor to consider changes reduce the project's overall costs without adversely affecting the long term performance of the project. The basis for NDOR or a local public agency to consider a VECP is the analysis and documentation supporting the proposed benefits that would result from implementing the proposed change in the project's contract or project plans.

Proposals to accelerate construction after the award of the contract will not be considered a VECP and will not be eligible for Federal-aid highway program funding participation. Where it is necessary to accelerate construction, NDOR and local public agencies are encouraged to use the appropriate incentive or disincentive clauses so that all proposers will take this into account when preparing their bids or price proposals.

The Construction Division shall provide the Standards Engineer with the VECP's and the net savings between NDOR and the contractor.

VE for Local Public Agencies

The Local Projects Section of the Materials & Research Division shall ensure that a VE analysis has been performed on each applicable project administered by sub-recipients, and shall ensure approved recommendations are implemented into the project's plans, specifications, and estimates prior to the project being authorized for construction. The final report and VE recommendations shall be placed in the NDOR document management database sent to the Design Standards Engineer. The report shall be retained for at least three years following final completion of the project.

VE Program Reporting

The Design Standards Engineer shall monitor and assess NDOR's VE Program, and provide an annual report to the FHWA consisting of a summary of all approved recommendations implemented on applicable projects requiring a VE analysis, the accepted VECPs, and VE program functions and activities;

The Design Standards Engineer shall facilitate training for NDOR's VE program as the need arise.

References include the following

- Title 23, United States Code (U.S.C), Section 106(e)
- Moving Ahead for Progress in the 21st Century (MAP-21, Section 1503 (a)(3)
- Title 23, Code of Federal Regulations (CFR), Part 627
- Title 23 U.S.C., Section 101(a)(23)
- The Office of Management and Budget's (OMB) Value Engineering Circular A-131
- 2007 NDOR Standard Specifications for Highway Construction, Section 104.03