Value Engineering

of

State Agency Capital Outlay Projects

for

Fiscal Year 2009

DEPARTMENT OF GENERAL SERVICES

BUREAU OF CAPITAL OUTLAY MANAGEMENT

Serving Government. Serving Virginians.

September 10, 2009

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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.C was granted, including a statement of the compelling reasons for granting the waiver.

II. Projects

Twenty-eight (28) projects with a combined estimated construction value of approximately $600 million were reported by Agencies as undergoing the Value Engineering process during Fiscal Year 2009. 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 $33.8 million. The average VE savings were 5.6% of the estimated construction value.

The average cost of a VE Study was $40,000. The average savings in construction value was $1,208,000. The aggregate costs of the VE studies as a percent of aggregate savings were 3.3%. This is equivalent to a payback ratio of 30:1 for employing the VE process.

IV. Waivers Granted / Projects Excluded

Sixteen (16) reported projects were granted waivers or otherwise excluded from the VE process. These 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. The average "value" savings reported by agencies as being incorporated in the design for these sixteen projects were 4.7% of the estimated construction value.

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, 2008 - JUNE 30, 2009

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 2009 which encompasses the period from July 1, 2008 - June 30, 2009.

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.

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 a second 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, structural, electrical, and mechanical) 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-eight (28) projects with a combined estimated construction value of approximately $600 million were reported by Agencies as undergoing the VE process during Fiscal Year 2009. The Value Engineering teams identified design changes, which were accepted by the agencies and institutions, which produced an aggregate estimated savings in construction cost of approximately $33.8 million. (See Table 1.)

The aggregate VE savings reported are equivalent to 5.6% of the combined preliminary budgets of these twenty-eight projects.

4. Study Costs

The aggregate cost for preparing studies for these 28 projects was $1,118,000. Study costs ranged from a low of $10,000 to a high of $71,000. The average study cost was $40,000. The median cost was $35,000. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately $32,709,000 by employing the Value Engineering process. The VE Cost as a percent of the VE Savings as an aggregate for these 28 projects was 3.3%. Stated otherwise, this represents a payback ratio of 30 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.

Sixteen (16) projects exceeding the $5,000,000 threshold were identified by agencies as being granted waivers or otherwise excluded from the VE process. These sixteen projects and the associated reasons for exclusion from the VE process are identified in Table 3.

Projects approved for procurement using the "Design Build" (D/B) 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*.)

Exemptions from the formal VE process continue to expand due to the use of these alternative procurement methods for major projects. Agencies did, however, report "value" savings of approximately $10.5 million for these D/B and CM projects. A request to waive a Value Engineering Study is granted contingent upon the agency submitting a summary of cost savings that have been incorporated in the project design prior to issuance of a final Building Permit. Based on their aggregate construction value of approximately $225 million, the savings reported represent 4.7% of the total construction value.

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	See Note
1)	194-17177	Department of General Services	Paul and Phyllis Galanti Education Center	$1,024,000	$6,730,000	15.2%	
2)	204-17586	College of William & Mary	School of Education	$3,630,000	$35,000,000	10.4%	
3)	204-16784	College of William & Mary	Small Hall Renovation	$327,000	$19,700,000	1.7%	
4)	204-90001	College of William & Mary	Career Services Center	$535,000	$5,524,000	9.7%	
5)	207-B1008-000	University of Virginia	Physical & Life Sciences Research Building	$1,821,000	$52,750,000	3.5%	(a)
6)	207-17476	University of Virginia	Information Technology Engineering Building	$1,244,000	$38,250,000	3.3%	
7)	207-B1061-001 and 002; 17470	University of Virginia	Alderman Road Student Housing - Phase II (includes Bldg 1, Bldg 2, and Commons)	$8,374,000	$48,000,000	17.4%	(a)
8)	207-B1025	University of Virginia	ITC Data Center	$2,563,000	$11,880,000	21.6%	
9)	207-1028	University of Virginia	Garrett Hall Rehabilitation Project	$387,000	$8,590,000	4.5%	
10)	207-17284	University of Virginia	Old Jordan Hall HVAC Infrastructure Replmnt	$1,238,000	$20,259,000	6.1%	
11)	207-17564	University of Virginia	New Cabell Hall Renovations	$2,348,000	$51,690,000	4.5%	(a)
12)	207-B1005	University of Virginia	Rugby Road Administration Building	$364,000	$9,300,000	3.9%	
13)	207-B1096	University of Virginia	Band Rehersal Hall	$169,000	$8,605,000	2.0%	
14)	211-17664	Virginia Military Institute	Renovate Science Building	$505,000	$18,300,000	2.8%	
15)	212-17306	Virginia State University	Renovate Singleton Hall	$797,000	$5,779,000	13.8%	
16)	213-17667	Norfolk State University	Nursing and Classroom Building	$169,000	$36,500,000	0.5%	
17)	213-17480	Norfolk State University	Brooks Library	$191,000	$36,400,000	0.5%	
18)	214-17317	Longwood University	Bedford Hall Addition and Renovation	$390,000	$25,932,000	1.5%	
19)	215-16803	University of Mary Washington	Monroe Hall Renovation	$1,141,000	$11,700,000	9.8%	
20)	216-17562	James Madison University	Port Republic Road Athletic/Rec Fields	$330,000	$24,000,000	1.4%	
21)	218-17676-004	VSDB - Staunton	New Dormitory	$200,000	$6,619,000	3.0%	
22)	218-17676-006	VSDB - Staunton	New Education Building	$16,000	$20,182,000	0.1%	
23)	221-16821	Old Dominion University	Hughes Hall Renovation	$241,000	$6,820,000	3.5%	
24)	246-17693	University of Virginia College at Wise	Multipurpose Building	$4,090,000	$23,100,000	17.7%	(b)
25)	247-17486	George Mason University	Performing Arts Building Addition	$170,000	$9,707,000	1.8%	
26)	247-17540	George Mason University	President's Park Renovation Ph 2	$349,000	$12,178,000	2.9%	
27)	260-17501	VCCS / NVCC	Manassas Campus Ph 3 Academic Building	$346,000	$20,330,000	1.7%	
28)	260-17377	VCCS / NVCC	Loundoun Campus Ph 3 Academic Building	$868,000	$26,375,000	3.3%	
			TOTAL	**$33,827,000**	**$600,200,000**		
			AVERAGE	**$1,208,000**	**$21,436,000**	**5.6%**	
			MEDIAN	**$447,500**	**$19,941,000**		

Notes:

(a) includes combined savings from from schematic and preliminary design studies.

(b) CVS facilitated study prepared at schematic design phase.

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	Payback Ratio	See Note
1)	194-17177	Department of General Services	Paul and Phyllis Galanti Education Center	$35,000	$1,024,000	3.4%	29:1	
2)	204-17586	College of William & Mary	School of Education	$32,000	$3,630,000	0.9%	113:1	
3)	204-16784	College of William & Mary	Small Hall Renovation	$34,000	$327,000	10.4%	10:1	
4)	204-90001	College of William & Mary	Career Services Center	$35,000	$535,000	6.5%	15:1	
5)	207-B1008-000	University of Virginia	Physical & Life Sciences Research Building	$71,000	$1,821,000	3.9%	26:1	(a)
6)	207-17476	University of Virginia	Information Technology Engineering Building	$34,000	$1,244,000	2.7%	37:1	
7)	207-B1061-001 and 002; 17470	University of Virginia	Alderman Road Student Housing - Phase II (includes Bldg 1, Bldg 2, and Commons)	$69,000	$8,374,000	0.8%	121:1	(a)
8)	207-B1025	University of Virginia	ITC Data Center	$53,000	$2,563,000	2.1%	48:1	
9)	207-1028	University of Virginia	Garrett Hall Rehabilitation Project	$31,000	$387,000	8.0%	12:1	
10)	207-17284	University of Virginia	Old Jordan Hall HVAC Infrastructure Replmnt	$10,000	$1,238,000	0.8%	124:1	
11)	207-17564	University of Virginia	New Cabell Hall Renovations	$29,000	$2,348,000	1.2%	81:1	(a)
12)	207-B1005	University of Virginia	Rugby Road Administration Building	$32,000	$364,000	8.8%	11:1	
13)	207-B1096	University of Virginia	Band Rehersal Hall	$28,000	$169,000	16.6%	6:1	
14)	211-17664	Virginia Military Institute	Renovate Science Building	$30,000	$505,000	5.9%	17:1	
15)	212-17306	Virginia State University	Renovate Singleton Hall	$36,000	$797,000	4.5%	22:1	
16)	213-17667	Norfolk State University	Nursing and Classroom Building	$37,000	$169,000	21.9%	5:1	
17)	213-17480	Norfolk State University	Brooks Library	$35,000	$191,000	18.3%	5:1	
18)	214-17317	Longwood University	Bedford Hall Addition and Renovation	$35,000	$390,000	9.0%	11:1	
19)	215-16803	University of Mary Washington	Monroe Hall Renovation	$44,000	$1,141,000	3.9%	26:1	
20)	216-17562	James Madison University	Port Republic Road Athletic/Rec Fields	$43,000	$330,000	13.0%	8:1	
21)	218-17676-004	VSDB - Staunton	New Dormitory	$34,000	$200,000	17.0%	6:1	
22)	218-17676-006	VSDB - Staunton	New Education Building	$51,000	$16,000	318.8%	0:1	
23)	221-16821	Old Dominion University	Hughes Hall Renovation	$39,000	$241,000	16.2%	6:1	
24)	246-17693	University of Virginia College at Wise	Multipurpose Building	$65,000	$4,090,000	1.6%	63:1	
25)	247-17486	George Mason University	Performing Arts Building Addition	$42,000	$170,000	24.7%	4:1	
26)	247-17540	George Mason University	President's Park Renovation Ph 2	$31,000	$349,000	8.9%	11:1	
27)	260-17501	VCCS / NVCC	Manassas Campus Ph 3 Academic Building	$59,000	$346,000	17.1%	6:1	
28)	260-17377	VCCS / NVCC	Loundoun Campus Ph 3 Academic Building	$44,000	$868,000	5.1%	20:1	
			TOTAL	**$1,118,000**	**$33,827,000**			
			AVERAGE	**$40,000**	**$1,208,000**	**3.3%**	**30:1**	
			MEDIAN	**$35,000**	**$447,500**			

Notes:

(a) includes combined costs and savings from schematic and preliminary design studies.

- The Department of Conservation & Recreation also completed a $17,000 VE study for a prototype cabin design, however, no recommendations were accepted. (Project not included in above tabulation as construction budget not yet specified.)

Table 3

Other Projects Exceeding $5,000,000 Threshold

Item No.	Project Code	Agency / Institution	Project Title	Estimated "Value" Savings (Accepted Items)	Preliminary Construction Budget	"Value" Savings as a % of Con. Budget	Reason Reported for VE Study Exemption	VE Study Reqmnt. Waived By
1)	207-B1011	University of Virginia	Aquatics & Fitness Center Chiller Plant Exp'n	$34,000	$14,207,000	0.2%	Construction Mgmt project.	Agency
2)	208-L00016	Virginia Tech	Football Locker Room Addition	$1,277,000	$13,835,000	9.2%	Design-Build project.	DGS
3)	208-17295	Virginia Tech	Recreation, Counseling and Clinical Space	$181,000	$8,798,000	2.1%	Construction Mgmt project.	Agency
4)	209-	UVa Health System	Clinical Office Bldg, 3rd Floor Fit Out	$567,000	$4,800,000	11.8%	Construction Mgmt project.	Agency
5)	209-B1012-001	UVa Health System	Univ. Hospital Heart Center Renovation - East	$200,000	$3,840,000	5.2%	Construction Mgmt project.	Agency
6)	211-17663	Virginia Millitary Institute	Military & Leadership Field Training Impr., Ph. 1	$4,100,000	$15,100,000	27.2%	Construction Mgmt project.	DGS
7)	212-17479	Virginia State University	Howard Quad Residence Halls Ph. 1	$343,000	$22,286,000	1.5%	Construction Mgmt project.	DGS
8)	216-17331	James Madison University	Bridgeforth Stadium Expansion & Renovation	($159,000)	$32,000,000	-0.5%	Construction Mgmt project.	DGS
9)	217-17026	Radford University	Dedmon Center Roof Rplmnt and Air Cond.	$0	$10,800,000	0.0%	See Note (b)	DGS
10)	221-17339-001	Old Dominion University	Diehn Center Addition	$330,000	$9,720,000	3.4%	Construction Mgmt project.	DGS
11)	221-17339-002	Old Dominion University	Diehn Center Theater	$530,000	$12,897,000	4.1%	Construction Mgmt project.	DGS
12)	241-17687	Richard Bland College	Science and Technology Building	$1,000,000	$16,300,000	6.1%	Construction Mgmt project.	DGS
13)	247-17142	George Mason University	Surge Space Building and Data Center Fit Out	$505,000	$21,577,000	2.3%	Design-Build project.	DGS
14)	247-17485	George Mason University	Student Center Addition & Renovation	$351,000	$17,550,000	2.0%	Design-Build project.	DGS
15)	260-17068	VCCS / TCC	Norfolk Campus Student Center	$143,000	$14,700,000	1.0%	Construction Mgmt project.	DGS
16)	260-17384-002	VCCS / JSRCC	Renovate Burnette Hall	$1,096,000	$6,542,000	16.8%	Construction Mgmt project.	DGS
			TOTAL	**$10,498,000**	**$224,952,000**	**4.7%**		

Notes:

(a) Waiver was granted based on size / nature of two projects (roof and A/C) which were combined. Nature of projects offered few VE opportunities, however, feasibility and system selection studies were conducted.

- College of William & Mary also reported for Project Code 204-17651, Cooling Plant Addition I, that VE for building shell was completed as part of the adjacent North Campus Power Plant Design. Waiver for further VE was granted by College's Associate VP for Facility Management.
- Virginia Tech also reported for Project Code 208-08208, Visitor's and Undergraduate Admissions Center, that savings are yet to be determined for this CM project.