

**Value Engineering
of
State Agency Capital Outlay Projects
for
Fiscal Year 2018**



**DEPARTMENT OF
GENERAL SERVICES**

DIVISION OF ENGINEERING AND BUILDINGS

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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

Four (4) projects with a combined estimated construction value of approximately \$121 million were reported by Agencies as undergoing the Value Engineering process during Fiscal Year 2018. 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 \$4.9 million. The average VE savings were 4.1% of the estimated construction value.

The average cost of a VE Study was \$61,000. The average savings in construction value was \$1,233,000. The aggregate costs of the VE studies as a percent of aggregate savings were 4.9%. This is equivalent to a payback ratio of 20:1 for employing the VE process.

IV. Waivers Granted / Projects Excluded

Twenty (20) reported projects were granted waivers or otherwise excluded from the VE process, eighteen (18) of which were CM and are identified in Table 3. The remaining two (2) 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 3.8% 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, 2017 - JUNE 30, 2018

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 2018 that encompasses the period from July 1, 2017 - June 30, 2018.

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. In addition, 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

Four (4) projects with a combined estimated construction value of approximately \$121 million were reported by Agencies as undergoing the VE process during Fiscal Year 2018. The Value Engineering teams identified design changes that were accepted by the agencies and institutions. These accepted changes produced an aggregate estimated savings in construction cost of approximately \$4.9 million. (See Table 1.)

The aggregate VE savings reported are equivalent to 4.1% of the combined preliminary budgets of these four projects.

4. Study Costs

The aggregate cost for preparing studies for these 4 projects was \$244,686. Study costs ranged from a low of \$49,750 to a high of \$73,624. The average study cost was \$61,000. The median cost was \$60,656. Deducting the study costs, the Commonwealth realized a net savings in estimated construction value of approximately \$4,686,000 by employing the Value Engineering process. The VE Cost as a percent of the VE Savings as an aggregate for these 4 projects was 4.9%. Stated otherwise, this represents a payback ratio of 20 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.

Twenty (20) reported projects were granted waivers or otherwise excluded from the VE process, eighteen (18) of which were Construction Management at Risk and are identified in Table 3. The remaining two (2) 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 \$43.2 million for exempted Construction Management at Risk projects. Based on an aggregate construction value of approximately \$1.136 billion, the savings reported represent 3.8% 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) | 208-18268-000 | Virginia Polytechnic Institute and State University | Chiller Plant Phase II | \$1,531,671 | \$33,633,000 | 4.6% |
| 2) | 260-18223-000 | Virginia Community College System | VWCC - Construct Parking Garage | \$733,056 | \$10,703,000 | 6.8% |
| 3) | 146-18200-000 | Science Museum of Virginia | Construct Parking Facility/Master Site Plan | \$1,340,753 | \$11,890,577 | 11.3% |
| 4) | 274-18284-000 | Eastern Virginia Medical School | New Education and Academic Administration Building | \$1,325,245 | \$64,396,060 | 2.1% |
| TOTAL | | | | \$4,930,725 | \$120,622,637 | |
| AVERAGE | | | | \$1,233,000 | \$30,156,000 | 4.1% |
| MEDIAN | | | | \$1,332,999 | \$22,761,789 | |

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) | 208-18268-000 | Virginia Polytechnic Institute and State University | Chiller Plant Phase II | \$64,208 | \$1,531,671 | 4.2% | 24:1 |
| 2) | 260-18223-000 | Virginia Community College System | VWCC - Construct Parking Garage | \$73,624 | \$733,056 | 10.0% | 10:1 |
| 3) | 146-18200-000 | Science Museum of Virginia | Construct Parking Facility/Master Site Plan | \$57,104 | \$1,340,753 | 4.3% | 23:1 |
| 4) | 274-18284-000 | Eastern Virginia Medical School | New Education and Academic Administration Building | \$49,750 | \$1,325,245 | 3.8% | 27:1 |
| TOTAL | | | | \$244,686 | \$4,930,725 | | |
| AVERAGE | | | | \$61,000 | \$1,233,000 | 4.9% | 20:1 |
| MEDIAN | | | | \$60,656 | \$1,332,999 | | |

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) | 720-18166-000 | Department of Behavioral Health and Developmental Services | Construct New Sexually Violent Predator Facility | \$5,085,425 | \$87,800,000 | 5.8% | Construction Mgmt project. | (a) |
| 2) | 194-18081-001 | Department of General Services | General Assembly Building | \$4,350,697 | \$170,900,000 | 2.5% | Construction Mgmt project. | (a) |
| 3) | 194-18081-003 | Department of General Services | Old City Hall Renovation | \$2,703,503 | \$49,600,000 | 5.5% | Construction Mgmt project. | (a) |
| 4) | 123-18312-000 | Department of Military Affairs | Construct Cyber Brigade Readiness Center | \$815,420 | \$14,231,000 | 5.7% | Construction Mgmt project. | (a) |
| 5) | 247-18207-000 | George Mason University | Construct/Renovate Robinson Hall, New Academic & Research Facility Harris Theater Site | \$1,800,000 | \$87,220,000 | 2.1% | Construction Mgmt project. | (a) |
| 6) | 247-18208-000 | George Mason University | Construct Utilities Distribution System | \$961,000 | \$43,044,000 | 2.2% | Construction Mgmt project. | (a) |
| 7) | 236-18243-000 | Virginia Commonwealth University | School of Engineering Research Building | \$1,460,000 | \$69,419,410 | 2.1% | Construction Mgmt project. | (a) |
| 8) | 221-18303-000 | Old Dominion University | Reconstruction of the Football Stadium at Foreman Field | \$2,113,899 | \$53,615,240 | 3.9% | Construction Mgmt project. | (a) |
| 9) | 221-18068-000 | Old Dominion University | New Chemistry Building | \$3,569,500 | \$59,000,000 | 6.1% | Construction Mgmt project. | (a) |
| 10) | 221-18101-000 | Old Dominion University | Construct New Residence Hall (Owens House) | \$1,565,660 | \$49,000,000 | 3.2% | Construction Mgmt project. | (a) |
| 11) | 216-18273-000 | James Madison University | College of Business Renovation & Expansion | \$6,414,670 | \$71,014,838 | 9.0% | Construction Mgmt project. | (a) |
| 11) | 216-17963/18231 | James Madison University | New Convocation Center/East Campus Parking Deck | \$4,609,824 | \$118,509,824 | 3.9% | Construction Mgmt project. | (a) |
| 12) | 216-18274-000 | James Madison University | Renovate Wilson Hall | \$120,909 | \$20,129,909 | 0.6% | Construction Mgmt project. | (a) |
| 13) | 216-18197-000 | James Madison University | Student Housing | \$2,307,292 | \$49,828,682 | 4.6% | Construction Mgmt project. | (a) |
| 14) | 216-18143-000 | James Madison University | Dining Hall | \$437,370 | \$25,125,000 | 1.7% | Construction Mgmt project. | (a) |
| 15) | 211-18204-0000 | Virginia Military Institute | Improve Post Infrastructure Phase I, II, & III | \$2,075,000 | \$32,811,000 | 6.3% | Construction Mgmt project. | (a) |
| 16) | 204-18292-000 | College of William and Mary | Fine and Performing Arts Center | \$1,796,108 | \$93,417,497 | 1.9% | Construction Mgmt project. | (a) |
| 17) | 204-90009 | College of William and Mary | Alumni House Addition | \$536,800 | \$15,549,811 | 3.5% | Construction Mgmt project. | (a) |
| 18) | 204-18202-000 | College of William and Mary | Construct West Utilities Plant | \$432,818 | \$25,356,895 | 1.7% | Construction Mgmt project. | (a) |
| TOTAL | | | | \$43,155,895 | \$1,135,573,106 | 3.8% | | |

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 |
|----------|---------------|--|--|---|
| 1) | 720-18210-001 | Department of Behavioral Health and Developmental Services | Expand Western State Hospital | The project scope is the addition of another wing to match a project previously designed under the Design-Build process. |
| 2) | 214-18271-000 | Longwood University | Replace Steam Distribution System Wheeler Mall | The project scope is straightforward and few disciplines are involved. Various design options were considered during the early planning and schematic phases of design. |