Value Engineering Program Guide for Design and Construction

Volume 1

Internal Operations and Management

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Table of Contents

Chapter 1- General 1-1

Introduction 1-3

Background 1-4

Governing Directives 1-5

Approach 1-5

Relationship to Other Documents 1.6

Organization of this Guide 1-7

Definition and Use of Terms 1-8

Index of Acronyms 1-9

Chapter 2- Value Engineering WE) Program Intent 2-l

Philosophy and Overall Objectives 2-l

Basis of Evaluating the Program 2-5

Funding 2-7

Monitoring 2.7

Overall Constraints 2-8

Chapter 3- Program Implementation and Management ... 3-1

Project Delivery Methods 3-3

Independence of Value Engineering Consultant 3-3

Contracting Approaches 3-4

Project Selection Guidelines 3.4

Budgeting/Funding Guidelines 3-5

Management and Staffing Considerations 3-6

Reporting Requirements to Central Office 3-7

Design Stage Reject Budget Adjustments 3-1o

Disposition of Savings 3-14

Impact of Cost Estimate Revisions on A-E Design Contracts 3-l5

Chapter 4- Value Engineering Consultant Selection Guidelines 41

General Considerations 4-3

Value Engineering Team Qualifications 4-4

Support Qualifications 4-6

VE Consultant Solicitation Guidelines 4-7

Chapter 5- Value Engineering Study Requirements 5-l

Timing of Studies 5-3

Recommended Value Engineering Procedures 5-5

Coordination with Design A-E and CM 5.8

Establishing Value Objectives and Study Constraints 5-9

Implementation Strategies 5-10

Reporting and Follow Up Procedures 5-12

Study Evaluation Guidelines 5-13

Recommended Scope of Services 5-l5

Guidelines on Level of Effort 5-16

Chapter 6- Value Engineering Change Proposal (VECP) **Procedures 6-1**

Objectives 6-3

Processing Procedures 6-4

Computation Procedures 6-6

Savings Sharing Guidelines 6-7

Review and Follow Up 6-8

Chapter 7- Life Cycle Costing Guidelines. 7-1

Economic Analysis Concepts 7.3

Recommended Approaches 7-7

Technical Guidelines 7-8

Chapter 8- Other Issues 8-1

Training and Education 8-3

Impact on Criteria Review/Development 8-8

VE Study Participation by Facility Operating Personnel 8-8

Tables

5-1 Overall Recommended VE Level of Effort 5-17

5-2 Recommended Study Composition 5-18

5-3 Suggested Detailed Level of Effort 5-19

Appendices

A PBS 8050.lC Public Buildings Service Value Engineering Program A-1

B Suggested Value Engineering Procedures . . . .B-l

C Value Engineering Clauses for A-E, Construction and Design-Build Contracts C-1

D D&C VE Program Summary Report Format . . . . . .D-l

Chapter 1 General

Introduction. 1-3

Background. 1-4

Governing Directives 1-5

Approach l-5

Relationship to Other Documents 1-6

Organization of this Guide 1-7

Definition and Use of Terns l-8

Index of Acronyms 1-9

Chapter 1 General

Introduction

This document provides guidelines for establishing and managing a value engineering WE) program. It is applicable to Public Buildings Service (PBS) projects under the technical direction of the Regional Design and Construction (D&C) Divisions.

This guide is intended for use by internal staff and provides specifics on goals and objectives, implementation, management, consultant selection, contracting, technical procedures and reporting. A companion guide (Volume 2) has been prepared for use by contracting officers and professional services contractors - architects-engineers (A-Es), construction managers (CMs) and VE consultants. The companion guide is intended to be incorporated by reference in these professional services contracts and to serve as a basis of negotiating services and fees.

Past VE practices in PBS were setup under a centralized management approach with extensive involvement and participation by dedicated in-house staff. The implementing GSA Orders (PBS P8000.1A, P8020.2 and P8050.lB) were cancelled by the succeeding GSA Order, Public Buildings Service Value Engineering (VE) Programs (PBS 8050.lC). This Order (included as Appendix A) eliminated the central management of VE and requires each PBS program office to setup its own VE programs in applicable areas. By this approach, the direction and emphasis of VE can be specifically tailored to the diverse program areas in which it is to he applied.

A principal area for VE application is in design and construction - both for new facilities and for repair and alteration of existing ones. This guide instructs Regional and Central office, D&C program managers in how to “establish, implement and maintain” a VE program, as required by the GSA Order. The companion guide replaces the cancelled GSA Handbook, Architect Engineer and Construction Manager Value Management Services (PBS P8010.1).

Background

PBS started its formal VE program in 1970. In the mid 1970s, PBS adopted the term Value Management (VM) and developed and issued a body of policy and procedural guidance on VM. These documents defined a single, centrally managed program for all functional areas within PBS.

Resulting VE activity was high during the 1970's, particularly on major PBS design and construction projects. During the 1980's VE activity dropped off as emphasis on the program was reduced.

The Office of Management and Budget (OMB) has placed a renewed emphasis on the application of VE in the federal government and established new requirements. As a result, a study was undertaken by PBS to determine how best to establish and manage a VE program. This study, completed in 1991, consisted of a review of previous and existing programs in federal and private sectors and interviews with PBS personnel in the regions and at the Central Office. The primary focus of the study was on design and construction,

The final product of the study was a report outlining key features and elements of a PBS D&C VE program. This guide (and the companion Contracting Officers/Professional Services Contractors Guide) is based on the conclusions of that report.

Governing Directives

On January 26, 1988, OMB issued circular A-131 which required all agency heads to establish and/or improve their use of VE. Subsequently on December 5, 1988, GSA Order ADM 8030. 1A was issued in order to establish overall GSA-wide guidelines for VE.

On August 14, 1991, the GSA Order, Public Buildings Service Value Engineering Programs (PBS 8050.lC) was issued. This Order establishes PBS-wide general guidelines for implementing VE. These guidelines form the basis for the specific requirements of the D&C VE Programs described in this guide.

Approach

The approach to VE as outlined in this guide and as called for in PBS 8050.1C consists of the following key objectives:

(1) To help PBS live up to its responsibility to serve the public trust.

(2) To conform to the letter and the spirit of OMB Circular A-131 and GSA Order ADM 8030.lA.

(3) To not unduly impede the efficient and effective delivery of services to PBS customer agencies.

Value Engineering is defined as “an organized effort directed at analyzing the functions of systems, equipment, facilities, services and supplies for the purpose of achieving the essential functions at the lowest life cycle cost consistent with the required performance, reliability, quality and safety". Numerous other terms (value management, value analysis, etc.) are also used when referring to VE. While there are subtle differences among these terms they all refer to-generally the same process. PBS will uniformly use the term value engineering, as does this guide.

Relationship to Other Documents

The general requirement to apply VE on D&C projects is also addressed in the following GSA documents:

- The GSA Handbook, Facilities Standards for the Public Buildings Service (PQS-100).
- The GSA Order, Design and Construction Operating Principles and Procedures (PBS 3430.4).
- The GSA Handbooks, Procurement and Administration of Design and Construction, Volumes 1 and 2 (PBS P 3420.lA and PBS P 3420.2A).

If specific references or provisions within these directives are inconsistent with this guide, the guide will govern. Any inconsistencies will be corrected by future modifications of these existing directives.

The regulatory basis for the D&C VE program is the FAR - Part 48. The applicable standard clauses for the participation of A-E and construction contractors in the VECP process appear in the FAR - Part 52. Refer to Appendix C for a special deviation to the FAR standard clauses for design-build contracts. The two standard FAR clauses (A-E and construction) are also provided in Appendix C.

Organization of this Guide

This guide is divided into eight chapters. Each chapter is intended to cover individual and generally independent areas of interest. The purpose of each chapter is as follows:

(1) ***Chapter 1- General -*** Provides general and background material. Sets the context in which the D&C VE program operates.

(2) ***Chapter 2- Value Engineering Program Intent -*** Provides the overall philosophy and intent of the D&C VE program. Discusses program evaluation, funding, monitoring and constraints.

(3) ***Chapter 3- Program Implementation and Management -*** Provides specific direction for implementing and managing the D&C VE program.

(4) ***Chapter 4- Value Engineering Consultant Selection Guidelines -*** Provides guidelines to advertise for and select VE consultants.

(5) ***Chapter*** 6- ***Value Engineering Study Requirements -*** Provides specific requirements for conducting VE studies on GSA-PBS projects. This includes technical guidance, scope of services and suggested level of effort.

(6) ***Chapter 6- Value Engineering Change Proposal (VECP) Procedures -*** Provides recommended procedures for processing VECP's.

(7) ***Chapter 7- Life Cycle Costing Guidelines -*** Provides general guidelines on applying LCC techniques as part of a VE study.

(8) ***Chapter 8- Other Issues -*** Covers other issues including training and education and impact of VE on GSA-PBS criteria.

Appendices are included to supplement material presented in the chapters. Appendix Bin particular is intended to provide specific VE workshop procedures.

Definition and Use of Terms

In general, terms used throughout this guide are presented and defined within the appropriate chapter or section. However, for consistency, the following terms are used throughout the guide.

(1) Value Engineering WE) is used in lieu of all the various related terms such as Value Analysis (VA) and Value Management (VM). Further distinction of terms is not necessary.

(2) VE study refers on the overall process of applying VE on an individual project. The VE workshop refers to the specific portion of the study involving an intensive group/team effort and a specific agenda.

(3) PBS representative refers to the PBS project manager or other PBS employee in charge of the project under consideration.

(4) User agency refers to the specific agency or agencies to occupy the building being constructed or altered.

(5) VE consultant refers to the specific firm providing VE services on a projector projects.

(6) A-E refers to the architect or architect/engineering firm responsible for the design of the project under study.

(7) CM refers to the firm providing construction management services for the project under study.

(8) VEP refers to Value Engineering Proposal. VECP refers to Value Engineering Change Proposal. These terms are defined in the FAR Standard Clauses contained in Appendix C.

Index of Acronyms

A-E	Architect-Engineer
CADD	Computed Aided Design and Drawing
CBD	Commerce Business Daily
CM	Construction Manager
COTR	Contracting Officer's Technical Representative
CVS	Certified Value Specialist
D&C	Design and Construction
FAR	Federal Acquisition Regulations
FAST	Function Analysis System Technique
GSAR	General Services Administration Regulations
IQ	Indefinite Quantity
LCC	Life Cycle Cost
MEP	Mechanical-Electrical-Plumbing
OMB	Office of Management and Budget
PBS	Public Buildings Service
PM	Project Manager
R&A	Repair and Alteration
RFP	Request for Proposal
SAVE	Society of American Value Engineers
VA	Value Analysis
VE	Value Engineering
VECP	Value Engineering Change Proposal
VEP	Value Engineering Proposal
VETC	Value Engineer Team Coordinator
V M	Value Management

Chapter 2 Value Engineering Program Intent

Philosophy and Overall Objectives 2-1

Basis of Evaluating the Program 2-5

Funding 2-7

Monitoring 2-7

Overall Constraints 2-8

Chapter 2 Value Engineering Program Intent

Philosophy and Overall Objectives

The basic philosophy of the PBS D&C VE program is to enhance the value received per dollar spent over the life-cycle of constructed assets. The program is centered on several major overall objectives:

(1) The VE program is an integral part of the overall project delivery process and is not a separate entity designed to "second-guess" PBS management, the design A-E or the CM. The application of VE will be planned and scheduled on projects to promote timely, efficient and effective delivery of services to PBS customer agencies.

(2) For maximum effect without undue impact on project schedules, VE focus must begin early in the design process (at Concept Design), then continue through Tentative Design and into Construction Documents, if necessary.

(3) Primary emphasis is placed on obtaining maximum life-cycle value for first-cost dollars expended within project budgets. Improved value can be represented in a number of different ways depending upon specific project needs. This would include improved function, flexibility, expandability, maintainability and/or aesthetics, as well as reduced life-cycle cost (LCC).

(4) Secondary emphasis is placed on first-cost reductions derived from the program. First-cost reductions achieved to bring a project within approved budget are not considered nor reported as "savings". First cost savings to be reported are only those dollars withdrawn from approved budgets and reallocated to other uses, all as a result of VE. This will occur when required project functions and features can be delivered at a reduced project budget. VE is not to be applied as a simple cost cutting mechanism at the expense of required functions or features.

Philosophy and Overall Objectives (Continued)

(5) First cost budget increases will be considered when justified based on life-cycle cost reductions. This will be a priority use for funds accumulated as a result of budget revisions described above.

(6) Estimated life-cycle cost reductions will be considered and reported as savings only when supported by a full economic analysis. Acceptance and implementation of VE ideas based on projected life-cycle cost reductions are encouraged, whether or not the cost reductions meet the criteria to be counted as savings.

(7) Internal PBS VE reporting requirements are based on realistic measures of effectiveness - first and life cycle cost savings (as described above), and value improvement measured by percentage of acceptance of ideas.

(8) VE services generally will be provided by an independent consultant, with support from the design A-E, CM, PBS and the user agency.

(9) Regional emphasis will be on implementing VE studies on individual projects and reporting results achieved. The Central Office will be responsible for program level analysis and reporting of resources budgeted and return on investment.

(lo) Regions will have broad flexibility in determining the level of VE effort allocated to each project, based on a reasonable expected return on investment relative to project size, complexity and status.

(11) VE is not intended to serve as an instrument for project scope/budget reconciliation. Using VE for this purpose is discouraged, because it compromises both the integrity of VE process and the accountability of the A-E in meeting the “design to” cost limitation.

Basis of Evaluating the Program

Within PBS, the effectiveness of the D&C VE program is assessed by evaluation of several interrelated factors. These factors are explained in detail in following chapters. They fall into the following general areas:

(1) **First Cost Reduction**

These reductions are attributed to the VE program only when required project functions or features can be delivered at the reduced cost. Simple cost cutting - e.g. reducing cost at the expense of required features or functions - is not VE. VE first cost reductions are counted as VE savings to the extent that dollars are withdrawn from approved budgets based on the results of VE studies.

(2) Life Cycle Cost Reduction

LCC reductions are based on the aggregate of first cost and anticipated future cost in maintenance and operations. Techniques in LCC are presented in Chapter 7. When additional first cost is required to implement a specific VE suggestion, this can be offset by other VE suggestions which reduce initial cost. If the project budget must be increased to accommodate the additional investment, first cost savings derived from other projects may be used for this purpose after appropriate approvals. As long as they do not entail first-cost project budget increases, VE suggestions based on apparent life-cycle cost reductions may be adopted without formal LCC analysis. However, LCC reductions will be counted as VE LCC savings only when supported by sufficient economic analysis as described in Chapter 7. Further guidance on LCC analysis is provided in the PBS Facility Standards Handbook (PQS-100).

Basis of Evaluating the Program (Continued)

(3) Value Improvement

Value improvement is a subjective expression referring to a projected or apparent favorable shift in cost/worth ratio. The objective of all VE suggestions is value improvement, whether or not cost reductions are involved. VE suggestions maybe to reduce life cycle cost with no reduction or a lesser reduction in worth, to increase worth with no increase or a lesser increase in life-cycle cost, or (ideally) to increase worth and reduce cost. All VE suggestions which involve adjustments in worth should be related to specific forms of such adjustment (e.g., productivity, flexibility, expandability, aesthetics, etc.), whether or not they also involve cost adjustments.

(4) Reporting

External (to PBS) evaluation is based on semi-annual reports of VE activity, as prescribed by GSA Order ADM 8030. IA. Reporting requirements associated with both internal and external program evaluation are further discussed in Chapter 3.

Funding

All D&C services required to support PBS new construction and major repair/alterations projects are funded on a project-by-project basis. This funding includes provision for VE services described in this guide.

Production standards used to develop the D&C services funding amounts by project include the effort by professional services contractors and D&C in-house staff required to conduct and administer project VE studies under the guidelines contained in Chapter 5.

All VE activity costs on projects are to be accounted as D&C services costs against the related projects. No centralized, program-level budgeting or formal accounting for VE services costs is required.

The Central Office will develop annual program-level estimates of VE costs. Cost estimates will be abstracted from regional project workload/schedules using the VE component within the production standards described above. These costs will be compared to VE savings generated from the projects, to determine return-on-investment for the VE program. By the same methodology, the Central Office will develop estimates of D&C staff resources dedicated to VE, for use in external reporting.

On GSA-funded projects, under the D&C services budget activity (BA90), flexibility within the account will permit increases and decreases in VE services budgets when dictated by project characteristics that are out of line with the production standards. For projects with budget controlled at the total project cost level, budget breakdowns must provide funding for VE services at a level appropriate to the characteristics of the project. (See Chapter 5)

Monitoring

Each regional D&C Division Director is expected to monitor the effectiveness of regional D&C VE program activity against the general criteria presented (See Basis of Evaluating the Program). Reporting requirements to the Central Office have been kept to a minimum and are not set against any specific numeric goals.

Central Office monitoring of regional VE program implementation will be conducted on a periodic “audit” basis only and as a part of the overall regional management review process.

Overall Constraints

No specific constraints are set against the VE program except as overall funding may limit and specific procedures of this guide may apply.

1. Technical Criteria and Standards

Technical considerations should be set on a project by project basis and should not limit the reasonable application of VE. GSA and other governing criteria are considered to be open to challenge and reconsideration when significant benefits can be obtained. Applicability of criteria and requirements for justifying deviations from these criteria are generally provided in the issuing documents. Only criteria that are governed by law or by codes must be followed without exception. Cases may arise where criteria deviations appear to have wide applicability and potential benefit beyond the specific project involved in a VE study. These cases should be brought to the attention of the Central Office through the reporting process. (See Chapter 3). Criteria will be reviewed and charged when and as appropriate, in response to regional recommendations.

2. Programmatic Requirements

Concept stage VE studies may also include consideration and challenge of a project's program of requirements, if there are apparent inefficiencies in the program. The primary focus in this area should be on whether the program most efficiently accommodates the basic spatial and functional needs and desired features. With regard to program review, what is and is not VE needs to again be emphasized. Simply paring down the program to reduce cost is not VE. Restructuring the program to achieve the same basic end objectives more fully or efficiently is a legitimate and desired VE activity. Attention in this area can typically focus on support space requirements, with emphasis on redundant or otherwise unnecessary program elements.

Program revisions may require intervention by PBS management to authorize reviews and reconsideration of the program as developed.

Chapter 3 Program Implementation and Management

Project Delivery Methods 3.3

Independence of Value Engineering Consultant 3-3

Contracting Approaches. 3-4

Project Selection Guidelines. 3-4

Budgeting/Funding Guidelines 3-5

Management and Staffing Considerations. 3-6

Reporting Requirements to Central Office. 3-7

Design Stage Reject Budget Adjustments 3-10

Disposition of Savings 3-14

Impact of Cost Estimate Revisions on A-E Design Contracts 3-15

CHAPTER 3- PROGRAM IMPLEMENTATION AND MANAGEMENT

Project Selection Guidelines

VE studies of at least the minimum recommended level are to be conducted on all major GSA new construction and repair and alteration projects, unless a reasoned contrary decision is made in advance by the regional D&C Division Director and documented in the project file. For definition of a major GSA project, see the GSA Order PBS 3430.4. For major reimbursable projects, the decision on level of VE study rests with the funding agency. Client agencies should be encouraged to support VE in accordance with GSA guidelines and should be made aware of the requirements of OMB circular A-131, when applicable.

To the extent that resources are available, VE studies should be employed on selected minor projects having high potential for cost Auction and or value improvement.

Using general guidance provided herein, regional D&C staff should set the appropriate level of VE study based on the relevant characteristics of each individual project.

Note that the recommended level of effort per project is a function of size, complexity and degree of repetition. Refer to Chapter 5 for specific level of effort guidelines.

Budget/Funding Guidelines

This section provides overall program level funding guidance to assure that sufficient funds are available to support the VE program. Refer to Chapter 5 for specific level of effort guidance for projects.

VE program funding is intended to support the contract fees associated with VE consultant services, the additional fees for VE support to be provided by the A/E and CM, and the in-house D&C personnel and administrative costs. Funding is to be allocated in the same manner as any other D&C budget element.

VE program funding is included in the D&C services funding generated from the current D&C production standards (lookup tables). This funding is intended to cover both contract fees and D&C in-house costs. The allowances for contract fees in the lookup tables are based on the following recommended fee guidelines, expressed in percentage of estimated construction contract award amount (ECCA):

Project Estimated Construction Contract Award Amount		VE Consultant (Percent)	A/E (Percent)	CM (Percent)	Total (Percent)
(1)	$2 M	1.1	0.3	0.2	1.60
(2)	$5 M	0.6	0.2	0.1	0.90
(3)	$10 M	0.4	0.1	0.05	0.55
(4)	$25 M	0.20	0.04	0.02	0.26
(5)	$50 M	0.15	0.02	0.01	0.18
(6)	$75 M	0.10	0.02	0.01	0.13
(7)	$100 M	0.08	0.01	0.005	0.095
(8)	$150 M	0.07	0.01	0.005	0.085”
(9)	$300 M	0.04	0.005	0.002	0.047

Management and Staffing Considerations

PBS 8050.1C (See Appendix A) identifies VE program management staff and outlines management responsibilities. In general terms, the VE program is to be managed as an integral element of the overall D&C program. Staff assignments must be implemented within overall authorized resource limits.

Management of the D&C VE program will be accommodated by the following positions and responsibilities:

(1) VE Program Manager (Design & Construction) - Central Office

a. Establishes a specific VE program appropriate to the D&C mission and organization.

b. Emphasizes through training, evaluation and other programs the potential for VE to reduce unnecessary costs.

c. Establishes criteria and guidelines to identify projects most appropriate for VE.

d. Ensures that responsible officials document why projects were not selected for VE.

e. Establishes guidelines to evaluate and process VE proposals.

f. Develops and issues regional guidelines for administration of the VE program, collect data on regional VE activity and forwards reports to the PBS VE Program Director.

(2) Assistant Regional Administrators for PBS

a. Ensures that regional offices operate in accordance with applicable PBS 8050. lC requirements and VE program guidance issued by the D&C VE Program Manager.

b. Ensure regional compliance with reporting requirements. (See following section of this chapter)

c. Name a single point of contract in the region for all matters pertaining to the D&C VE program.

Reporting Requirements to Central Office

Each regional office is required to submit interim and annual D&C VE program summary reports to the Central Office. Interim reports are due on April 10th and cover the preceding 6 month period beginning October lst. Final reports for each fiscal year are due on the following October l0th. Reports are to be submitted to the D&C VE Program Manager.

A standard format for D&C VE program summary reports is provided as Appendix D. Regions should follow this format and the guidance outlined below in preparing semiannual reports.

Section I - VE Proposal Summary - This section is for reporting design stage VE activity on projects. All projects for which VE proposals were acted on during the reporting period should be listed. Only those VE proposals which have been accepted or rejected should be addressed. Any proposals received and still pending action should be deferred to the next report. All savings reported must be attributed to either contract or in-house source of ideas. ***Initial (first cost) savings must be supported by budget adjustments already processed.*** LCC savings must be supported by fill economic analysis, documentation of which must be retained in official project files. If a first-cost budget increase is required in order to realize LCC savings, such savings should not be reported unless the first-cost budget increase has been processed and approved. LCC savings should be reported in present value dollars. Procedures for processing budget adjustments based on either initial or life cycle cost are addressed in the next section of this chapter, "Design Stage Project Budget Adjustments".

Section II- VE Change Proposal Summary - This section is for reporting summary data on VECPs submitted by construction or design-build contractors. All VECPs submitted during the reporting period or carried forward from the preceding period should be reported. From the final report for each fiscal year, the number pending will be carried forward to the next year's reports. For all accepted VECPs only both initial (instant contract) and collateral savings should be broken down into contractor's and government's shares. Total collateral savings should be reported in present value dollars, based on the projected collateral savings for a typical year of use applied to the effective useful like of the involved building system(s) or component(s). A thirty year useful life should be assumed unless circumstances dictate use of a different figure.

Report Requirements to Central Office (Continued)

Section III - Recommendations for Criteria Review - VEPs or VECPs may involve deviations from general criteria and standards established by the Central Office. Deviations maybe warranted because of the particular circumstances of a project, or may appear to have general applicability and benefit on all projects (or a class of projects). In the latter case, proposals should be made for Central Office review of the affected criteria to determine if a change is in order. This section is for making such recommendations. Regions are encouraged to do so whenever potential benefit is expected. Recommendations should consist of specific references to the documents containing. the criteria, identification of the criteria and discussion of recommended changes. Copies of relevant VEP/VECP documentation may be referenced and attached. The Central Office will conduct appropriate criteria reviews and provide summary reports to all regional points of contact for the D&C VE program. Regions may also be called upon to assist with criteria reviews and development/review of resulting proposed criteria changes.

Section IV - Exceptional/Outstanding Value Improvements - This section is for reporting VEPs or VECPs worthy of special note because of high degree of resulting value improvement. Value improvement may be based on either or a combination of cost reductions and increased worth. Improvements in worth may be subjective (increased functionality, aesthetics, etc.) as well as objective. Reports should include project information and a discussion of value improvement achieved. Again, copies of the involved VEP/VECP documentation maybe referenced and attached. All reports submitted will be disseminated to all regional points of contact for the D&C VE program. These reports may also be used as a basis for internal recognition/awards. Reporting regions may be asked to provide additional details and/or project photographs/renderings, if the Central 0ffice plans to further publicize a VE achievement.

Section V- VE Training - All VE training received during the reporting period by regional personnel involved in the D&C VE program should be reported. Numbers should be broken down by duration of training (over or under 8 hours) and by organization (D&C Division staff and others). Comments on the quality/usefulness of specific training are encouraged and should be provided in the remarks column.

Report Requirements to Central Office (Continued)

The reporting requirements listed in GSA Order PBS 8050. 1C include funds invested in VE staff resources used and return on investment in VE programs. There is no requirement for regional reporting on these factors under the D&C VE program. The Central Office will develop estimates of funding and staff resourcing for the program as described in Chapter 2 under “Funding”. These estimates will be used along with the information provided in regional reports to develop the complete, nationwide semiannual regional reports on the D&C VE program as required by GSA Order PBS 8050.lC. The nationwide summary reports will be forwarded to the PBS VE Program Director for inclusion in PBS and GSA external reports on VE activity in the agency.

Design Stage Project Budget Adjustments

After project construction budgets are established at the beginning of design, budget adjustments maybe considered for various reasons, including VE study results. VE workshop will generally entail offsetting first-cost increases and reductions resulting from individual VE proposals. The budget review process is further described in Chapter 5. Basic steps of the process areas follows:

1. The VE study is conducted and proposals are tentatively selected for adoption. The VE consultant summarizes the projected resulting impact on the construction cost of the project.

2. The current working construction cost estimate for the project is tentatively revised by the A-E based on the preliminary VE study results. The revised estimate is reviewed by the CM and/or regional D&C estimating staff. All parties coordinate as required to reconcile any significant differences from the initial projection.

3. If the revised estimate is within the current approved construction budget, all selected VE proposals are adopted. Regional PBS management determines whether to reduce the construction budget and report VE savings as described below.

4. If the revised estimate exceeds the current approved construction budget, all VE proposals involving initial cost increases are reviewed and given relative rankings. A “cut-off point is established within the budget and the in-budget VE proposals are adopted. Regional PBS management decides whether to seek a budget increase as described below to cover some or all of the above-budget proposals.

Design Stage Project Budget Adjustments (Cont.)

Budget adjustments should be processed according to the guidance provided in this section before the affected VE proposals are acted on and reported to the Central Office. Budget adjustments will generally occur after a formal VE workshop — either at the concept or tentative stage of design — but they may also arise at other times in a project's life cycle. They fall into two basic categories:

1. ***Budget Reductions*** may be in order as a result of first cost reductions identified through VE, if the new estimated cost is significantly below the approved project construction budget. Such budget reductions are reportable as VE savings ***only if the project budget* is *formally reduced and any surplus available funds are reallocated to other use.*** The amount reportable as savings is only the amount of the actual budget reduction. Cost reductions to bring a project within its approved budget will not be considered as VE savings, whether or not they are attributable to VE application. Also, below-budget cost reductions occurring as a result of revised project requirements will not be counted as VE savings. (Obviously, budget reductions made simply because the budget was too high to begin with also are not attributable to VE).

2. ***Budget Increases*** maybe warranted if LCC analysis indicates that a first-cost increase above the approved project construction budget will result in reduced life-cycle cost. All such proposed budget increases must be supported by fully developed and documented LCC analyses as described in GSA Handbook PBS P3430.lA " Budget increases to achieve LCC reductions should be a priority use for any available finds, including savings generated through budget reductions as described above. (See the following section, Disposition of Savings.) However, funding constraints may prevent approval of a budget increase, even if the projected life cycle cost could be significantly reduced. Accordingly, the affected VE proposals cannot be adopted until a budget increase has been approved. After approval of a budget increase and adoption of the affected VE proposals, the related LCC savings should be reported. Again, only that portion of a budget increase that is attributable to VE should be included in the calculation of LCC savings. Any portion of increase resulting from an inadequate initial budget must be discounted to achieve a valid LCC analysis.

Design Stage Project Budget Adjustments (Cont.)

As indicated by the above, regions should make every possible effort to have a valid working cost estimate within the appropriate range of the approved budget before going into a VE workshop. Otherwise, the true cost impact of the VE effort is much more difficult to assess. Nonetheless, VE methodology is an effective means for bringing a project within budget. When VE is used in this way, care must be taken to separate and report valid VE savings as opposed to other cost avoidance measures. (See further discussion on this matter in the following section, Impact of Cost Estimate Revisions on Design A-E Contract).

GSA New Construction and Major Repair and Alteration Projects:

Approved construction budgets for these projects are set through GSA's external budget process. Initial budgets are established by line item in an annual GSA budget request (supported by a prospectus), or when a project is otherwise included in an appropriation bill. For nonprospectus new construction projects, initial budgets are set by agreement between the involved regions and the Central Office. Budget adjustments resulting from VE application may occur any time after a project's initial budget is set. When a budget adjustment is approved, the project management plan (if applicable) and other project documentation should be revised accordingly. Procedures for processing budget adjustments areas follows:

1. ***Budget Reductions:*** If the construction funds for the project have not yet been allowed to the region, the region should formally (in writing) notify the Central Office of its intent to reduce the construction budget. This maybe done through the normal internal budget formulation/ administration process or by separate communication through the same channels. The Central Office will return written confirmation to approve the budget adjustment. Funds later allowed will be in the amount of the reduced budget. If the full construction funds have already been allowed to the region, budget adjustments will be proposed and approved through the allowance process. Any amounts reported as VE savings on line item projects must be supported by either a notification of budget reduction or an allowance document returning the funds to Central Office. Appropriated funds exceeding the reduced budgets will be identified as construction savings and retained in the Central Office until reallocated.

Design Stage Project Budget Adjustments (Cont.)

GSA New Construction and
Major Repair and Alteration Projects: (Continued)

2. ***Budget Increases:*** If the funds for a budget increase are not needed until they would become available through the normal budget cycle, requests should be made and acted on through the normal PBS budget formulation process. If not, an "out-of-cycle" request should be made through the same channels. On prospectus projects, budget increases that are within ten percent of the original approved budget may be treated as escalations. Should a request exceed ten percent of the original budget, an amended prospectus will also be required. It must be realized, that using a portion of the 10 percent escalation provision at this stage in the project will impact on this reserve and compromise the ability to resolve cost overruns due to unforeseen conditions later as the project develops or when the project is bid for construction. The Central Office will promptly notify the affected region whether a proposed budget increase is approved or denied. If an approved increase is dependent on external authorization and/or funding, the region will be advised to develop contingency plans to allow the project to proceed within the previously approved budget.

Reimbursable Projects and GSA Minor R&A Projects:

Regions are responsible to develop and implement internal procedures for making budget adjustments for any reason on all reimbursable projects and on minor repair and alteration projects. Authority to make VE-related budget adjustments on these projects rests entirely with the regions. Budget adjustments and reporting of savings attributable to VE should be done in accordance with regional procedures already in place, and should be consistent with the philosophy and approach outlined herein. This provision also applies to reimbursable work being done in conjunction with a GSA new construction or major R&A project.

One additional provision applies to reimbursable projects. If first-cost VE savings are identified and reported after construction funding has been authorized by the client agency, they should be supported by an amended authorization showing a like budget reduction.

Budget Increases for VE Change Proposals:

A proposal for a budget increase might also arise in connection with a design-build or construction VECP based on collateral savings. If so, the budget increase procedures described in this section generally apply. See Chapter 6 for further guidance on VECP's.

Disposition of Savings

First-cost savings on GSA new construction projects can be reprogrammed by the Central Office to cover other funding needs. Since a valid LCC savings opportunity presents one of the best possible justifications for a project budget increase, this will be a high priority use for first-cost savings. Savings on GSA major R&A projects are also available for reprogramming, or they maybe allowed to the regions for priority minor R&A funding needs.

Regions are responsible for disposition of first-cost VE savings on GSA minor R&A projects, within the overall process of management or minor R&A funding. First-cost savings on reimbursable projects must revert to the funding agency.

LCC savings are not captured for disposition, rather they should be realized in the form of lower budget requirements over the life-cycle of the affected facility.

Impact of Cost Estimate Revisions on Design A-E Contract

The A-E's design fee is limited by law to six percent of the estimated construction contract award amount. This limitation is based on the estimate (including escalation to projected contract capability date) *at the time of negotiation of the A-E fee.* The estimate may then be substantially reduced as a result of VE, even to the extent that the design fee exceeds six percent of the new estimate. There is no requirement to reduce the A-E design fee in this circumstance. To ensure the A-E's active and willing participation in the VE effort, the Government generally should not attempt to reduce the A-E design fee as a result of VE application. Conversely, the A-Es cost to implement VE proposals is considered part of the normal design process and is generally not compensable by an increase in fee. In extreme cases a VE study may result in a major departure from the design effort envisioned at the time of negotiation of the A-E fee. In such cases, renegotiation of the fee (upward and downward) maybe in order. Fee increases should only be considered when extensive redesign is required to implement a design solution that could not have reasonably been conceived by the A-E.

Each A-E design contract includes a construction cost limitation. The contract provides that if the bids or offers received exceed this limitation, the A-E must redesign the project within the limitation at no additional cost or forfeit the entire fee for failure to perform the contract. As the estimated project cost is adjusted during design due to VE application, care must be taken to ensure fair treatment of the A-E and the Government with regard to the construction cost limitation. The following guidance should be applied:

1. The A-E's design contingency, if any, should not be coopted by the VE program. If the working cost estimate is below the construction cost limitation and is increased as a result of adoption of a set of VE proposals, the construction cost limitation should be increased by a like amount. This may result in a situation where the cost limitation exceeds the approved budget, even though the working estimate does not. Regional PBS management must then decide whether to request a budget increase or assume added risk. If the working estimate is below the cost limitation by an amount exceeding a prudent design contingency, the A-E may agree to no increase or a lesser increase in the cost limitation.

Impact of Cost Estimate Revisions on Design A-E Contract (Continued)

2. If the working estimate exceeds the construction cost limitation before a VE workshop, at a minimum the A-E should be required to explain the apparent breach of contract. The problem and explanation should be taken into account in preparation of the A-E performance evaluation. The Contracting Officer may also decide to pursue other remedies. By application of VE, the cost estimate may then be brought within the construction cost limitation. However, implementation of the VE the proposals may entail extensive redesign effort. Obviously, in this instance the A-E is not entitled to any increase in fee, regardless of the amount of redesign required.

3. The A-E should not be expected to assume additional risk with regard to the construction cost limitation as a result of VE. If the working cost estimate is substantially reduced through VE, the construction cost limitation should not be reduced accordingly. The amount of the A-E's design contingency should be added to the new working estimate to establish a target construction award amount. If the bids or offers exceed this target but are within the cost limitation, the A-E should be required to explain why the target was not met. The problem and the A-Es explanation should be taken into account in preparing the A-E performance evaluation. However, there is no contractual requirement for the A-E to redesign to the cost target. When the VE proposals are adopted, regional PBS management must consider this added risk in deciding whether to effect a budget reduction and report VE savings. If the bids/offers exceed the cost limitation, the A-E remains liable under the applicable provision of the contract— but only to meet the original cost limitation, not the lower cost target.

Chapter 4 VE Consultant Selection Guidelines

General Considerations 4-3

Value Engineering Team Qualifications 4-4

Support Qualifications 4-6

VE Consultant Solicitation Guidelines 4-7

Chapter 4 VE Consultant Selection Guidelines

General Considerations

Except when VE services are included in a CM contract, VE consultant services will be procured under the provisions of the Brooks Architect-Engineer Services Act (PL92-582). Contracts will generally be either fixed-price contracts for services on one or more specifically identified projects or IQ contracts for multiple, unspecified projects.

The consultant providing VE services must demonstrate the necessary resources and experience to conduct the VE studies called for. In the case of an individual project or projects, the VE consultant will be selected based on qualification to perform studies on one or more specific sets of project requirements. For an indefinite quantity contract, the VE consultant will be selected based on qualification to perform studies on a probable cross section of projects which maybe of different types, sizes and complexity.

In either case, certain important considerations should be addressed in the selection process:

(1) The consultant demonstrates skills and experience in the design and construction field.

(2) Value engineering represents a significant portion of the firm's overall services.

(3) The consultant demonstrates sufficient skill levels and depth of resources to handle the magnitude and complexity of required tasks.

(4) The consultant shows a capability to integrate VE into the overall design process and demonstrate the proper sensitivity to design and owner issues. This is particularly important for early design phase efforts.

In most cases, responses to VE service consultant solicitations will be made up of joint ventures or teams of two or more firms. Although a limited number of A/E's offer complete in-house VE services, most A/E's would need to sub-contract to VE specialists. Conversely, most VE specialists do not have sufficient technical/professional staff and would subcontract to an A/E.

It is important that the VE consultant team demonstrate experience and a track record at working together effectively on similar services.

Value Engineering Team Qualifications

The proposed VE team will consist of one or more VE team coordinators (VETC) and multiple technical team members representing various disciplines.

The VETC's responsibilities include:

- coordination of all aspects of the studies with PBS, the A/E and the CM
- final selection of VE team members for each study
- management of each study
- collection and organization of material before each study
- preparation of required reports and presentations
- assistance in evaluating VE proposals and implementing the results

The VETC's qualifications are critical to the success of VE studies and the overall VE program. VETC qualifications should consist of the following

(1) Demonstrated competence and experience in value engineering and related fields. This would normally consist of completion of a formal 40-hour VE training seminar, participation in at least 10 VE studies and general experience in VE of at least four years. A Certified Value Specialist (CVS) would typically possess at least these qualifications. CVS certification is administered by the Society of American Value Engineers (SAVE) and is an accepted standard of competence in the field. CVS certification or equivalent for VETC's is recommended.

(2) Construction industry experience including familiarity with design, construction and construction management.

(3) Experience as a VETC on construction related projects of a similar nature and complexity as those contemplated under the VE contract.

(4) Demonstrated skills in technical report writing and oral presentation.

(5) Technical degrees in architecture or engineering and related certifications such as cost estimating or specifications should generally be considered as minimum requirements.

Value Engineering Team Qualifications (Cont.)

VE team members provide the technical input into VE studies in the fields of programming, architecture, engineering, cost estimating, specifications and special areas (environmental, asbestos, building automation, etc.) Qualifications should consist of

(1) Completion of a formal 40-hour VE training session or participation in a previous VE study for each team member.

(2) Experience in the design, construction and operation of buildings of similar nature, scope and complexity as those contemplated.

(3) Appropriate technical degrees and professional registrations should generally be required. Use of non degreed/registered members is encouraged if they are otherwise uniquely qualified because of extensive field experience. It is extremely important that the skills and experience of the VE team are equal to or superior to those of the design A/E.

(4) Related certifications should be considered as advantages.

(5) The mix of proposed disciplines and experience of the team should be sufficient to cover the anticipated needs of the projects to be studied. This should include at minimum the normal architectural and engineering disciplines as well as special disciplines appropriate to the projects under consideration.

Support Qualifications

Additional qualifications are pertinent to the conduct of VE studies and should be considered in the selection process. These include:

(1) Availability of cost and performance information on similar facilities to those under consideration. This information is useful in determining potential areas of study as well as providing data for cost evaluation of VE proposals.

(2) Access to automated construction cost data systems or applications for assistance in costing VE ideas.

(3) Familiarity with the use and application of Computer Aided Design and Drafting (CADD) systems.

(4) Word processing and other automation systems useful in supporting VE studies and producing reports.

(5) Support disciplines such as graphics which can enhance the quality of printed material.

(6) Management and administrative systems useful in supporting indefinite quantity contracts (as appropriate).

VE Consultant Solicitation Guidelines

Detailed procedures and requirements for conducting Brooks Architect-Engineer Services Act procurements are contained in the GSA Handbook PBS P 3420.lA This section provides general guidance for publicizing VE consultant contract opportunities and selecting VE consultants under the Brooks Act procedures.

VE consultant contract opportunities will be publicized in the *Commerce Business Daily* (CBD). Depending on the specific approach to contracting for VE services, the CBD notice would address a single project, multiple projects or a group of potential projects. Information should include:

(1) A description of the project(s) under consideration. A program or early facility plan should be available for review by the "short-listed" firms.

(2) The design schedule(s) (typically in milestone form, showing percentage completion vs. date).

(3) The estimated construction cost for each project.

(4) The number of VE studies to be performed and the points in time (i.e., percentage of design completion) at which each VE workshop is expected to be performed. Scope and timing of VE studies will be based on the requirements outlined in this guide and in the companion document to this guide (volume 2) for Contracting officers and professional services contractors.

(5) The evaluation criteria which will be used to rate the proposals and select the VE consultant (e.g., relative weight to be applied to qualifications, facility design and construction experience, proposed approach, etc.)

The response to the CBD notice by the prospective VE consultants should consist of the following

(1) General Statement of Qualifications (SF 254,255, etc.)

(2) VE experience and references

(3) VETC qualifications and resume

(4) Technical team qualifications and resumes

(5) Special qualifications

(6) Technical approach to services

(7) Demonstrated experience with conduct of VE studies, as evidenced by examples of VE study final reports previously performed on projects of a similar type as the project at hand.

Chapter 5 VE Study Requirements

Timing of Studies 5-3

Recommended Value Engineering Procedures 5-5

Coordination with Design A-E and CM 5-8

Establishing Value Objectives and Study Constraints 5-9

Implementation Strategies 5-10

Reporting and Follow Up Procedures 5-12

Study Evaluation Guidelines 5-13

Recommended Scope of Services 5-15

Guidelines on Level of Effort 5-16

Chapter 5 VE Study Requirements

Timing of Studies

VE services generally are to consist of two studies to be conducted at:

(1) the completion of Concept Design

(2) the completion of Tentative Design

Additional studies may be conducted at Intermediate Design and for final Construction Documents if deemed necessary due to technical or budget constraints. A single study maybe appropriate on smaller, less complex projects.

For new construction projects, the first study at Concept Design is intended to review basic design decisions that pertain to areas such as:

(1) Siting and building orientation

(2) Building form, shape and massing

(3) Layout

(4) Occupiable to gross area relationships

(5) Design criteria

(6) Building systems selection options

(7) Space program options

(8) Building space/volume parameters

(9) Vertical and horizontal circulation

(lo) Major Mechanical-Electrical-Plumbing (MEP) considerations

(11) Overall energy considerations

(12) Site access/egress

(13) Overall phasing/scheduling plans (as appropriate)

(14) Sub-soil conditions and geological data

(15) Utility availability

For repair and alteration projects, the applicable items from the above list are appropriate to the concept stage study.

Timing of Studies (Continued)

The second study at Tentative Design will focus on more detailed design decisions including (as applicable):

(1) Specific building system design

(2) Specification and performance requirements

(3) Proposed design details

(4) Layout options within overall building geometry

(5) Specific MEP system selections

(6) Site paving, grading and utilities

(7) Phasing and scheduling plans

(8) Major constructibility issues

The basic approach is intended to consider macro level issues at Concept Design and more micro level issues at Tentative Design. In general, decisions made as a result of the first study will not be reconsidered in the second study unless significant new information is available. Furthermore, design changes implemented as a result of the studies will generally be considered to be within the bounds of the normal design process. Exceptions to this will be considered on a case by case basis.

Recommended VE Procedures

Successful VE involves the cooperative participation of PBS (and user), the design A-E, the CM and the VE consultant. In addition, the success of the effort also depends on the management and organization of the overall VE process. The following procedures are recommended for use by VE consultants. This section provides general guidance while Appendix B provides specific guidance intended for the VE consultant. (Identical Appendix material is included in the VE Guide for Contracting Officers and Professional Services Contractors)

VE Sequence and Typical Schedule

The VE study effort is divided into three sequential periods of activity: (1) pre-workshop activity, (2) VE workshop, (3) post-workshop. Two VE studies are held at different stages of design completion as described previously. Therefore, the pre-workshop activities, the workshop, and the post-workshop activities will be performed twice. Basically, the size and complexity of a project control the effort required.

Pre-Workshop Activity

The VE Team Coordinator (VETC) uses this period to become familiar with the project, obtain and review the technical and cost data, complete logistical arrangements for the VE workshop, coordinate timing for the VE workshops, complete the selection of VE team members, and establish a productive working relationship with the A-E, the PBS representative and the CM.

It is also at this time that the VETC will contact the PBS representative and the A-E to coordinate the handling of material and overall schedule. Any limitations or constraints on the overall study should be addressed at this time. (See section forward for more detail on defining constraints.)

VE Workshop

The VE Workshop(s) will be for the duration deemed appropriate for the size and complexity of the project. (See guidelines on Level of Effort) The workshop portion will typically vary from a one day effort involving five participants to a five day effort involving as many as eleven participants.

VE Workshop (Continued)

VE Job Plan

The recommended VE methodology (Job Plan) used by the VE team during the Workshop has five distinct phases. Briefly, these phases are:

1. **Information Phase:**

   During this phase, the VE team gains as much information as possible about the project design, background, constraints, and projected costs. The team performs a function analysis and relative cost ranking of systems and sub-systems to identify potential high cost areas.

2. **Speculative/Creative Phase:**

   The VE team uses a creative group interaction process to identify alternative ideas for accomplishing the function of a system or sub-system.

3. **Evaluation/Analytical Phase:**

   The ideas generated during the Speculative/Creative Phase are screened and evaluated by the team. The ideas showing the greatest potential for cost savings and project improvement are selected for further study.

4. **Development/Recommendation Phase:**

   The VE team researches the selected ideas and prepares descriptions, sketches and life cycle cost estimates to support the recommendations as formal VE proposals.

5. **Report Phase:**

   The VE consultant will work in concert with the A-E and the PBS representative to produce a preliminary written VE Report which is intended to represent the results of the VE workshop activities, and meet the VE Program objectives.

Post Workshop Activity

Following the VE Workshop, the VE consultant will prepare and submit the final VE report, incorporating all comments from the preliminary report. The A-E will then work in concert with the VE consultant and the PBS representative to ensure that all VE proposals are considered for implementation.

Formal consideration is given to all VE proposals by the A-E and the PBS representative for inclusion into the design. Consultation with the user agency(s) will be conducted as appropriate.

After completion of this effort the A-E will prepare a report itemizing the status of each of the proposals presented in the final VE report. The VE implementation summary report will include reasons for the acceptance, partial acceptance or rejection of all proposals.

Post workshop activity would also include processing of a budget adjustment as described in Chapter 3, if necessary. If a budget increase is required to support one or more of the VE proposals, those proposals cannot be adopted for implementation until the budget increase is approved. In such cases, the A-Es final implementation summary report cannot be completed until the request for a budget increase has been acted upon.

Typical time periods for accomplishing VE are:

- Pre-Workshop Activity (each workshop) . . . . . .l to 2 weeks
- VE Workshop (each workshop) . . . . . .1 week maximum
- Post-Workshop Activity (each workshop) . . . . . .1 to 4 weeks

Coordination with Design A-E and CM

The VE consultant is responsible for coordinating the activities of the A-E and CM during the VE process. The following is a list of items/services to be provided:

(1) The VE consultant will advise the A-E and CM of the schedule for the VE services.

(2) During the pre-workshop portion of the effort the VE consultant must advise the design A-E of information requirements. The A-E is expected to provide sufficient copies of workshop material directly to the VE consultant. (For specifics refer to the “Scope of Services” section of this chapter.)

(3) The VE consultant will provide sufficient facilities for the workshop including allowances for the A-E and CM. The A-E and CM are expected to provide a fill-time representative to the Concept Design workshop and a part-time representative to the Tentative Design workshop.

(4) The A-E is expected to make a technical project presentation at the beginning of each workshop. This will include key members of the A-E team as necessary to present technical issues.

(5) The VE consultant will present a preliminary report of workshop proposals to the A-E on the last day of each workshop. The A-E will initiate review of proposals at that point and await receipt of the final report to be provided by the VE consultant. The final report should generally be provided within one week of the completion of the workshop.

(6) In the one to two week period following the issuance of the final report the VE consultant will coordinate with the A-E, CM and the PBS representative and review the implementation of VE proposals. Questions will be answered and additional information or clarification will be provided by the VE consultant as may reasonably be required.

(7) The VE consultant will assist the A-E in preparing the final VE implementation summary report and will provide a review and analysis of the report to the PBS representative.

Establishing Value Objectives and Study Constraints

The philosophy and objectives of the overall VE program are outlined in Chapter 2. The objectives of any specific study must be consistent with the overall philosophy and objectives of the program, considering the individual requirements of the project.

For a project whose construction cost is within budget, the emphasis will be on maintaining or improving value in terms of operations, flexibility, expandability, etc. If this can be delivered at reduced cost then cost reduction becomes a secondary goal with the possibility of reducing the budget.

When a project is determined to be above budget, the emphasis of the VE study should be on reducing construction cost to within budget without compromising the program of requirements or eroding the value of the finished project. The VE study is not intended to be used as a device for producing cost reductions by "cost cutting" with an accompanying reduction in the scope of the projector in value to be realized over the life cycle of the completed facility.

As a general rule, no constraints are placed on the VE program in terms of areas of study for projects. Likewise governing criteria, except as required by codes or law, is considered open for challenge by the VE consultant providing that the value and cost benefits are worthwhile and no compromises are made to important project functions. Even the program of requirements for a project is open to challenge by the VE team, to the extent that programmatic inefficiencies can be eliminated without sacrificing the basic project objectives and intended features or functions of the completed facility.

For a specific project, any constraints to be placed on the study must be identified and justified prior to the VE study. Normally such constraints will be the result of specific studies earned out by the A-E or other consultants and not just the result of the normal design process. It is intended that these conditions will be uncommon.

Conversely, the VE team is expected to use the rule of "common sense" in challenging design decisions or criteria which are deep seeded and important issues to the A-E, PBS or the agency user. The rule of "common sense" should also preclude the team from expending valuable time on farfetched or frivolous ideas which have little or no chance of acceptance.

Implementation Strategies

It must be understood that the VE program only *suggests* changes in the design or program of requirements. The ultimate responsibility for the design rests with the A-E and therefore the A-E must accept and implement changes or reject changes for valid reasons. The risk involved is a factor for consideration when suggesting new ideas.

The VE consultant will assist in the implementation process and provide technical backup as needed. However, the PBS representative in consultation with the agency user(s) is responsible for administering the implementation process.

Suggested strategies to improve implementation include:

(1) Assure that the A-E fully understands the nature and benefits of each VE proposal under consideration. If necessary, the VE consultant can provide additional backup information to better clarify the proposal.

(2) Reasons provided by the A-E for rejection must be valid and be based on technical considerations and not just a critique of the validity of the VE proposal. Rejections should be accompanied by distinct technical analysis. In the case where choices represent opinions, this should be so stated.

(3) If a proposal is rejected because the A-E claims that the issue had been studied previously, assure that the conditions are actually the same and not just similar. The failure of one idea is not necessarily justification for the rejection of a similar idea, especially if the circumstances are different.

(4) New and comparatively untried ideas should be investigated carefully before acceptance. However, newness by itself is not a valid reason for rejection.

(5) A disagreement with the VE consultant's cost estimate for a proposal is not by itself a reason for rejection. In the case where the A-E disclaims that a savings actually exists, then the proposal still must be evaluated on other merits. In other words, cost saving is not a sole reason for acceptance and neither is the lack of cost saving a sole reason for rejection.

Implementation Strategies (Continued)

(6) Redesign cost and/or time is not by itself a reason for rejection, only one consideration among others. If substantial redesign effort is required, then the A-E would be eligible for additional compensation only if the effort was beyond the normal design evolution and not reasonably identifiable by the A-E. However, it should be noted that the VE process is conducted in two steps (at Concept and Tentative Design). A major reason for the early study is to identify and make any broad-based changes in design direction before definitive/detailed design begins. As a result, extensive redesign past Concept Design Stage is much less likely.

(7) Proposals which provide improved value irrespective of added or reduced cost should be considered for implementation. If added cost is required, other proposals which reduce cost can offset the added cost. In other words, the cost saving goals are *collective to* the project and not individual to proposals.

(8) Proposals which offer substantial reductions in life-cycle cost should not be summarily rejected because of increased first-cost, even on a project with actual or potential budget overrun problems. LCC savings opportunities should not be passed over simply because a project is over budget or was not properly budgeted at the outset. Provisions for budget increases to achieve LCC reductions are discussed in Chapter 3.

(9) Proposals which are common to disciplines and or building elements should be considered as a group. It is the VE consultant's responsibility to group proposals in a logical and efficient way for consideration.

(10) Care should be taken that the impact of VE proposals on other areas is properly considered.

Reporting and Follow-Up Procedures

Detailed report preparation procedures for the VE consultant are included in Appendix B - Suggested Value Engineering Procedures. This section provides overall guidance.

The report which results from a VE study should be a concise yet self-sufficient document. It should contain enough technical project description so that someone not intimate with the project can understand the major issues. In addition, the individual VE proposals should clearly document the original concept, the proposed concept, advantages and disadvantages and economic consequences. Summaries should be presented which allow for a quick overview and also provide the A-E with a simple means of review and inclusion into the A-Es final VE implementation summary report.

Subsequent to the issuing of the VE consultant's final report and the A-E's final report, it is important that the PBS representative pass along the results to the regional point of contact for the D&C VE program, for inclusion in periodic reports to the Central Office. The PBS representative should include a short narrative assessment of the study including both good and bad points and suggestions for improvement.

Follow-up procedures by the region should include a general tracking and analysis of patterns, tendencies and trends. This is of particular importance in tuning and improving the VE process in the future.

Study Evaluation Guidelines

The relative success of a VE study can be measured by a number of analytical factors which are comparatively easy to track. A more difficult factor to assess is the relative degree of “quality” of the original design. “Quality” in this context is a measure of the value and appropriateness of design decisions and the clarity of the design requirements. Although it is not an automatic relationship, good "quality" design tends to yield less significant results in a VE study.

It is therefore important that before a VE study is evaluated that the "quality" of the original design he assessed. Several techniques are suggested:

(1) Assess the quality of the design calculations and supporting documentation. Calculations and rationale should be clear, well conceived and complete.

(2) Compare the estimated cost (after appropriate adjustment) of the facility under study with the cost of other similar facilities. Avery high comparative cost might indicate either extreme requirements or excessive design. Very low comparative cost might indicate low first cost but poor long term value decisions.

(3) Examine the track record of the design A-E and their experience on similar facilities.

(4) Solicit the opinions of the PBS representative and user agency as to their opinion of the relative quality of the design.

(5) To a certain degree the Cost/Worth model prepared during the study will give some indication of relative quality.

It is not the intent of this evaluation to judge the A-E’s design for any reason except for the purpose of setting a reasonable baseline of expectations for the VE study. The issue of design quality should be separately addressed in preparation of the A-Es performance evaluation.

Study Evaluation Guidelines (Continued)

Once this baseline is considered, specific evaluation guidelines of a VE study are suggested as follows:

(1) Overall organization of study

(2) Adherence to schedule

(3) Skill levels of the VE team

(4) Cooperation and working relationship between the VE consultant and A-E and CM

(5) Number of ideas generated

(6) Number of proposals generated

(7) Percentage of proposals indicating value improvement

(8) Percentage of proposals indicating initial cost savings

(9) Percentage of proposals indicating LCC savings

(lo) Total potential initial savings

(11) Total potential LCC savings

(12) Quality of cost models, function analysis and supporting technical analysis

(13) Clarity of proposals

(14) Organization and clarity of report

(15) VE consultant implementation support

Performance in each of the categories should be evaluated against the baseline where appropriate.

Recommended Scope of Services

A scope of services should reflect the requirements of this guide as well as the size, nature and special requirements of the project. The following outlines the contents of a scope of services to be presented to the VE consultant for a proposal:

(1) Number and timing of studies to be performed. Normally this will beat the completion of Concept and Tentative Design. Other studies may be merited in special cases. A single study during preliminary design may be appropriate on smaller, less complex projects.

(2) Project description, budget, current status, A-E of record and key user agencies involved.

(3) Reference or attach the VE Guide for Contracting Officers and Professional Services Contractors as a technical guide.

(4) Define any special requirements or special disciplines required in the study (e.g. environmental, asbestos, etc.) Also, specify whether energy and life-cycle cost models will be required.

(5) Space and support requirements for study room. Normally a study would require a minimum of 300 SF for sufficient work area and would increase depending on the magnitude of the study. Easy access to telephones, fax machines, computers and copy machines is also important.

(6) Suggested location of the study. Normally the study would be conducted near the A-E's office. For reconstruction projects or projects with significant site restraints, it is important and normal for the VE team to visit the site. This may affect the suggested location if it is deemed appropriate to be near the site.

(7) Any other special requirements.

The VE consultant should respond within one week with a technical and fee proposal addressing the above issues. Negotiations should proceed using this guide as a basis. A key issue is often the makeup of the workshop team and the number of disciplines involved. Recognize that in many cases two part-time team members are more valuable than one fill-time member.

Guidelines on Level of Effort

Overall effort required for VE studies is a function of several variables including the magnitude and complexity of the project as well as the degree of repetition within a project. The status of budget, schedule and constructibility issues may also have impact.

The level of effort tables (Tables 5-1,5-2 & 5-3) in this section correspond to the guidelines presented in the companion document to this guide - VE Guide for Contracting Officers and Professional Services Contractors minus hourly rate and fee information. The fee proposal presented by the VE consultant and subsequent negotiations will use these levels of effort as a guideline. Deviation from these guidelines will be clearly documented and justified.

Use of the Tables

Table 5-1 Overall Recommended VE Level of Effort presents the total recommended level of effort for VE studies expressed in effort hours. Three curves are presented

(1) **Average:** for projects of average complexity and repetition corresponding to Federal Office Buildings

(2) **High:** for projects of high complexity such as courthouses or Federal Buildings with complex space requirements (laboratories, etc.)

(9) **Low:** for lower complexity projects such as warehouses or for projects with a very high degree of repetition

Locate the estimated project construction cost on the horizontal axis and move vertically to a point representing the approximate degree of project complexity (high, average, low). Total recommended effort hours can be located on the vertical axis. This figure represents the total recommended level of effort for two studies - one at Concept Design and one at Tentative Design. Dividing the hours identified by the number of hours appropriate to “average” complexity will produce a "complexity" factor to be applied to Table 5-3. (See Forward)

Table 5-2 Recommended Study Composition provides the recommended number of days in the workshop portion of the study and team composition in fill-time workshop equivalents.

Use of the Tables (Continued)

Table 5-3 Suggested Detailed Level of Effort presents detailed level of effort guidelines for selected projects of $2M to $300M corresponding to average complexity. Data in this table should be adjusted by the "complexity" factor developed from reference to Table 5-1. Level of effort is subdivided per study, per phase of study and per discipline. Additional guidance is provided for probable level of effort for the A-E and CM. Table 5-3 includes approximate cost calculations based on current (1992) average hourly rates. These should be adjusted as appropriate to reflect prevailing local rates at the time of negotiation of fees.

These tables are intended to provide assistance in negotiating fees with the VE consultant, the A-n and the CM.

Table 5-1 Recommended VE Level of Effort

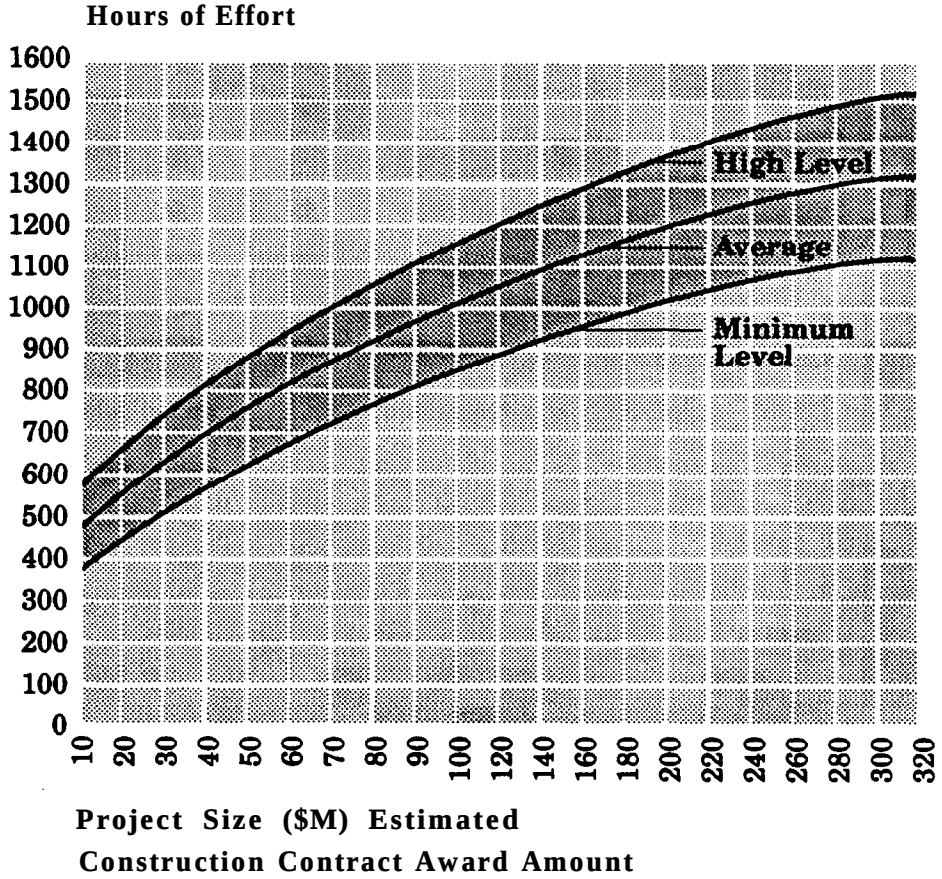

Table 5-2 Recommended Study Composition

Project Size	Concept Design Stage		Tentative Design Stage		Total	
Estimated Construction Contract Award Amount (ECCA)					Average	
	Days	Team	Days	Team	Days	Team
$2M	1	6	1	6	2	6
$5M	1	6	2	6	3	6
$10M	2	6	2	6	4	6
$25M	2	7	3	7	5	7
$50M	3	7	4	7	7	7
$75M	3	7	5	8	8	7.5
$100M	4	8	5	8	9	8
$150M	5	8	5	9	10	8.5
$300M	5	10	5	11	10	10.5

DAYS Number of days in the VE workshop

TEAM Full-time equivalents workshop attendees including VETC

Table 5-3 Suggested Detailed Level of Effort

PBS VALUE ENGINEERING STUDIES

PROJECT SIZE (ECC)	PHASE	CONCEPT DESIGN								TENTATIVE DESIGN								TOTAL							
		APPROXIMATE HOURLY RATES AS OF MARCH 1992																							
				$85	$80	$40		$80	$80			$85	$80	$40		$80	$80			$85	$80	$40		$80	$80
		WS DAYS	TEAM SIZE	VETC	TEAM	SUPP	TOT	A-E	CM	WS DAYS	TEAM SIZE	VETC	TEAM	SUPP	TOT	A-E	CM	WS DAYS	TEAM SIZE	VETC	TEAM	SUPP	TOT	A-E	CM
		<--- LEVEL OF EFFORT (hrs) --->								<--- LEVEL OF EFFORT (hrs) --->								<--- LEVEL OF EFFORT (hrs) --->							
$2M	PRE-WORKSHOP			12	10	4	26	12	8			12	10	8	30	12	8			24	20	12	56	24	16
	WORKSHOP	1	6	8	40	8	56	8	8	1	6	8	40	8	56	8	8	2	6	16	80	16	112	16	16
	POST-WORKSHOP			20	8	24	52	16	8			24	8	24	56	16	8			44	16	48	108	32	16
	TOTAL			40	58	36	134	36	24			44	58	40	142	36	24			84	116	76	276	72	48
	APPROX COST			3.4	4.6	1.4	9.5	2.9	1.9			3.7	4.6	1.6	10.0	2.9	1.9			7.1	9.3	3.0	19.5	5.8	3.8
$5M	PRE-WORKSHOP			12	10	8	30	12	8			24	20	8	52	16	8			36	30	16	82	28	16
	WORKSHOP	1	6	8	40	8	56	8	8	2	6	16	80	8	104	16	16	3	6	24	120	16	160	24	24
	POST-WORKSHOP			20	8	30	58	20	8			32	16	30	78	32	8			52	24	60	136	52	16
	TOTAL			40	58	46	144	40	24			72	116	46	234	64	32			112	174	92	378	104	56
	APPROX COST			3.4	4.6	1.8	9.9	3.2	1.9			6.1	9.3	1.8	17.2	5.1	2.6			9.5	13.9	3.7	27.1	8.3	4.5
$10M	PRE-WORKSHOP			16	20	8	44	16	8			20	20	8	48	16	8			36	40	16	92	32	16
	WORKSHOP	2	6	16	80	8	104	16	16	2	6	16	80	8	104	16	16	4	6	32	160	16	208	32	32
	POST-WORKSHOP			24	8	32	64	24	8			40	24	40	104	32	8			64	32	72	168	56	16
	TOTAL			56	108	48	212	56	32			76	124	56	256	64	32			132	232	104	468	120	64
	APPROX COST			4.8	8.6	1.9	15.3	4.5	2.6			6.5	9.9	2.2	18.6	5.1	2.6			11.2	18.6	4.2	33.9	9.6	5.1
$25M	PRE-WORKSHOP			24	24	8	56	16	8			20	24	8	52	16	8			44	48	16	108	32	16
	WORKSHOP	2	7	16	96	8	120	16	16	3	7	24	144	8	176	16	16	5	7	40	240	16	296	32	32
	POST-WORKSHOP			28	16	32	76	28	8			40	24	40	104	32	8			68	40	72	180	60	16
	TOTAL			68	136	48	252	60	32			84	192	56	332	64	32			152	328	104	584	124	64
	APPROX COST			5.8	10.9	1.9	18.6	4.8	2.6			7.1	15.4	2.2	24.7	5.1	2.6			12.9	26.2	4.2	43.3	9.9	5.1
$50M	PRE-WORKSHOP			32	24	8	64	16	8			32	24	8	64	24	8			64	48	16	128	40	16
	WORKSHOP	3	7	24	144	8	176	24	24	4	7	32	192	8	232	16	16	7	7	56	336	16	408	40	40
	POST-WORKSHOP			32	24	32	88	32	8			40	40	40	120	36	8			72	64	72	208	68	16
	TOTAL			88	192	48	328	72	40			104	256	56	416	76	32			192	448	104	744	148	72
	APPROX COST			7.5	15.4	1.9	24.8	5.8	3.2			8.8	20.5	2.2	31.6	6.1	2.6			16.3	35.8	4.2	56.3	11.8	5.8
$75M	PRE-WORKSHOP			32	24	8	64	24	8			32	28	8	68	24	8			64	52	16	132	48	16
	WORKSHOP	3	7	24	144	8	176	24	24	5	8	40	280	8	328	16	16	8	7.5	64	424	16	504	40	40
	POST-WORKSHOP			36	30	32	98	36	8			40	40	40	120	36	8			76	70	72	218	72	16
	TOTAL			92	198	48	338	84	40			112	348	56	516	76	32			204	546	104	854	160	72
	APPROX COST			7.8	15.8	1.9	25.6	6.7	3.2			9.5	27.8	2.2	39.6	6.1	2.6			17.3	43.7	4.2	65.2	12.8	5.8
$100M	PRE-WORKSHOP			40	28	8	76	30	8			40	28	8	76	30	8			80	56	16	152	60	16
	WORKSHOP	4	8	32	224	8	264	32	32	5	8	40	280	8	328	16	16	9	8	72	504	16	592	48	48
	POST-WORKSHOP			36	36	32	104	36	8			40	60	40	140	36	8			76	96	72	244	72	16
	TOTAL			108	288	48	444	98	48			120	368	56	544	82	32			228	656	104	988	180	80
	APPROX COST			9.2	23.0	1.9	34.1	7.8	3.8			10.2	29.4	2.2	41.9	6.6	2.6			19.4	52.5	4.2	76.0	14.4	6.4
$150M	PRE-WORKSHOP			40	28	8	76	30	8			40	32	8	80	30	8			80	60	16	156	60	16
	WORKSHOP	5	8	40	280	8	328	40	40	5	9	40	320	8	368	16	16	10	8.5	80	600	16	696	56	56
	POST-WORKSHOP			36	36	32	104	36	8			40	60	40	140	36	8			76	96	72	244	72	16
	TOTAL			116	344	48	508	106	56			120	412	56	588	82	32			236	756	104	1096	188	88
	APPROX COST			9.9	27.5	1.9	39.3	8.5	4.5			10.2	33.0	2.2	45.4	6.6	2.6			20.1	60.5	4.2	84.7	15.0	7.0
$300M	PRE-WORKSHOP			60	36	8	104	30	8			60	40	8	108	30	8			120	76	16	212	60	16
	WORKSHOP	5	10	40	360	8	408	40	40	5	11	40	400	8	448	16	16	10	10.5	80	760	16	856	56	56
	POST-WORKSHOP			36	36	32	104	36	8			40	60	40	140	36	8			76	96	72	244	72	16
	TOTAL			136	432	48	616	106	56			140	500	56	696	82	32			276	932	104	1312	188	88
	APPROX COST			11.6	34.6	1.9	48.0	8.5	4.5			11.9	40.0	2.2	54.1	6.6	2.6			23.5	74.6	4.2	102.2	15.0	7.0

Chapter 6 Value Engineering Change Proposal (VECP) Procedures

Objectives 6-3

Processing Procedures. 6-4

Computation Procedures 6-6

Savings Sharing Guidelines 6-7

Review and Follow Up 6.8

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Chapter 6 Value Engineering Change Proposal (VECP) Procedures

Objectives

A Value Engineering Change Proposal (VECP) is submitted by the construction or design-build contractor to propose a change or substitution in the requirements, materials and/or methods prescribed in the contract documents. The change is intended to reduce cost (both initial and/or life cycle) but still meet or exceed all necessary functions including performance, safety, aesthetics, operations and quality. If accepted and approved by GSA then the VECP will result in a formal contract change with a sharing of cost savings between the construction contractor and GSA

It is the objective of the GSA-PBS VECP program to encourage contractors to investigate improved construction methods and materials, submit VECP's and, upon acceptance, receive fair and reasonable compensation in the way of shared savings.

Various provisions of the Federal Acquisitions Regulations (FAR) govern the processing of VECP's. These provisions are included in construction and design-build contracts and are provided for general reference in Appendix C.

This section provides overall guidance and methodology to be used for processing VECP's.

Similar material is also contained in the companion document (Volume 2) to this guide -Value Engineering Guide for Contracting Officers. and Professional Services Contractors.

Processing Procedures

The processing of VECP's involves the construction or design-build contractor, the PBS project representative, the GSA Contracting officer (CO), the CM, the user agency, and the original A-E or designated A-E. For additional guidance on the Contracting Officer's responsibilities in processing VECIP's, see the GSA Handbook, Procurement and Administration of Design and Construction (PADAC), Volume 2- Construction Contracts (GSA Order PBS P3420.2A).

General procedures to process VECP's are as follows:

(1) The construction contractor submits a VECP for consideration to the CO. The VECP consists of a technical description of the proposed change, a cost estimate of savings in initial cost and life cycle costs as appropriate and an assessment of any time impact

(2) The CM reviews the VECP for adequacy of documentation and either continues processing or returns the VECP to the contractor for additional backup and development. The VECP is handled in a similar manner to other suggested contract changes except that it is separately identified as VECP related.

(3) After acceptance for processing, the CM will consult with the A-E on technical issues and with the user agency from an operational point of view. The CM will prepare an analysis of the estimated savings as submitted by the construction contractor and review the estimate prepared by the A-E as appropriate. It is also important that any collateral factors not directly covered in the VECP are assessed. This will include analysis of the time required as well as the cost of any design changes.

(4) The CM prepares a recommendation to GSA-PBS to accept or reject the VECP.

(5) GSA-PBS will make the final decision on acceptance or rejection.

Processing Procedures (Continued)

(6) If a VECP is rejected, it must be based on specific technical, operational or economic reasons. The contractor should be given an opportunity to comment on the rejection and formally request reconsideration or resubmit a modified VECP which addresses the reasons for rejection. A subsequent second rejection is considered final.

(7) When a VECP is accepted, it is processed as a contract change including negotiations on savings and any time related impacts. The only exception is for negotiating collateral savings for which in the case of disputes, the government estimate is considered final.

(8) The VECP process does not normally involve a VE consultant. On extremely large or complex VECP's, it may be advantageous to engage the VE consultant of record for the project to assist with VECP evaluation. Using the VE consultant of record (who performed design stage VE study) is preferable. If there is no VE consultant of record for the project or that VE consultant is unavailable, the required services might then be obtained through an IQ contract with another VE consultant.

Computation Procedures

Savings are to be computed by assessing the cost impact of all changes proposed in the VECP. This can be accomplished by either estimating only the differences or by preparing both a before and after estimate and calculating the difference. The most appropriate method should be discussed with the contractor before submission of the VECP, if possible.

The procedures to calculate savings are recommended as follows:

(1) Estimate all direct costs to the installing contractor or subcontractor. This should include labor, materials and equipment. Estimating procedure and breakdown should be in accordance with original contract provisions for estimating contract changes except as stated herein.

(2) Contractor development and implementation cost to prepare the VECP can be calculated as a direct cost unless otherwise reimbursable through the original contract.

(3) If the computations result in a net decrease in the original contract amount then overhead and profit are not affected for reduced work effort either at a subcontractor or prime contractor level.

(4) New work performed by a new subcontractor can be marked up for overhead and profit in accordance with the original contract provisions.

(5) If the VECP results in a net increase in the original contract amount then additional costs for overhead and profit can be added in accordance with contract provisions.

(6) Collateral savings should be calculated using the life cycle costing guidance included in this guide on the basis of total present worth of savings.

When negotiations on the magnitude of savings for an accepted VECP are completed, the following table on sharing of savings is to be followed except as specifically amended in the contract:

Contract Type		Contractor's Share of Savings	
		First-Cost Savings	**LCC (Collateral) Savings**
Construction	Fixed Price	55 Percent	20 Percent of Savings to be realized in a typical year of use*
	Cost Reimbursement**	25 Percent	20 Percent of Savings to be realized in a typical year of use*
Design-Build (Mandatory VE **clause)**	Fixed Price	25 Percent	20 Percent of Savings to be realized in a typical year of use*
	Incentive	Same sharing arrangement as contractor's profit or fee adjustment formula	20 Percent of Savings to be realized in a typical year of use*
	Cost Reimbursement**	15 Percent	20 Percent of Savings to be realized in a typical year of use*
Design-Build (voluntary VE clause)	Fixed Price	50 Percent	20 Percent of Savings to be realized in a typical year of use*
	Incentive	Same sharing arrangement as contractor's profit or fee adjustment formula	20 Percent of Savings to be realized in a typical year of use*
	Cost Reimbursement	25 Percent	20 Percent of Savings to be realized in a typical year of use*

* Not to exceed the lesser of the contract amount at the time of acceptance of the VECP or $100,000.

** Includes cost-plus-award-fee contracts.

Review and Follow Up

The monitoring of VECP's will be conducted in a similar manner to the monitoring of the overall VE program (see other sections of this Guide). However, certain key issues should be reviewed on an ongoing basis to assure that VECP's are being productively utilized. These key issues include:

(1) Tracking and evaluating reasons for rejecting VECP's and assuring that rejections are for sound technical or economic reasons.

(2) Assuring that VECP's are handled in an expeditious manner and there are not undue delays.

(3) Assuring that proper attention is given to the collateral effects of VECP's both on economics and on operations.

(4) Assuring that appropriate attention is given to reporting requirements.

Chapter 7 Life Cycle Costing Guidelines

Economic Analysis Concepts 7.3

Recommended Approaches 7-7

Technical Guidelines 7-8

Chapter 7 Life Cycle Costing Guidelines

The Economic Analysis Concept

Life cycle costing (LCC) is the development of all significant cost of acquiring, owning and using an item, system or service over a specified length of time. The time period used is the projected effective useful life of the facility and its determination includes consideration of functional obsolescence of major components or systems. LCC is a method used to compare and evaluate the total costs of competing solutions based on the anticipated life of the facility or product to be acquired. In performing a VE study, LCC analysis is performed in the development phase of the VE job plan to determine the least costly alternative. Additional guidance on LCC analysis is provided in the PBS Facility Standards Handbook (GSA HB PBS P3430.lA). Specific LCC references are listed in this chapter under the section, *Technical Guidelines.*

The value of an item includes not only consideration of what the costs are to squire it, but also the cost to use it or the cost of performance to the user for as long as the user needs it. It is the user who determines value. Therefore, one measure of value to the user is to calculate the cost of ownership or use.

Costs of repairs, operations, preventive maintenance, logistic support utilities, depreciation and replacement, in addition to capital cost, all reflect on the total value of a product to a user. Calculation of LCC for each alternative during performance of a VE study is a way to judge whether product quality is being maintained in sufficient degree to prevent degradation of necessary reliability, performance, and maintainability.

The concept of economic analysis, which is used in LCC, requires that comparisons be made between things similar in nature. For example, one cannot compare the LCC of a bus to a car on a product basis, nor can one compare a house to a school on a product basis. In VE all ideas can be compared on a LCC basis if all alternatives were defined to satisfy the same basic fiction or set of functions.

In addition to comparable functions, economic analysis requires that alternative choices be considered on the same:

(1)	Time Frame	(5)	Economic Conditions
(2)	Quantities	(6)	Market Conditions
(3)	Quality Level	(7)	Operating Conditions
(4)	Levels of Service		

The Economic Analysis Concept (Continued)

Life cycle cost analysis requires the knowledge of several basic economic concepts. One of these is the concept of equivalent costs to deal with time frame. Equivalent costs are typically developed by equating all costs to a common baseline using an "interest rate to adjust for variable expenditure years. One must also hold the economic conditions constant while the cost consequences of each alternative are being developed. . That is, the same economic factors are applied to each alternative using a uniform methodology.

Selection of Useful Life Parameters

A thirty year (SO) useful life is to be used unless otherwise specified on a case by case basis.

Discount/Interest Rate

A discount/interest rate of 10 percent is to be used unless otherwise specified.

Cost Elements

In performing LCC for a VE study the emphasis is on performing a comparative estimate rather than on developing a full budget estimate over the life span. This means that the VE team should identify, and quantify, only those elements of cost that they consider statistically significant in the decision making process. The applicable cost elements will vary with the item, system, or facility being studied. However, some of the types of costs to consider fall into the following three categories.

A. Initial Costs:

(1) Item Cost

These are costs to produce or construct the item.

(2) Development Cost

These are costs associated with design, testing, prototype, and models.

Cost Elements (Continued)

A. Initial Costs: (Continued)

(3) Implementation Cost:

These are costs expected to occur after approval of the idea such as: redesign, inspection, testing, contract administration, training, and documentation.

(4) Miscellaneous Cost

These costs depend on the item and include costs for owner furnished equipment, financing, licenses and fees, and other one-time expenditures.

B. Annual Recurring costs:

(1) Operation Cost:

These costs include estimated annual expenditures associated with the item such as for utilities, fuel, custodial care, insurance, taxes, other fees, and labor.

(2) Maintenance Cost:

These costs include annual expenditures for scheduled upkeep and preventative maintenance for an item to keep it in operable condition.

(3) Other Recurring Costs:

These include costs for annual use of equipment associated with an item as well as annual support costs for management overhead.

Cost Elements (Continued)

C. Nonrecurring Cost:

(1) Repair and Replacement Cost:

These are costs estimated on the basis of predicted failure and replacement of major system components, predicted alteration costs for categories of space related to the frequency of moves, and capital improvements predicted necessary to bring systems up to current standards at given points in time. Each estimated cost is for a specific year in the future.

(2) Salvage:

Salvage value is often referred to as residual value. Salvage value is an equivalent credit and is entered as a negative amount in the LCC calculation. Salvage value represents the remaining market value or use value of an item at the end of the selected LCC life span.

Recommended Approaches

The two most frequent methodologies used to calculate LCC are: 1) annualized costs, and 2) present worth costs. Both methods will arrive at an equivalent answer for selection of alternatives.

Present-Worth Method:

GSA recommends the use of the present worth method of Life Cycle Cost Analyses of competing alternative design solutions. The present-worth method requires the conversion of all present and future expenditures to a base line of today's costs. Initial costs are already expressed in present worth. Conversion tables are to be found in most VE and LCC textbooks for converting recurring and non-recurring costs into present-worth values.

Impact of Escalation:

Department of Energy guidelines for escalating future cost increases for fuel will be followed. This usually will result in a 3-5 percent differential escalation rate (e.g. above general inflation) for energy.

Economic Criteria:

The VE consultant shall itemize the economic criteria as part of each LCC analysis for reference in the final report of the VE study proceedings and results. The economic criteria shall clearly reference the values of key parameters and for all significant variables in LCC analyses.

Technical Guidelines

An LCC analysis should be undertaken when the VE recommendation has significant impact on future costs. It must be emphasized that the analysis need only cover those items which vary between options under consideration. Items in common can be ignored. Specific techniques are presented in Economic Analysis, VE and LCC textbooks and handbooks.

Following is a listing and description of current technical references (including computer programs) on life cycle costing:

LCC References:

1. Life-cycle Cost Manual for the Federal Energy Management Program, National Institute of Standards and Technology, Handbook 135 (revised 1991).

   Handbook 135 is a guide to understanding life-cycle costing and related methods of economic analysis as they are applied to Federal decisions. It describes the required procedures and assumptions, defines and explains how to apply and interpret economic performance measures, gives examples of Federal decision problems and their solutions, explains how to use the energy price indices and discount factors which are updated annually in the supplement (2), and provides worksheets and other computational aids and instructions for calculating the required measures.

2. Energy Prices and Discount Factors for Life-Cycle Cost Analysis, National Institute of Standards and Technology, (Annual Supplement to NIST Handbook 135 and NBS Special Publication 709), NISTIR 85-3273 (updated annually).

   This report, which is updated annually, gives the energy price and discount factor multipliers needed to estimate the present value and other future costs. The data are based on energy price projections developed by the Energy Information Administration of the U.S. Department of Energy. Request the latest edition.

3 The NIST “Building Life-Cycle Cost” (BLCC) Computer Program (version 3.1), National Institute of Standards and Technology, 1990.

   The NIST Building Life-Cycle Cost computer program (BLCC 3.1) provides economic analysis of proposed capital investments that are expected to reduce long-term operating costs of buildings or building systems. It is especially useful for evaluating the costs and benefits of energy conservation projects in buildings. Two or more alternative designs can be evaluated to determine which has the lowest life-cycle cost. Economic measures, including net return savings, savings-to-investment ratio, and adjudted internal rate of return can be calculated for any design alternative relative to the designated base case.

Technical Guidelines - continued

BLCC can be used for evaluating both Federal and private-sector projects. It complies with ASTM standards related to building economics as well as FEMP and OMB A-94 guidelines for economic analysis of Federal building projects. BLACC is designed to run on an IBM-PC or compatible microcomputer with approximately 840K of random access memory (RAM), with or without a hard disk. The BLCC program supersedes both the FBLCC and NBSLCC computer programs previously released by NIST (NBS).

4. DISCOUNT - A program for Discounting Computations in Life-cycle Cost Analyses (version 3.1), NISTIR 4513, National Institute of Standards and Technology, 1991.

   The DISCOUNT program computes discount factors and related present values, future values, and periodic payment values of cash flows occurring at known points in time. DISCOUNT is especially useful for solving life-cycle cost analysis problems which do not require the comprehensive summation and reporting capabilities provided by the BLCC program. DISCOUNT performs all of the functions of standard discounting tables, computing present values of periodic payments, periodic payments corresponding to present and future amounts, and corresponding discount factors. In addition, DISCOUNT computes the present value of periodic payments which increase at known rates projected by the U.S. Department of Energy for use in Federal life-cycle cost analyses. DISCOUNT provides the added flexibility of accepting non-integer discount rates, time periods, and escalation rates in its computations. DISCOUNT runs on most IBM-PC and compatible microcomputers with no special equipment requirements. The user's guide and reference manual is included on the program diskette.

   Both BLCC and DISCOUNT computer programs access DOE energy price projections from the same two disk files included with these programs (currently ENCOST92.SEQ and ENCOST92.RAN). These files are updated and released at the same time that NISTIR 85-3273, Energy Prices and Discount Factors for Life-Cycle Cost Analysis, is released each year. These disk files ensure that BLCC and DISCOUNT are compatible with computations performed using factors in NISTIR 85-3273.

5. PBS Facilities Standards Handbook (GSA HB PBS PQ100, Feb 28, 1992)

Chapter 8 Other Issues

Training and Education 8-3

Impact on Criteria Review/Development. 8-8

VE Study Participation by Facility Operating Personnel 8-8

Chapter 8 Other Issues

Training and Education

Training and education in value engineering for GSA-PBS staff and A-E consultants is encouraged. Improved understanding of VE will benefit the overall VE program both in terms of management and technical capability.

Numerous courses in VE are offered by private consultants. Attendance at these courses can be provided for through normal GSA-PBS channels. Information on available courses can be obtained from:

Society of American Value Engineers
National Business Office
60 Revere Drive, Suite 500
Northbrook, Illinois 60062

Phone: (708) 480-1730

An example of an agenda for a formal 40-hour VE training session follows:

Typical Training Agenda for a 40-Hour Value Engineering Training Workshop Course Curriculum

Day 1 Morning Session

1. Introduction to the Course
   - Individuals and backgrounds
   - Purpose of VE Training Workshop
   - Explanation of workbook
   - Agenda
2. Introduction to Value Engineering
   - History of Value Engineering
   - Current state of the art
   - Related concepts
3. The Value Engineering Job Plan
   - Job plan variations
4. Information Phase
   - What is it?
   - What does it cost?
   - Setting value objectives
   - Costing for value in construction
5. Explanation of VE Worksheets

Sample - Training Agenda

Day 1 Afternoon Session

6. Information Phase
   - VE Team assignments
   - Introduction of Training Project
   - Project time (review documents, drawings and cost estimates as a team)
   - Prepare cost models
7. The Functional Approach
   - Principles
   - FAST diagrams
   - Graphic function analysis
   - Project time (function analysis)

Day 2 Morning Session

- Principles
- FAST diagrams
- Graphic function analysis
- Project time (function analysis)

Day 2 Afternoon Session

8. Can Creativity be Taught?
   - How to create new ideas
   - How can creativity be improved
   - The barriers to creative thinking
   - What is brainstorming?
9. Creative Phase Idea Listing
   - Project time (idea generation and listing)

Sample - Training Agenda

Day 3 Morning Session

10. Evaluation Phase

- Idea list ranking
- Criteria weighting process
- Analysis Matrix
- How LCC enters the process
- Project time (complete idea evaluation)

11. Being Really Creative

- Creative Creations
- The effective use of study time
- Project time (add more ideas and evaluate)

Day 3 Afternoon Session

12. Life Cycle Costing

- What is it?
- How to work with it
- Its place in the VE study
- The effect of energy use on LCC

13. Development Phase

- Telling the story
- Selling the story
- Project time (writing proposals)

Sample - Training Agenda

Day 4 Morning Session/Afternoon Session

14. Development Phase (Continued)
    - Working with the cost estimates
    - Working with LCC
    - Pictures are worth a thousand words
    - Back up calculations/information
    - Project time

Day 5 Morning Session

15. Presentation Phase
    - Complete proposals and check details
    - Plan oral presentation of study results
    - Rehearse presentation
16. Report Phase
    - How to structure a report
    - The importance of an executive summary
    - Complete workshop training evaluation form (hand into instructor)

Day 5 Afternoon Session

17. Oral Presentations
    - Results of the VE study
    - Instructors comments
18. Conclusion
    - Presentation of Certificates
    - Adjourn

Impact on Criteria Review/Development

GSA-PBS governing criteria is subject to ongoing review, evaluation, updating and modification. The VE program offers a means of input into this process by feeding back the results of VE studies and VECPs. VE activities in the regions should be monitored by regional staff and Central Office staff for trends or patterns indicating that a criteria review should be done. The format for semi-annual VE program reports (Appendix D) provides a section for regional reporting of recommended criteria reviews.

Criteria issues appropriate for a VE based review may also arise through regional activities other than VE workshops. Regions are encouraged to submit any such issues in their semi-annual reports, or separately to the Central Office D&C VE program manager.

VE Study Participation by Facility Operating Personnel

When specific ideas and issues under consideration have obvious implications on facility operations, operating personnel should be consulted for advice and input to the study. The degree of participation by operating personnel in the study and the review of subsequent proposals should be determined by the PBS representative.

Appendix A

GSA Order PBS 8050.1C
Public Buildings Service
Value Engineering Program

GENERAL SERVICES ADMINISTRATION
WASHINGTON, D.C. 20405

PBS 8050.lC
August 14, 1991

GSA ORDER

SUBJECT : Public Buildings Service Value Engineering Programs

1. Purpose. This order serves to redefine and revise the Public Buildings Service (PBS) Value Engineering (VE) effort.

2. Cancellations. PBS P 8000.lA, PBS P 8020.lB, and PBS 8050.lB are canceled.

3. Background.

The PBS VE Program established in 1970. During the following 5 years the program was expanded in scope of application and developed into a Value Management (VM) Program with full-time employees performing VE analysis on PBS projects and programs. The VM Program was formally established in 1974.

b. A series of standard PBS value incentive contract clauses was developed in conjunction with the VM program, and was issued for use in 1978. Also in 1978, PBS issued a handbook, value Management (PBS P 8000.1A) of detailed instructions for operation of the VM Program. That handbook prescribed a heavily in-house oriented, resource-intensive VE process under a centralized management approach. The method of implementing VE studies in PBS has changed. In-house effort requiring GSA value specialists has been replaced by VE services contracted from private firms. Also, the previously issued value incentive contract clauses have been superseded by VE clauses provided in the Federal Acquisition Regulation (FAR) and General Services Acquisition Regulation (GSAR).

c. Throughout its history in PBS, practical application of VE has been predominantly on major design and construction (D&C) projects. The GSA HB, Architect-Engineer and Construction Management Value Management Services (PBS P 8010.1), was issued specifically for the D&C program. This handbook established requirements for obtaining contract VM services and provided related administrative guidelines. The D&C handbook contains dollar thresholds and other requirements that are no longer valid in the current environment and need revision.

d. There has recently been a renewal of emphasis on VE in the Federal Government. OMB Circular A-131, Value Engineering, dated January 26, 1988, requires all Federal agencies to establish and

Distribution: Pl; P2: P3: F: RP(10, 20, 30): WP(10, 20, 30)

improve their use of VE Programs in all applicable areas, including€ all major systems as defined by Public Law 93-400 (41 U.S.C. 403).€ The implementing GSA order, GSA Value Engineering Program€ (ADM 8030.lA), requires the establishment or improvement of agency€ VE Programs in all GSA offices having programs and procurements€ which lend themselves to the conduct of VE studies. The GSA order€ also establishes a GSA VE Program Director in the Office of the€ Associate Administrator for Acquisition Policy (v), and requires€ each GSA service to appoint a VE Program Director.€

4. Nature of revisions. This revision does the following:

a. Disestablishes VM councils:

b. Disestablishes VM boards:

c. Eliminates outdated VE contract clauses:

d. Provides guidance for redirection of PBS VE effort under a decentralized management approach:

l. Defines the role of the PBS VE Program Director:

f. Modifies the applicability of the GSA HB; Architect-Engineer and Construction Manager Value Management Services (PBS P 8010.1): and

g. Requires appointment of VE Program Managers with full authority end responsibility to establish, Implement and maintain VE Programs for all PBS operational areas suited to VE application.

5. Definitions.

a. Value Engineering. An organized effort directed at analyzing the functions of systems, equipment, facilities, services, end supplies for the purpose of achieving the essential functions at the lowest life cycle cost consistent with required performance, reliability, quality, and safety.

b. Value Engineering Change Proposal (VECP). A change proposal that is submitted by a contractor under a value engineering incentive or program requirement clause included in a Federal contract.

c. Value Engineering Proposal (VEP). A change proposal developed by employees of the Federal Government or contractor value engineering personnel under contract with the agency to provide value engineering services for the contract or program.

d. Life Cycle Cost (LCC). The summation of all costs over the useful life of a building, system or product. It includes all

relevant costs to the Government to acquire, own, operate, maintain and dispose of a building, system or product war a specified period of time, less any salvage value.

6. Goal and objectives. The goal of the PBS VV effotr is to obtain maximum value for funds expended war the life cycle of systems. equipment, facilities, services and supplies. recognizing that the potential savings are generally greater during the early phases of project/program development. The related objectives are to:

a. Increase awareness and application of VE as a cost management tool:

Extend available resources (financial, personnel, material) by eiminating nonessential costs:

c. Improve operating efficiency by application of LCC analysis in the development of projects and programs:

d. Instill the concepts and methodology of VE in PBS managers and technical staff:

e. Emphasize the advantages of VE in the planning, development and design stages of projects or programs, whereby the Government receives full benefit of optimum savings opportunities (as opposed to shared savings with contractors); and

f. Encourage full application and use of value engineering provisions in PBS contracts.

7. Program management.

a. PBS VE Program Director. The Commissioner, PBS, has appointed a PBS VE Program Director, as required by ADM 8050.lA. The responsibilities of the PBS VE Program Director are to:

(1) Promote the use of VE and monitor its application throughout PBS :

(2) Provide management guidance to Assistant Commissioners on the establishment, implementation and maintenance of VE Programs; and

(3) Consolidate summary VE Program data from all PBS offices for reporting to the GSA VE Program Director.

b. VE Program Managers. The Assistant Commissioners, Offices of Planning (PL), Real Property Development (PQ), Real Property Management and Safety (PM), Governmentwide Real Property Policy and Oversight (PG), PBS Information Systems (PK), Physical Security

and Law enforcement (PS) will identify operational areas within€ their offices which are suited to application of VE, in accordance€ with the provisions of the GSA Order ADM 8030.lA. and appoint VE€ Program Managers to establish, implement and maintain VE Programs€ for identified operational areas. Names and telephone numbers of€ VE Program Managers will be reported to the PBS VE Program€ Director . Appointments will be updated as necessary. The€ authorities and responsibilities of the VE Program Managers are to:€

(1) Establish a VE Program tailored to the mission and organizational structure of the office involved.

(2) Emphasize, through training, evaluation, and other programs, the potential for VE to reduce unnecessary costs.

(3) Establish criteria and guidelines to identify those programs and projects that are most appropriate for VE studies. The criteria and guidelines should recognize that the potential savings are generally greatest during planning, design and other early phases of project/program development.

(4) Require that files be documented to explain why VE studies were not performed or required for any programs/projects meeting the established criteria.

(5) Establish guidelines to evaluate and process value engineering proposals.

(6) Develop and issue, through the Assistant Commissioners, regional guidelines for administration of VE Programs . Receive, assemble and forward to the PBS VE Program Director, data on resources expended and results achieved through VE.

c. Controller (PF). The Controller will ensure that funds and full-time equivalents (FTE) necessary for operating VE Programs are included in annual budget requests. The controller will disseminate guidance from the Office of the Comptroller (B) on funding for VE staffing, awards, training, and on the disposition of savings from contract and internal VE Programs. The Controller will assist the VE Program Managers with development and administration of VE training programs.

d. Assistant Commissioner for Procurement (PP). With support as necessary from the program offices identified in subpar. 7b, the Assistant Commissioner for Procurement will develop and issue guidance to ensure that all affected PBS contracting officers and their duly authorized representatives:

(1) Ensure that appropriate VE provisions are included in contracts associated with planning, development and design stages of projects or programs.

(2) Actively elicit soundly based VECPs from contractors.

(3) Promote VE through contractor meetings and the dissemination of promotional and informational literature regarding VE provisions of contracts.

(4) Recess VSCPs in a timely manner and document contract files when it takes more than 45 days to accept or reject a VECP.

(5) Document contract files to explain the rationale for accepting or rejecting VECPs.

(6) Use the VE clauses provided in the FAR and/or GSAR for appropriate supply, service, architect-engineer and construction contracts.

e. Assistant Regional Administrators for PBS. The Assistant Regional Administrators for PBS will:

(1) Ensure that regional PBS Divisions and staff offices comply with VE Program guidance issued by the controller and Assistant Commissioners in accordance with Subpars. b., c. and d. above.

(2) Ensure regional compliance with reporting requirements provided in par. 9, below.

8. VE guidance for D&C projects. The GSA HB, Architect-Engineer and Construction Manager Value Management Services (PBS P 8010.1) will be canceled upon issuance of new documents currently under development. For the interim, the provisions of the current handbook are to be treated as optional guidance only. Regional D&C program managers should tailor VE requirements to individual projects based on the general guidance contained in this order, with appropriate adjustments to the specific requirements in the handbook. All references in the handbook to other directives canceled by this order should be disregarded. No design phase VE services are required on D&C projects which fall below the prospectus construction dollar threshold prescribed by Section 7 of the Public Buildings Act of 1959, as amended (40 U.S.C. 606).

9. Reporting requirements.

a. Each VE Program Manager must submit periodic summary reports on their VE Program to the PBS VE Program Director. VE program managers are required to maintain documentation supporting their summary reports. Reports must be submitted by April 10 for the preceding 6-month period of October 1 through March 31 and by October 10 for the preceding l-year period of October 1 through September 30.

b. Each report must include:

(1) The estimated total amount of funds invested in VE during the fiscal year and the estimated amount of return on investment for An-house or contractor VE efforts, if available,

(2) The total VE savings achieved during fiscal year:

(a) Savings achieved by In-house staff.

(b) Savings generated by contractors.

(3) The number of employees assigned to value engineering work:

(a) Number of employees dedicated full time to VE.

(b) Number of FTE used on VE activity.

(4) Number of employees receiving 8 hours or more of VE training durinng the fiscal year;

(5) Number of VE proposals received during the fiscal year, number of these proposals wholly or partially accepted, and number still pending at the end of the reporting period: and

(6) Any other VE Program data that may be requested.

10. Resources . The VE Programs outlined in this order must be initially implemented within currently available resource allocations. PBS program offices planning to establish new or expand existing VE programs in response to this Order should include related resources in their annual budget requests. Implementation plans should accommodate the 2-year lead time inherent in the PBS budget cycle. VE activities that are not inherently governmental should be contracted if the necessary VE capability is not available in-house.

11. Implementing actions. The PBS Assistant Commissioners, Controller. and Assistant Regional Administrators shall initiate all actions necessary to implement this order.

WILLIAM c. COLEMAN
Commissioner
Public Buildings Service

Appendix B

Suggested Value Engineering Procedures

Appendix B

Suggested GSA/PBS Value Engineering Procedures

Value Engineering (VE is a structured, function oriented approach to cost control which yields savings and/or improved value without compromising quality, performance or usefulness.

The main goal of a VE effort is to supplement the A-Es work on the project in order to arrive at improved value and a better end product. VE offers a systematic approach for searching out high cost areas in a design and arriving at the best balance between cost, performance and reliability and other key issues of the project. It is not a design review but rather an in depth cost study based on achieving the required program and functions at the lowest life cycle cost (LCC).

This material provides recommended procedures for conducting VE studies for GSA-PBS. The contents are as follows:

Section 1

1. Preparation for the VE Workshop:

1.1 Overview

1.2 Coordination Meeting

1.3 Technical & Cost Data

1.4 VE Team composition and Logistical Arrangements

1.5 Cost Estimates

1.6 Cost, Energy and Life Cycle Cost Models

Section 2

2. The VE Workshop

2.1 VE Job Plan

2.2 Information Phase & Function Analysis

2.3 Speculative/Creative Phase

2.4 Evaluation/Analytical Phase

2.5 Development/Recommendation Phase

2.6 Report Phase

Suggested GSA/PBS Value Engineering Procedures (continued)

Section 3

3. Post Workshop Activity

3.1 Review of the VE Report

3.2 Final VE Implementation Summary Report

Section 4

4. Reference Material

4.1 Sample Workshop Agendas

4.2 Sample Report Format

4.3 Sample Worksheets

Section 1- Preparation for the VE Workshop

1.1 Overview

The success of the overall VE study depends heavily on the organization and management of the pre-workshop activity. During the preparation for the VE workshop, the following activities should be accomplished in the general sequence listed below:

- A coordination meeting between the PBS representative, A-E and value engineering team coordinator (VETC).
- Accumulation of the project's technical and cost data.
- Confirmation of the composition of the VE team and logistical arrangements for the VE workshop.
- Preparation of initial cost, energy, and life cycle models.
- Distribution of the technical and cost data to VE team members.

1.2 Coordination Meeting

The VETC will conduct a meeting with the PBS representative, A-E, and CM at the beginning of the pre-workshop activity of each workshop. The meeting is intended to promote a common level of understanding about the objectives and constraints of the VE workshop, establish a productive working environment, confirm the schedule of events, and coordinate the handling of material. Items discussed during the meeting would include the availability and format of technical and cost data, agenda of the VE workshop, processing of the VE recommendations, plus the date, location, and other logistical arrangements for the VE workshop.

1.3 Technical and Cost Data

The A-E should supply the project data to the VETC at least two weeks before the VE workshop to allow sufficient time for review and development of the VE study models.

The technical data consist of the functional space program, engineering reports, design calculations and all current drawings and specifications. The cost data consist of construction cost estimates and any special cost studies.

Material Required for the Concept Workshop:

The purpose of the Concept Phase of design is to establish basic design approaches such as building massing, fictional relationships, space allocations and schematic layouts. In addition, basic building systems concepts should be established as well as any special requirements including environmental, safety and historic preservation.

Material to be submitted by the A-E to the VETC should typically include:

- Initial phasing/scheduling plans
- Functional space program
- Gross and occupiable area analysis
- Drawings including block layouts, building siting, preliminary elevations and sections
- Narrative descriptions of major building systems and basis of design
- Renderings, perspectives and model photographs
- Special studies, statistical reviews and calculations
- Boring logs, soil reports or preliminary analysis
- Preliminary narrative specifications
- Cost estimate and cost studies
- Utility rate guidelines
- Planned building operating profile
- Utilities available to site

Normally two sets of all drawings/graphic material and two copies of the cost estimate are required. One copy of other material is normally sufficient.

1.3 Technical and Cost Data (Continued)

Material Required for the Tentative Design Phase Workshop

The purpose of Tentative Phase of Design is to establish final layouts and appearance of the facility and to determine major building system selections. Most special requirements should be finalized or under study and approaching completion.

Material to be submitted by the A-E to the VETC should typically include:

- Drawings including architectural, civil/site, structural, mechanical and electrical
- Preliminary specifications
- Preliminary phasing/scheduling plans
- Design calculations
- Boring logs and soil reports
- Gross and occupiable areas analysis
- Utility rates
- Energy studies
- Life cycle cost studies
- Building operating profile
- Construction cost estimate
- Construction market survey

Normally two sets of drawings, specifications and cost estimates are required. One copy of other material is normally sufficient.

1.4 VE Team Composition and Logistical Arrangements

The final selection of the VE team members should be accomplished by the VETC after a detailed review of the project's technical data. Special disciplines required and the degree of participation of standard disciplines should also be finalized.

Once the VE team(s) selection is finalized, the VETC should distribute selected technical and cost data to each team member for a brief review prior to the workshop. The pre-workshop review should typically allow for 2 to 4 hours per team member. This review is intended to briefly familiarize the participant with the project.

1.4 VE Team Composition and Logistical Arrangements (Continued)

The VE workshop should be located at a site which is mutually agreeable with the PBS representative, A-E, CM, and VETC. A location in reasonably close proximity to the A-Es office is usually desirable. A site visit prior to the start of the workshop is also often beneficial for the VETC and selected VE team members especially for reconstruction projects or those projects with significant site restraints.

Arrangements for the VE workshop facilities should be made with the following considerations in mind:

- The location should isolate the team members from their normal on-going activities and promote interaction of the team members throughout the study.
- Room size should beat least 50 SF per team member.
- The facilities should be well lighted with ample working space. The amenities should include a large table for each team member plus access to telephone and copy services.
- A mini-computer with appropriate software and peripherals may be required. Terminal access to remote ADP capability may also be needed for accessing automated cost estimating services. If some of the design documentation is CAD-based, one or more CAD workstations may be needed.
- Blackboards and/or flip charts should be provided.

1.5 Cost Estimates

The availability of accurate and comprehensive cost data is an essential element in the success of all VE studies. The VE team uses cost data as its primary tool for establishing potential study areas and evaluating alternative ideas.

Estimates by the A-E as well as any review comments by the CM are required to follow existing GSA-PBS guidance. Information, quantities, unit costs and pricing assumptions should be clearly delineated. The project schedule and contemplated escalation should likewise be clearly defined.

Any special cost studies should also be reviewed.

1.6 Cost Energy and Life Cycle Cost Models

In VE studies, the cost and energy data are organized in a manner to facilitate rapid analysis and identification of high cost systems or components. This is accomplished by assembling the cost and energy data in the form of models. The VETC typically prepares the cost, energy and life cycle models with the assistance of a cost estimator prior to the VE workshop. The preparation of a cost model is always required. The need for energy and life cycle cost models will be determined on a project by project basis.

Cost Model:

A cost model is a VE study tool which presents both estimated and target construction costs distributed by subsystem or fictional area. The target cost is determined during the VE workshop since it represents the VE team's estimate of the least cost to perform the function of each subsystem or functional area. The past experiences of team members and historical cost data serve as the basis for developing the target costs. The target costs represent the least possible cost for each subsystem or functional area. The target cost can be a historical average value or the worth. Large differences between estimated costs and target costs highlight areas with potential for large cost savings or value improvement.

Energy Model:

Energy optimization is one of the goals of a VE study. To achieve this goal, the VETC can assemble an energy model for the VE team to use in a similar manner as the cost models. Energy models present displays of energy consumption for the facility subsystem or fictional area. The models typically express energy in units of KWH per year. As in the cost model, target energy consumption estimates are assigned to each area by the VE team during the workshop. The target estimates represent the least possible energy consumption for each subsystem or fictional area based on historical energy data and the VE team's experience.

The energy model is not intended to provide a precise projection of energy demand or cost. Its primary purpose is the rapid identification of energy intensive areas which offer a high potential for energy reductions and cost savings.

1.6 Cost, Energy and Life Cycle Cost Models (Continued)

Life Cycle Cost Model

A life cycle cost (LCC) model can be prepared to illustrate the total cost of ownership. The LCC model provides a complete cost picture and can serve as a baseline for the VE team's determinations of the cost impacts of VE recommendations.

The interest or discount rate used to prepare LCC models should be an appropriate value established by the PBS representative, the A-E, and VETC.

Life cycle cost models are useful for energy and operational intensive facilities such as laboratories or computer processing centers.

Section 2- The VE Workshop

2.1 VE Job Plan

The VE workshop is the major component of a VE study. The systematic methodology used by the VE team to accomplish the workshop is called the VE Job Plan. It should be noted that throughout the field of value engineering there are variations in the titles for these phases. However, despite these variations in terminology, all job plans represent the same basic methodology.

Use of the Job Plan assists the VE team in a number of ways:

- It is an organized approach which allows the VE team to analyze a project by quickly identifying high cost to worth areas and selecting alternatives which minimize costs while maximizing quality.
- It encourages the VE team to think in a creative manner, i.e., to look beyond the use of common or standard approaches.
- It emphasizes total ownership costs (life cycle costs) for a facility, rather than just initial capital costs.
- It leads the VE team to develop a concise understanding of the purposes and functions of the facility.

The suggested VE Job Plan consists of the following five distinct phases:

1. Information Phase
2. Speculation/Creative Phase
3. Evaluation/Analytical Phase
4. Development/Recommendation Phase
5. Report Phase

The five VE Job Plan phases from the Information Phase through the oral presentation of the VE team recommendations in the Report Phase are normally performed during a VE workshop.

It should be noted that for workshops whose duration is only one day the formal VE job plan is compressed as maybe necessary.

2.2 Information Phase

During the Information Phase, the VE team solicits comments on the technical and cost data to develop an overall understanding of the project's functions and requirements. Most of the data, including the cost and energy models, will have been reviewed by the VE team members prior to the workshop. The Information Phase occurs during the morning of the first day of the workshop.

An oral presentation by the PBS representative, user agency, A-E and CM on the first morning of the workshop provides the VE team with an understanding and appreciation of the factors that have influenced the project's design. This oral presentation serves to open the lines of communication between the VE team members, PBS, and the A-E. It allows the A-E to expose the VE team to the difficulties encountered during the design of the project.

The oral presentation should include a description of the rationale, evolution, constraints and alternatives, for the major design components. The quality and organization of the data presented are important since these factors directly impact the usefulness of the VE recommendations.

It is important for the VE team to understand the A-E's rationale for the project's development, including the assumptions used to establish the design criteria and select the materials and systems. The VE team should identify and review the alternatives considered by the A-E.

For a Concept Design Phase workshop the A-E, CM and PBS are expected to provide a full time workshop attendee. This is necessary because the background and rationale of project decisions are important considerations during a Concept Phase review and this is not always easily communicated in the documents. It is the VETC's responsibility to assure that the input of the A-E, CM and PBS representative is positive and contributes to better communication.

For a Tentative Design Phase workshop, the A-E, CM and PBS representative are expected to attend only the initial presentation and final presentation of results on the last day of the workshop.

2.2 Information Phase (Continued)

Function Analysis:

Function analysis is the cornerstone of value engineering since it separates VE from direct cost reduction techniques. The function analysis approach is used in value engineering to arrive at the basic purpose of building systems and sub-systems. It aids the VE team in determining the least costs to perform primary functions and peripheral or support functions and identifying costs which can be reduced or eliminated without affecting the performance or reliability of the facility.

Functions are identified by a two word verb-noun description. The verb is an *action verb* and the noun is a *measurable noun. As an* example, the function of an electric cable is to "conduct current." "Conduct" is the action verb and "current" is the measurable noun. Other examples are to "support load,"" contain heat" and" provide access."

The basic function of an item is the specific task or work it must perform. Secondary functions are those functions that may be desired but are not actually required to perform the specific task or work. Required secondary functions are absolutely necessary to accomplish the specific task or work, although they do not exactly perform the basic function.

The following is a list of questions which are helpful in determining the functions of an item:

1. What is its purpose?
2. What does it do?
3. What is the cost?
4. What is it worth?
5. What alternative would accomplish the same function?
6. What would that alternative cost?

In function analysis, it is important to identify functional areas sequentially since the functions vary according to the selected area. For example, the function of the total facility would be established before functions are established for the building elements.

2.2 Information Phase (Continued)

Function Analysis: (Continued)

The most difficult part of the function analysis is establishing an estimate of the worth of each subsystem or component for comparison with its estimated cost. Since worth is an indication of the value of performing a specific function, extreme accuracy in estimating the worth is not critical. Worth is merely used as a mechanism to identify areas of high potential savings and value improvement. Subsystems performing secondary functions have no worth because they are not directly related to the basic function. As an example, an access road to an office building does not provide the primary function of housing people even though the road may provide a required secondary function for the facility. Thus, the road is an area to examine for potential savings without affecting the basic function of the facility.

Value engineering looks for alternatives to the original design that might effectively increase the value and or reduce the cost of the project. Alternatives may be developed by asking the basic question, "What else will perform the essential function, and what will it cost?" The alternatives for performing a function identified in determining worth often become part of the creative idea listing for the function.

A function analysis would be completed as follows:

1. Identify the study area.
2. Identify the basic verb/noun function of the study area.
3. List the component parts of the study area.
4. List the verb/noun function of each component and subcomponent.
5. Identify whether each function is basic, secondary, or a required secondary function.
6. Identify the estimated construction cost of each fiction.
7. Speculate on the worth or the least cost to accomplish the function.

2.2 Information Phase (Continued)

Function Analysis: (Continued)

As part of the function analysis, the VE team makes a comparison of the cost-to-worth ratios for the total facility and its subsystems. These cost-to-worth ratios are obtained by dividing the estimated cost of the system or subsystems by the total worth for the basic functions or the system or subsystem. High cost-to-worth ratios suggest areas of large potential cost savings and identify systems or subsystems which would be selected for further study by the VE team. Similarly, low cost-to-worth ratios indicate areas where further study efforts would probably not be justified due to diminished potential for cost savings. Cost-to-worth ratios greater than two usually indicate areas with the potential for substantial cost savings and value improvement.

Fast Diagramming:

FAST is an acronym for Function Analysis System Technique. It is tool that graphically shows the logical relationship of the functions of an item, subsystem, or facility. The FAST diagram is a block diagram based on answers to the questions of “Why?” and “How?” for the item under study.

A FAST diagram is most appropriately used on complex systems as a road map for clear delineation of the basic and secondary functions of a particular system.

FAST diagraming may be used to augment the function analysis portion of the Information Phase and is often most useful in delineating fictional space program issues.

Most VE textbooks contain a detailed description of the FAST diagraming process.

2.3 Speculative/Creative Phase

The Speculative/Creative Phase is a group interaction process which the VE team uses to identify alternative ideas for accomplishing the function of systems or subsystems associated with specific study areas. This phase involves an open discussion without any restrictions on the imagination or inventive thinking of individual team members. All analysis, evaluation, or judgement of the ideas generated is delayed until the Evaluation/Analytical Phase.

The ideas should be listed by system, subsystem, and component to facilitate effective organization of the study. The objective of the Speculative/Creative Phase is to generate a completely free interplay of ideas between team members to create an extensive list of alternative ideas for later evaluation. *The key to successful results is the deferral of any critical judgments or comments which might inhibit any of the team members.*

The active participation of all team members must be encouraged in the creative development of ideas. The VETC is responsible for maintaining a climate for the free exchange of ideas by directing the team members away from discussion or arguments about relative merits of individual ideas.

The following points should he considered during the Speculative/Creative Phase.

1. When team members believe that improvement can be made to the project, they will work to achieve it.
2. There is always room for improvement in a project. Most A-E's will have ideas for improving their project after observing its construction.
3. The word "impossible" should be eliminated from the team's thinking. The synergistic effect of free flow of information generated by a multidisciplined team can create extraordinary results.
4. Encourage all participants to share all ideas with the group, even if they seem extremely unconventional. After initial consideration, those ideas that are too frivolous or far-fetched to merit further serious study can be discarded. (Use the rule of "common sense".)

2.3 Speculative/Creative Phase (Continued)

5. Develop as many ideas as possible. This stimulates the creative ability of team members.

6. Look for associations of ideas. Often a function can be performed by a technique currently applied to another area or industry.

7. Ask questions which elicit information based on the knowledge and experience of team members.

8. Record all ideas as they are developed rather than risk forgetting them,

2.4 Evaluation/Analytical Phase

During the Evaluation/Analytical Phase, the ideas developed in the Speculative/Creative Phase are examined to assess which have the best opportunity for implementation, cost savings, and value improvement. The VE team evaluates the feasibility of each idea by identifying its advantages and disadvantages. The ideas are then rated on a scale of one to ten. A ten represents either the best technical idea or the one with the greatest potential for cost savings and value improvement.

In ranking ideas, the VE team should consider the following

- Are the aesthetic, performance, quality and reliability requirements met or exceeded?
- Will excessive redesign or project delay be created?
- Is there improvement in operation and maintenance?
- Will life cycle cost savings be achieved?
- Does the idea have a reasonable chance of acceptance and implementation?

The ideas with the highest ratings are selected by the VE team for more detailed investigations in the Development/Recommendation Phase.

2.5 Development/Recommendation Phase

In the Development/Recommendation Phase, the best ideas from the Evaluation/Analytical Phase are developed into workable VE proposals. The VE team researches and develops preliminary designs and life cycle cost comparisons for the original designs and the proposed alternative ideas.

During this phase, the technical expertise of the team becomes very important. Frequently, it is necessary to consult outside experts, vendors, and reference sources to obtain additional evaluation information before developing the VE proposals.

The development of an idea into a proposal should include the following steps:

1. Description of the original design and the alternative idea.
2. Sketch of the original design and the alternative idea.
3. Discussion of the advantages and disadvantages of the alternative idea including its impact on life cycle costs and other key facility issues.
4. Preparation of a cost estimate and a life cycle cost analysis if necessary, for the original design and the alternative idea.
5. Recommendation of preferred approach.

It is important that the VE team be able to convey the concept of each VE proposal in a clear and concise manner to avoid its rejection due to a lack of understanding by the A-E or PBS. In preparing VE proposals, it is helpful to view them from the A-Es perspective for value, reliability, cost effectiveness and implementation.

In the development of the VE proposals, each alternative idea should be presented as a single independent VE recommendation. Ideas should not be grouped together into a proposal unless there is a technical advantage to doing so. This procedure assures each recommendation will be reviewed on its own merit.

2.6 Report Phase

The Report Phase consists of both an oral and written presentation of the results from the VE study.

Oral Presentation:

The VE proposals are presented by the VE team in an oral presentation on the last day of the VE workshop. The oral presentation should be a relaxed and informal meeting which lasts approximately one to three hours. The presentation provides an opportunity for the PBS representative and the A-E to discuss the VE proposals with the VE team.

The VETC should start the presentation with an overview of the VE study and a summary of the VE proposals including the potential cost savings. The major factors which influenced the study would be highlighted by the VETC. This presentation would be followed by a brief description of each VE proposal. The PBS representative and A-E should seek only to understand the concept and background of each proposal during the oral presentation. They should delay detailed discussions on the merits of the proposals.

A summary of the VE proposals should be provided to the PBS representative and A-E during the oral presentation so they can commence their review and analysis prior to the receipt of the VE report.

VE Report:

The VE consultant prepares a written report which summarizes the results of the entire VE study. This report is used by the PBS representative and A-E in their review and evaluation of the VE proposals. The report should be prepared and submitted within one to two weeks following the workshop to avoid delaying the project's design. Since the VE report stands alone as an independent document, it should contain at least the following information:

1. Executive summary
2. Project name and general description and summary fictional space program
3. Scope of the VE study
4. Names of the PBS representative, the A/E, the CM and VE team members and their related responsibilities

2.6 Report Phase (Continued)

VE Report: (Continued)

5. Location and date of the workshop
6. List of the data provided by the A-E
7. Project objectives and constraints
8. All cost, energy, and life cycle models, and worksheets from the Job Plan phases.
9. Summary of VE proposals and cost savings
10. Specific VE proposals with supporting documentation
11. Appendix with additional information which the VETC may find appropriate

Reports which result from one day workshops will still contain the required elements but in a compressed and condensed form.

Section 3- Post-Workshop Activity

3.1 Review of the VE Report

The post-workshop VE activity involves a thorough review and evaluation of each VE recommendation presented in the VE report and the preparation of the VE implementation summary acceptance by the A-E.

The PBS representative and A-E evaluate each VE proposal on the basis of technical, operational, and life cycle cost savings considerations and may consult with the VETC to clarify any questionable items which arise during their review of the VE proposals. An in-depth evaluation of each VE proposal provides the best basis for reaching a sound decision to accept or reject.

3.2 Final VE Implementation Summary Report

Once all the VE proposals have been reviewed, this report is prepared by A-E to summarize the results of the action taken on each of the VE proposals. The VE implementation summary report and the VE report serve as the complete documentation for the VE study. Separate sets of reports must be prepared for each VE study conducted on a project.

Accepted VE Proposals:

The acceptance of a VE proposal requires no justification in the VE implementation summary report. Such action requires only a statement of acceptance. When certain elements of a VE proposal are acceptable and other elements of the proposal are unacceptable, a justification should be provided for only the rejected portion of the proposal. The A/E may also modify a VE proposal before incorporating it into the design. These modifications would be described in the VE implementation summary report.

Rejected VE Proposals:

Each rejection of a VE proposal must be supported by valid reasons which are specifically detailed in the VE implementation summary report. Reasons should be based on sound technical analysis. When rejection is based on an opinion, it must be clearly stated as such.

In the VE implementation summary report, the specific reasons for the rejection or partial rejection of individual VE proposals must be stated in sufficient detail to convince PBS and the user agency of the validity of the rejection. For example, the reasons for rejecting a proposal on the basis of safety would explain how and why the proposals would create an unsafe condition.

3.2 Final VE Acceptance Report

Contents of the Final VE Implementation Summary Report:

The VE implementation summary report should include:

- A brief description of the project, the scope of the VE efforts, and the timing of the study.
- A summary list of the accepted and rejected VE proposals. Identification numbers from the original VE report should be carried forward.
- An implementation schedule for incorporating the accepted proposals into the design.
- An analysis by the A-E of the value improvement effect of VE proposals. This can be done in a summary form or by individual proposal(s).

Section 4- Reference Material

4.1 Sample Workshop Agendas

Attached are samples of suggested agendas:

- One day workshop
- Three day workshop
- Five day workshop

These agendas are intended as guidelines for specific agendas to be prepared by the VE contractor.

Sample - 1 Day Agenda

VE Review Workshop (8 hours participation required)

Day 1

- **Orientation**
  - VE team leader distributes project workbooks and information, reviews scheduling, purpose and methodology of study with VE team.
- **Information Phase**
  - project briefing by PBS representatives and Fee A-E design team members.
- **Creative Phase**
  - VE team brainstorms alternative ways to improve function and value of project design and design construction; lists ideas.
- **Evaluation Phase**
  - VE team evaluates ideas for achieving improved value.
- **Development Phase**
  - VE team develops Value Engineering review proposals from idea listings.
  - VE team develops range of cost savings potential for each idea proposed and identifies LCC benefits where appropriate.
  - VE team completes review evaluation.
- **Conclusion**
  - VE team leader collects all worksheets

Sample - 3 Day Agenda

VE Review Workshop (24 Hours Participation Required)

Day 1

- **Orientation**
  - VE team leader distributes project workbooks and information, reviews scheduling, purpose methodology of study with VE Team.
- **Information Phase**
  - Project briefing by PBS representatives and fee A-E design team members. Function analysis and Cost Model Review.
- **Creative Phase**
  - VE team brainstorms alternative ways to improve function and value of project design and design construction.

Day 2

- **Evaluation Phase**
  - VE team evaluates ideas for achieving improved value and identifies those to be developed into proposals for cost savings and LCC benefits.
- **Development Phase**
  - VE team develops proposals for cost savings. Development consists of the following
  - Description of the original design with sketches if considered necessary to support narrative.

    Description of the proposed changes with sketches if considered necessary to support narrative.
  - List of advantages and disadvantages.
  - Cost estimate of both designs for comparison.
  - LCC Analysis to be performed (i.e. energy, maintenance, reduced staffing, etc. that will improve the facility value long term).

Sample - 1 Day Agenda

VE Review Workshop (24 Hours Participation Required)

Day 3

- Development Phase (continued)
  - VE team completes development of all proposals to be included in VE study report.
  - Concentrate on completing narratives, sketches and supportive discussion sections (Cost & LCC will be added afterwards if not completed during study session).
- **Conclusion**
  - VE team leader collects all VE proposals and team member worksheets required for the VE study report.
  - Presentation of results to PBS representative and A-E.

Sample - 5 Day Agenda

VE Review Workshop (40 Hours Participation Required)

Day 1

- **Orientation**
  - VE team leader distributes project workbooks and information, reviews scheduling, purpose methodology of study with VE team.

  Information Phase
  - Project briefing by PBS representatives and fee A-E design team members. Review of Cost Model. In depth Function Analysis preparation.

Day 2

- **Creative Phase**
  - VE team brainstorms alternative ways to improve function and value of project design and design construction.
- **Evaluation Phase**
  - VE team evaluates ideas for achieving improved value and identifies those to be developed into proposals for cost savings and LCC benefits.

Day 3

- **Evaluation Phase**
  - Complete review and ranking of ideas.

Sample - 5 Day Agenda

VE Review Workshop (40 Hours Participation Required)

Day 3

- **Development Phase**
  - VE team develops proposals for cost savings. Development consists of the following
  - Description of the original design with sketches if considered necessary to support narrative.
  - Description of the proposed changes with sketches if considered necessary to support narrative.
  - List of advantages and disadvantages.

    Cost estimate of both designs for comparison.
  - LCC Analysis to be performed (i.e. energy, maintenance, reduced staffing, etc. that will improve the facility value long term).

Day 4

- **Development Phase (continued)**
  - VE team completes development of all proposals to be included in VE study report.
  - Concentrate on completing narratives, sketches and supportive discussion sections (Cost & LCC will be added afterwards if not completed during study session).

Day 5

- **Conclusion**
  - VE team leader collects all VE proposals and team member worksheets required for the VE study report.

Section 4- Reference Material

4.2 Report Format

Attached is a sample Table of Contents for a suggested report format.

Sample Federal Building
Washington, DC
March 9,1992- March 13,1992

Table of Contents

Section	Description	Page Number
	Table of Contents	#
	List of Figures and Tables	#
I	**Executive Summary**	#
II	**Introduction**	#
	2.0 General	
	2.1 The Value Engineering Team	
	2.2 Project Design Team	
III	**Project Description**	#
	3.0 General	
	3.1 Space Scheduling	
	3.2 Scope of Work	
	3.3 Phasing of Work	
	3.4 Completion of Work	
	3.5 Floor Plans and Details	
	3.6 Cost Estimate	
IV	**Value Engineering Analysis Procedure**	#
	4.0 General	
	4.1 Pre-Study Preparation	
	4.2 Estimate Review	
	4.3 Cost Model	
	4.4 Economic Factors	
	4.5 VE Workshop Phase	
	4.6 Post Study Procedure	

Sample Federal Building
Washington, DC
March 9,1992- March 13,1992

Table of Contents (continued)

Section	Description	Page Number
V	**Summary of Results**	#
	5.0 General	
	5.1 Order of Proposals	
	5.2 Summary of Proposals	
	5.3 Level of Redesign	
VI	**Appendices**	#
	A Cost Model Backup Data& Cost Breakdown Analysis	#
	B. Creative Phase or Evaluation Phase	#
	1. Function Analysis Worksheets	
	2. Idea Listing Worksheet	

Sample Federal Building
Washington, DC
March 9,1992- March 13,1992

List of Tables and Figures

List of Tables

Table	Description	Page Number
5-1	Summary of Potential Cost Savings	#

List of Figures

3-1	Housing Plan	#
3-2	Building Stacking Plan	#
3-3	Site Plan	#
3-4	Floor Plan - Basement	#
3-5	Floor Plan - 1st Floor	#
3-6	Floor Plan - 2nd Floor	#
3-7	Floor Plan - 3rd Floor Thru 15th Floor	#
3-8	Floor Plan - 16th Floor	#
3-9	Floor Plan - 17th Floor	#
3-1o	Floor Plan - 18th Floor	#
3-11	Floor Plan - 19th Floor	#
3-12	Floor Plan - 20th Floor	#
3-13	Building Section	#
4-1	Task Flow Diagram	#
4-2 Thru 4-6	Cost Models	#
4-7	Agenda for Workshop	#

Section 4- Reference Material

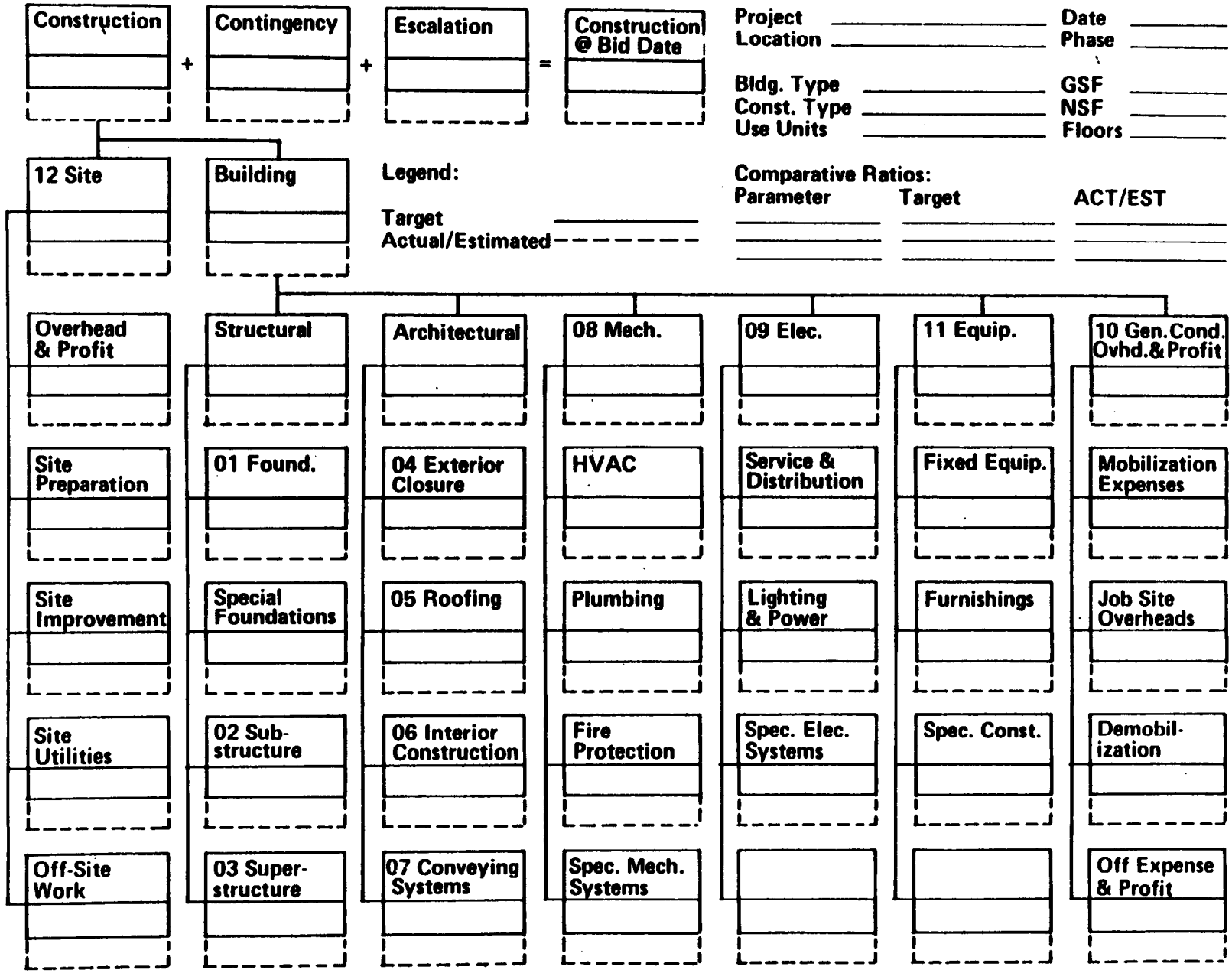
4.3 Sample Worksheets

Attached are selected sample worksheets as follows:

- Cost Model
- Function Analysis
- Idea Listing/Evaluation
- VE Proposals
- Cost Estimates
- Summary of Proposals
- Life Cycle Cost Estimate

These worksheets are provided for general guidance only. The VE consultant may use proprietary worksheets providing that the overall content is similar.

Cost Model


Construction
+
Contingency
+
Escalation
=
Construction @ Bid Date
Project
Location
Date
Phase
Bldg. Type
Const. Type
Use Units
GSF
NSF
Floors
Legend:
Target
Actual/Estimated
Comparative Ratios:
Parameter
Target
ACT/EST
12 Site
Building
Overhead & Profit
Site Preparation
Site Improvement
Site Utilities
Off-Site Work
Structural
01 Found.
Special Foundations
02 Sub-structure
03 Super-structure
Architectural
04 Exterior Closure
05 Roofing
06 Interior Construction
07 Conveying Systems
08 Mech.
HVAC
Plumbing
Fire Protection
Spec. Mech. Systems
09 Elec.
Service & Distribution
Lighting & Power
Spec. Elec. Systems
11 Equip.
Fixed Equip.
Furnishings
Spec. Const.
10 Gen.Cond. Ovhd.&Profit
Mobilization Expenses
Job Site Overheads
Demobil-ization
Off Expense & Profit

PROJECT _____
LOCATION _____
CLIENT _____
SYSTEM _____

FUNCTION ANALYSIS PHASE

DATE _____
PAGE _____ OF _____
ITEM _____
FUNCTION _____

ITEM NO.	DESCRIPTION	FUNCTION			COST	WORTH	VALUE INDEX C/W	COMMENTS
		VERB	NOUN	KIND				

ACTIVE VERB
MEASURABLE NOUN

KIND P = Primary or Basic
S = Secondary

Cost/Worth Ratio of Basic Function only.

C/W: _____

IDEA LISTING & EVALUATION	PROJECT:	DATE:
	LOCATION:	SYTEM:
	CLIENT:	FUNCTION:
		PAGE:

CREATIVE PHASE		EVALUATION PHASE		IDEA RATING (1-10)
NO.	IDEA	ADVANTAGES	DISADVANTAGES	

CREATIVE / EVALUATION PHASE 1= LEAST DESIREABLE 10 = MOST DESIRABLE

	VALUE ENGINEERING PROPOSAL	PROPOSAL NO. PAGE OF

PROJECT: LOCATION: CLIENT:	DATE: SYSTEM: ITEM: FUNCTION:

ORIGINAL DESIGN :

PROPOSED DESIGN

ADVANTAGES

DISADVANTAGES

DISCUSSION/JUSTIFICATION

LIFE CYCLE COST SUMMARY	COST SAVINGS (PRESENT VALUE)		
	INITIAL COST	O&M COSTS	TOTAL LIFE CYCLE COSTS
ORIGINAL DESIGN			
PROPOSED DESIGN			
GROSS SAVINGS			

PROJECT _____

LOCATION _____

CLIENT _____

COST ESTIMATES

PROPOSAL NUMBER

DATE _____

PAGE _____ OF _____

AS DESIGNED				AS PROPOSED			
ITEM	UNIT	RATE	TOTAL	ITEM	UNIT	RATE	TOTAL
TOTAL				TOTAL			

PROJECT _____

LOCATION _____

CLIENT _____

VALUE ENGINEERING STUDY
SUMMARY OF PROPOSALS

DATE _____

PAGE _____ OF _____

PROP. NO.	DESCRIPTION	COST SAVINGS (PRESENT VALUE)					
		ORIGINAL DESIGN COST	PROPOSED DESIGN COST	INITIAL COST SAVINGS	ESTIMATED IMPLEMENT COST	O & M COST SAVINGS	TOTAL LCC COST SAVINGS
	TOTAL INITIAL COST SAVINGS						
	TOTAL LIFE CYCLE COST SAVINGS						

Life Cycle Cost Analysis
Using Present Worth Costs

Life Cycle Costing Estimate
General Purpose Work Sheet

Study Title: _____
Discount Rate: _____ Date: _____
Economic Life: _____

			Original Describe:		Alternative 1 Describe:		Alternative 2 Describe:		Alternative 3 Describe:	
			Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth
Initial/Collateral Costs	Initial/Collateral Costs									
	A.									
	B.									
	C.									
	D.									
	E.									
	F.									
	G.									
	Total Initial/Collateral Costs									
Replacement/Salvage Costs	Replacement/Salvage (Single Expenditure)	Year / PW Factor								
	A.									
	B.									
	C.									
	D.									
	E.									
	F.									
	G.									
	H.									
	Salvage									
	Total Replacement/Salvage Costs									
Annual Costs	Annual Costs	Diff. Escal. Rate / PWA W/Escal.								
	A.									
	B.									
	C.									
	D.									
	E.									
	F.									
	G.									
	Total Annual Costs									
LCC	Total Present Worth Life Cycle Costs									
	Life Cycle Present Worth Dollar Savings									

PW – Present Worth PWA – Present Worth Of Annuity

Worksheet 15

Appendix C

Value Engineering Clauses for A-E, Construction and Design-Build Contracts

- A-E - FAR Standard Clause (52.248-2)
- Construction - FAR Standard Clause (52.248-3)
- Design-Build - Special Clause (Deviation from FAR Standard) - Reserved

Federal Acquisition Regulation

Part 52- Solicitation Provisions and Contract Clauses

52.248-2 Value Engineering-Architect-Engineer

As prescribed in 48.201(0, insert the following clause:
Value Engineering-Architect-Engineer
(March 1990)

(a) *General.* The Contractor shall (1) perform value engineering (VE) services and submit progress reports as specified in the Schedule; and (2) submit to the Contracting Officer ant resulting value engineering proposals (VEPs). Value engineering activities shall be performed concurrently with, and without delay to, the schedule set forth in the contract. The services shall include VE evaluation and review and study of design documents immediately following completion of the 35 percent design state or at such stages as the Contracting Officer may direct. Each separately priced line item for VE services shall define specifically the scope of work to be accomplished and may include VE studies of items other than design documents. The Contractor shall be paid as the contract specifies for this effort, but shall not share in savings which may result from acceptance and use of VEPs by the Government.

(b) *Definitions.* “Life cycle cost," as used in this clause, is the sum of all costs over the useful life of a building, system or product. It includes the cost of design, construction, acquisition, operation, maintenance and salvage (resale) value, if any.

"Value engineering", as used in this clause, means an organized effort to analyze the functions of systems, equipment, facilities, services and supplies for the purpose of achieving the essential functions at the lowest life cycle cost consistent with required performance, reliability, quality and safety.

"Value engineering proposal”, as used in this clause, means, in connection with an A-E contract, a change proposal developed by employees of the Federal Government or contractor value engineering personnel under contract to an agency to provide value engineering service for the contract or program.

(c) *Submissions.* After award of an architect-engineering contract the contractor shall-

(1) Provide the Government with a fee breakdown schedule for the VE services (such as criteria review, task team review, and bid package review) included in the contract schedule:

(2) Submit, for approval by the Contracting Officer, a list of

team members and their respective resumes representing the engineering disciplines required to complete the study effort, and evidence of the team leader's qualifications and engineering discipline. Subsequent changes or substitutions to the approved VE team shall be submitted in writing to the Contracting Officer for approval; and

(3) The team leader shall be responsible for prestudy work assembly and shall audit, reproduce, and sign the final report and each VEP. All VEPs, even if submitted earlier as an individual submission, shall be contained in the final report.

(d) *VEP preparation.* As a minimum, the contractor shall include the following information in each VEP:

(1) A description of the difference between the existing and proposed design, the comparative advantages and disadvantages of each, a justification when an item's function is being altered, the effect of the change on system or facility performance.

(2) A list and analysis of design criteria or specifications that must be changed if the VEP is accepted.

(3) A separate detailed estimate of the impact on project cost of each VEP, if accepted and implemented by the Government.

(4) A description and estimate of costs the Government may incur implementing the VEP, such as design change cost and test and evaluation cost.

(5) A prediction of any effects the proposed change may have on life cycle cost.

(6) The effect of the VEP will have on the design or construction schedules.

(e) *VEP acceptance.* Approved VEPs shall be implemented by bilateral modification to this contract.

(End of clause)

52.248-3 Value Engineering--Construction

As prescribed in 48.202, insert the following clause:
Value Engineering-Construction
(March 1989)

(a) *General.* The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECPs) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECPs, in accordance with paragraph (f) below.

(b) *Definitions.* “Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Govemment-furnished property.

“Collateral savings,” as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

“Contractor's development and implementation costs,” as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

“Government costs," as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistical support. The term does not include the normal administrative costs of processing the VECP.

“Instant contract savings,” as used in this clause, means the estimated reduction in Contract cost of performance resulting from acceptance of the VECP, minus the allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) below).

"Value engineering change proposal (VECP)” means a proposal that-

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; *provided,* that it does not involve a change-

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) *VECP preparation. As* a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through

(7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effects of the change on the end item's performance.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revision.

(3) A separate, detailed cost estimate for (i) the affected portions of the existing contract requirements and (ii) the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) below.

(4) A description and estimate of costs the Government may incur implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submission. The Contractor shall submit VECPs to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) Government Action.

(1) The Contracting Officer shall notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer shall notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will

process VECPs expeditiously; however, it shall not be liable for any delay in acting upon a VECP.

(2) If the VECP is not accepted, the Contracting Officer shall notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

(3) Any VECP maybe accepted, in whole or in part, by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Contracting Officer's decision to acceptor reject all or any part of any VECP shall be final and not subject to the Disputes clause or otherwise subject to litigation under the Contract Disputes Act of 1978(41U.S.C.601 -613).

(f) *Sharing.*

(1) *Rates.* The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by

(i) 45 percent for fixed-price contracts or

(ii) 75 percent for cost-reimbursement contracts.

(2) *Payment.* Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to-

(i) Accept the VECP

(ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and

(iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) *Collateral savings.* If a VECP is accepted, the instant contract amount shall be increased by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However,

the Contractor's share of collateral savings shall not exceed (1) the contract's firm-fixed-price or estimated cost, at the time the VEPC is accepted, or (2) $100,000, whichever is greater. The Contracting Officer shall be the sole determiner of the amount of collateral savings, and that amount shall not be subject to the Disputes clause or otherwise subject to litigation under 41U.S.C.601-613.

(h) *Subcontracts.* The Contractor shall include an appropriate value **engineering** clause in any subcontract of $50,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contracts price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value **engineering** incentive payments; provided, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) *Data.* The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

"These data, furnished under the Value Engineering-Construction clause of contract . . . . . , shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations."

If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the data. (The terms "unlimited rights" and "limited rights" are defined in Part 27 of the Federal Acquisition Regulation.)

(End of clause)

Alternate I (APR 1984). When the head of contracting activity determines that the cost of calculating and tracking collateral savings will exceed the benefits to be derived in a construction contract, delete paragraph (g) from the basic clause and redesignate the remaining paragraphs accordingly.

Design Build - Special Clause

(Deviation from FAR Standard) - Reserved

Appendix D

VE Program Summary Report Format

VALUE ENGINEERING PROGRAM -- DESIGN AND CONSTRUCTION

PAGE 1 OF ____

PROGRAM SUMMARY REPORT
****

REGION: ____
DATE: _____

REPORT FOR FISCAL YEAR: _____

____ INTERIM (OCT THRU MAR)
____ FINAL (OCT THRU SEP)

I. VALUE ENGINEERING PROPOSAL (VEP) SUMMARY FOR REPORTING PERIOD: _____

PROJECT DESCRIPTION				VE PROPOSAL SUMMARY		SAVINGS	
PCNO	CITY	STATE	BUILDING	NUMBER ACTED ON	NUMBER ACCEPTED	INITIAL SAVINGS ($000)	PRES VAL LCC SVGS ($000)
			TOTALS				

VALUE ENGINEERING PROGRAM -- DESIGN AND CONSTRUCTIONPAGE 2 OF

PROGRAM SUMMARY REPORT
****

II. VALUE ENGINEERING CHANGE PROPOSAL (VECP) SUMMARY FOR REPORTING PERIOD: _____

		VE CHANGE PROPOSAL (VECP) SUMMARY DATA	
CONTRACTOR VECPS FOR REPORTING PERIOD	NUMBER SUBMITTED OR CARRIED FORWARD FROM LAST FISCAL YEAR		
	NUMBER ACCEPTED		
	NUMBER PENDING		
TOTAL NUMBER OF VECPS			
VE SAVINGS	INITIAL SAVINGS ($000)	CONTRACTOR'S SHARE	
		GOVERNMENT'S SHARE	
	PRESENT VALUE OF COLLATERAL SAVINGS ($000)	CONTRACTOR'S SHARE	
		GOVERNMENT'S SHARE	
		TOTAL CONTRACTOR'S SHARE ($000)	
		TOTAL GOVERNMENT'S SHARE ($000)	

VALUE ENGINEERING PROGRAM -- DESIGN AND CONSTRUCTION PAGE 3 OF ___

PROGRAM SUMMARY REPORT
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III. RECOMMENDATIONS FOR CENTRAL OFFICE CRITERIA REVIEW BASED ON VEP/VECP RESULTS:

REPORTING PERIOD: _____

DOCUMENT REFERENCE	CRITERIA/STANDARD AFFECTED	DISCUSSION

VALUE ENGINEERING PROGRAM -- DESIGN AND CONSTRUCTION PAGE 4 OF ___

PROGRAM SUMMARY REPORT
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IV. EXCEPTIONAL/OUTSTANDING VALUE IMPROVEMENTS:

REPORTING PERIOD: _____

PROJECT DESCRIPTION				DISCUSSION
PCNO	STATE	CITY	BUILDING	

VALUE ENGINEERING PROGRAM -- DESIGN AND CONSTRUCTION PAGE 5 OF

PROGRAM SUMMARY REPORT
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V. D&C PROGRAM-RELATED VE TRAINING

REPORTING PERIOD: _____

ORGANIZATION	NUMBER TRAINED		REMARKS
	8 HOURS OR MORE	UNDER 8 HOURS	

Definitions

1 FUNDS INVESTED

In-House - This quantity includes salaries and overhead expenses of GSA employees and contract employees assigned to a specific project involved in implementing the value engineering program, costs for contracting for value engineering services, costs associated with implementing accepted value engineering proposals (VEPs) and any other costs directly associated with the value engineering program. Overhead may be estimated at 50% of salaries.

Contractor ReLated - This quantity includes the construction contractor's share of the savings resulting from an acceptance of a submitted VECP, the costs incurred by GSA associated with the evaluation of the value engineering cost proposal (VECP) that has been submitted and accepted, and the contractor's development costs associated with a VECP that has been accepted.

2 *SAVINGS*

In-House -Savings are defined as those first cost dollars and life cycle cost related identified dollars, resulting from a) accepted proposals (VEPs), generated in contractor led value engineering workshops and b) GSA employee generated VE proposals, that may be withdrawn from the approved budget of a project and that constitute a true surplus. Savings should be reported in the year incurred, i.e., in the year that the savings or reduction in cost actually occurs. Recurring savings resulting from a specific VE effort should be reported for a maximum of three years - the initial year and the two subsequent years.

Contractor Related: - Savings resulting from construction contractor value engineering efforts (VECP)s should be calculated in accordance with FAR 52.248-l(g). The appropriate Government share of savings should be reported.

3 COST AVOIDANCE:

Dollars identified, as a result of a VE study, that lower costs of a project that is over budget are not considered true savings since they are not available to be considered for withdrawal from the project budget. These cost avoidance dollars that are identified should be reported separately from true savings in the report submission.

4 RETURN ON INVESTMENT - (ROI):

ROI is determined by dividing the Government's cost of performing the value engineering function into the true savings generated by the function.

5 FTEs:

The total hours devoted to value engineering by fill-time and part-time individuals divided by 2087 hours.

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