

Value Engineering
of
State Agency Capital Outlay Projects
for
Fiscal Year 2006

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 following:

- (i) the number and value of the state capital projects where value engineering (VE) was employed
- (ii) the 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, 2005 through June 30, 2006.

II. Projects

Twenty-one (21) projects with a combined estimated construction value of approximately \$253 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 \$21.6 million. The average VE savings were 8.5% of the estimated construction value.

The average cost of a VE Study was \$38,000. The average savings in construction value was \$1,027,000. The aggregate costs of the VE studies as a percent of aggregate savings were 3.7%. This is equivalent to a payback ratio of 27:1 for employing the VE process.

IV. Waivers Granted / Projects Excluded

Twelve (12) reported projects were granted waivers or otherwise excluded from the VE process. These twelve 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, 2005 - JUNE 30, 2006

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 2006 which encompasses the period from July 1, 2005 - June 30, 2006.

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

Twenty-one (21) projects with a combined estimated construction value of approximately \$253 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 \$21.6 million. (See Table 1.)

The aggregate VE savings reported is equivalent to 8.5% of the combined preliminary budgets of these twelve projects.

4. Study Costs

The aggregate cost for the VE consultants for these 21 projects was \$802,000. Costs ranged from a low of \$15,000 to a high of \$76,000. The average study cost was \$38,000. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately \$20,755,000 by employing the Value Engineering process. (See Table 2.)

The VE Cost as a percent of the VE Savings as an aggregate for these 21 projects was 3.7%. Stated otherwise, this represents a payback ratio of 27 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.

Twelve (12) 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)	204-16579-000	College of William & Mary	Construct Football Practice Facility	\$45,000	\$7,800,000	0.6%
2)	207-17107-000	University of Virginia	School of Nursing Expansion	\$1,112,000	\$9,485,000	11.7%
3)	208-16792-000	Virginia Tech	Renovate Cowgill Hall HVAC and Power	\$567,000	\$5,410,000	10.5%
4)	208-16796-000	Virginia Tech	Construct Building Construction Laboratory	\$953,000	\$5,730,000	16.6%
5)	213-16800-000	Norfolk State University	Construct RISE Project	\$4,000,000	\$18,000,000	22.2%
6)	214-16802-000	Longwood University	Construct Bedford Wygal Connector	\$170,000	\$7,101,000	2.4%
7)	214-16874-000	Longwood University	Renovate Wheeler Dormitory	\$340,000	\$6,556,000	5.2%
8)	215-16594-000	University of Mary Washington	Renovate Lee Hall & Construct Addition	\$1,497,000	\$11,628,000	12.9%
9)	216-16806/16807	James Madison University	Center for Performing Arts/Music Recital Hall	\$5,000,000	\$48,708,000	10.3%
10)	216-16808-000	James Madison University	CISAT Library	\$6,000	\$16,503,000	0.0%
11)	221-16089-000	Old Dominion University	Health & P.E. Building Additions and Renovation	\$346,000	\$21,400,000	1.6%
12)	221-16688-005	Old Dominion University	Student Housing Renovation	\$1,177,000	\$5,415,000	21.7%
13)	221-16817-000	Old Dominion University	Physical Science Building - Phase 2	\$895,000	\$11,942,000	7.5%
14)	221-16818-002	Old Dominion University	Batten Arts & Letters Building Renovation	\$1,432,000	\$7,202,000	19.9%
15)	246-16830-000	University of Virginia - College at Wise	Drama Building Addition/Renovation	\$1,395,000	\$10,428,000	13.4%
16)	247-15812-000	George Mason University	Patriot Center Addition	\$410,000	\$8,060,000	5.1%
17)	260-16838-000	VCCS / TCC	Science Building I	\$650,000	\$14,256,000	4.6%
18)	260-16848-000	VCCS / TCC	Regional Automotive Center	\$58,000	\$5,829,000	1.0%
19)	260-16501-000	VCCS / SWCC	Learing Resource Center	\$579,000	\$9,500,000	6.1%
20)	501-16140-014	Department of Transportation	Salem District Office Addition & Renovation	\$216,000	\$5,234,000	4.1%
21)	912-16249-000	Department of Veterans Services	Construct New Veterans Care Center	\$709,000	\$17,101,000	4.1%
TOTAL				\$21,557,000	\$253,288,000	8.5%
AVERAGE				\$1,027,000	\$12,061,000	8.5%

Note:

VDOT also reported a VE Study for Project Code 510-16676-000, Staunton District Office Addition & Renovation, however project was stopped before VE savings could be determined. As incomplete data was available, project is not included in above table to avoid distorting the totals & averages.

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)	204-16579-000	College of William & Mary	Construct Football Practice Facility	\$40,000	\$45,000	88.9%
2)	207-17107-000	University of Virginia	School of Nursing Expansion	\$48,000	\$1,112,000	4.3%
3)	208-16792-000	Virginia Tech	Renovate Cowgill Hall HVAC and Power	\$45,000	\$567,000	7.9%
4)	208-16796-000	Virginia Tech	Construct Building Construction Laboratory	\$76,000	\$953,000	8.0%
5)	213-16800-000	Norfolk State University	Construct RISE Project	\$34,000	\$4,000,000	0.9%
6)	214-16802-000	Longwood University	Construct Bedford Wygal Connector	\$31,000	\$170,000	18.2%
7)	214-16874-000	Longwood University	Renovate Wheeler Dormitory	\$29,000	\$340,000	8.5%
8)	215-16594-000	University of Mary Washington	Renovate Lee Hall & Construct Addition	\$34,000	\$1,497,000	2.3%
9)	216-16806/16807	James Madison University	Center for Performing Arts/Music Recital Hall	\$42,000	\$5,000,000	0.8%
10)	216-16808-000	James Madison University	CISAT Library	\$35,000	\$6,000	583.3%
11)	221-16089-000	Old Dominion University	Health & P.E. Building Additions and Renovation	\$37,000	\$346,000	10.7%
12)	221-16688-005	Old Dominion University	Student Housing Renovation	\$35,000	\$1,177,000	3.0%
13)	221-16817-000	Old Dominion University	Physical Science Building - Phase 2	\$38,000	\$895,000	4.2%
14)	221-16818-002	Old Dominion University	Batten Arts & Letters Building Renovation	\$25,000	\$1,432,000	1.7%
15)	246-16830-000	University of Virginia - College at Wise	Drama Building Addition/Renovation	\$50,000	\$1,395,000	3.6%
16)	247-15812-000	George Mason University	Patriot Center Addition	\$33,000	\$410,000	8.0%
17)	260-16838-000	VCCS / TCC	Science Building I	\$39,000	\$650,000	6.0%
18)	260-16848-000	VCCS / TCC	Regional Automotive Center	\$40,000	\$58,000	69.0%
19)	260-16501-000	VCCS / SWCC	Learning Resource Center	\$38,000	\$579,000	6.6%
20)	501-16140-014	Department of Transportation	Salem District Office Addition & Renovation	\$38,000	\$216,000	17.6%
21)	912-16249-000	Department of Veterans Services	Construct New Veterans Care Center	\$15,000	\$709,000	2.1%
TOTAL				\$802,000	\$21,557,000	3.7%
AVERAGE				\$38,000	\$1,027,000	3.7%

Payback Ratio: 27 : 1

Note:

VDOT also reported a VE Study for Project Code 510-16676-000, Staunton District Office Addition & Renovation, however project was stopped before VE savings could be determined. As incomplete data was available, project is not included in above table to avoid distorting the totals & averages.

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)	194-16967-000	Department of General Services	Renovate Washington Building	\$12,195,000	PPEA project.
2)	204-16296-000	College of William & Mary	Construct Integrated Science Center	\$42,800,000	CM-at-Risk project.
3)	204-16514-000	College of William & Mary	Renovate Lake Matoaka Amphitheatre	\$5,357,000	CM-at-Risk project.
4)	207-17151-000	University of Virginia	Arts & Grounds Parking Garage	\$12,000,000	Design-Build project.
5)	211-17119-001	Virginia Military Institute	Renovate Kilbourne Hall Complex	\$8,400,000	CM-at-Risk project.
6)	211-17163-000	Virginia Military Institute	Construct Leadership & Ethics Center	\$15,000,000	CM-at-Risk project.
7)	211-17303-000	Virginia Military Institute	Barracks Expansion	\$28,000,000	CM-at-Risk project.
8)	221-17195-000	Old Dominion University	Quad Student Housing - Phase 1	\$21,291,000	V.E. Study waived. Peer review conducted.
9)	236-17108-000	Virginia Commonwealth University	School of Engineering / School of Business	\$64,000,000	CM-at-Risk project.
10)	236-17109-000	Virginia Commonwealth University	Monroe Park Deck and Housing	\$43,000,000	CM-at-Risk project.
11)	247-16665-000	George Mason University	Krasnow Institute Addition	\$5,140,000	Design-Build project.
12)	247-16832-002	George Mason University	Academic V Fairfax	\$18,763,000	CM-at-Risk project.
TOTAL				\$275,946,000	