

# MISSOURI DEPARTMENT OF TRANSPORTATION VALUE ENGINEERING UNIT

## VALUE ENGINEERING TEAM MEMBER GUIDE\*

### INTRODUCTION

Congratulations! You've been selected to serve on a value engineering team. We are sure that you will find this experience to be both rewarding and enjoyable. It will also be hard work. You will spend several days working intensively and creatively with a group of your peers. Regardless of the results of your particular study, you will gain a better understanding of the perspectives of your teammates, and of the complexities of the subject that you are analyzing.

### PREPARATION

Value Engineering (VE) studies normally require three to five consecutive days. Make every effort to clear your calendar and delegate as needed, so that you will be able to concentrate fully on your study. This will not only enhance your experience, but will also help your teammates.

You will normally receive a brief Study Plan in advance of the study, either at the same time you receive this Guide, or soon thereafter. The Study Plan contains background, scope and logistical information about your study. Sometimes it may include one or more attachments which will provide a brief description of your study subject. Often these are excerpts from documents which will be available during the study. When reviewing these excerpts, you might want to note which documents you want to review more thoroughly during the first phase of the study.

You are encouraged to bring appropriate resources with you to the study. Please keep in mind, however, that value engineering is by design an intensive, time-constrained procedure. Therefore, bring only those resources with which you are very familiar, and can refer to quickly and accurately. Phone numbers, e-mail addresses, and websites of resources and contact persons could also be helpful. Bring your own calculator, computer, notepaper, pencils, scale, triangles, circle templates, etc.

Some things to consider regarding teams:

- A team can't necessarily be created merely by bringing 5-10 people together in the same room. You need to make it happen!
- Check your "agendas" at the door! But bring your respect for and trust of your teammates.
- Approach your study with a positive attitude!
- Teams sometimes tend to slip into "war story" sessions during a study. Up to a point, these may help with team building and provide useful information, but they also eat up a lot of valuable time!
- Avoid the situation in which everyone on a team agrees to something that no one really supports. They each assume that the others are in favor, so they go along. More typically, you may observe a similar situation in which one or two team members support an idea, and the rest who don't, go along anyway for various reasons. If you can't "buy in" to what is proposed, it is your responsibility to speak up. It is also your responsibility, of course, to help the team achieve true consensus. You may have to compromise, but don't do so until you have aired your views.
- Avoid early brainstorming! (See the discussion in The Study section below).
- Value Engineering is not about quotas, peer review, design review, etc. Your role as a team is to "search for the second right answer", not to find fault.
- Work hard and have a good time!
- Most importantly, trust in, and follow the methodology. It has been successfully used around the world for 50 years!

### **VALUE ENGINEERING TEAM LEADER**

The Value Engineering Team Leader is responsible for the overall conduct of the study.

Because of the intensive and structured nature of the value analysis, good teamwork and "group dynamics" are essential parts of a successful study. There will be plenty of opportunity for everyone to contribute during each phase, but the Team Leader may have to "move things along", or spread the conversation around, in order to be sure everyone participates and the goals of the study are met. Please give your Team Leader your maximum cooperation in this regard.

## THE STUDY

Value studies consist of six phases:

1. Investigation
2. Analysis
3. Speculation
4. Evaluation
5. Development of Recommendations
6. Presentation

The proportion of the total study time which is spent on each phase will vary, but each will be a distinct part of the total effort. New techniques may also be intermixed within these phases. These could include project performance measures- using performance criteria and a performance matrix to quantify and optimize project scope performance. Risk assessment techniques may also be utilized to identify impacts to project success or to try to determine the likelihood of a risk event occurring.

**Investigation** –This is the phase of a VE study at which time the team gathers information about the present design. The project manager, designer, and any other person who can shed light on the project should be available for questions or, in most cases, make formal presentations.

Information to be gathered in this phase may include engineering reports, design plans, estimates, alternatives, right-of-way maps, etc. All available information, including constraints and commitments, should be collected during this phase. The VE study team should become thoroughly knowledgeable about the project.

The investigation phase will include the design presentation (kickoff), document review, review of the project by field trip or videos and preparation of a cost model. The team will use various techniques such as Cost Modeling and FAST Diagramming, to select elements for function analysis.

**Analysis** – In the analysis phase, the team identifies the elements with the greatest potential for value improvement. This phase brings the three fundamental concepts of value engineering (function, cost, and worth) to bear on the problem. These concepts make the VE process different from all other management and cost-control techniques. This phase requires the team to ask and answer the following basic questions:

- What is it?
- What does it do? (what is the function?)
- What must it do? (Is its function basic?)

- What is it worth?
- What does it cost?

By the end of the analysis phase, the team has identified the high-cost elements, functionally analyzed them, and assessed their cost/worth relationships. Most, if not all VE studies will utilize a Caltans technique – Project Performance Measures (PPM). PPM will be utilized to measure and evaluate the alternates that the study may generate. Sometimes the VE team will be developing the PPM, other times the project core team will develop the PPM prior to the study. Either way, this is a decision making system that will be utilized throughout the study.

**Speculation** – The speculation phase is where the power of the VE technique manifests itself. The team applies brainstorming techniques to develop good alternatives to the proposed project design. This technique generates a large list of potential (creative) solutions to the problems identified in the investigation phase. The value study team applies creativity to function statements selected from the cost/worth estimates. The team uses the generic format of the function to speculate on all possible solutions to the problem presented in that function statement.

Rules for brainstorming include:

- Don't brainstorm until you reach this phase! If an idea pops into your head during earlier phases, write it down and bring it up later. Early discussion of solutions tends to inhibit a thorough understanding of the subject.
- When you do reach this phase - don't hold back! No idea is too wacky during brainstorming. Don't prejudge or dismiss anything. Write them all down! A way-out idea, when focused on by a team, may generate a very feasible idea.
- Don't just sit there waiting for ideas to surface. Think hard! Concentrate on the functions, not the existing solutions. Concentrate on the other ideas and try to build on them. Someone has likened this to pearl diving - the more oysters you collect, the more likely you are to find a pearl.

**Evaluation** – The evaluation phase determines the best alternatives by listing the advantages and disadvantages of each alternative. Each advantage and disadvantage is described in general terms. The team also can perform a weighted matrix analysis to determine which alternative is best, based upon the relative importance of each of the desirable criteria that must be addressed. This analysis satisfies the VE objective to achieve the best blend of performance, cost and schedule. If the disadvantages far outweigh the advantages of any alternatives, they are dropped at this point.

**Development** – Development phase involves the advancement of the team's ideas, which can be presented, and to some extent, defended. This work can include the preparation of sketches, calculations, graphics and reports, as well as making contacts to obtain further information. The team will be responsible for

determining the extent of the Development phase for your study, based on the nature of your ideas and recommendations, and on time constraints. The entire team will contribute to a written report, the report will be completed before the presentation.

**Presentation** – At the completion of a study, the VE team presents its recommendations to district management and appropriate staff, who must evaluate and implement the findings. This presentation should be brief, with time allocated for district management or staff to question the team on any concerns. The presentation and discussion period helps to establish the viability of the team’s recommendations.

A VE study report or other organized format is compiled during the VE study as a step-by-step record of the analysis. The record should be complete, clear and thorough. It serves as documentation to support the team’s recommendations, tracks the team’s deliberations and considerations, and aids in implementation of the recommendations. It also can be referenced for future VE studies on similar topics.

## **AFTER THE STUDY**

Once you complete the study your work is done! You will receive a copy of the completed report.

## **CONCLUSION**

This document is intended to assist you in preparing for your participation in a VE study. It is intentionally brief. Please contact the VE unit with any questions or suggestions for improvement.

Also, please be sure to complete the **Evaluation Form** and return it to your team leader. Your suggestions will help us to improve our Value Engineering studies. Thank you!!

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