

**Value Engineering
of
State Agency Capital Outlay Projects
for
Fiscal Year 2020**



**DEPARTMENT OF
GENERAL SERVICES**

DIVISION OF ENGINEERING AND BUILDINGS

Serving Government. Serving Virginians.

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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.

II. Projects

Ten (10) projects with a combined estimated construction value of approximately \$253 million were reported by Agencies as undergoing the Value Engineering process during Fiscal Year 2020. 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 \$8.6 million. The average VE savings were 3.4% of the estimated construction value.

The average cost of a VE Study was \$47,000. The average savings in construction value was \$863,000. The aggregate costs of the VE studies as a percent of aggregate savings were 5.4%. This is equivalent to a payback ratio of 18:1 for employing the VE process.

IV. Waivers Granted / Projects Excluded

Nine (9) reported projects were granted waivers or otherwise excluded from the VE process, six (6) of which were CM or Design-Build and are identified in Table 3. The remaining three (3) projects and the associated reasons for exclusion are identified in Table 4. Projects approved for procurement using the Design Build methodology are 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 exempted from the VE process. The average "value" savings reported by agencies as being incorporated in the design for these waived/excluded projects was 7.2% of the estimated construction value.

Projects procured under the provisions of the Public-Private Education Facilities and Infrastructure Act of 2002 (PPEA) are 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, 2019 - JUNE 30, 2020

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 2020 which encompasses the period from July 1, 2019 - June 30, 2020.

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 5.14 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 and 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 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

Ten (10) projects with a combined estimated construction value of approximately \$253 million were reported by Agencies as undergoing the VE process during Fiscal Year 2020. The Value Engineering teams identified design changes which were accepted by the agencies and institutions. These accepted changes produced an aggregate estimated savings in construction cost of approximately \$8.6 million. (See Table 1.)

The aggregate VE savings reported are equivalent to 3.4% of the combined preliminary budgets of these projects.

4. Study Costs

The aggregate cost for preparing studies for these ten (10) projects was \$474,879. Study costs ranged from a low of \$22,399 to a high of \$74,992. The average study cost was \$47,000. The median cost was \$46,656. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately \$8,628,569 by employing the Value Engineering process. The VE Cost as a percent of the VE Savings as an aggregate for these ten (10) projects was 5.4%. Stated otherwise, this represents a payback ratio of 18 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.

Nine (9) reported projects were granted waivers or otherwise excluded from the VE process, six (6) of which were Construction Management at Risk or Design-Build and are identified in Table 3. The remaining three (3) projects and the associated reasons for exclusion are identified in Table 4.

Projects approved for procurement using the Design Build (D/B) methodology are 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 exempted from the VE process. Projects procured under the provisions of the Public Public-Private Education Facilities and Infrastructure Act of 2002 (PPEA) are exempted from the VE provisions mandated in Section 2.2-1133 of the Code of Virginia.

Exemptions from the formal VE process are primarily due to the use of these alternative procurement methods for major projects. Agencies did, however, report “value” savings of approximately \$20.25 million for exempted Construction Management at Risk projects. Based on an aggregate construction value of approximately \$283 million, the savings reported represent 7.2% 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
1)	194-18081-002	Department of General Services	New Construction of Parking Structure	\$31,100	\$25,139,000	0.1%
2)	194-18394-001	Department of General Services	Reuse and Renovations to 219-223 Morson's Row	\$49,778	\$11,771,000	0.4%
3)	204-18360-000	College of Willam & Mary	Sadler West Addition	\$1,457,804	\$27,284,000	5.3%
4)	207-B1283	University of Virginia	Athletics Complex Phase I	\$1,023,100	\$13,500,000	7.6%
5)	207-P04475	University of Virginia	Student Health & Wellness Center	\$2,797,900	\$72,997,576	3.8%
6)	214-18384-000	Longwood University	Renovate/Expand Environmental Health & Safety Facilities Annes Building	\$666,000	\$13,320,000	5.0%
7)	218-18324-000	The Virginia School for the Deaf and the Blind	Main Hall Exterior Renovation	\$0	\$8,484,235	0.0%
8)	260-18341-000	Virginia Community College System	Repalce Diggs Moore Harrison Complex, Thomas Nelson Community College	\$1,329,923	\$44,500,000	3.0%
9)	260-18342-000	Virginia Community College System	Construct Advance Technology Training Center, Piedmont Virginia Community College	\$120,000	\$18,419,000	0.7%
10)	885-18402-000	Institute for Advanced Learning and Research	Center for Manufacturing Advancement	\$1,152,964	\$17,758,000	6.5%
TOTAL				\$8,628,569	\$253,172,811	
AVERAGE				\$863,000	\$25,317,000	3.4%
MEDIAN				\$844,550	\$18,088,500	

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
1)	194-18081-002	Department of General Services	New Construction of Parking Structure	\$38,737	\$31,100	124.6%	1:1
2)	194-18394-001	Department of General Services	Reuse and Renovations to 219-223 Morson's Row	\$46,608	\$49,778	93.6%	1:1
3)	204-18360-000	College of Willam & Mary	Sadler West Addition	\$46,704	\$1,457,804	3.2%	31:1
4)	207-B1283	University of Virginia	Athletics Complex Phase I	\$22,399	\$1,023,100	2.2%	46:1
5)	207-P04475	University of Virginia	Student Health & Wellness Center	\$74,992	\$2,797,900	2.7%	37:1
6)	214-18384-000	Longwood University	Renovate/Expand Environmental Health & Safety Facilities Annes Building	\$46,277	\$666,000	6.9%	14:1
7)	218-18324-000	The Virginia School for the Deaf and the Blind	Main Hall Exterior Renovation	\$39,895	\$0	N/A	0:1
8)	260-18341-000	Virginia Community College System	Repalce Diggs Moore Harrison Complex, Thomas Nelson Community College	\$55,000	\$1,329,923	4.1%	24:1
9)	260-18342-000	Virginia Community College System	Construct Advance Technology Training Center, Piedmont Virginia Community College	\$52,413	\$120,000	43.7%	2:1
10)	885-18402-000	Institute for Advanced Learning and Research	Center for Manufacturing Advancement	\$51,854	\$1,152,964	4.5%	22:1
TOTAL				\$474,879	\$8,628,569		
AVERAGE				\$47,000	\$863,000	5.4%	18:1
MEDIAN				\$46,656	\$844,550		

Table 3
Other Projects Exceeding \$5,000,000 Threshold with Informal VE Process

The requirement to perform a formal VE study was waived for the following projects. However, an informal VE process was utilized which yielded the following results:

Item No.	Project Code	Agency / Institution	Project Title	Estimated "Value" Savings (Accepted Items)	Preliminary Construction Budget	Savings as a % of Con. Budget	Reason Reported for VE Study Exemption	See Note
1)	208-18427-000	Virginia Tech	Data & Decision Sciences (D&DS)	\$1,809,000	\$59,000,000	3.1%	Construction Mgmt project.	(a)
2)	208-L00043-000	Virginia Tech	Corps Leadership Military Science Building (CLMS)	\$4,434,380	\$37,000,000	12.0%	Construction Mgmt project.	(a)
3)	215-18362-000	University of Mary Washington	Renovate Residence Halls - Phase II - Virginia Hall	\$1,560,703	\$19,612,170	8.0%	Construction Mgmt project.	(a)
4)	221-18335-000	Old Dominion University	New Health Sciences Building	\$3,605,413	\$57,065,000	6.3%	Construction Mgmt project.	(a)
5)	236-18336-000	Virginia Commonwealth University	Construct STEM Class Lab Building	\$6,103,861	\$93,960,000	6.5%	Construction Mgmt project.	(a)
6)	268-18344-000	Virginia Institute of Marine Science	Replace Oyster Hatchery	\$2,738,635	\$15,954,000	17.2%	Construction Mgmt project.	(a)
TOTAL				\$20,251,992	\$282,591,170	7.2%		

Notes:

(a) The Code of Virginia section 2.2-1133.C exempts projects procured utilizing Design-Build or Construction Management at Risk from the requirement for a formal VE process.

Table 4
Other Projects Exceeding \$5,000,000 Threshold

The requirement to perform a formal VE study was waived for the following projects for the reasons outlined below:

Item No.	Project Code	Agency / Institution	Project Title	Reason for Waiver	See Note
1)	215-18272-000	University of Mary Washington	Repair/Replace Underground Utilities	Project primarily involves repair and replacement of sections of utility distribution systems for sanitary, steam, and water piping and would not significantly benefit from the process.	
2)	208-L00050-000	Virginia Tech	Dietrick First Floor & Plaza Renovation	The independent 40-Hour VE Study was waived by the VT Chief Facilities Officer in SEP 2019 on the basis two A/E firms were involved in the design phase--the second of which did a full VE validation of the design work of the first A/E. Approximately \$750K of VE options were developed during the project; of those options, more than \$350K was accepted and incorporated into the design.	(a)
3)	207-P05409	University of Virginia	Emily Couric Clinical Cancer Center MRI-Linac	The vault location in the ECCCC was constructed in anticipation of a linear accelerator. The addition of the MRI to the Linac requires additional radiation shielding, floor & wall penetrations, chilled water & power, non-ferrous floor reinforcing, etc, all of which are dictated by the MRI-Linac supplier and are inflexible. The project's engineer has done numerous projects in the bldg & is intimately familiar with the bldg MEP systems. Major MEP items were reviewed with our Energy & Util group and modified based on those discussions, including a power conditioner/UPS to modulate incoming bldg power, and changing a chiller to a heat exchanger. Cancer treatments are done in adjacent spaces; all work must be done at night. For these reasons there was little opportunity for a VE session with paid peer reviewers to add value or reduce cost and a waiver was requested and approved.	(a)

Notes:

(a) Waiver granted by Higher Education Institution based upon their Tier III Authority under the Restructured Higher Education Financial and Administrative Operations Act.