

**Value Engineering**  
**of**  
**State Agency Capital Outlay Projects**  
**for**  
**Fiscal Year 2005**

Department of General Services  
Division of Engineering & Buildings  
Bureau of Capital Outlay Management

September 7, 2005

## **TABLE OF CONTENTS**

<b>Section</b>	<b>Page</b>
• Executive Summary	---
• Introduction	1
• Background	1
• Projects Studied and Savings Identified	2
• Study Costs	3
• Waivers Granted / Projects Excluded	3
• Table 1 - Value Engineering Savings vs. Construction Budget	---
• Table 2 - Value Engineering Savings vs. Study Cost	---
• Table 3 – Other Projects Exceeding \$5,000,000 Threshold	---

## **EXECUTIVE SUMMARY**

### **I. Introduction**

The Director of the Department of General Services is required by Section 2.2-1133 of the *Code of Virginia* to report to the Governor and the General Assembly on or before September 15 of each year the (i) number and value of the state capital projects where value engineering (VE) was employed and (ii) identity of the capital projects for which a waiver of the requirements of Section 2.2-1133.B was granted, including a statement of the compelling reasons for granting the waiver. This report provides information for the period from July 1, 2004 through June 30, 2005.

### **II. Projects**

Thirteen (13) projects with a combined estimated construction value of approximately \$266 million were reported by Agencies as qualified for the Value Engineering process. The requirements for Value Engineering are defined in Section 2.2-1133 of the *Code of Virginia*. The associated administrative procedures are provided in the Commonwealth of Virginia's *Construction and Professional Services Manual*.

### **III. Savings / Cost**

Estimated savings for owner-accepted VE items were provided for these projects by the applicable agencies and institutions. The estimated savings recommended by the value engineering teams and accepted by state agencies for these projects totaled approximately \$12.2 million. The average VE savings were 4.6% of the estimated construction value.

The average cost of a VE Study was \$42,000. The average savings in construction value was \$936,000. The aggregate costs of the VE studies as a percent of aggregate savings were 4.5%. This is equivalent to a payback ratio of 22:1 for employing the VE process.

### **IV. Waivers Granted / Projects Excluded**

Fifteen (15) reported projects were granted waivers or otherwise excluded from the VE process. These fifteen projects and the associated reasons for exclusion are identified in Table 3. Projects approved for procurement using the "Design Build" methodology are typically excluded from the standard VE process as the Design Build Contractor provides a lump sum fixed price prior to design and contract award. Projects procured using Construction Management at Risk (CM at Risk or CM/GC) are also typically exempted from the VE process. Projects procured under the provisions of the *Public-Private Education Facilities and Infrastructure Act of 2002* (PPEA) are specifically exempted from the value engineering requirements defined in Code of Virginia Section 2.2-1133.

# VALUE ENGINEERING OF STATE CAPITAL OUTLAY PROJECTS FOR THE PERIOD JULY 1, 2004 - JUNE 30, 2005

## 1. Introduction

The Director of the Department of General Services is required by Section 2.2-1133 of the Code of Virginia to report by September 15 each year to the Governor and the General Assembly on the (i) number and value of the capital projects where value engineering (VE) was employed and (ii) identity of the capital projects for which a waiver of the requirements of Section 2.2-1133.B was granted, including a statement of the compelling reasons for granting the waiver. This report provides the information for Fiscal Year 2005 which encompasses the period from July 1, 2004 - June 30, 2005.

## 2. Background

Section 2.2-1133.A of the *Code of Virginia* establishes the requirement for use of value engineering on any capital project costing more than five million (\$5,000,000) dollars. This requirement became effective in 1994 and procedures for implementing a value engineering program were developed and issued to state agencies in July 1994. The procedures for implementing the VE process are contained Section 814.0 of the Commonwealth of Virginia's *Construction and Professional Services Manual (CPSM)*.

Value engineering is a systematic process of review and analysis of a project design performed by an independent team of persons not originally involved in the design of the project. The team members are themselves licensed design professionals and the team leader is specially trained in conducting the team study process.

The purpose of the Value Engineering review and analysis of the design is to offer suggestions to the project owner and project design firm that improve project quality and reduce total project cost by combining or eliminating inefficient or expensive parts or steps in the original design or recommending redesign of the project using different technologies, materials or methods. Value engineering is often used to deal with "cost growth" during the project design phase. In some cases, a VE study may result in an increase in initial cost for a portion of a project. This generally occurs when the team recommends a design change that may involve a higher initial investment during construction, but is more cost effective when measured on a life cycle basis (construction cost plus long term operating costs).

Not all projects are candidates for VE. Where an initial analysis of a project indicates that the cost of conducting the VE study may not produce sufficient

recommendations of cost savings to cover study costs, there is no potential net benefit in conducting the study. Also, projects which are site adaptations or reuse of previously value-engineered projects are not typically cost-effective for another VE study.

Current state procedures require capital projects with an estimated construction cost exceeding **\$5,000,000** to be value engineered, unless waived by the Director of the Department of General Services. The VE study is conducted at the preliminary design stage of the project after the design concept has been selected and the various building systems evaluated and selected by the designer. The project design is approximately **35% complete** at the preliminary design stage.

The Commonwealth's process involves a **40-hour study** of the project by the VE team. The team is composed of registered design professionals that practice architecture and the engineering disciplines (civil, electrical, mechanical, etc.) involved in the project design and a certified value specialist who is the VE team leader. The A/E (architect/engineer) firm that designed the project is a part-time participant in the VE study. Building shape, floor plan layout and building systems components are sufficiently developed at the preliminary stage of design for all VE team disciplines to evaluate the essential elements of the design and suggest alternatives where appropriate.

The recommendations produced by the VE team are reviewed by the project owner and the A/E firm employed to design the project. Recommendations are selected or rejected by the project owner in consultation with the design firm based on program requirements, cost, technical feasibility, aesthetics, and other related considerations.

Recommendations dealing with technical design issues must ultimately be accepted or rejected by the owner's design consultant as the designer of record is the party with ultimate liability for the design and is required by law to professionally seal the design documents.

Accepted recommendations must be incorporated into the project design and most often this will require additional work on the part of the design consultant. Since the nature and scope of this additional work is not known when the A/E design contract and price are negotiated, the A/E is entitled to a fee for this additional design service.

### **3. Projects Studied and Savings Identified**

Thirteen (13) projects with a combined estimated construction value of approximately \$256 million were reported by Agencies as qualified for Value Engineering as required by Section 2.2-1133.A of the *Code of Virginia* and

Section 814.0, Value Engineering, of the Commonwealth of Virginia's *Construction and Professional Services Manual*. The VE teams identified design changes, which were accepted by the agencies and institutions, which produced an aggregate estimated savings in construction cost of approximately \$12.2 million. (See Table 1.)

The aggregate VE savings reported is equivalent to 4.6% of the combined preliminary budgets of these twelve projects.

#### **4. Study Costs**

The aggregate cost for the VE consultants for these 13 projects was \$552,000. Costs ranged from a low of \$25,000 to a high of \$91,000. The average study cost was \$42,000. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately \$11,621,000 by employing the Value Engineering process. (See Table 2.)

The VE Cost as a percent of the VE Savings as an aggregate for these 13 projects was 4.5%. Stated otherwise, this represents a payback ratio of 22 to 1. (See Table 2.)

#### **5. Waivers Granted / Projects Excluded**

Agencies are requested each year to report all projects under their purview which were at the preliminary design phase during the reporting period and which exceed the \$5,000,000 threshold, but did not undergo a formal VE process.

Fifteen (15) projects exceeding the \$5,000,000 threshold were identified by agencies as being granted waivers or otherwise excluded from the VE process. These fifteen projects and the associated reasons for exclusion from the VE process are identified in Table 3.

Projects approved for procurement using the "Design Build" methodology are typically excluded from the standard VE process as the Design Build Contractor provides a lump sum fixed price prior to design and contract award. Projects procured using Construction Management at Risk (CM at Risk or CM/GC) are also typically exempted from the VE process. Projects procured under the provisions of the Public Public-Private Education Facilities and Infrastructure Act of 2002 (PPEA) are specifically exempted from the VE provisions mandated in Section 2.2-1133 of the Code of Virginia. (The PPEA exemption from the Value Engineering process is identified in § 56-575.16 of the *Code of Virginia*.)

The number of projects exempted from the VE process is increasing due to the expanding use of these alternative procurement methods.

**Table 1**  
**VE Study Savings vs. Construction Budget**

Item No.	Project Code	Agency / Institution	Project Title	Estimated VE Savings (Accepted Items)	Preliminary Construction Budget	VE Savings as a % of Con. Budget
1)	207-16283	University of Virginia	Ruffin Hall - The Studio Art Building	\$3,166,000	\$14,681,000	21.6%
2)	208-16713	Virginia Tech	Biology / Vivarium Facility	\$864,000	\$25,000,000	3.5%
3)	212-16798	Virginia State University	Engineering and Technology Building	\$45,000	\$14,299,000	0.3%
4)	213-16873	Norfolk State University	Alteration to the Mills E. Godwin Center	\$0	\$22,000,000	0.0%
5)	216-16809	James Madison University	Miller Hall Renovation	\$430,000	\$10,438,000	4.1%
6)	216-16395-003	James Madison University	Hoffman Hall	\$79,000	\$5,180,000	1.5%
7)	217-16813	Radford University	Fine Arts Center	\$1,314,000	\$14,492,000	9.1%
8)	221-16817	Old Dominion University	Physical Science Building - Phase II	\$744,000	\$10,883,000	6.8%
9)	221-16818-002	Old Dominion University	Batten Arts and Letters Renovations	\$989,000	\$7,202,000	13.7%
10)	238-16495-001	Virginia Museum of Fine Arts	Museum Expansion	\$223,000	\$61,500,000	0.4%
11)	247-16745	George Mason University	Prince William Performing Arts Center	\$2,075,000	\$26,666,000	7.8%
12)	247-16523	George Mason University	Arlington II	\$1,461,000	\$44,000,000	3.3%
13)	260-16610	VCCS/Lord Fairfax Comm. College	Science Laboratory Building	\$783,000	\$9,850,000	7.9%
<b>TOTAL</b>				<b>\$12,173,000</b>	<b>\$266,191,000</b>	
<b>AVERAGE</b>				<b>\$936,000</b>	<b>\$20,476,000</b>	<b>4.6%</b>

**Note:**

A value engineering study was also prepared for Project 501-16140-014, Virginia Department of Transportation's Salem District Office Addition and Renovation project. VE Savings are still under evaluation as project has been delayed. Project will be included in next year's annual report.



**Table 2**  
**VE Study Savings vs. VE Study Cost**

Item No.	Project Code	Agency / Institution	Project Title	VE Study Cost	Estimated VE Savings (Accepted Items)	Study Cost as % of VE Savings
1)	207-16283	University of Virginia	Ruffin Hall - The Studio Art Building	\$39,000	\$3,166,000	1.2%
2)	208-16713	Virginia Tech	Biology / Vivarium Facility	\$69,000	\$864,000	8.0%
3)	212-16798	Virginia State University	Engineering and Technology Building	\$39,000	\$45,000	86.7%
4)	213-16873	Norfolk State University	Alteration to the Mills E. Godwin Center	\$35,000	\$0	n/a
5)	216-16809	James Madison University	Miller Hall Renovation	\$30,000	\$430,000	7.0%
6)	216-16395-003	James Madison University	Hoffman Hall	\$30,000	\$79,000	38.0%
7)	217-16813	Radford University	Fine Arts Center	\$30,000	\$1,314,000	2.3%
8)	221-16817	Old Dominion University	Physical Science Building - Phase II	\$55,000	\$744,000	7.4%
9)	221-16818-002	Old Dominion University	Batten Arts and Letters Renovations	\$25,000	\$989,000	2.5%
10)	238-16495-001	Virginia Museum of Fine Arts	Museum Expansion	\$91,000	\$223,000	40.8%
11)	247-16745	George Mason University	Prince William Performing Arts Center	\$34,000	\$2,075,000	1.6%
12)	247-16523	George Mason University	Arlington II	\$39,000	\$1,461,000	2.7%
13)	260-16610	VCCS/Lord Fairfax Comm. College	Science Laboratory Building	\$36,000	\$783,000	4.6%
<b>TOTAL</b>				<b>\$552,000</b>	<b>\$12,173,000</b>	
<b>AVERAGE</b>				<b>\$42,000</b>	<b>\$936,000</b>	<b>4.5%</b>

**Payback Ratio: 22 : 1**

**Note:**

A value engineering study was also prepared for Project 501-16140-014, Virginia Department of Transportation's Salem District Office Addition and Renovation project. VE Savings are still under evaluation as project has been delayed. Project will be included in next year's annual report. The VE Study costs for this \$5,234,000 project were \$38,500.

**Table 3**  
**Other Projects Exceeding \$5,000,000 Threshold**

Item No.	Project Code	Agency / Institution	Project Title	Preliminary Construction Budget	Reason Reported for VE Study Exemption
1)	194-16966	Department of General Services	Finance Building Renovation	\$22,802,000	PPEA project.
2)	194-16967	Department of General Services	Washington Building Renovation	\$13,516,000	PPEA project.
3)	211-17133	Virginia Military Institute	Renovate Alumni Memorial & Patchin Field	\$8,250,000	CM-at-Risk project.
4)	213-16800	Norfolk State University	Rise Center I	\$24,400,000	CM-at-Risk project.
5)	221-16089	Old Dominion University	43rd Street Parking Structure	\$6,871,000	Design-Build project.
6)	236-16599	Virginia Commonwealth University	School of Nursing	\$12,600,000	CM-at-Risk project.
7)	236-16602	Virginia Commonwealth University	Hibbs Building Renovations	\$7,549,000	CM-at-Risk project.
8)	236-16879	Virginia Commonwealth University	8th & Duval Parking Deck	\$15,700,000	CM-at-Risk project.
9)	236-17108	Virginia Commonwealth University	Schools of Business and Engineering	\$31,000,000	CM-at-Risk project.
10)	247-17056	George Mason University	Student Housing VII	\$54,680,000	Design-Build project.
11)	799-16992	Department of Corrections	Medium Security Prison - Tazewell	\$61,376,000	CM-at-Risk project.
12)	799-16993	Department of Corrections	Expand Deerfield Correctional Center	\$18,741,000	CM-at-Risk project.
13)	799-17128	Department of Corrections	Medium Security Prison - Pittsylvania	\$66,219,000	CM-at-Risk project.
14)	912-16249	Department of Veterans' Services	Virginia Veterans' Care Center	\$18,700,000	CM-at-Risk project.
15)	999-17131	Alcoholic Beverage Control	Warehouse Renovation	\$5,200,000	Emergency project.
<b>TOTAL</b>				<b>\$367,604,000</b>	