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Project Development Design

Value Engineering Requirements for Federal-aid Projects

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Value engineering requirements on Federal-aid projects help reduce costs and improve quality



Imagine you are back in time and responsible for designing one of the most impressive transportation engineering icons -- the Golden Gate Bridge. It is a massive and complex project, and there are teams assigned to various components and deadlines to meet. Each team is working hard to make the design decisions that will eventually be used in construction.



Let's examine this project more closely and focus on the decisions and recommendations that the design teams came up with. If you invited an independent team to evaluate those recommendations and suggest ways to improve, you stand a good chance of adding value to the project. For example, the foundations of the Golden Gate Bridge are planted deep under water in the San Francisco Bay, making them a challenge to construct. They make great candidates for this independent team to review and find better, faster or cheaper ways to build these massive foundations. This independent team is doing something called "value engineering," a process proven to produce huge benefits for projects both large and small.



The Federal-aid Highway Program has requirements for value engineering. In this short presentation we will

define what value engineering is and when it is required, explain how it works, and illustrate its benefits. Value engineering has proven to be a

sound approach that can reduce project costs, improve project quality, eliminate unnecessary design elements, foster innovation, and improve productivity. Value engineering is a process that can reap hefty benefits for your organization, customers, and stakeholders.

In general, value engineering, or VE for short, is the systematic application of recognized techniques by an independent, multi-disciplined team to identify the function of a product or service, establish a worth for that function, and generate alternatives. We'll go into details to make this easier to understand, so let's start by looking at what the value engineering study process can accomplish.

There are several objectives that the value engineering study process focuses on beyond achieving the desired level of quality at the lowest cost. The value engineering study process may also look for ways to reduce construction time or make construction easier to accomplish. This process considers all project objectives, such as safety, operational, and environmental commitments, while trying to reduce total ownership costs. Value engineering recommendations may suggest using innovative technologies that improve the finished quality and should consider long-term or life-cycle costs.

- 1 Reduce construction time
- 2 Safety
- 3 Operational and environmental commitments
- 4 Reduce total costs
- 5 Use of innovative technologies
- 6 Life-cycle costs

The value engineering study process can be broken down into four core components:

- When a value engineering study is required
- Who makes up a value engineering team
- Following a procedure called the VE Job Plan
- Reporting recommendations

Let's look at each of these in more detail. A value engineering study is required on any Federal-aid project under the following circumstances:

- The project is located on the National Highway System and has an estimated total cost of \$50 million or more.
- The project is considered a bridge project, located on or off the National Highway System, with an estimated total cost of \$40 million or more.
- The project is considered a major project, located on or off the National Highway System with a total cost of \$500 Million or more.
- A change in project scope or design after the final design and prior to letting for construction causes the project cost to exceed the \$50-million threshold for projects on the National Highway System, or \$40-million threshold for bridge projects on the National Highway System, or the \$500 – million major project threshold.
- Or any other project the Federal Highway Administration (FHWA) determines to be appropriate.

The value engineering team is comprised of:

- A multi-disciplinary group of individuals who are not directly involved in the planning or design of the project
- Someone trained and knowledgeable in value engineering techniques to serve as the facilitator and coordinator



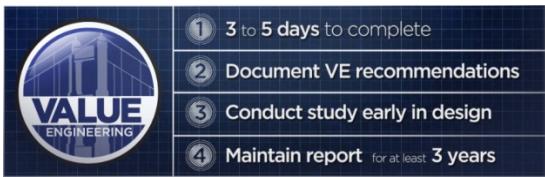
The value engineering team follows a procedure, called a Value Engineering Job Plan, which has seven phases:

- In the Information Phase, project information is gathered, including project commitments and constraints.
- The Function Analysis Phase analyzes the project to understand the required functions.
- In the Creative Phase ideas are generated on ways to accomplish the required functions, improve the project's performance, enhance its quality, and lower project costs.
- The Evaluation Phase involves evaluating and selecting feasible ideas for development.
- The Development Phase takes these selected ideas and turns them into fully supported recommendations.
- The Presentation Phase presents the value engineering recommendations to the project stakeholders.
- The Resolution Phase is when these recommendations are evaluated, approved or denied. These decisions are documented and all approved recommendations are then implemented.

The value engineering study culminates with a formal written report documenting the following:

- The analysis approach following the Value Engineering Job Plan
- The proposed recommendations and decisions made

A value engineering study normally takes three to five days to complete, depending on the project's complexity, followed by a formal report documenting the study team's recommendations. The study should be conducted as early in the design process as possible to maximize potential value engineering recommendations. Being prepared to review and then approve or reject recommendations in a timely manner will help ensure changes to the project can be quickly incorporated into the project design. Once these decisions have been made, maintain a copy of the report for at least three years after the project has been closed out.



Whether your Federal-aid project barely exceeds the monetary threshold for a value engineering study or is as large as the Golden Gate Bridge, the value engineering process can help improve quality and value.

Remember, if your agency has a Federal-aid project and a value engineering study is required, start the process early, consider the recommendations we've just outlined in this presentation, and make sure you comply with all Federal regulations.

Additional Resources

- FHWA regulation and policies on value engineering and other helpful guidance
<http://www.fhwa.dot.gov/ve/>
- FHWA's policy on value engineering
<http://www.fhwa.dot.gov/legsregs/directives/orders/13111a.htm>
- Questions and answers about FHWA's new value engineering regulation in effect since April 16, 2012
<http://www.fhwa.dot.gov/ve/finalruleqa.cfm>
- MAP-21 – Moving Ahead for Progress in the 21st Century Preconstruction Provisions Question and Answers on Value Engineering
<http://www.fhwa.dot.gov/map21/qandas/qapreconstruction.cfm>

The content of this document is not a substitute for information obtained from State departments of transportation, appropriate FHWA Division Offices, and applicable laws.

Scenarios have been simplified for emphasis and do not necessarily reflect the actual range of requirements applicable to the scenario or this topic. This document was created under contract number DTFH61-11-D-00024 by the Federal Highway Administration, U.S. Department of Transportation, and is offered to the public to heighten and focus awareness of Federal-aid requirements within the local public agencies community and reinforces the importance of these necessary policies, procedures, and practices.

This companion resource is the script content for the video production of the same name.