

# DEB NEWSLETTER

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## **Informational Sessions on Recent Code of Virginia Changes to the Construction Management and Design Build Procurement Methods**

Join Joe Damico, Director of the Department of General Services, and Mike Coppa, Director of the Division of Engineering & Buildings, for an informational session on recent Code of Virginia changes to the Construction Management and Design Build procurement methods.

Two sessions will be held on **Wednesday, October 24** at the **Virginia Beach Convention Center** in conjunction with the annual Procurement Forum. The first session (10:30 a.m. to 11:30 a.m.) is **open to government employees only**; the second session (11:45 a.m. to 12:45 p.m.) is **open to private sector attendees**.

These sessions will detail significant changes made during the 2017 General Assembly session and describe required reporting from Local, State and Higher Education Institutions. The sessions will also include a panel discussion.

You do not need to attend the Procurement Forum, proper, to attend one of these sessions, but registration is required. To register, please complete the online registration form. (Please note: If you have already registered for the Procurement Forum, proper, then you do not need to complete the [online registration form](#) for these special sessions.)



## **Geotechnical Investigations, Soils Reports, and Foundation Recommendations**

Geotechnical investigations, conducted and reported in accord with Virginia Construction Code Section 1803, are required for all new buildings constructed on State property. The State Building Official may waive the requirement for a geotechnical investigation where data from nearby borings is available and the new structure would be a small addition or an isolated, small, one-story structure.

The geotechnical investigation may include soil borings, test pits, or other subsurface exploration. A registered design professional determines the scope of the geotechnical investigation, including the number, types, and locations of the borings. Typically, one soil boring would be required on the site for a building similar in size to a residential house, and several soil borings may be needed for a larger building.

### **Soils Reports:**

Soils Reports documenting the geotechnical investigation and analyzing the soils information are extremely valuable for determining foundation type and evaluating foundation cost. Sometimes soil borings are taken and evaluated for building sites before the design of a structure is even considered. Other times soil borings are taken after the size of the structure is known. The specific soils information required to be included in the soils report is described in VCC Chapter 18, sections 1802, 1803 and 1804. While there is an upfront cost for the soil investigations and the geotechnical report, the information obtained can result in significant net savings by assuring the appropriate foundation design is selected for the project.

The Soils Report contains geotechnical analysis prepared by a Registered Professional Geotechnical Engineer and includes the following information:

1. General project information. (Site information and description of the proposed structure).
2. Engineers' scope of services, as understood by the engineer (such as visit site, take soil borings, coordinate utilities, review available geotechnical information, provide seismic site class definition, evaluate test boring logs and make a written report).
3. Evaluate and describe how mechanically the soil borings were taken on the site.
4. Describe regional geology.
5. Evaluate fill materials if needed.
6. Subsurface water: Show depth if encountered. Usually shown on the boring log.
7. Recommend foundation design based on the boring information and the size of the structure. An experienced professional geotechnical engineer will provide detailed information for the foundation recommendation and in some cases, will provide information for a comparable foundation, for use in costing.
8. Estimate building settlement based on the recommended foundation. The total settlement for the entire building with an estimated differential settlement between columns and columns and walls, etc.
9. Underground drainage if needed.
10. Horizontal loading for retaining walls.

**DEB Submittal Requirements:**

The geotechnical report, including boring logs, geotechnical analysis and foundation design recommendations, is required to be submitted to DEB with the Preliminary Documents. For the Working Drawing submittal, include the entire soils report in the Project Manual as an appendix to the specifications.

On the Site Drawings or a location map, indicate the locations of the test borings and locations of any special earthwork recommendations and construction considerations noted in the geotechnical report. The boring logs shall be presented on the drawings. Pertinent logs from previous soil exploration in the project location shall also be included on the drawings. Refer to 2018 CPSM, section 5.2.14 for specific information concerning boring log presentation. Do not copy the boring logs onto the drawing sheets by hand- a photocopy or computer image of the boring logs should be used in order to prevent errors in copying.

When value engineering is required for a project, the boring logs and soil reports are required to be sent to the VE Team by the architect/engineer prior to commencing the VE study.

**Incidental Useful Information:**

Occasionally soil boring logs are delivered to the Engineer of Record and the Building Official prior to receiving the full and final soils report. If it is determined that the foundation of the structure, based on the preliminary boring logs, can be a shallow foundation, a conservative guess can be made as to the allowable foundation design bearing pressure by using the boring logs. The soil boring logs contain six columns of information (Elevation, Depth, Description of Materials in the bore hole, Sample Blows, Sample Depth and N Value) the "N" value is derived from the Blow Count by throwing out the first blow count and adding the last two blow counts. Sample blow counts below 3 usually will require deep foundations and will require evaluation by the Geotechnical Engineer. Consider sample blow counts above 4: (never use the blow count in uncontrolled fill) The sample blow count as shown on the boring logs is for a 6" distance, therefore where three numbers are shown, the last two numbers are added together to determine the "N" value. Example: 3-4-4, the N value is 8. If this value (8) is at the elevation of the foundation bearing and there are no lower N values below it on the log presentation, then simply divide the N value by 4 and multiply by 1000 to get the allow foundation design bearing value. In this case  $8/4 \times 1000 = 2,000$  psf allowable. (Based on the height of a structure and high column loads a deep foundation may be required.)

The final soils report by the Registered Professional Geotechnical Engineer is to be the main deciding factor for the building foundation design.



## Position Openings for Mechanical and Electrical Engineers

### State Review Mechanical Engineer (EE049)

The Division of Engineering and Buildings seeks a qualified licensed engineer to perform tasks related to mechanical engineering review of building plans and specifications and performing construction inspections. The successful applicant holds: 1) a bachelor's degree in engineering with emphasis in mechanical engineering, 2) a professional engineering license in Virginia, and 3) a valid driver's license. In addition, the applicant has knowledge and experience in the application of the Virginia Uniform State Building Code, Virginia Mechanical Code, Virginia Plumbing Code, Virginia Fuel Gas Code, Virginia Energy Conservation Code, Americans with Disabilities Act, and state regulations.

### State Review Electrical Engineer (EE025)

The Division of Engineering and Buildings seeks a qualified licensed engineer to perform tasks related to electrical engineering review of building plans and specifications and performing construction inspections. The successful applicant holds: 1) a bachelor's degree in engineering with emphasis in electrical engineering, 2) a professional engineering license in Virginia, and 3) a valid driver's license. In addition, the applicant has knowledge and experience in the application of the Virginia Uniform State Building Code, the National Electric Code, Virginia Energy Conservation Code, and state regulations.



Submit applications through  
<http://jobs.virginia.gov>

## VCCO Update

The following individual recently passed the Virginia Construction Contracting Officer (VCCO) certification examination:

- **Bob Tabor** with the Virginia Museum of Fine Arts

Virginia Construction Contracting Officers are state and local government employees who have completed the necessary training and successfully passed a multi-part examination focused on state procurement law, policy and procedures. VCCOs perform several key functions in delivering projects including the procurement of professional services; the receipt, opening and review of bids; and in some cases the approval of CO-8 forms for recommending the award of construction contracts.



## The Energy Conservation Code and Air-Side Economizers

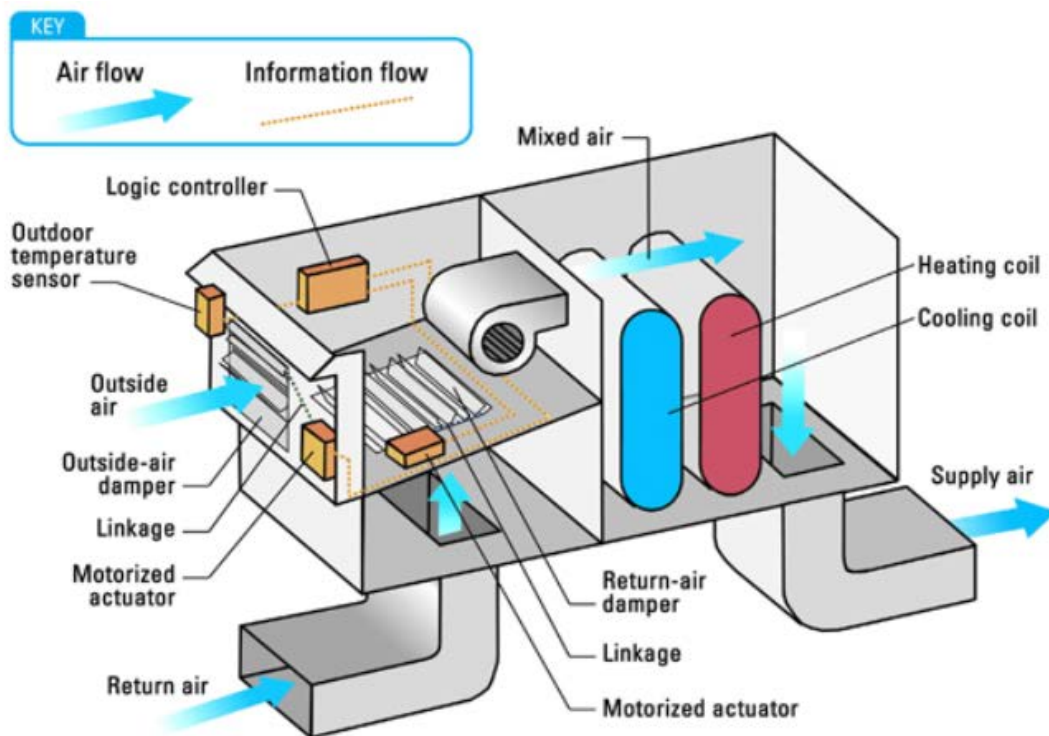
When the weather report calls for sunny days, with highs in the upper 60s to low 70s, we look outside and think "it sure is a nice day to be outdoors!" We drive to work with the windows down just enjoying the nice weather, but then we get to work where the windows don't open and the lights and our computers are on making us wish we could be outside in the fresh air and sunshine. Those are the kinds of days where that we want our building mechanical systems to open their windows (outside air dampers) and let in as much of that outdoor air in as possible. Those are economizer days.

There are many benefits to economizers. The obvious benefit is the reduction in cooling costs. Why pay for running compressors and condenser fans to cool our buildings when we can get the same cooling benefit, just by using outdoor air for free cooling. One of the lesser known benefits is the extra ventilation effect. Think about what most of us do after having our windows in our home shut for the long winter or even longer summer and those first mild days of spring and fall arrive. We open all the windows in our house to "air it out". Air-side economizers have a similar effect. While code minimum outdoor air is designed to dilute the buildup of contaminants such as CO<sub>2</sub> (by people) and VOCs (off-gassing of building materials), the air quality is never quite as good as it is outside, but when we operate our air-side economizers we "air out" the contaminants in our buildings with fresh outdoor air and "reset" the indoor air quality.

So, what does it take to provide air-side economizers? First we need to make provisions in the design of our mechanical systems to allow them to use up to 100% outdoor air. This means sizing our outdoor air intakes for 100% of the supply airflow and providing a modulating damper that can regulate the flow of outdoor air. We also need to make provisions to relieve the excess air from the building. This can be done by adding a relief damper or relief fan that operates when the economizer is available. Lastly, we need to determine if the outdoor air conditions are right for economizer. For our climate here in Virginia the 2015 Virginia Energy Conservation Code (VECC) permits us to use one of several means:

- 1. Fixed Dry-Bulb:** We measure the outdoor air temperature and if the outdoor air dry-bulb temperature is  $\leq 65^{\circ}\text{F}$  we use economizer (Note ASHRAE 90.1-2013 does not permit this method). This method is the simplest and has least expensive up-front cost, but misses many hours where economizer could still be beneficial. It also may use economizer on mild, but very humid days where economizer may not be beneficial.
- 2. Fixed Enthalpy:** We measure the outdoor air dry-bulb temperature and relative humidity, then calculate the outdoor air enthalpy and if the outdoor air enthalpy is  $\leq 28 \text{ BTU/lb}$  we use economizer. At  $75^{\circ}\text{F}$ , 28 BTU/lb is about 50%RH the condition most buildings are designed maintain indoors. This method is slightly more expensive than the Fixed Dry-Bulb method as both temperature and humidity need to be measured and then the enthalpy must be calculated by a controller of some type. However, for the average application this method will use most of the economizer hours available.

3. **Electronic Enthalpy:** Similar to fixed enthalpy, this method compares the measured outdoor air enthalpy to a curve to determine if economizer is available. Slightly more expensive than Fixed Enthalpy, this method will capitalize on a few more available economizer hours.
4. **Differential Enthalpy:** We measure the temperature and relative humidity of both the outdoor air and return air, then calculate their respective enthalpies and if the outdoor air enthalpy is  $<$  the return air enthalpy we use economizer (Cost less to cool outdoor air). This method has the most measured points and is likely the most costly, but uses every economizer hour available.
5. **Dew-Point and Dry-Bulb:** This method is very similar to the Fixed Dry-Bulb method with the exception that we are going to measure the outdoor air dew-point as well and if both the dry-bulb temperature is  $\leq 75^{\circ}\text{F}$  and the dew-point is  $\leq 55^{\circ}\text{F}$  we use economizer. This method is both trying to capitalize on the hours warmer than  $68^{\circ}\text{F}$  where economizer is beneficial and eliminate the hours where it is too humid. This method is likely similar in cost to the Fixed Enthalpy method.

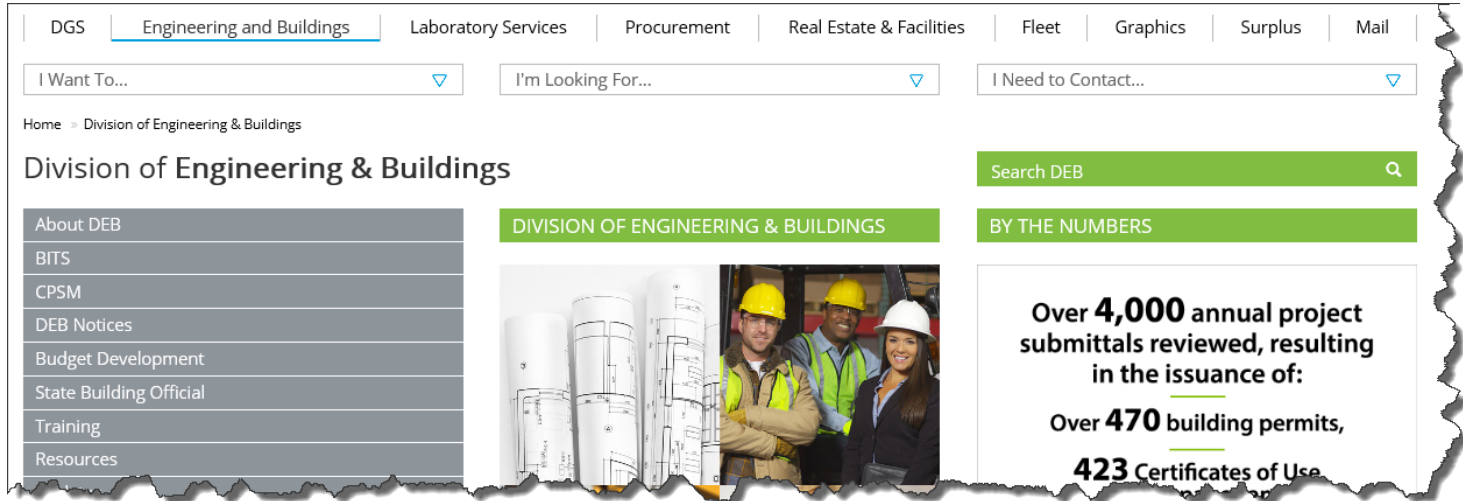


How do we know when we have to include economizer in our mechanical designs? Well, like our earlier article on "The Energy Conservation Code and Building Thermal Envelopes" (see BCOM Newsletter #18, June 2016), we first have to answer how we intend to comply with the 2015 Virginia Energy Conservation Code (VECC). The VECC permits designs to comply with either ASHRAE 90.1-2013 or with the VECC. The most significant difference between the two is the capacity at which the economizer is required. The VECC requires economizers in mechanical systems as small as 3-tons, about the size of the system at most of our homes, while ASHRAE 90.1-2013 does not require economizer until 5-Tons.

So the next time we have one of our beautiful Virginia days, enjoy the fresh air and the energy savings.

## Website & Forms Center Update

Following the recent DGS reorganization (see the August 2018 Newsletter), all former BCOM webpages on the DGS website have now been transformed into [DEB webpages](#):



All Business Unit "BCOM" forms on the [DGS Forms Center](#) are now identified as "DEB" forms:

Documents and Forms						
<div> <div>FILTER</div> <div>DEB</div> </div>		<input type="checkbox"/> Show Previous Versions				
Form/Document Name/Title	Number	Description/Key Word	Date	Business Unit	File Type	
<a href="#">Capital Outlay Management Forms Master List</a>	DGS-30-000	(CO Forms Master List)	09/18	DEB	Excel Doc	
<a href="#">A/E Firm Data Forms</a>	DGS-30-004	AE-1 – AE-6	12/17	DEB	Excel Doc	
<a href="#">Notification of Initiation of Environmental Impact Report Process</a>	DGS-30-010	CO-2a	07/11	DEB	Word Doc	
<a href="#">A/E Fee Proposal Worksheet</a>	DGS-30-012	CO-2.3	03/17	DEB	Excel Doc	
<a href="#">A/E Contract for Professional Services</a>	DGS-30-016	CO-3	07/15	DEB	Word Doc	

**Note:** The current CPSM and certain forms and documents may still contain references to BCOM or the Bureau of Capital Outlay Management. These references will be corrected in upcoming revisions. In the meantime, please construe any remaining BCOM references to now mean the Division of Engineering & Buildings (DEB).

Following are several useful DGS web addresses to bookmark:

- **DEB** (formerly BCOM): <https://deb.dgs.Virginia.gov> or <https://dgs.Virginia.gov/deb/>
- **DGS Home Page:** <https://dgs.Virginia.gov>
- **DGS Forms Center:** <https://forms.dgs.Virginia.gov>
- **eVA:** <https://eva.Virginia.gov>