

**Value Engineering**  
**of**  
**State Agency Capital Outlay Projects**  
**for**  
**Fiscal Year 2004**

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

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## 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, 2003 through June 30, 2004.

### II. Projects

Fourteen (14) projects with a combined estimated construction value of approximately \$227 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 million. The average VE savings were 5.3% of the estimated construction value.

The average cost of a VE Study was \$40,500. The average savings in construction value was \$859,000. The aggregate costs of the VE studies as a percent of aggregate savings were 4.7%. This is equivalent to a payback ratio of 21:1 for employing the VE process.

### IV. Waivers Granted / Projects Excluded

Three (3) projects were granted waivers or otherwise excluded from the VE process. The three projects and the associated reasons for exclusion are identified in Table 3. Projects approved for procurement using the "Design Build" methodology were excluded from the standard VE process since the Design Build Contractor provides a lump sum fixed price prior to design and contract award.

## VALUE ENGINEERING OF STATE CAPITAL OUTLAY PROJECTS FOR THE PERIOD JULY 1, 2003 - JUNE 30, 2004

### 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 the period from July 1, 2003 - June 30, 2004.

### 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 any capital project with an estimated construction cost greater than **\$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 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 design A/E firm. Recommendations are selected or rejected by the project owner in consultation with the design A/E 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 design A/E firm since the design A/E 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 A/E. 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**

Fourteen (14) projects with a combined estimated construction value of \$227 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 \$12 million. (See Table 1.)

The aggregate VE savings reported is equivalent to 5.3% of the combined preliminary budgets of these fourteen projects.

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

The aggregate cost for the VE consultants for these 14 projects was approximately \$566,638. Costs ranged from a low of \$23,000 to a high of \$91,000. The average study cost was \$40,500. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately \$11,465,000 by employing the Value Engineering process. (See Table 2.)

The VE Cost as a percent of the VE Savings as an aggregate for these 14 projects was 4.7%. Stated otherwise, this represents a payback ratio of 21 to 1. (See Table 2.)

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

Three (3) projects were granted waivers or otherwise excluded from the VE process. The three projects and the associated reasons for exclusion are identified in Table 3. Projects approved for procurement using the "Design Build" methodology were excluded from the standard VE process since the Design Build Contractor provides a lump sum fixed price prior to design and contract award.

**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)	204-16410-001	College of William & Mary	New Parking Deck	\$567,000	\$7,137,000	7.9%
2)	204-16691	College of William & Mary	New Dormitory	\$1,050,000	\$17,800,000	5.9%
3)	204-16692	College of William & Mary	Recreational Sports Addition & Renovation	\$39,000	\$7,235,000	0.5%
4)	207-15720	University of Virginia	Campbell Hall Addition & Renovation	\$2,617,000	\$8,551,000	30.6%
5)	207-16747	University of Virginia	Rouss Hall	\$1,600,000	\$34,000,000	4.7%
6)	208-16714	Virginia Tech	New Engineering Facility (VTRI/ICTAS) Ph. I	\$2,135,000	\$25,000,000	8.5%
7)	211-16684	Virginia Military Institute	Renovation and Addition to Crozet Hall	\$333,000	\$7,968,000	4.2%
8)	214-16420-002	Longwood University	New Student Recreation Center	\$148,000	\$11,078,000	1.3%
9)	217-16572	Radford University	New Student Union	\$642,000	\$7,175,000	8.9%
10)	238-16439	Virginia Museum of Fine Arts	Parking Deck	(\$97,000)	\$9,500,000	-1.0%
11)	238-16495-001	Virginia Museum of Fine Arts	Museum Expansion	\$1,634,000	\$61,500,000	2.7%
12)	247-16711	George Mason University	Fairfax Aquatic & Fitness Center	\$6,000	\$5,657,000	0.1%
13)	247-16744	George Mason University	Research I	\$1,137,000	\$17,433,000	6.5%
14)	268-16522-002	Virginia Institute of Marine Science	Seawater Research Laboratory	\$221,000	\$6,949,000	3.2%
<b>TOTAL</b>				<b>\$12,032,000</b>	<b>\$226,983,000</b>	
<b>AVERAGE</b>				<b>\$859,000</b>	<b>\$16,213,000</b>	<b>5.3%</b>

**NOTES:**

(refer to Item No. above)

- 10) VE Study Consultant and BCOM concurrently identified the need for an elevator for this project. This represented an \$97,000 increase rather than a savings to the project, however, the elevator was required to comply with Building Code.

**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)	204-16410-001	College of William & Mary	New Parking Deck	\$29,400	\$567,000	5.2%
2)	204-16691	College of William & Mary	New Dormitory	\$35,500	\$1,050,000	3.4%
3)	204-16692	College of William & Mary	Recreational Sports Addition & Renovation	\$25,000	\$39,000	64.1%
4)	207-15720	University of Virginia	Campbell Hall Addition & Renovation	\$40,000	\$2,617,000	1.5%
5)	207-16747	University of Virginia	Rouss Hall	\$33,038	\$1,600,000	2.1%
6)	208-16714	Virginia Tech	New Engineering Facility (VTRI/ICTAS) Ph. I	\$72,600	\$2,135,000	3.4%
7)	211-16684	Virginia Military Institute	Renovation and Addition to Crozet Hall	\$30,000	\$333,000	9.0%
8)	214-16420-002	Longwood University	New Student Recreation Center	\$36,800	\$148,000	24.9%
9)	217-16572	Radford University	New Student Union	\$30,500	\$642,000	4.8%
10)	238-16439	Virginia Museum of Fine Arts	Parking Deck	\$55,000	(\$97,000)	-56.7%
11)	238-16495-001	Virginia Museum of Fine Arts	Museum Expansion	\$91,000	\$1,634,000	5.6%
12)	247-16711	George Mason University	Fairfax Aquatic & Fitness Center	\$28,300	\$6,000	471.7%
13)	247-16744	George Mason University	Research I	\$23,000	\$1,137,000	2.0%
14)	268-16522-002	Virginia Institute of Marine Science	Seawater Research Laboratory	\$36,500	\$221,000	16.5%
<b>TOTAL</b>				<b>\$566,638</b>	<b>\$12,032,000</b>	
<b>AVERAGE</b>				<b>\$40,500</b>	<b>\$859,000</b>	<b>4.7%</b>

**NOTES:**

(refer to Item No. above)

**Payback Ratio: 21 : 1**

10) VE Study Consultant and BCOM concurrently identified the need for an elevator for this project. This represented an \$97,000 increase rather than a savings to the project, however, the elevator was required to comply with Building Code.

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

Item No.	Project Code	Agency / Institution	Project Title	Preliminary Construction Budget
1)	194-16881	Department of General Services	Renovation and Extension to State Capitol	\$73,903,000
2)	236-16344	Virginia Commonwealth University	Massey Cancer Center Expansion	\$6,200,000
3)	247-16711	George Mason University	Parking Deck II	\$11,900,000
<b>TOTAL</b>				<b>\$92,003,000</b>

**NOTES:**

(refer to Item No. above)

- 1) This "Construction Management" project was not subject to the requirements for a formal 40-hour VE Study. Modified Value Engineering services were performed by the Construction Manager as part of his services. A waiver of the requirements was granted by the Director of the Department of General Services.
- 2) A VE Study was performed on original Addition project. The Expansion project is to be incorporated into the Addition contract and will incorporate recommendations accepted from the Addition's VE Study. A waiver of the requirements for an additional study was granted by the Director of the Department of General Services.
- 3) This "Design/Build" project was not subject to the requirements for a formal 40-hour VE Study. Projects approved for procurement using the "Design Build" methodology are excluded from the standard VE process since the Design Build Contractor provides a lump sum fixed price prior to design and contract award.