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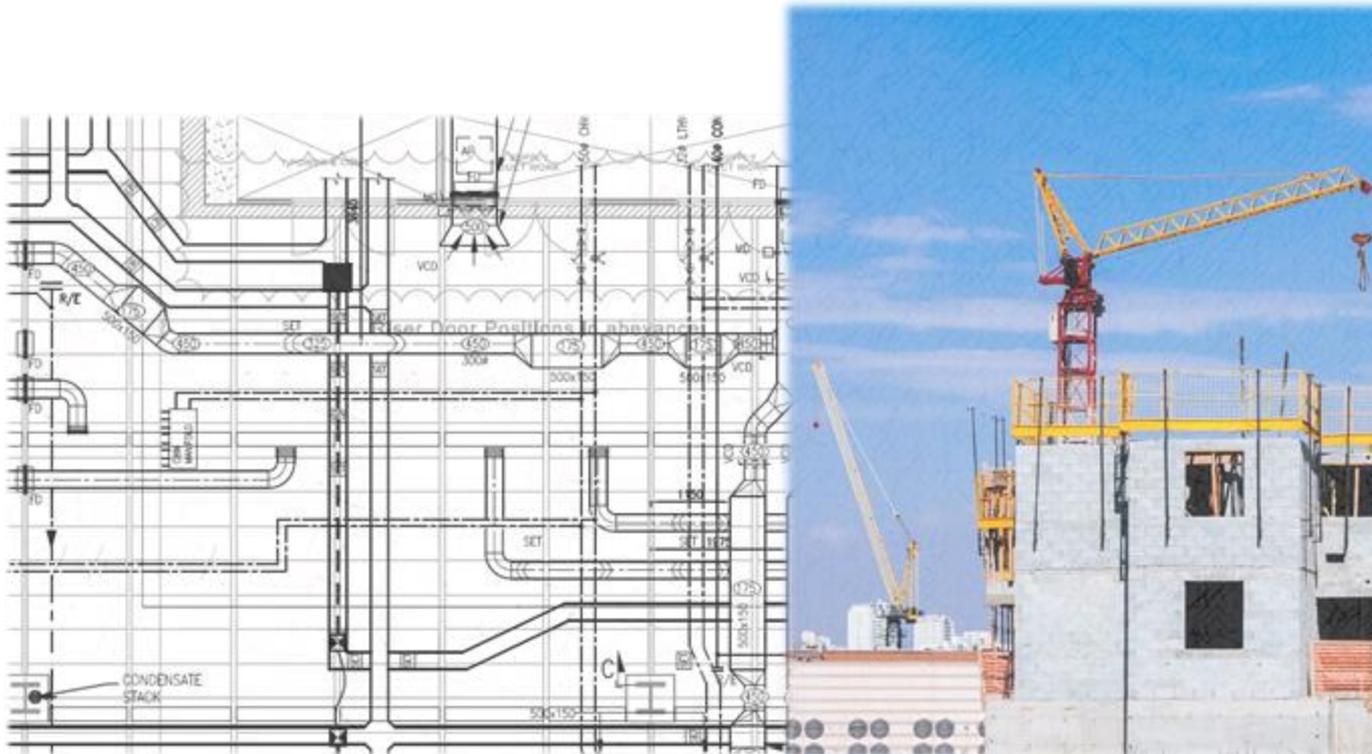


Commonwealth of Virginia  
Department of General Services  
**Division of Engineering & Buildings**

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### **DEB Response to COVID-19**

The Division of Engineering and Buildings (DEB) remains open for business and continues to perform all of our State mandated functions during this unprecedented time. However, in order to comply with Governor Northam's requirements in Executive Order 55 for maintaining social distancing, DEB has developed new procedures for document submittals, meetings and inspections. Please refer to the DEB website for the latest information on document submittals, and contact your agency's assigned Lead Reviewer for guidance when scheduling meetings or inspections.



### **Quick Links**

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# Design Philosophy

The Commonwealth’s design philosophy, stipulated in CPSM 1.4, encompasses four fundamental components; functional requirements, life-cycle costs, energy efficiency and environmental conservation. Each of these components is systematically interconnected in a way that may often be overlooked when viewed individually. This design philosophy provides the basis for creating successful state-owned facilities that will be designed for “durability, economy of operation, and ease of maintenance”. DEB has provided a series of resources to assist agencies and their A/E teams to investigate, calculate and document the following necessary components throughout the formative phases of project development.

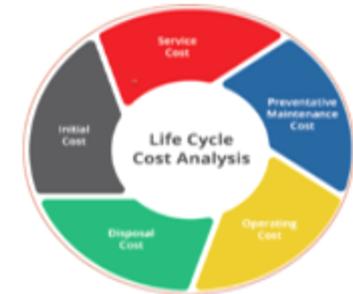


## FUNCTIONAL REQUIREMENTS

Arguably the most fundamental of the four components, the program will define the functional requirements including scope and scale for which the other three components are measured. Space planning for State-Owned facilities, as defined in the Appropriations Act, “shall be developed to meet Agency space requirements within a cost range comparable to similar public and private sector projects.” CPSM 6.1 provides a matrix of area guidelines for space planning and budget preparation. Designers must exercise discipline, with both area and volume, in developing the programmatic requirements so that the building achieves the highest Building Efficiency Ratio (CPSM 6.1.2.4) and Design Efficiency Rating (CPSM 6.1.2.5) as practical for the intended purpose. The Area Calculation Worksheet (DGS-30-219) shall be utilized to calculate and document the Gross Building Area for all Capital Outlay Forms and Cost Estimates. These building areas, definitions and attributes will vary from those defined within the Virginia Uniform Statewide Building Code (VUSBC) for “Area, Building” found in Chapter 2. DEB always recommends scheduling a pre-design conference so all parties involved are clear on the project scope, including types of occupancy and activities to be accommodated, capacity requirements of spaces, and all other elements of the defined program.

## LIFE-CYCLE COSTS and ENERGY ANALYSES

The second component is characteristically the economic driver of a project whereby all building systems, products, and materials should be selected on the basis of their life-cycle costs and not just their initial cost within the boundaries of the project’s “design-not-to-exceed” budget. Selections shall take into account maintenance, operations, service, and eventual disposal costs. Excessive or extraneous features that do not perform an integral function shall be avoided. The requirements for life-cycle costs and energy analyses are enumerated in Appendix I of the CPSM and include references to worksheets (DGS-30-228) that are available for download from the DGS Forms Center. Early in a project’s development the agency and their A/E team must analyze and document various strategies for building envelope, HVAC systems and fuel type based on periods of time, typically 20-30 years. The Life Cycle Cost and Energy Analyses are to be included as part of the Preliminary Submittal Requirements defined in Section 5.7 of the CPSM.



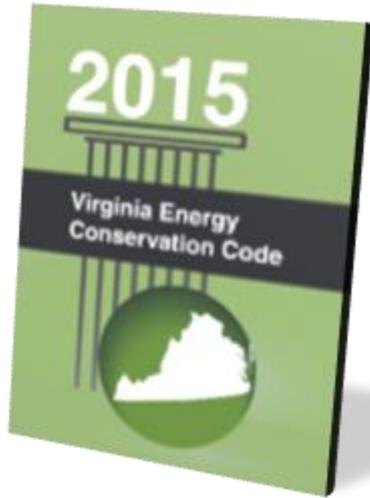
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## ENERGY EFFICIENCY

Building performance, including energy efficiency, can easily be viewed as the most complex of the four components. Continual technological advancements in equipment and extensive product availability create inherent challenges to meeting the necessary parameters of economy of operation and ease of maintenance. Energy efficient design is predicated upon compliance with the VECC. There are various methods for compliance with the Virginia Energy Conservation Code (VECC). The chosen method must be determined and documented early in the project development and shall apply to the complete project in its entirety. DEB has provided a flow chart, found in CPSM 6.1.5, that pairs the chosen compliance path with one of the twelve prepared Virginia Energy Conservation Code compliance statements. The title sheet of the drawings and the basis of design narrative shall have the selected compliance statement identified as early as the Schematic Drawings and on all other submissions that follow. Required in the Preliminary Design submittal, detailed calculations for each discipline shall identify and support the selected systems from the alternatives considered earlier in the Schematic phase life cycle cost and energy analyses.

## ENVIRONMENTAL CONSERVATION

This component of the Commonwealth's design philosophy is inherently the measuring instrument used to document the resources utilized in the construction or renovation of a state building. New construction exceeding 5,000 square feet and renovations exceeding 5,000 square feet where the cost of renovation exceeds 50% of the building value (CPSM 6.1.3) must comply with the High Performance Buildings Act (HPBA). For renovations, DEB has created a worksheet (DGS-30-383) that may be utilized to determine existing building value. It draws upon the Virginia Building Construction Cost Database that can be found in the Budget Development tab of the DEB website. It also requires the calculated gross square footage determined on the Area Calculation Worksheet (DGS-30-219). If the project is subject to compliance with the HPBA, a compliance method shall then be selected from the three allowable energy conservation and environmental performance standards (LEED, Green Globes, VEES) and documented using one of the prepared compliance statements found in CPSM 6.1.3.2 on the Schematic design drawings and project narrative. Appendix V of the CPSM defines the provisions for the Virginia Energy Conservation and Environmental Standards (VEES) if this compliance method is selected.

The Commonwealth's design philosophy for state buildings envisions a long and useful life, often exceeding 50 years. It is incumbent upon everyone involved with the development and management of state construction and renovation projects to be mindful of how decisions occurring in early stages of programming, design and budget development may impact other aspects of the process.

HPBA EXISTING BUILDING VALUE WORKSHEET	
DESCRIPTION	COST
<b>A. AREA OF RENOVATION</b>	
PROJECT SF TOTAL	
<b>B. EXISTING BUILDING</b>	
1. Cost of a Comparable New Building * (CPSM according to the Virginia Building Construction Cost Database)	
2. Area (existing building SF)	
3. HPBA EXISTING BUILDING VALUE TOTAL: (1) x (2)	
<b>C. RENOVATION PROJECT COST</b>	
1. Direct Cost of Renovation	
2. Contingency Fee	0
3. RENOVATION PROJECT COST TOTAL	0
<b>D. COMPLIANCE: C / B</b>	
* Excludes, or less than 50% compliance with HPBA, not required. If greater than 50% compliance with HPBA required.	
<b>E. APPROVAL</b>	
DEB Cost Reviewer approval	



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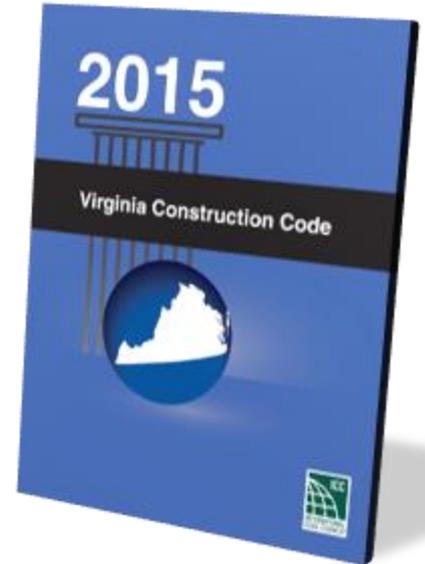
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## Criteria for Engineering Judgments Submitted to DEB

Instances frequently occur where tested assemblies for fire resistance rated conditions cannot be met. For such conditions, engineering judgments (EJ) are sometimes used to address the anomalies from the tested assemblies. In cases where fire resistance rated assemblies tested per ASTM E119 or UL 263 are involved, EJ's are usually developed by registered fire protection engineers, sometimes with the assistance of product manufacturers. In some cases, a nationally recognized testing laboratory (UL, Intertek, etc.) will provide written statements about conditions that do not require a formal EJ. EJ's involving fire resistance rated construction are submitted to DEB by the architect of record, who is required to opine that the proposed EJ provides construction that complies with the Virginia Construction Code (VCC).

EJ's are frequently required for modifications to NFPA 285 tested assemblies. Such EJ's shall be developed and submitted as described above. Note that where foam plastic materials are used in fire resistance rated wall assemblies, the complete assemblies are required to be tested per ASTM E119 or UL 263, as well as per NFPA 285.

The [January 2018 DEB Newsletter](#) article "Engineering Judgements Demystified" is recommended as an excellent resource regarding not only for the above issues, but also for EJ preparation and submission requirements in general.



### **For conditions such as:**

- a) Through penetration firestop systems, which are required by VCC Sections 714.3.1.2 and 714.4.1.2 to be tested per ASTM E814 or UL 1479,
- b) Fire-resistant joint systems, which are required by VCC Section 715.3 to be tested per ASTM E1966 or UL 2079, and
- c) Perimeter systems, which are required by VCC Section 715.4 to be tested per ASTM E2307, EJ's are frequently developed by firestopping material manufacturers. These EJ's are also required to be submitted to DEB by the architect of record in the same manner as described

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Unofficial guidelines for evaluating firestop system EJ's have been adopted by the International Firestop Council, which is "a nonprofit association of manufacturers, distributors, installers, inspectors, and other key stakeholders interested in passive fire protection materials and systems". The guidelines are titled Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments, and are described by the International Fire Code (IFC) as being intended for "informational and educational purposes". Note that they are not a Referenced Standard such as those listed in Chapter 35 of the VCC.

- IFC EJ Guidelines item number 1 is the same as often stated by DEB, EJ's shall not be used when tested systems are available. If the selected manufacturer does not have a tested assembly that can be installed in the project, sources such as Intertek, ICC-ES, FMG, and the UL Product iQ shall be searched for a usable tested assembly. In addition, if the listings and manufacturers' installation instructions for assemblies such as duct wraps and gypsum board partitions have specific construction instructions; do not try to use a third-party fire stop assembly as a substitute.
- IFC EJ Guideline item No. 3, EJ's should be "based upon interpolation or extension of previously tested firestop systems that are ... sufficiently similar in nature". The "extension" of previously tested firestop systems constitutes extrapolation of test data, which would appear to require careful documentation of the applied engineering principles used to apply the results of the testing to the proposed conditions. Hence the requirement for the A/E of record or consultant to submit the EJ with their professional seal and signature. Furthermore, IFC EJ Guideline item No. 4 states that the EJ should be "based upon full knowledge of the elements of the construction to be protected and the understanding of the probable behavior" of the arrangements indicated in the EJ. The person with such knowledge should be able to state in the EJ that if the construction indicated in the EJ "was subjected to the appropriate Standard Fire Test method for firestops for the rating indicated on the EJ", the assembly would perform as indicated.

**The IFC Guidelines "Basic Presentation Requirements" indicate that the EJ should:**

- a) include clear directions for the installation of the firestop assembly,
- b) reference the tested systems used to develop the EJ,
- c) indicate the non-standard conditions covered by the EJ, and
- d) provide authoritative justification, and
- (e) provide complete descriptions of critical elements for the firestop configuration



**INTERNATIONAL FIRESTOP COUNCIL**  
THE Source of Firestop Expertise®

Some EJ's provided by firestopping material manufacturers might follow these guidelines, but the results are sometimes ineffectual and do not usually provide evidence as to how the tested through penetration firestop systems are applied to the engineering judgement documents. Such EJ's are usually indicated to be based on one or more tested assemblies. It is assumed that such references are intended as "justification" for the engineering judgements, since "justification" is a requirement of *IFC Guidelines*. Copies of tested assemblies are not "justification" per the *IFC Guidelines*. The tested assemblies are not always provided by the submitting manufacturer, which means that the DEB reviewer has to ask for the referenced tested assemblies and an explanation of how they are applied to the EJ.

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There is usually no explanation from the manufacturer in the EJ as to how the referenced tested assemblies are applied to justify the substitute conditions. This ambiguity increases when multiple tested assemblies are referenced. In any event, further information is required from the manufacturer, since the manufacturer is assumed to have based the EJ on the manufacturer's testing experience, which, as described above, is an unknown for the AHJ.

The *IFC Guidelines* indicate that the EJ needs to provide "complete descriptions of critical elements for the firestop configuration". The technical descriptions and details found in EJ's submitted to DEB for review are often lacking in dimensions, gauges, materials, product names, etc. in the same manner found in the tested assemblies. Sometimes the number of elements in engineering judgements are different from the number of elements in the referenced tested. This happens more so when multiple tested assemblies are referenced.

Instructions and conditions in the EJ that are not modified shall be repeated in their entirety. This includes the text and applicable graphics that the EJ is complete. It is likely that the contractor will have only the EJ to use for the installation. When the EJ is based on one or more tested assemblies, it must be able to stand alone.

When one manufacturer submits an EJ that is based on tested assemblies that include products by other manufacturers, all manufacturers shall provide EJ's for their respective portions of the tested assembly. The EJ's shall be coordinated by all manufacturers and the A/E of record submittal to DEB shall comply with the instructions found at the beginning of this article.

For example, a firestop manufacturer cannot submit an EJ for another manufacturer's assembly or material. Furthermore, a firestop manufacturer cannot submit an EJ for a condition that is unrelated to the applications of VCC Sections such as 714 and 715, such as the construction of a fire resistance rated element such as a wall or floor assembly that is required to comply with ASTM E119 or UL 263 testing.

In summary, before submitting engineering judgements to DEB, the A/E of record should evaluate the proposed engineering judgements in consideration of the *IFC Guidelines* and this article.



**Fire-Resistance-Rated  
Wall Assembly  
ASTM E119/NFPA 251/UL263**



Contains flame, smoke AND  
blocks radiant heat

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## DEB Forms Update

The following recently revised DEB forms **are now available** on the [DGS Forms Center](#):

Form Name	DGS Form #	Alternate ID #
DEB Forms Master List	<a href="#">DGS-30-000</a>	(DEB Forms List)
A/E Contract for Professional Services	<a href="#">DGS-30-016</a>	CO-3
Terms and Conditions of the A/E Contract	<a href="#">DGS-30-018</a>	CO-3a
A/E Term Contract	<a href="#">DGS-30-020</a>	CO-3.1
A/E Term Contract, Project Order for	<a href="#">DGS-30-024</a>	CO-3.1a
A/E Contract for Selected Professional Services	<a href="#">DGS-30-028</a>	CO-3.2
A/E Contract Change Order	<a href="#">DGS-30-100</a>	CO-11ae
A/E Project Order Change Order	<a href="#">DGS-30-101</a>	CO-11.1ae
Notice of Invitation for Bids (notice for specs or posting)	<a href="#">DGS-30-256</a>	
Memorandum of Understanding for A/E Contract	<a href="#">DGS-30-258</a>	—
Memorandum of Understanding for A/E Term Contract	<a href="#">DGS-30-260</a>	—
RFP for A/E Services (Standard Format)	<a href="#">DGS-30-300</a>	—
RFP for A/E Services (Format for Term Services)	<a href="#">DGS-30-304</a>	—

Form DGS-30-000 provides a master list of the current version of all DEB forms posted on the DGS Forms Center.

The adjacent underscored DGS Form Numbers are hyperlinks to quickly access each form.

DGS-30-000 contains similar hyperlinks to quickly access all DEB forms posted on the DGS Forms Center.

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