**Please Note:** This document contains beneficial information on VCU’s Design & Construction Standards. It is evolving and subject to change as we continue to define these Standards unique to our University. If you have any comments, additions, and/or corrections to these Standards, please contact Evelyn Hinant at (804) 827-3838 or email her at ewhinant@vcu.edu. Thank you.

**VCU Design & Construction Standards Committee**

**Beverly Beaver**  
Director of Facilities Services  
VCU Physical Plant  
(804) 828-7270  
bdbeaver@vcu.edu

**Sean Brasch**  
Mechanical Engineer  
VCU Physical Plant  
(804) 628-3391  
stbrasch@vcu.edu

**Mary Cox**  
Director of Planning & Design  
VCU Planning & Design  
(804) 828-0905  
mcox@vcu.edu

**Joseph Mannix**  
Assistant Director of Construction Management  
VCU Construction and Inspection Management  
(804) 827-3842  
jgmannix@vcu.edu

**Erin Stanforth**  
Director of Sustainability  
VCU Physical Plant / Office of Sustainability  
(804) 628-5199  
eestanforth@vcu.edu

**Michael Sullivan**  
Director of Support Services and Special Projects  
VCU Physical Plant  
(804) 828-7429  
msullivan9@vcu.edu

**Larry Walters**  
Director of University Renovations  
VCU Construction and Inspection Management  
(804) 828-1904  
lwalters@vcu.edu

**Vacant**  
Director of Physical Plant  
VCU Physical Plant  
(804) -  
vacant

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Terms & Definitions

Integrate — When used in the context of building automation, this means that the system in question will be controlled by the software.

Interface — When used in the context of building automation, this term means that the system in question will communicate with the software, but not necessarily by controlled by it.

Acronyms & Abbreviations

A/E Architects / Engineers
ABB ASEA Brown Boveri
ACI American Concrete Institute
ACMs Asbestos-Containing Materials
ADA Americans with Disabilities Act
ADAAS Assuring Dependability in Architecture-based Adaptive Systems
AFF Above Finished Floor
AHJ Authority-Having-Jurisdiction
AHU Air Handler Units
AMCO American Meter Company
ANSI American National Standards Institute
ARR Association of American Railroads
ASCE American Society of Civil Engineers
ASHRAE American Society of Heating, Refrigerating, & Air-Conditioning Engineers
ASME American Society of Mechanical Engineers
ASSE American Society of Safety Engineers
ASTM American Society for Testing & Materials
AWWA American Water Works Association
BAS Building Automation System
BCOM Bureau of Capital Outlay Management
BSCs Biological Safety Cabinets
BTU British Thermal Unit
CBSS Chemical Biological Safety Section
CCTV Closed-Circuit Television
CFCs Chlorinated Fluorocarbons
CPSM Construction & Professional Services Manual
CRSI Concrete Reinforcing Steel Institute
CSA Canadian Standards Association
# Acronyms & Abbreviations

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<td>DAPC</td>
<td>Division of Air Pollution Control</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
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<tr>
<td>DCC</td>
<td>Data Communications Channel</td>
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<tr>
<td>DDC</td>
<td>Direct Digital Control</td>
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<tr>
<td>DEB</td>
<td>Division of Engineering &amp; Buildings</td>
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<tr>
<td>DHR</td>
<td>Virginia Department of Historic Resources</td>
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<tr>
<td>DOLI</td>
<td>Virginia Department of Labor &amp; Industry</td>
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<tr>
<td>DVD</td>
<td>Digital Versatile Disc</td>
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<td>DX</td>
<td>Direct Expansion</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>FACP</td>
<td>Fire Alarm Control Panels</td>
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<td>FRP</td>
<td>Fiber-Reinforced Plastic</td>
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<td>FSC</td>
<td>Forest Stewardship Council</td>
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<tr>
<td>GBI</td>
<td>Green Building Initiative</td>
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<tr>
<td>GC</td>
<td>General Contractor</td>
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<tr>
<td>GFCI</td>
<td>Ground-Fault Circuit Interrupters</td>
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<tr>
<td>GPF</td>
<td>Gallons Per Flush</td>
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<td>GPM</td>
<td>Gallons Per Minute</td>
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<td>HART</td>
<td>Highway Addressable Remote Transducer</td>
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<td>HCFCs</td>
<td>Hydrochlorofluorocarbons</td>
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<td>HMMA</td>
<td>Hollow Metal Manufacturers Association</td>
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<tr>
<td>HUD</td>
<td>Housing &amp; Urban Development</td>
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<td>HVAC</td>
<td>Heating, Ventilation, &amp; Air-Conditioning</td>
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<tr>
<td>HVLP</td>
<td>High Pressure Low Volume</td>
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<tr>
<td>IgCC</td>
<td>International Green Construction Code</td>
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<td>ILSM</td>
<td>Interim Life Safety Measures</td>
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<td>IPC</td>
<td>International Plumbing Code</td>
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<td>JCAHO</td>
<td>Joint Commission on Accreditation of Healthcare Organizations</td>
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<tr>
<td>LBP</td>
<td>Lead-Based Paint</td>
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<td>LCD</td>
<td>Liquid Crystal Display</td>
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<tr>
<td>LED</td>
<td>Light-Emitting Diode</td>
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<tr>
<td>LEED</td>
<td>Leadership in Energy &amp; Environmental Design</td>
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<tr>
<td>MCC</td>
<td>Motor Control Center</td>
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<tr>
<td>MDP</td>
<td>Main Distribution Panel</td>
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**Acronyms & Abbreviations**

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<td>Network Automation Engine</td>
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<td>NEC</td>
<td>National Electric Code</td>
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<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
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<td>NESHAP</td>
<td>National Emission Standards for Hazardous Air Pollutants</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<tr>
<td>NIST</td>
<td>National Institute of Standards &amp; Technology</td>
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<tr>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance</td>
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<tr>
<td>ODP</td>
<td>Open Drip Proof</td>
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<tr>
<td>OEHS</td>
<td>Office of Environmental Health &amp; Safety</td>
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<tr>
<td>OS&amp;Y</td>
<td>Outside Screw &amp; Yoke</td>
</tr>
<tr>
<td>OSB</td>
<td>Oriented Strand Board</td>
</tr>
<tr>
<td>PCBs</td>
<td>Polychlorinated Biphenyls</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
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<tr>
<td>QEI</td>
<td>Qualified Elevator Inspector</td>
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<tr>
<td>RACM</td>
<td>Regulated Asbestos-Containing Material</td>
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<tr>
<td>RCRA</td>
<td>Resource Conservation &amp; Recovery Act</td>
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<td>RFCI</td>
<td>Resilient Floor Covering Institute</td>
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<td>SCAQMD</td>
<td>South Coast Air Quality Management District</td>
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<td>SDI</td>
<td>Steel Door Institute</td>
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<td>TCLP</td>
<td>Total Concentrate Leachate Procedure</td>
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<td>TCNA</td>
<td>Tile Council of North America</td>
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<tr>
<td>TEAO</td>
<td>Totally Enclosed Air Over</td>
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<td>TEFC</td>
<td>Totally Enclosed Fan Cooled</td>
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<tr>
<td>TMS</td>
<td>The Masonry Society</td>
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<td>UPC</td>
<td>Uniform Plumbing Code</td>
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<td>UPS</td>
<td>Uninterruptible Power Supply</td>
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<td>USBC</td>
<td>Virginia Uniform Statewide Building Code</td>
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<td>USC</td>
<td>United States Code</td>
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<tr>
<td>USGBC</td>
<td>United States Green Building Council</td>
</tr>
<tr>
<td>VAT</td>
<td>Vinyl Asbestos Tile</td>
</tr>
<tr>
<td>VCC</td>
<td>Virginia Construction Code</td>
</tr>
</tbody>
</table>

Last Updated August 1, 2017
## Acronyms & Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCT</td>
<td>Vinyl Composition Tile</td>
</tr>
<tr>
<td>VCU</td>
<td>Virginia Commonwealth University</td>
</tr>
<tr>
<td>VCUAIT</td>
<td>Virginia Commonwealth University Academic Information Technology</td>
</tr>
<tr>
<td>VCUHS</td>
<td>Virginia Commonwealth University Health System</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile Organic Compounds</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice over Internet Protocol</td>
</tr>
<tr>
<td>VOSH</td>
<td>Virginia Occupational Safety &amp; Health</td>
</tr>
<tr>
<td>VSD</td>
<td>Variable Speed Drives</td>
</tr>
</tbody>
</table>
## Division 01: General Requirements

### 01.1 General

**General Requirements Guideline**
The following are special provisions for working at VCU, to acquaint Architects / Engineers (A/E), Contractors, and other consultants with our unique requirements.

**Work Hours**
Standard work hours are as follows:
- **Monday—Friday:** 7:00 AM to 5:00 PM
- **Weekends & Holidays:** 8:00 AM to 5:00 PM

On a case-by-case basis, Contractors may schedule work either earlier or later than the listed times, to accommodate material delivery or to avoid disruption to normal University operations. Such times must be approved by the VCU Project Manager or VCU Project Inspector, and the VCU Campus Coordinator.

**Work Impact**
- Prior to the start of work that disrupts streets, sidewalks, loading docks, service operations, or conduct of normal business operations, the Contractor shall notify the VCU construction phase Project Manager and the VCU Campus Coordinator of such disturbances. (This does not preclude the Contractor from notifying and obtaining the necessary permits from the locality).
- Prior to the start of construction in existing or occupied buildings, the Contractor will notify the VCU Operations Center on a daily basis, at (804) 828-9364, that they are beginning work. At the end of the day, the VCU Operations Center will be notified that the Contractor has completed their work for the day.

**No-Work (Blackout) Days**
Noisy, disruptive, construction work will typically not be allowed during the following times:
- Freshman Arrival and Move-in
- Reading Days

Architects / Engineers consider special work hours in preparing cost estimates; certain projects may require construction other than normal working hours.

Each situation will be evaluated on a case-by-case basis. The most important factor Contractors must consider, is whether their work will prevent teaching and learning.
## Division 01: General Requirements

### 01.1 General

**No-Work (Blackout) Days (continued)**

Noisy, disruptive, construction work will typically not be allowed during the following times:
- Exams
- Clinic Days
- Commencement
- Open House Dates

If noisy operations will disrupt student study time, the work must be rescheduled. If work will block streets, that work must be rescheduled to times other than student move-in or move-out. Disruptive work must be scheduled after normal class times. If the work is in an occupied building and will disrupt ongoing classes, research, or office operations, work must be rescheduled. Work adjacent to residence halls is particularly sensitive, and must accommodate normal sleep times for students.

The VCU Project Manager shall coordinate with the VCU Campus Coordinator for work in the streets and sidewalks, since the VCU Campus Coordinator is familiar with other utility work in the public way.

VCU Project Managers and or VCU Campus Coordinators, may be able to assist Contractors in obtaining “Work in the Streets” permits from the City of Richmond.

On occasion, Housing, Student Affairs, and other units will schedule outdoor events in open spaces on campus. The construction phase Project Manager shall verify that open space is unscheduled before turning it over to the Contractor.

### 01.10 Emergencies, Safety, & Security

**Emergency Contact Information**

Prior to mobilization, the Contractor must provide the construction
### 01.10 Emergencies, Safety, & Security

#### Emergency Contact Information (continued)
phase Project Manager a list of management personnel assigned to the project, including a 24-hour emergency point-of-contact.

#### Campus Points of Contact

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone number</th>
<th>Functional Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarissa Schick</td>
<td>(804) 828-7248 / 400-2192</td>
<td>MCV Campus Coordinator</td>
</tr>
<tr>
<td>Margaret Kelland</td>
<td>(804) 828-7269 / 400-2190</td>
<td>Monroe Park Campus Coordinator</td>
</tr>
<tr>
<td>VCU Police Emergency</td>
<td>(804) 828-1234</td>
<td>VCU Police</td>
</tr>
<tr>
<td>Fire / Medical Emergency</td>
<td>First 911, Then (804) 828-9364</td>
<td>Fire</td>
</tr>
<tr>
<td>Other Emergencies</td>
<td>(804) 828-9364</td>
<td>VCU Physical Plant Operations Center</td>
</tr>
</tbody>
</table>

#### Safety & Security
- Contractor’s personnel are required to wear ID badges provided by the firm doing the work.
- The University does not permit Contractor’s personnel to antagonize or shout at students, faculty, staff, or others.
- **VCU is a research and medical institution, and has many hazardous areas. Contractor’s personnel should observe and heed all warning signs.**
- Jobsite security is the Contractor’s responsibility (i.e. control access, shrinkage, etc.)

#### Worker Behavior & Decorum
Contractor’s personnel shall refrain from contact with students, faculty, and staff; other than for interaction necessary for the execution of their contract responsibilities. Expressly prohibited is contact in the form of harassment, whistles, cat-calls, comments, gestures, or any form of uninvited communication. Violation of this policy, even once, will result in immediate and permanent removal of violators from the project site.
### Division 01: General Requirements

#### 01.12 Special Work Restrictions by Building

<table>
<thead>
<tr>
<th>Sanger Hall</th>
<th>West Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain VCU facilities are so heavily used or are so environmentally sensitive, that special provisions apply.</td>
<td>Because West Hospital houses VCU Health System (VCUHS) Clinics, this building is subject to accreditation requirements for the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). As such, the conduct of work including clean-up and temporary provisions, must be carefully monitored.</td>
</tr>
<tr>
<td><strong>Note:</strong> Unless specifically permitted, all construction work in Sanger Hall must be performed during nights and weekends.</td>
<td><strong>Note:</strong> All projects on levels 2-10 within West Hospital, must have a completed and approved VCUHS Construction and Renovation Permit before work begins. Said Permit shall be presented to the VCU Health System Permit Review Committee for approval. This group meets every Wednesday at 2:00 PM in the Epidemiology Conference room on the second floor of North Hospital. The VCU Project Manager is responsible for completing and maintaining all paperwork, including the submission of daily Interim Life Safety Measures (ILSM) when...</td>
</tr>
</tbody>
</table>

- **Sanger Hall**
  - Sanger Hall houses animal facilities, which are sensitive to noise, vibrations, temperature, and humidity fluctuations within the animal environments.
  - Sanger Hall houses teaching and research facilities, which are also sensitive to noise and construction disruptions.
  - Sanger Hall’s loading dock must be kept clear of all Contractor vehicles, unless prior permission is granted.
  - Sanger Hall houses an electron microscope in Sanger room 3-0067. This room is sensitive to vibration and electromagnetic interference.

- **West Hospital**
  - Complete the highlighted portions of the VCUHS Construction and Renovations Permit and Assessment Worksheets.
  - Project Managers should contact Mark Jacubec or Bob Reardon when doing projects in West Hospital, because there are very few patient contact areas in West Hospital and a permit is not necessarily required for every project.
  - Bring the design documents, the approved CO-17 Building Permit for Bureau of Capital Outlay Management (BCOM) reviewed projects, and the semi-completed VCUHS Construction Permit, to the Permit Review meeting when held. If the project was not reviewed by BCOM, the Director of Capital Outlay for VCUHS or the Director of Construction...
West Hospital (continued)
Management for VCU, shall review the design for Code Compliance and sign on the VCUHS Code Official line of the VCUHS Construction Permit.
- Special Hospital Requirements Include:
  - Infection Control Procedures: (May impact the cost, and should be identified and establish prior to bid. This activity may occur prior to presenting the permit to the review board. Contact Epidemiology for assistance, Janis Ober 828-2121.) Strict adherence to these measures must be followed; all hospital staff are trained to enforce compliance with these standards, and will report any deviations to their supervisor.
  - Daily Interim Life Safety Measures Checklists: When these measures are required, a copy of the checklist must be completed by the Contractor and faxed to the Hospital’s Safety Office by 9:00 AM the following morning. Use “TBD” if the dates of the ILSMs that are required are unknown at the time of permitting. Each Monday morning at 8:30 AM, an ILSM meeting is held in West Hospital room 624, in which the previous weeks ILSMs are checked and the current week’s ILSMs are scheduled. Attendance is not mandatory, but the dates for your ILSMs must be presented. For assistance, contact the Director of Capital Programs with the information for presentation. These documents are critical for JHACO compliance.
  - Health System’s Contractor Training for the Foremen and Supervisors: A Copy of the training manual / DVD is located at 700 West Grace Street. This training is valid for one year from issuance of card.
  - Hot Works Permits: Note requirements on permit.
  - Daily Construction Containment Inspection Log: The log must be updated daily and maintained on-site.
  - Badges for Non-Temporary Contractors: VCU badges are suitable.
  - Project Closeout Documentation: See permit for requirements.

Bring back to Permit Review Board for final signatures. All of the original applicable, the maintenance of the Containment Log, the submission of As-built drawings, and proper close-out of the project. The Director of Capital Programs for the Health System is available as a resource to assist the Project Manager with any questions.
01.12 Special Work Restrictions by Building

**West Hospital (continued)**
ILSM sheets, and the complete Daily Containment Log must be included.
- A copy of the Construction Permit must be on-site at all times during construction.

**Molecular Medicine Research Building**
This building houses animals in the penthouse. Any potential for noise, vibration, temperature, or humidity fluctuations, should be reported to the construction phase Project Manager before work begins.

**Student Housing**
Since VCU is in an urban environment, security is extremely important.

**Harris Hall**
Harris Hall is very tightly scheduled. Classes often run continuously from 6 AM until 10 PM all weekdays. For this reason, it is difficult to schedule major shutdowns and difficult to schedule work.

**Massey Cancer Center / Dalton Oncology**
Massey Cancer Center houses small animals. Any potential for noise, vibration, temperature, or humidity fluctuations, should be reported to the construction phase Project Manager. Because Massey Cancer Center houses VCUHS Clinics, it is subject to JCAHO accreditation requirements. As such, the conduct of work including clean-up and temporary provisions, must be carefully monitored.

**Virginia Treatment Center for Children**
Because Virginia Treatment Center for Children houses VCU Health System Clinics, it is subject to JCAHO accreditation requirements. As such, the conduct of work including clean-up and temporary provisions, must be carefully monitored.
# Design & Construction Standards

## Division 01: General Requirements

### 01.15 Traffic / Parking / Work in the Street or Sidewalk

**Parking Policy**
The Contractor is responsible for providing parking for their personnel. In an urban environment, parking is scarce and could be a significant issue that should be considered early in project planning, and in the cost estimate. No parking is allowed on paved driveways or roads. Vehicles shall not be parked on grass, planted areas, or sidewalks. Vehicles shall not block any means of access or egress. The planning phase Project Manager shall notify VCU Parking and Transportation when parking lots will be disrupted as early as possible. However, these lots should not be closed until a firm construction date is known, and the Contractor is ready to mobilize.

**Vehicular & Pedestrian Traffic Management Plan**
A/E’s and Project Managers should consider the impact of the project on surrounding vehicular and pedestrian traffic flow, and take the necessary steps (such as signage, barricades, and re-striping) to ameliorate problems. These efforts should be included in the schedule, and in the cost estimate. Temporary signage may be needed.

### 01.30 Administrative Requirements

**Roles & Responsibilities**
The following describes the roles and responsibilities for project decision-making for planning, design, construction, and project turnover.

**Schematic Design**
The planning phase Project Manager shall deliver Schematic design documents in electronic format to the Executive Director of Physical Plant (or designees as directed), at completion of the design phase. This is when the commissioning agent will be brought on board. The Executive Director of Physical Plant shall be responsible for submitting

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*Note: Physical Plant with manage and tour this process.*

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*Last Updated August 1, 2017*
## Division 01: General Requirements

### 01.30 Administrative Requirements

**Schematic Design (continued)**

comments to the planning phase Project Manager.

**Design Development & Working Drawings**

During this phase, the planning phase Project Manager shall conduct a review session with the Design & Construction Standards Committee at the end of each phase, and shall identify appropriate resource personnel for inclusion in the Building Committee design meetings. Project Managers must coordinate audio visual, data, telecommunications, and security during this phase, and inclusion in the cost estimate. Be specific to show the location and number of data drops. Check on janitorial closet space needs, ground storage space needs, and office maintenance and storage needs.

### Construction

- **Minority (SWaM) Utilization**

It is the policy of the Commonwealth of Virginia to contribute to the establishment, preservation and strengthening of minority business enterprises, and to encourage the participation of minority businesses in State procurement activities. Towards that end, the Owner encourages firms to provide for the participation of minority owned businesses through partnerships, joint ventures, subcontracts, and other contractual opportunities.

- **Drug-Free Workplace Required**

Bidders are reminded that Section 2.2-4312 of the Code of Virginia, requires that during the performance of the contract resulting from this solicitation, the Contractor agrees to (i) provide drug-free workplace for the Contractor’s employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance, or
**Design & Construction Standards**

### Division 01: General Requirements

#### 01.30 Administrative Requirements

**Construction (continued)**
marijuana is prohibited in the Contractor's workplace, and specify the actions that will be taken against employees for violations of such prohibition; advertisements for employees placed by or on behalf of the Contractor, that the Contractor maintains a drug-free workplace; and (iii) include the provisions of the foregoing clauses in every subcontract, or purchase order over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

“Drug-Free Workplace” means a site for the performance of work done in connection with a specific contract awarded to a Contractor, in accordance with this solicitation, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of any controlled substance, or marijuana during the performance of the contract.

#### 01.50 Construction Site

**Construction Sign**
A construction sign will be posted at a location to be determined by the VCU Project Manager. The cost of mounting and disposing of the sign, shall be included in the Contractor’s general condition’s cost.

**Design and graphics for signs must be approved by the VCU Project Manager.**

**Staging & Lay-Down Areas**
Staging and lay-down areas are very limited. The impact of this should be considered in the schedule and cost estimate, especially if off-site lay-down or staging areas are required.

**Contractor Signage**
The Contractor may mount or display company logo signage, after the proposed type, size, verbiage, and location is approved by VCU.

**Temporary Construction Barriers**
If construction barriers are needed, the type of barrier will be
### Division 01: General Requirements

#### 01.50 Construction Site

**Temporary Construction Barriers (continued)**
determined by both project scope, and length of use of the material. Caution tape may be used for a period not to exceed one day. Plastic safety fence may be used for a period not to exceed one week. Portable chain link fence panels are to be used for longer durations. Plywood barriers may be needed for closed sidewalks adjacent to construction sites.

**Interior Temporary Partitions & Barriers**
Interior temporary partitions are to be specified as part of the design documents. The Contractor shall provide spare keys to temporary locks for the construction phase Project Manager, in case emergency access is required.

Temporary partition materials must comply with building code requirements for construction type and use of the existing facility.

#### 01.51 Permits & Shut-Downs

**Hot Work Permit**
Any activity in an existing or occupied facility that generates heat, e.g. welding, soldering, torch-cutting, etc., is require a Hot Work Permit. These permits are available through VCU Fire Safety, by contacting (804) 828-0040.

**Building Permits**
Because this is a Project of the Commonwealth of Virginia, codes or zoning ordinances of local political subdivisions do not apply. However, the Virginia Uniform Statewide Building Code (USBC) shall apply to the Work, and will be administered by the Building Official for State owned buildings. The CO-17 Building Permit will be obtained and paid for by the Owner. All other permits, local license fees, business fees, taxes, or similar assessments imposed by the appropriate political subdivision, shall be obtained and paid by the Contractor.

**Fire Protection System Shut-Downs**
Shut down of fire suppression, fire alarm, and other fire protection
## Division 01: General Requirements

### 01.51 Permits & Shut-downs

<table>
<thead>
<tr>
<th>Fire Protection System Shut-Downs (continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>systems, shall be coordinated with VCU Fire Safety through VCU Construction Management. A 14 day minimum notice is required, along with provision of a fire watch provided by the Contractor requesting the outage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exits</th>
</tr>
</thead>
<tbody>
<tr>
<td>No work shall take place which obstructs the building's means of egress, without first coordinating with VCU Fire Safety.</td>
</tr>
</tbody>
</table>

| Note: Additional temporary partitions and doors may be required to eliminate dead-end conditions, and redirect exit access away from a blocked exit. |

<table>
<thead>
<tr>
<th>Electrical Shutdowns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shut-down of electrical systems must be coordinated with end users, and Facilities Management through VCU Construction Management. A 14 day minimum notice is required. Critical systems may require a provision of alternate or temporary power. The A/E shall identify critical systems during design, and determine requirements to be included in the construction documents.</td>
</tr>
</tbody>
</table>

### 01.77 Project Completion

<table>
<thead>
<tr>
<th>As-Built Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Contractor shall complete and deliver As-Built documents within 6 months of project completion. VCU will retain a portion of the fee to ensure timely delivery of the documents. Failure to deliver As-Built documents on a timely basis, will be considered as criteria in future A/E and Contractor selections.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Close-Out Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation and Maintenance (O&amp;M) manuals are to be provided during O&amp;M training for VCU Facility Management personnel. Specific warranty information is to be provided prior to, or at Substantial...</td>
</tr>
</tbody>
</table>
### Division 01: General Requirements

#### 01.77 Project Completion

**Close-Out Documents (continued)**

Completion.

**Attic Stock**

Attic Stock is to be specified for each finish used per project. Specifiers should consult with the VCU Project Manager to determine the quantity of materials, and storage location.

#### 01.81 Sustainable Design Requirements

**LEED (Leadership in Energy & Environmental Design) Certification**

All VCU new construction and renovations greater than 5000 square feet, will be designed to LEED Silver standards which include enhanced commissioning.

See “Division 18 Sustainability” section for additional guidance.

#### 01.91 Commissioning

In general, construction and renovation projects with a construction budget of $1 million dollars or greater will be commissioned. Projects with a value less than $1 million dollars, will be commissioned if they affect vivarium, scientific, or clinical laboratory spaces. Projects affecting patient care spaces, with a value less than the threshold, will be considered for commissioning. Additionally, projects of less than the designated threshold value, that because of technical considerations or significant adverse affects on the University community, will be considered for commissioning.

Commissioning will normally be procured by utilization of the statewide open end contract for commissioning services, administered by the Department of General Services, Division of Engineering and Buildings (DEB).

For projects seeking some level of LEED certification, the minimum basic commissioning required as a prerequisite will be done. Enhanced
**Division 01: General Requirements**

### 01.91 Commissioning

Commissioning is encouraged, and will be considered for the additional LEED point that it generates.

Details as to specific systems to be commissioned and the degree and depth of the required commissioning, will be provided in the Request for Quote for Services under the State Contract. Normally, the Commissioning Agent will develop and write the commissioning specification and plan for the project manual, subject to review by VCU.

Unless otherwise provided by the State Contract, the Project Manual, the Request for Quote for Service under the State Contract by VCU, the LEED requirements, or other specific direction by VCU, commissioning will be done in compliance with the most recent versions of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

- [ASHRAE Guideline 0](#): The Commissioning Process
- [ASHRAE Guideline 1](#): The HVAC Commissioning Process
- [ASHRAE Guideline 4](#): Preparation of Operating and Maintenance Documentation for Building Systems

Generally, Physical Plant will procure the commissioning agent, who will prepare the scope of work in consultation with the planning phase Project Manager and Construction Program Manager.
Deviation from Standards Flowchart

Request to Deviate from Standards

VCU Project Manager

Facilities Management Standards Committee

Executive Director, Physical Plant

Director, Planning & Design

Director, Construction Management

End of Division 1

Last Updated August 1, 2017
02.10 General

Vermin Protection
All demolition and construction sites shall be pre-treated by a pest control contractor, to place bait stations and mechanical devices near the demolition site or the perimeter of nearby occupied buildings, to curtail rodent activity from moving to nearby occupied buildings.

Infection Control
Due to the presence of Aspergilla spores present in soils, all ground disturbances on the VCUHS campus must comply with the hospital’s Infection Control Policy, established for each project as directed by the Hospital Epidemiologist.

The hospital’s Epidemiologists should provide specific recommendations and protocols based on the risks presented by each project.

02.20 Asbestos / Lead Abatement

Refer to the most current edition of the Virginia Construction and Professional Services Manual (CPSM) together with any subsequent DEB notices or revisions, as currently posted on the Virginia Department of General Services’ website.

See 4.12 of the 2016 CPSM for required special procedures for asbestos abatement. See 4.13 of the 2016 CPSM for required lead-containing building materials procedures.

The following VCU facilities have special asbestos alerts:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Hospital</td>
<td>It has asbestos throughout almost all aspects of the building’s components.</td>
</tr>
<tr>
<td>Lyons</td>
<td>There is asbestos above the fourth floor ceilings, and in select areas on other floors.</td>
</tr>
<tr>
<td>Harris Hall</td>
<td>Although it has been incrementally abated over the years, there are ceiling tiles in a few remaining rooms that contain asbestos, along with the auditorium.</td>
</tr>
<tr>
<td>Franklin St. Gym</td>
<td>The mastic on the vapor barrier underneath the brick facade is a typical condition, and has been found to contain approximately 10% Chrysotile asbestos (MPC 7-08).</td>
</tr>
</tbody>
</table>
## Division 02: Existing Conditions

### 02.20 Asbestos / Lead Abatement

If asbestos is found in floor tile or floor tile mastic, VCU policy states that the floor must be abated and removed, rather than covering over it with carpet or some other floor materials.

Specifically require abatement contractor(s) to comply with the 20 working-day notice requirement to the Virginia Department of Labor and Industry in advance of beginning any asbestos abatement. See CPSM 4.12.11. Note the use of “working days.” Contractor must add additional time for weekends and holidays as appropriate.

### 02.21 General Project Requirements — Asbestos

Buildings constructed prior to 1980 are presumed to have Asbestos-Containing Materials (ACMs) in many typical materials, until such materials have been tested and found not to contain asbestos. Existing facilities constructed prior to January 1, 1985 must be inspected by a Virginia-licensed or properly certified asbestos inspector who must provide their signed (certified) report.

Possible ACMs includes but is not limited to, asphalt and vinyl flooring, resilient floor covering, mastics, fibrous pipe insulations and lagging materials, caulking, roofing, flashings, cement boards and composite sidings, bonding agents, coatings, and various binders and adhesives.

An estimated cost for asbestos abatement when suspected or predetermined, shall be included in the cost estimate supporting the construction budget or budget request. For renovation, demolition, or addition projects, including roofing materials, the University shall test for ACMs prior to submittal of the preliminary design. The asbestos survey and inspection report must be made available to the project A/E for information and use in preparing the project documents.

If ACMs are found, the University shall have a licensed asbestos designer in consultation with the A/E, shall prepare an asbestos abatement plan and prepare or update the University Asbestos Management Plan as required by the University, in compliance with ACMs abatement designers and A/E’s can coordinate with each other, but neither can legally be responsible for the other’s work.
## 02.21 General Project Requirements — Asbestos

§2.1-1164, Code of Virginia. The asbestos abatement contractor shall be required to mark up the Asbestos Management Plan to show the “As-Built” conditions resulting from its work; to include areas where asbestos was abated, areas where asbestos was encapsulated, and areas where ACMs exist, but were left in place.

Based on the report of the asbestos survey and inspection report and the Asbestos Management Plan, the construction drawings for renovation or addition projects shall indicate all locations where ACMs were found, where ACMs are to be disturbed, and where ACMs are to remain. The asbestos survey and inspection report and the Asbestos Management Plan, must be made available for their respective information to the contractor(s) for demolition and for construction.

Include the appropriate Asbestos Disclosure Statement on the demolition plan sheets, and the floor plan sheets for all disciplines and for each floor. See the current edition of the CPSM for approved language.

The VCU Project Manager will verify that the A/E and the licensed asbestos designer have coordinated their design work with each other, and the licensed abatement contractor has coordinated and verified their work and project scope with other contractors.

## 02.22 Asbestos Removal

All ACMs that will be disturbed as a result of a renovation, demolition, or addition project, must be removed.

The University will have asbestos project specifications written by a Virginia licensed asbestos designer.
Divison 02: Existing Conditions

02.22 Asbestos Removal

Virginia licensed designer. The designer’s license number, name, and signature must appear at the beginning of the asbestos specifications. The asbestos abatement designer is mandatory. The asbestos abatement designer must be under direct contract with the University.

The asbestos project specifications shall adhere to all current Federal and State regulations and policies.

The specifications shall include a copy of the project specific asbestos inspection report and Asbestos Management Plan, indicating the sampling of and analyses for all materials that will or may be disturbed or accessed by the project. The specifications shall include a section that covers project notification by the asbestos contractor to the United States Environmental Protection Agency (EPA), the Virginia Occupational Safety and Health (VOSH), and the Division of Air Pollution Control (DAPC), at least 20 calendar days prior to the actual start of the asbestos project.

Asbestos drawings and specifications shall be submitted to the VCU Office of Environmental Health and Safety (OEHS), with the Contract Documents for review and approval.

The University has two contracting options for use, in the removal of asbestos from a structure and option two is the preferred method:

1. A separate contract for removal of the asbestos prior to renovation, demolition, or addition.
2. A contract where the abatement is an integral part of the renovation, demolition, or addition project, in which VCU Physical Plant is licensed as an asbestos contractor, or hires a licensed asbestos abatement subcontractor to perform the work.

The asbestos abatement contractor shall be required to mark-up the Asbestos Management Plan to show the “As-Built” conditions resulting
## Division 02: Existing Conditions

### 02.22 Asbestos Removal

From its work, to include areas where asbestos was abated, areas where asbestos was encapsulated, and areas where ACMs exist, but were left in place.

### 02.23 Use of Asbestos or Asbestos Containing Materials

The use of materials that contain asbestos is prohibited in any new construction or renovation.

### 02.24 Removal & Replacement of Sprayed-On Fireproofing

In consultation with the University, the A/E shall verify early in the design phase with the appropriate Fire Marshal, the original purpose of the fireproofing material to be removed or replaced and what, if anything, must be done to restore the fire resistive characteristics. Plans and specifications shall be submitted to the Fire Marshal, which will include any bidding documents, addenda, or change orders from the original construction, which may relate to the fire resistive characteristics of the structure. On a submittal to the Fire Marshal, indicate the original construction date, and any renovation or alteration dates, original and present uses, height of floors in feet, and whether sprinkler or any other information that may assist the Fire Marshal in his determination, be provided.

If sprayed-on ACMs is to be replaced, the University or its’ A/E shall also submit copies of the specifications for the intended replacement material, and the bridging encapsulate specified by the asbestos project designer for review by the Fire Marshal.

Require that the spray-applied fireproofing applicator provides bridging encapsulate that is correctly matched with the replacement fireproofing material, to ensure maximum bonding strength and intended fire rating integrity of the assembly, and acceptable flame spread ratings.

Last Updated August 1, 2017
## Division 02: Existing Conditions

### 02.25 Asbestos Related Work Insurance Requirements

Asbestos inspectors, project designers, project monitors, and their firms, are required to provide evidence of professional liability or errors and omissions insurance, with asbestos coverage in an amount not less than $1,000,000.00. VCU, its’ officers, employees, agents, or any other persons acting in an official capacity, temporarily or permanently in the service of the Commonwealth, should also be named as additional insured persons.

Asbestos contractor or subcontractor, as the case may be, to name the A/E as an additional insured on the Contractor’s liability insurance with asbestos coverage. Where the A/E for the renovation project is also a Virginia licensed asbestos designer, and prepares the asbestos project drawings and specifications, the requirement to name the A/E as an insured party is waived.

### 02.26 Special Procedures for Lead-Containing Materials

See the General Conditions of the Construction Contract for references to lead regulations, and the Virginia DOLI permitting requirements.

When planning a renovation, demolition, or addition project, the VCU OEHS shall have the facility to be renovated, surveyed for lead-containing building materials by a Virginia licensed lead inspector or risk assessor, and document in a lead inspection report all quantities and locations found. If the structure is to be demolished, the lead inspector or risk assessor shall determine whether a Total Concentrate Leachate Procedure (TCLP) test is warranted.

#### U.S. Housing and Urban Development (HUD) Lead Testing

All facilities which may house children 6 years of age and younger that were constructed prior to 1978, must have a lead materials and lead paint inspection and risk assessment conducted by a Virginia-licensed
**U.S. Housing and Urban Development (HUD) Lead Testing (continued)**

Lead inspector and or risk assessor prior to being occupied by children 6 years and younger. Where abatement or renovation is to be conducted in these facilities, a Virginia-licensed lead project designer shall develop lead project specifications that comply with all EPA and VOSH regulations. A Virginia-licensed risk assessor or lead project designer shall insure that the requirements of the project specifications are followed, including the collection and documentation of all clearance samples.

An estimated cost for lead abatement, when suspected or predetermined, shall be included in the cost estimate supporting the construction budget or budget request. In addition to abatement, disposal budget estimates and requests shall include cost of Contractor compliance with Virginia DOLI requirements for the protection of construction workers for the specific project.

In areas to be renovated, the agency shall include a copy of the lead inspection report as an appendix to the project specifications. Where lead materials are found in structures to be demolished, the agency shall determine if the structure has the potential to be considered a hazardous waste when demolished, and shall have a TCLP test conducted, if recommended by the lead inspector or risk assessor.

**Lead Materials Disclosure**

The title page of the construction drawings for renovation or addition projects, shall include the lead materials disclosure statement that follows:

An inspection to identify lead-containing or coated building components has been conducted, and can be found in the project specifications. This report is provided for the Contractor’s use and may not be all inclusive. It is the Contractor’s responsibility to

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| **See also CPSM 4.13.2** |

| **In areas to be renovated, the agency shall include a copy of the lead inspection report as an appendix to the project specifications. Where lead materials are found in structures to be demolished, the agency shall determine if the structure has the potential to be considered a hazardous waste when demolished, and shall have a TCLP test conducted, if recommended by the lead inspector or risk assessor.** |
| **CPSM 4.13.4** |

| **Lead Materials Disclosure** |
| **The title page of the construction drawings for renovation or addition projects, shall include the lead materials disclosure statement that follows:** |
| An inspection to identify lead-containing or coated building components has been conducted, and can be found in the project specifications. This report is provided for the Contractor’s use and may not be all inclusive. It is the Contractor’s responsibility to |

**CPSM 4.13.5**
## Lead Materials Disclosure (continued)
comply with all VOSH regulations as they pertain to employee exposures to lead. All lead and lead-coated building components shall be recycled to the extent possible.

## Lead Notification
In facilities where children 6 years and under may be located, and if lead-containing materials will be encountered by the General Contractor (GC), the A/E shall identify the type and location of all lead-based paint and notify the GC that this work is part of the contract for construction. Lead-based paint must be identified and the contractors notified that they must be in compliance with all EPA requirements for lead control and abatement in target housing, and all VOSH requirements for worker safety. It shall be the Contractor’s responsibility to comply with all EPA and VOSH requirements.

## Scheduling
Require the Contractor to establish a schedule with the University for abatement and containment in buildings that are to remain occupied during construction.

## Disposal Testing
Following the demolition of lead-containing or coated building components which are designated as waste products, additional TCLP tests, in accordance with EPA guidelines, shall be done on these materials, which include the total waste stream, to determine disposal requirements. TCLP tests of waste materials shall identify whether the material will be required to be disposed of as hazardous waste, or as ordinary construction debris. It shall be unlawful for materials identified as hazardous waste to be disposed of with ordinary construction debris.
**02.27 Resilient Floor Covering**

**Summary**
If the floor tile, when dry, can be crumpled in one's hand, it is considered "friable". All friable materials must be removed using the standards from the National Emission Standards for Hazardous Air Pollutants (NESHAP). If the floor tiles are friable and total less than 10SF of surface area, the Armstrong method may be used. If the floor tiles total more than 10SF of surface area, NESHAP abatement methods are required.

There is a wide variety of resilient floor covering applications that contain asbestos. The most common are linoleum flooring and Vinyl Asbestos Tile (VAT). VAT is most commonly found in either a 9" x 9" or a 12" x 12" square size. The 9" x 9" VAT's are normally found in older buildings, because they were manufactured earlier than the 12" x 12" VAT's; however, floor tile sizes and resilient floor covering applications vary greatly since many buildings have been re-tiled several times.

In order to determine if a resilient floor covering is in poor condition, look for sections or tiles which are cracked or peeling to the extent that they are crumbled. If the floor covering is in poor condition, collect a small representative sample and seal it in a transparent, sample bag. Hand pressure should be applied to determine if the material can be crumpled, pulverized, or reduced to powder. If it can be crumpled, the Resilient floor covering that will be or has been sanded, ground, or material is considered friable.

Resilient floor covering that will be or has been sanded, ground or abraded is subject to NESHAP standards.

If the floor tiles are friable, they are considered Regulated Asbestos-Containing Material (RACM), and must be handled in accordance with NESHAP standards.

Floor coverings in poor condition can often be found near doorways or loading / staging areas where the floor has sustained a lot of stress and traffic.

Regulated Asbestos-Containing Material (RACM) is (a) friable asbestos material, (b) Category I non-friable ACMs that has become...
## Division 02: Existing Conditions

### 02.27 Resilient Floor Covering


Reference the Virginia Department of Labor & Industry (DOLI) fact sheets, “Renovation & Demolition of a Building / Facility” and the “VA Department of Labor & Industry Asbestos FACT Sheet” at the end of “Division 2: Existing Conditions”.

If floor tiles are non-friable and specify compliance with the Resilient Floor Covering Institute’s (RFCI) “Recommended Work Practices for Removal of Resilient Floor Coverings” including removal of residual adhesives, underlayment materials (if required), and the packaging and labeling of waste materials.

The October 2011 edition of RSCI’s recommendations replace all prior editions and Armstrong Recommended Work Practices publications.

### 02.28 Disposal of Hazardous Materials

**General**

These guidelines are written to comply with LEED goals, and also to limit VCU’s liability with respect to the disposal of hazardous waste. The diversion of construction and or demolition waste materials shall generally be accomplished through salvage, reuse, and recycling, as defined in the project specifications, with goals in accordance with LEED standards.

**Important!** If hazardous waste is disposed of improperly during construction, VCU could be fined or sanctioned, or both. It is important to coordinate disposal of hazardous waste with OEHS.

**During Planning**

1. The planning phase Project Manager shall contact OEHS to review and comment on hazardous material’s inspection reports, specifications, work plans, etc., for technical accuracy, and for

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*Last Updated August 1, 2017*
**Design & Construction Standards**

**Division 02: Existing Conditions**

**02.28 Disposal of Hazardous Materials**

### During Planning (continued)

- Soils: Hazardous material soil sample result submittals will be reviewed by OEHS for accuracy and consistency with VCU’s policies and standards.
- Building Waste: Disposal of all hazardous waste, Polychlorinated Biphenyls (PCBs), Lead-Based Paint (LBP), chemical waste, PCBs-containing ballasts, or any other Resource Conservation and Recovery Act (RCRA) regulated materials, universal waste (mercury-containing light tubes, mercury-containing thermostats, etc.) or any special wastes such as asbestos resulting from demolition, renovation, and construction, must be coordinated through OEHS / Chemical Biological Safety Section (CBSS). The Project Manager should be aware of potentially contaminated research equipment, such as Biological Safety Cabinets (BSCs), chemical fume hoods, and other such equipment that may pose a health or environmental risk.

2. The planning phase Project Manager shall ensure that the cost for disposal of hazardous materials (all costs relating to the removal, disassembly, characterization, packaging, transportation, and disposal of such materials) is included in the project budget, and that the project specifications contain base specifications provided by OEHS.

### During Construction

1. Unless otherwise noted, demolished materials shall become the Contractor’s property, and shall be removed from the job site with further disposition legally.
2. All shipping and disposal documents of hazardous waste must be signed by a representative from OEHS / CBSS. Unless given...
### Division 02: Existing Conditions

#### 02.28 Disposal of Hazardous Materials

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<td>explicit written permission by OEHS / CBSS, a Contractor may not sign disposal documents or manifests on behalf of VCU. With prior approval of OEHS, a Contractor may, if properly trained and or licensed, remove, disassemble, and or abate, and properly containerize such materials for disposal.</td>
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<tr>
<td>3. Construction phase Project Manager shall contact OEHS to review Contractor training / certification of project personnel permits, applications, and disposal documents.</td>
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<tr>
<td>4. Contractors must contact OEHS / CBSS when assessing potentially contaminated research equipment, such as BSCs, chemical fume hoods, and other such equipment that may pose a health or environmental risk.</td>
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Division 02: Existing Conditions

Renovation & Demolition of Building / Facility

RENOVATION and DEMOLITION OF A BUILDING/FACILITY

No Asbestos

Requirements

- No VOSH Asbestos Requirements
- VOSH 1926 Construction Industry Safety Standard Requirements
- NESHAP Requirements (90 Day Notification for Demolition)

**Respirators**
- Mandatory if
- Non-intact removal, or
- No NEA, or
- > PEL, or
- Dry removal (except for intact roofing where NEA obtained), or
- In emergencies, or
- Class I

**Medical Surveillance**
- Mandatory if
- Wearing negative-pressure respirator, or
- Exposed => PEL => 30 days of work/year, or
- Class I, II, or III work => 30 days/yr.

**PPE**
- Mandatory if
- Class I if > 25' or 10 ft, or
- < 25' or 10 ft and No NEA, or
- > PEL

Key:
- ACM: Asbestos-containing material
- PACM: Presumed asbestos-containing material
- HEPA: High Efficiency Particulate Air
- NEA: Negative Exposure Assessment
- > PEL: Greater than the Permissible Exposure Limits
- >= PEL: Greater than or equal to Permissible Exposure Limits
- PPE: Personal Protective Equipment
- TSI: Thermal System Insulation

Asbestos

Requirements for Class I

- TSI & Surfacing Materials
- Licensed asbestos abatement contractor
- Project notification if project => 10' or 10 ft
- 40-hour initially trained/accredited competent person and 8-hour annual refresher training/accreditation
- 32-hour initially accredited trained worker(s) and 8-hour annual refresher training/accreditation
- Regulated area (restricted access to work area)
- Personal air monitoring or NEA
- Wet methods
- Decontamination unit (shower > 25' or 10 ft)
- Drop cloth, 6 HEPA vacuum < 25' or 10 ft
- Respirators*
- Medical surveillance**
- PPE***
- Waste Disposal (sealed, impermeable bags/containers)
- Engineering controls for partial interior demolition and pre-building demolition interior removals (isolation/containment)
- Engineering controls for demolition of building where ACM remains

NESHAP Requirements

Requirements for Class II

1 Non-Intact Class II ACM
- (i.e., roofing materials, flooring materials, siding materials, ceiling tiles, or transite materials)
- Licensed asbestos abatement contractor if friable
- Project notification of friable project => 10' or 10 ft
- 40-hour initially trained/accredited (if friable) competent person and 8-hour annual refresher training/accreditation
- 8 or more hours initial worker training and annual refresher training
- Regulated area (restricted access to work area)
- Personal air monitoring or NEA
- Wet methods
- Decontamination unit (drop cloth + HEPA vacuum) if no NEA
- Respirators*
- Medical surveillance**
- PPE***
- Waste Disposal (sealed, impermeable bags/containers)
- Engineering controls for partial interior demolition and pre-building demolition interior removals (isolation/containment)
- Engineering controls for demolition of building where ACM remains

NESHAP Requirements

More than 1 Non-Intact Class II ACM
- (i.e., roofing materials, flooring materials, siding materials, ceiling tiles, or transite materials)
- Licensed asbestos abatement contractor if friable
- Project notification of friable project => 10' or 10 ft
- 40-hour initially trained/accredited (if friable) competent person and 8-hour annual refresher training/accreditation
- 32-hour initially trained/accredited worker(s) and 8-hour annual refresher training/accreditation on friable projects
- > 8 hours initial worker training and annual refresher training on non-friable projects
- Regulated Area (restricted access to work area)
- Personal air monitoring or NEA
- Wet methods
- Decontamination unit (drop cloth + HEPA vacuum) if no NEA
- Respirators*
- Medical surveillance**
- PPE***
- Waste Disposal (sealed, impermeable bags/containers)
- Engineering controls for partial interior demolition and pre-building demolition interior removals (isolation/containment)
- Engineering controls for demolition of building where ACM remains

NESHAP Requirements

Definitions:
- Intact: means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that asbestos in no longer likely to be bound to its matrix.
- Friable: means ACM that can be crumbled, pulverized, or reduced to powder dry, by hand pressure.
- Asbestos-Containing Material: means any material containing more than one percent asbestos.
- Accredited: means individuals have successfully completed a training program approved by the Virginia Board for Asbestos, Lead, and Home Inspectors to engage in asbestos abatement.
- Demolition: means wrecking or taking out of any load-supporting structural member and any related removing or stripping of friable asbestos material.
- Class I Asbestos Work: means activities involving the removal of TSI and surfacing ACM or PACM.
- Class II Asbestos Work: means activities involving the removal of ACM which is not TSI or surfacing material.
Asbestos Containing Materials

Asbestos is the name given to a group of naturally occurring minerals used in certain products to resist heat and corrosion. Common products that contain asbestos include, but are not limited, to pipe and boiler insulation, spray-on insulation, floor tiles, ceiling tiles, patching and joint compound, roofing material and marble shingles and siding.

The primary characteristic that makes asbestos a concern is its ability to separate into microscopic needle-like fibers. Once these fibers become airborne, (usually by disturbing the product in which they are contained), they can be inhaled into the lungs. The inhalation of asbestos fibers can cause serious diseases of the lungs and other organs that may not appear until years after the exposure has occurred.

Background

The Virginia Department of Labor and Industry (DOLI) has comprehensive regulations to control the hazards of asbestos. DOLI regulates asbestos through enforcement of the Virginia Occupational Safety and Health (VOSH) regulations, enforcement of the U.S. Environmental Protection Agency’s (EPA) Asbestos National Emission Standard for Hazardous Air Pollutants (Asbestos NESHAP), and enforcement of the Asbestos Notification regulations found in the Labor Laws of Virginia.

VOSH Asbestos Regulations

The State Plan agreement between the Federal Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor and Virginia gives DOLI authority to regulate occupational safety and health for construction related activities. The VOSH Asbestos Construction standard, Part 1926.1101, regulates exposure to asbestos during demolition activities when asbestos containing material (ACM) is present, removing or encapsulating ACM, and renovation operations where ACM is present or could be potentially disturbed.

Asbestos NESHAP

The EPA established the Asbestos NESHAP as part of the Clean Air Act to protect the general public by minimizing the release of asbestos fibers when buildings or facilities which contain ACM are demolished or renovated. DOLI has been authorized by the EPA to provide direct enforcement in Virginia of certain parts of the Asbestos NESHAP including demolition and renovation activities.

Asbestos Contractor Notification Requirements

DOLI’s Asbestos Notification and Permit Program regulations require written notification by licensed asbestos contractors for any asbestos abatement project that is at least ten linear or ten square feet. A notification is not required for nonfibrous asbestos containing roofing, flooring, or siding materials which when installed, encapsulated, or removed do not become friable. Notifications must be submitted 30 calendar days prior to starting the asbestos project. Notifications should be sent to the address below by certified mail or hand delivery. Notifications may also be sent by facsimile (FAX) transmission for projects that do not require a fee or projects with fees paid by credit card.

A notification form can be obtained online from DOLI at: http://www.doli.virginia.gov/leadsbestos/leadasbestos_forms.html or by contacting the Department in writing at the address below:

Asbestos Program
Department of Labor and Industry Powers-Taylor Building 13 South Thirteenth Street Richmond, VA. 23219 Phone (804) 786-9805 Fax (804) 371-7634

The EPA must also be notified for any asbestos projects that are at least 160 square or 260 linear feet and essentially for all demolition projects, regardless of whether asbestos containing materials are present in the structure or facility. Notifications required by the EPA must be sent to the Department as described above except the notification period is 10 working days.

NOTE: The EPA does not allow FAX transmission. NESHAP required notifications must be mailed to the EPA at the address below:

Asbestos Coordinator USEPA Region III Mail Code 3LC62 1650 Arch St. Philadelphia, PA 19103-2029

Building Inspection Requirements

Building owners often are the only or best sources of information concerning asbestos hazards within their building. They along with employers of potentially exposed employees are assigned specific duties under the DOLI asbestos regulations. To comply with these regulations, a thorough inspection must be conducted prior to the start of any demolition or renovation activity which may disturb ACM.

The EPA and DOLI have specific requirements for public and commercial buildings where renovation or demolition are to take place. Prior to the renovation or demolition, there must be an inspection for suspect ACM regardless of the age of the building.

The VOSH 1926.1101 Asbestos construction standard also requires that building owners and employers determine the presence of asbestos prior to any work that may disturb ACM. Thermal system insulation (TSI) and sprayed or towelled on surfacing material must be presumed to contain asbestos until testing indicates otherwise. Asphalt and vinyl flooring material installed no later than 1980 must also be considered as asbestos-containing until testing determines that it is not.

If an appropriate building inspection has not been conducted for asbestos, an accredited asbestos inspector who has been licensed by the Virginia Department of Professional and Occupational Regulation (DPOR) should be obtained to conduct an inspection.

Demolition Projects

All demolition projects, with the exception of some residential structures, require notification 10 working days in advance even if no asbestos is present.
Recommended Work Practices for Removal of Resilient Floor Coverings

Supersedes Recommended Work Practices Published in August 2004

OCTOBER 2011

Resilient Floor Covering Institute

115 Broad Street, Suite 201, LaGrange, GA 30240 | phone: 706.882.3833
fax: 706.882.3880 | www.rfci.com

Last Updated August 1, 2017
Recommended Work Practices for Removal of Resilient Floor Coverings

WARNING

Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic “cutback” adhesive, or other adhesive.

These products may contain asbestos fibers and/or crystalline silica.

Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm.

Unless positively certain that the product is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content.

RFCI's Recommended Work Practices for Removal of Resilient Floor Coverings are a defined set of Instructions addressed to the task of removing all resilient floor covering structures.
IN CANADA

The Recommended Work Practices for the Removal of Resilient Floor Covering Materials are intended for use in the United States. The work practices for the removal of in-place resilient floor coverings and associated adhesives described in this publication have not been reviewed with either National or Provincial officials in Canada to determine their applicability when asbestos-containing or assumed to be asbestos-containing resilient floor covering materials are encountered. These work practices are recommended when removing resilient floor covering and its associated adhesives that have been determined not to be asbestos-containing.

To determine what are acceptable work practices and the associated requirements for the removal of resilient floor covering that is assumed to contain asbestos or has been determined to contain asbestos, you should contact your local or provincial officials.

As an alternative to the removal of any in-place resilient floor covering materials, refer to page 9 (Alternative to Removal of Existing Resilient Floor Coverings).
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NOTICE

Various Federal, State and local government agencies have regulations governing the removal of in-place asbestos-containing material. If you contemplate the removal of a resilient floor covering structure that contains (or is presumed to contain) asbestos, you must review and comply with all applicable regulations.

This booklet replaces all prior editions of the RFCl and Armstrong Recommended Work Practices Publications. Please note that these recommended work practices are subject to change as new practices are incorporated. It is your responsibility to determine that the recommended work practices you use are those in effect.

Important Information for Installers of Resilient Floor Coverings Concerning Existing Resilient Floor Covering Structures

- Vinyl asbestos tile and asphalt tile contain asbestos fibers, as did some asphaltic "cutback" adhesives and the backings of many sheet vinyl floorings and lining felts. The presence of the asbestos in these products is not readily identifiable.

- While resilient floor covering products manufactured today do not contain asbestos, the asbestos used in the older products was encapsulated in the matrix of the product. The Environmental Protection Agency (EPA) recognizes that those products are non-friable (i.e., when dry cannot be crumbled, pulverized or reduced to powder by hand pressure) unless certain activities prohibited by the removal practices in this booklet occur.

- Unless positively certain that the product you intend to remove is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content.

- RFCl's Recommended Work Practices are a defined set of instructions addressed to the task of removing all resilient floor covering structures whether or not they contain asbestos. When RFCl's Recommended Work Practices are followed, resilient floor covering structures that contain (or are presumed to contain) asbestos can be removed in a manner that will comply with the current Occupational Exposure to Asbestos Standard's Permissible Exposure Limits (PEL) issued by the Occupational Safety and Health Administration (OSHA).

- Numerous products, devices and techniques have been recently introduced and/or recommended for the removal of resilient floor covering structures. Before you use any practices other than those identified in this booklet for the removal of an in-place resilient floor-covering product that contains (or is presumed to contain) asbestos, you must determine that the practice meets all applicable regulations or standards including the OSHA standards for occupational exposure to asbestos and the EPA asbestos regulations. You must also determine that any materials used during the removal practice will be compatible with the new floor covering to be installed.
Mold and Mildew

Prior to removing an existing resilient floor following the RFCl Recommended Work Practices for Removal of Resilient Floor Coverings (unless state or local law requires other measures) or installing a new floor, if there are visible indications of mold or mildew or the presence of a strong musty odor in the area where resilient flooring is to be removed or installed, the source of the problem should be identified and corrected before proceeding with the flooring work. In virtually all situations, if there is a mold issue, there is or has been an excessive moisture issue. Visible signs of mold or mildew (such as discoloration) can indicate the presence of mold or mildew on the subfloor, on the underlayment, on the back of the flooring, and sometimes even on the floor surface. If mold or mildew is discovered during the removal or installation of resilient flooring, all flooring work should stop until the mold/mildew problem (and any related moisture problem) has been addressed. Before installing the new resilient flooring, make sure the underlayment and/or subfloor is allowed to thoroughly dry and that any residual effect of excessive moisture, mold, or structural damage has been corrected.

To deal with mold and mildew issues, you should refer to the U.S. Environmental Protection Agency (EPA) guidelines that address mold and mildew. Depending on the mold or mildew condition present, those remediation options range from cleanup measures using gloves and biocide to hiring a professional mold and mildew remediation contractor to address the condition. Remediation measures may require structural repairs such as replacing the underlayment and/or subfloor contaminated with mold and mildew as a result of prolonged exposure to moisture.

The EPA mold guidelines are contained in two publications "A Brief Guide to Mold, Moisture and Your Home" (EPA 402-K-02-003) and "Mold Remediation in Schools and Commercial Buildings" (EPA 402-K-01-001). Appendix B of the "Mold Remediation in Schools and Commercial Buildings" publication describes potential health effects from exposure to mold, such as allergic and asthma reactions and irritation to eyes, skin, nose and throat. These publications can be located on EPA’s website at www.epa.gov/iaq/molds
OSHA REQUIREMENTS

In August 1994, OSHA published revised asbestos standards which affect some of the operations described in this booklet. OSHA has determined that intact resilient floor covering materials can be removed under a "negative exposure assessment" in compliance with the revised standards by appropriately trained workers using the Recommended Work Practices.

- "Intact" is defined to mean that the asbestos-containing material has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix. The incidental breakage of flooring materials, or slitting of sheet vinyl floor covering with a sharp-edged instrument, during removal operations conducted in accordance with the Recommended Work Practices does not mean that the materials are not removed in an "intact" condition. OSHA has recognized that resilient floor covering materials are considered nonfriable if intact and generally do not emit airborne fibers unless subjected to sanding, sawing or other aggressive operations.

- Installers of resilient floor covering materials that plan to use the Recommended Work Practices outlined in this book to remove intact and nonfriable asbestos-containing flooring materials are required to complete an 8-hour training program.

- Employers must designate a "competent person" with 4 hours of additional training to be responsible for the health and safety of the workers at the floor removal job site.

- OSHA has determined that the competent person can make a "negative exposure assessment" based upon data in the OSHA asbestos rulemaking record (including data from the Envirof Reports) showing that use of the Recommended Work Practices during removal of intact flooring material consistently results in worker exposures below the levels permitted in the OSHA standards.

- Where other workers or persons may have access to the flooring removal worksite, the employer must establish a demarcated "regulated area" (e.g. using barrier tape or closing room doors to enclose a work area) and post warning signs.

- Workers who engage in the removal of asbestos-containing flooring materials for more than 30 days per year (one hour or more per day) must receive medical surveillance.

- Employers are required to maintain certain training and workplace and medical records.
Effective July 6, 2010, EPA has established training, certification, and work practice requirements for paid renovation, repair, or remodeling work that disturbs more than 6 square feet of lead-based paint per room within a 30 day period in a home (e.g., single-family, apartments) or a facility occupied by children under age of 6 (e.g., daycare center, preschool) built prior to 1978. 40 C.F.R. § 745.80 et seq. In these pre-1978 facilities, it is assumed that any painted surfaces contain lead paint, unless EPA-approved testing is performed to show that the disturbed surfaces are lead-free.

The removal or installation of resilient flooring in these pre-1978 buildings may involve disturbing or removing molding, baseboards, or floors (e.g., wood) that have been painted with lead-based paint or cutting off the bottom of painted doors or molding to allow the new floors to fit. To determine whether more than 6 square feet of a room is disturbed, multiply the total length of the disturbed painted material by its height (both numbers in feet). For example, if a 4 inch high baseboard (1/3 foot) is being removed as part of an installation or removal, over 18 linear feet of this baseboard would have to be removed to trigger the rule (1/3 foot x 18 feet = 6 square feet). For more examples, see http://www.epa.gov/lead/pubs/rrp-faq.pdf.

If the rule is triggered the following training, certification, and work practices are required:

- Employees performing the work must have completed a lead-safe work practices training course of 8 hours in length approved by EPA, which training is valid for 5 years. See http://cfpub.epa.gov/flpp/searchrrp_training.htm for approved courses in each state.

- The firm performing the work must be lead-safe certified by EPA, which requires the submission of an application and fee to EPA. The application fee is typically $300 for a five year certification and it may take up to 90 days to process the application. The application procedures for each state can be found at the link in the paragraph above.

- Before beginning work, your firm must: (1) notify the residents of the affected homes or the parents of the affected children by providing the EPA Renovate Right pamphlet (http://www.epa.gov/lead/pubs/renovaterightbrochure.pdf); and (2) must maintain its notification records for 3 years.

- Your firm and employees must use lead-safe work practices, including posting warning signs; isolating the work area with plastic sheeting or other materials; removing or covering furniture; cleaning and inspecting the worksite when the work is finished; and disposing of any waste in a safe manner.

Some states operate their own lead-based paint programs and may have more stringent requirements than the EPA rule. See http://www.epa.gov/lead/pubs/renovation.htm#states for a list of states with their own rules.
GENERAL RULES FOR REMOVAL OF RESILIENT FLOOR COVERING

When following the Recommended Work Practices there are several general rules to follow:

Never sand, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize any resilient flooring, backing, lining felt, asphaltic "cutback" adhesive, or other adhesive to remove them from the floor. See "Warning Statement" on page one.

- Unless positively certain the product you intend to remove is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content.

- Removal of existing floor covering should be considered the last alternative.

- Use a vacuum equipped with HEPA filter, disposable dust bag, and metal floor attachment (no brush).

- All sheet floor removals must be done using detergent solution.

- All felt scraping must be done wet.

- Prior to removal, all tile must be wetted (except in cases where heat will be applied).

- Do not dry sweep.

- Material removed must be placed in heavy-duty impermeable bags at least 6 mils thick or in a leak-tight container, properly labeled and disposed of in an authorized landfill.
ALTERNATIVES TO REMOVAL OF EXISTING RESILIENT FLOOR COVERINGS

Removal of the in-place resilient floor should be considered the final alternative. It is preferred you leave the existing resilient floor covering in place and go over the top (single flooring layer only) with the new floor.

Alternatives to the removal of an existing resilient floor over approved subfloors are:

- Installing directly over a single layer of approved existing resilient flooring.
- Filling the embossing of the in-place resilient flooring with embossing leveler before installation (residential use only).
- Covering existing resilient flooring on an approved suspended wood subfloor with a recommended wood underlayment.

When you plan to install a new resilient sheet or tile floor covering over an existing resilient floor covering, follow the installation instructions published by the manufacturer. Those instructions will tell you what must be done to the existing surface before the new resilient floor covering can be installed. Remove wax and other finishes by wet stripping only.

Contact a local established floorcovering dealer for additional information.
REMOVAL OF RESILIENT SHEET FLOORING

Supplies and Tools

- Safety glasses and gloves
- Stiff-bladed wall or floor scraper
- Utility or hook knife
- Tank-type High Efficiency Particulate Air (HEPA) wet/dry vacuum cleaner with disposable dust bag and metal floor attachment (no brush)
- Hand-held tank sprayer
- Large-size heavy-duty impermeable trash bags (at least 6 mils thick) or closed leak-tight containers with ties, tape, or string to tie the bags shut, and appropriate labels stating, for example "Caution—Contains Asbestos. Avoid Opening or Breaking Bag or Container. Breathing Asbestos is Hazardous to Your Health"
- A liquid dishwashing detergent which is stated to contain anionic, nonionic, and amphoteric surfactants. Mix this specified liquid dishwashing detergent with water to make a dilute solution (16 oz. specified liquid dishwashing detergent in one gallon of water)
- Ground fault circuit interrupter for electrical connection of the HEPA vacuum and any other electrical connections required
REMOVAL OF FULLY-ADHERED
RESILIENT SHEET FLOORING

WARNING

Do not sand, dry sweep, dry scrape, drill, saw, beadblast or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic "cutback" adhesive, or other adhesive. See "Warning Statement" on page one.

- Remove all furniture and appliances from the work area.
- Remove any binding strips or other restrictive moldings from doorways, walls, etc.
- Prepare the specified liquid dishwashing detergent solution (16 oz. of specified liquid dishwashing detergent to one gallon of water) and pour into a hand sprayer.
- Before removal begins, vacuum the entire floor using a HEPA vacuum with a metal floor attachment.

WARNING

Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment

- Make a series of parallel slices 4" to 8" apart through the top layer of the flooring and about halfway through the backing, parallel to the wall, for the entire floor.

WARNING

Resilient flooring becomes slippery when wet with the specified liquid dishwashing detergent solution. Use caution to contain the solution in the immediate work area.

- Wear layer removal: One worker starts at the end of the room farthest from the entrance door and pries up the corner of the strip, separating the backing from the wear layer. As the strip is being removed, another worker sprays a constant mist of the specified liquid dishwashing detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, the felt remaining on the floor and on the back of the strip will be thoroughly wet. Do only one three-stripe area at a time. Stand on the remaining floor covering or clean floor (to the extent feasible, minimize standing on the felt). The sliced strips should be peeled from the backing by pulling or rolling around a core which will control the stripping angle to create a uniform tension (some resilient flooring wear layers may not be readily strippable and may require wet-scraping). Tie or tape the removed material securely and place in the heavy-duty impermeable trash bag or closed leak-tight container for disposal.
• Remove and dispose of each succeeding strip in the above manner. Minimize walking on the exposed felt to the extent feasible. Worker footwear must be cleaned or removed before leaving work area. Close full bags tightly, and seal securely for disposal. Identify with an appropriate label stating, for example "Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Dispose in an approved landfill only.

• Occasionally, parts of the top or inner layer will stick to the backing. This can often be eliminated by peeling in the opposite direction. The stiff-bladed scraper may aid in the removal or peeling of these layers.

• Wet-scraping residual felt:
  (1) After three strips of flooring material are removed, any residual felt must be wet scraped. Thoroughly wet the residual felt with the specified liquid dishwashing detergent solution. Wait a few minutes to allow the specified liquid dishwashing detergent solution to soak into the felt.

(2) Stand on the remaining floor covering to the extent feasible (not the felt) and use the stiff bladed scraper to scrape up the wet felt.
(3) Rewet the felt if the specified liquid dishwashing detergent solution has not completely penetrated, if drying occurs, or if dry felt is exposed during scraping. Pick up the scrapings while still wet as they are removed from the floor and place in a heavy-duty impermeable trash bag or leak-tight container. Wet-scrape all felt from this floor area before proceeding further.

**PRECAUTION:**
Excessive moisture can cause permanent damage to wood underlayments. It is the installer’s responsibility to use the correct amount of specified liquid dishwashing detergent solution to prevent underlayment damage. A floor that has been wet-scraped must be allowed to dry before installing any new resilient flooring.

(4) When this floor area has been cleaned free of felt, vacuum with HEPA vacuum cleaner with the metal floor attachment. Position the vacuum cleaner so that the discharge air does not blow on the area being cleaned.

(5) Repeat the above on the next series of strips.

(6) Repeat this operation until the felt has been removed from the whole floor. Close full bags tightly and seal securely for disposal. Identify with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Bag or Container. Breathing Asbestos is Hazardous to Your Health.” Dispose in an approved landfill only.

(7) When the entire floor has been removed, let it dry and vacuum with HEPA vacuum cleaner with the metal floor attachment. Position the vacuum cleaner so that the discharge air does not blow on the area being cleaned.

(8) After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturer’s instructions and placed in a heavy-duty impermeable trash bag or leak-tight container with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Bag or Container. Breathing Asbestos is Hazardous to Your Health.” Close and seal the trash bag securely for disposal. Dispose in an approved landfill only.

(9) The floor is now ready to have a new resilient floor covering installed. Follow the manufacturer’s installation instructions.
REMOVAL OF UNADHERED (LOOSE-LAY) OR PERIPHERALLY-ADHERED RESILIENT SHEET FLOORING

WARNING
Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic "cutback" adhesive, or other adhesive. See "Warning Statement" on page one.

- Remove all furniture and appliances from the work area.
- Remove any binding strips or other restrictive moldings from doorways, walls, etc.
- Prepare the specified liquid dishwashing detergent solution (16 oz. of specified liquid dishwashing detergent to one gallon of water) and pour into a hand sprayer.
- Before removal begins, vacuum the entire floor using a HEPA vacuum with a metal floor attachment.

WARNING
Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment.

- If flooring is unadhered, start at the end of the room farthest from the entrance doorway and slice a strip 18" wide in the unadhered flooring. One worker removes the sliced strip while another worker sprays the specified liquid dishwashing detergent solution directly into the separation nip point. Minimize standing on the exposed subfloor during the removal process to the extent feasible.

CAUTION
Resilient flooring becomes slippery when wet with specified liquid dishwashing detergent solution. Use caution to contain the solution in the immediate work area. Standing on a new sheet of plywood or non-slip surface while working is recommended.

- Roll the wet strip tightly and tie or tape securely so it will not unroll. Place it in a heavy-duty, impermeable trash bag or closed leak-tight container big enough to accommodate several rolls for disposal.

  Use this method for nonbonded areas of peripherally-adhered floors. To remove bonded areas, follow instructions under "Removal of Fully-Adhered Resilient Sheet Flooring."

- Clean the exposed floor with a HEPA vacuum cleaner with the metal floor attachment. Position the vacuum cleaner so that the discharge air does not blow on the area being cleaned.

- Repeat the above, slicing, rolling and disposing of one strip at a time and cleaning the newly exposed area immediately until the entire floor covering has been removed. Let the floor dry, then vacuum with a HEPA vacuum cleaner using metal floor attachment.

- After vacuuming, used HEPA filters and cleaner bags should be removed according to manufacturer's instructions and placed in a heavy-duty impermeable trash bag or leak-tight container with an appropriate label stating, for example "Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Close and seal the trash bags or leak-tight container securely for disposal. Dispose in an approved landfill only.

- The floor is now ready for installation of new floor covering using the manufacturer's installation instructions.
REMOVAL OF RESILIENT TILE

Supplies and Tools

- Safety glasses and gloves
- Short or long-handled scraper (DO NOT USE SPUD BAR OR MECHANICAL CHIPPER)
- Hammer
- Commercial-type hand-held hot-air gun or a radiant heat source such as an infrared machine
- Large size, heavy-duty labeled, impermeable trash bags with minimum 6 mil thickness (or closed leak-tight containers), with ties, tape or string to tie shut, and tags for labeling
- Tank-type High Efficiency Particulate Air (HEPA) wet/dry vacuum cleaner with disposable dust bag and metal floor attachment (no brush)
- Hand-held tank sprayer
- Ground fault circuit Interrupter for electrical connection of the HEPA vacuum and any other electrical connections required

REMOVAL PROCEDURE

WARNING
Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing lining felt, asphaltic "cutback" adhesive, or other adhesive. See "Warning Statement" on page one.

- Remove all furniture and appliances from the work area. Remove any binding strips or other restrictive moldings from doorways, walls, etc.
- Before removal begins, vacuum the entire floor using a HEPA vacuum with a metal floor attachment.
- Floor tiles must be wetted (misted with hand sprayer) before actual removal begins (unless heat will be used to remove tiles).

WARNING
Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment.

- Those areas normally exposed to heavy foot traffic patterns usually have tiles adhered the tightest. In starting the tile removal process, select those areas which receive the least traffic. Try to remove individual tiles in one piece although some breakage of tiles is unavoidable.
- Start the removal by carefully wedging a short or long handled scraper in the seam of two adjoining tiles and gradually forcing the edge of one of the tiles up and away from the floor. Continue to force the balance of the tile up by working the scraper beneath the tile and exerting both a forward pressure and a twisting action on the blade to promote release of the tile from the adhesive and the floor.
• After the tiles are removed, place them, without further breakage, in a heavy-duty impermeable trash bag or closed leak-tight container which will be used for disposal. Removed tiles can be placed in empty tile cartons first and then placed in the heavy-duty impermeable trash bag. To prevent tearing of the heavy-duty impermeable trash bag, place only one full carton of removed tile in a bag.

• With the removal of the first tile, accessibility of other tiles is improved. Force the scraper under the exposed edge of another tile, and continue to exert a prying, twisting force to the scraper as it is moved under the tile until the tile releases from the floor. Remove and dispose of each tile in the manner described above.

• Minimize walking on the exposed adhesive to the extent feasible. Worker footwear must be cleaned or removed before leaving work area. Close full bags tightly and seal securely for disposal. Identify with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health.” Dispose in an approved landfill only.

• Some tiles will release quite easily while others require varying degrees of force. Where the adhesive is spread heavily or the tile is bonded tightly, it may prove easier to force the scraper under the tightly adhered areas by striking the scraper handle with a hammer, using blows of moderate force while maintaining the scraper at a 25° to 30° angle to the floor.

CAUTION

Wear safety glasses when using this procedure.

• If you encounter areas where even the above methods will not remove the tiles, the removal procedure can be simplified by thoroughly heating the tiles
with a hot air gun or a radiant heat source until the heat penetrates through the tile and softens the adhesive.

- Alternatively, without first prying up floor tiles using a scraper, a heat source like a hot air gun or infrared heat machine can be used to apply heat to the floor tiles and then the tiles may be removed by hand or by using a scraper. (Wetting the tiles is not required for this alternative removal method). When using this procedure, walking on exposed adhesive may be unavoidable. Worker footwear must be cleaned or removed before leaving the work area.

**CAUTION**

Handle the hot-air gun or radiant heat source carefully to avoid burn injury. Do not handle the heated tiles or adhesive without suitable glove protection. Do not use a blowtorch or open flame. Use caution not to burn or char tiles. Work area must be adequately ventilated.
When using an infrared heat machine, follow manufacturer’s instructions.

- After tiles are removed, place them in a heavy-duty impermeable trash bag or other closed leak-tight container without further breakage. Removed tiles can be placed in empty tile cartons first and then placed in the heavy duty impermeable trash bags. To prevent tearing of the heavy-duty impermeable trash bag, place only one full carton of removed tile in a bag.

- Close the full bags of removed tile tightly and seal securely for disposal. Identify with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos Is Hazardous to Your Health.” Dispose in an approved landfill only.

**WARNING**

Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic “cutback” adhesive, or other adhesive. See “Warning Statement” on page one.

- See Section 5, “Removal of Residual Adhesives” for proper treatment of remaining adhesive.
The removal of latex based adhesives commonly used with vinyl sheet floors and some tiles can be accomplished by wetting the adhesive residue (which will soften the adhesive) and scraping. Do not use an excessive amount of water which can damage wood subfloors.

The treatment of residual asphaltic "cutback" adhesive, which is covered in this section, is dependent upon the type of new resilient floor covering material to be installed and the type of subfloor. Recommendations for the treatment of residual asphaltic "cutback" adhesive are shown on pages 21 through 26.

**NOTE**

There are commercial adhesive removal products containing solvents that are effective in removing cutback or emulsion adhesives and comply with OSHA requirements (e.g. flashpoint greater than 140°F). These products may be used for adhesive removal; however, they may leave a solvent residue within the subfloor that can adversely affect the new adhesive or floor covering. Thus, the warranties provided by the manufacturers of new floor covering materials will not cover instances where subfloor conditions damage their products or affect their installation.

The use of asbestos encapsulants or bridging materials over asphaltic adhesive is not recommended as those products may affect the bonding properties of the new adhesive. The application of asphaltic "cutback" adhesives, if recommended by the replacement flooring manufacturer, has been demonstrated to be a suitable adhesive when applied over existing cutback adhesive. The use of any new adhesive must be consistent with the installation recommendations of the replacement-flooring manufacturer.

**Supplies and Tools**

- Safety glasses and gloves
- Stiff-bladed wall or floor scraper
- Tank-type High Efficiency Particulate Air (HEPA) wet/dry vacuum cleaner with disposable dust bag and metal floor attachment (no brush)
- Large-size, heavy-duty, impermeable trash bags (or closed leak-tight containers) with ties, tape, or string to tie the bags shut, and tags for labeling.
- Slip-resistant shoes or rubber boots
- Ground fault circuit interrupter for electrical connection of the HEPA vacuum and any other electrical connections required
- Hand-held sprayer
• A liquid dishwashing detergent which is stated to contain anionic, nonionic and amphoteric surfactants. Mix this specified liquid dishwashing detergent with water to make a dilute solution (1 oz. of the specified liquid dishwashing detergent to one gallon of water)

• Floor machine fitted with 3M black floor pad (or equivalent)

• Removal solution—e.g., “mop on, mop off, no machine scrub,” tripping solution

See note on page 21 regarding use of other solutions

• Water-absorbent material
### RESIDUAL ASPHALTIC “CUTBACK” ADHESIVE

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1 Amount of adhesive which must be removed varies. Check with manufacturer of replacement felt-backed sheet flooring for requirements.

2 All warranties and/or guarantees concerning underlayment’s performance rest with the underlayment manufacturer and not with the resilient floor covering manufacturer.

**WET-SCRAPING RESIDUAL ADHESIVE**

**WARNING**

Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphalitic "cutback" adhesive, or other adhesive. See "Warning Statement" on page one.

If new resilient floor tile is to be installed over a concrete subfloor using an asphalitic adhesive, the residual asphalitic "cutback" adhesive must be left so that no ridges or puddles are evident and what remains is a thin, smooth film. This can be accomplished by wet-scraping the residual adhesive.

Wet-Scraping residual asphalitic "cutback" adhesive:

- Moist an area with water mixed with the specified liquid dishwashing detergent (1 oz. specified liquid dishwashing detergent to one gallon of water) to aid in wetting the adhesive. Make sure that the area stays moist. Wet-scrape with a stiff-bladed wall or floor scraper removing ridges and any loose adhesive. Make sure the adhesive is kept wet.

- Place loosened adhesive residue into a heavy-duty impermeable trash bag or leak-tight container with an appropriate label stating, for example: "Caution —Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Close and seal the trash bag securely for disposal. Dispose in an approved landfill only.

- Wet vacuum standing water with the HEPA vacuum cleaner.
- Continue above steps until what remains of the residual asphalitic "cutback" adhesive is a thin, smooth film.
- Clean the entire floor with the HEPA vacuum cleaner using the metal floor attachment.
- After vacuuming, used HEPA filters and cleaner bags should be removed according to manufacturer’s instructions and placed in a heavy-duty, impermeable trash bag or leak-tight container with an appropriate label stating, for example: "Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Close and seal the trash bags or containers securely for disposal. Dispose in an approved landfill only.

COMPLETE REMOVAL OF ASPHALTIC “CUTBACK” ADHESIVE

WARNING

Do not sand, dry sweep, dry scrape, drill, saw, beadblast or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic “cutback” adhesive, or other adhesive. See “Warning Statement” on page one.

REMOVAL METHOD

• Start in corner of the room farthest from the entrance door. Apply the removal solution (e.g. “mop on, mop off, no machine scrub,” stripping solution) by using a hand sprayer or mop over an area of residual adhesive so that the adhesive in this area always remains wet during its removal. Allow the area to soak for 5-10 minutes. Remove the adhesive using a floor machine equipped with a 3M black floor pad (or equivalent), ensuring that the floor is kept wet in the area where the machine is operating.

WARNING

Electrical shock hazard exists. Use a ground fault circuit interrupter for any electrical connections of equipment used in a wet environment.

• Occasionally push away the adhesive slurry from the subfloor with a wall or floor scraper or squeegee to check for complete removal. Continue to use the floor machine, equipped with black pad, in the same area until the concrete subfloor is cleaned to the degree necessary for the new floor installation.

• Adhesive around the edge of the room and in areas that were missed or difficult to reach with the machine can be removed with a hand-held piece of the black floor pad using the above procedures.

WARNING

Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment.
• Wet HEPA vacuum the adhesive slurry. When the HEPA vacuum is full, place commercially suitable water absorbent into the HEPA container until the adhesive slurry is absorbed. An absorbent material may be used on the slurry to absorb the adhesive residue. Place the adhesive waste from the HEPA vacuum or floor into heavy-duty, impermeable bags or leak-tight containers with an appropriate label stating, for example “Caution—Contains Asbestos”. Avoid Creating Dust. Breathing Asbestos May Cause Bodily Harm.” Close and seal the trash bag securely for disposal. Dispose in an approved landfill only.

• Rinse floor area with clean water using a hand sprayer or mop. Worker footwear should also be cleaned and rinsed.

• Wet-vacuum standing water with HEPA vacuum cleaner.

• Continue above steps until the entire room is complete.

• Allow subfloor to dry and vacuum with a HEPA vacuum with metal floor attachment.

• Minimize walking on the wet adhesive to the extent feasible. Worker footwear must be cleaned or removed before leaving the work area.

COMPLETE REMOVAL OF WOOD UNDERLAYMENT

Supplies and Tools

- Safety glasses and gloves
- Chisel
- Hammer or mallet
- Short and long-handled pry bars
- Utility or hook knife
- Stiff-bladed wall or floor scraper
- Large-size, heavy-duty, impermeable trash bags (or leak-tight container) with ties, tape, or string to tie the bag shut and tag for labeling
- Tank-type High Efficiency Particulate Air (HEPA) wet/dry vacuum cleaner with disposable dust bags and metal floor attachment (no brush)
- Hand sprayer
- A liquid dishwashing detergent which is stated to contain anionic, nonionic and amphoteric surfactants
- 6-mil polyethylene sheathing
- Duct tape
- Ground fault circuit interrupter for electrical connection of the HEPA vacuum and any other electrical connections required
- For tile removal only—Commercial-type, handheld, hot-air gun or a radiant heat source such as Infrared machine
COMPLETE REMOVAL OF WOOD UNDERLAYMENT (SUBFLOOR) UNDER EXISTING SHEET FLOORING

**WARNING**

Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic “cutback” adhesive, or other adhesive. See “Warning Statement” on page one.

- Remove all furniture and appliances from the work area.
- Remove any binding strips or other restrictive moldings from doorways, walls, etc.
- Prepare the specified liquid dishwashing detergent solution (16 oz. of specified liquid dishwashing detergent to one gallon of water) and pour into a hand sprayer.
- Before removal begins, vacuum the entire floor using a HEPA vacuum with a metal floor attachment

**WARNING**

Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment.

- Starting at the doorway or a floor ventilation vent, locate a joint in an underlayment board.
- Slice a strip of flooring 4 to 8 inches wide centered over the underlayment joint in the panel to be removed. Slice through the top and inner layers of flooring and about halfway through the backing. Continue this procedure for all underlayment joints over the entire floor.

**CAUTION**

Resilient flooring becomes slippery when wet with specified liquid dishwashing detergent solution. Use caution to contain the solution in the immediate work area.

- One worker pries up the corner of a strip, separating the backing from the wear layer. As the strip is being removed, another worker sprays a constant mist of the specified liquid dishwashing detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, the felt remaining on the floor and on the back of the strip will be thoroughly wet. Stand on the remaining floor covering or clean floor (do not stand on the felt).
The sliced strips should be peeled from the backing by pulling or rolling around a core which will control the stripping angle to create a uniform tension (some resilient flooring wear layers may not be readily strippable and may require wet-scraping). Tie or tape the removed material securely and place in a heavy-duty, impermeable, trash bag or closed leak tight container for disposal.

- Remove and dispose of each succeeding strip in the above manner. Minimize walking on the exposed felt to the extent feasible. Worker footwear must be cleaned or removed before leaving work area. Close full bags tightly, and seal securely for disposal. Identify with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos Is Hazardous to Your Health.” Dispose in an approved landfill only.

- Occasionally, parts of the top or inner layer will stick to the backing. This can often be eliminated by peeling in the opposite direction. The stiff bladed scraper may aid in the removal or peeling of these layers.

**WARNING**

Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic “cutback” adhesive, or other adhesive. See “Warning Statement” on page one.

- Remove all furniture and appliances from the work area.

- Remove any binding strips or other restrictive moldings from doorways, walls, etc.

- Prepare the specified liquid dishwashing detergent solution (16 oz. of specified liquid dishwashing detergent to one gallon of water) and pour into a hand sprayer.

- Before removal begins, vacuum the entire floor using a HEPA vacuum with a metal floor attachment

- Wet-scraping residual felt—follow instructions for wet-scraping residual felt on Page 12.

- For procedures for removing wood underlayment boards see Page 32.

**COMPLETE REMOVAL OF WOOD UNDERLAYMENT (SUBFLOOR) UNDER EXISTING TILE FLOORING**

- Before removal begins, the entire floor is vacuumed using a HEPA vacuum with a metal floor attachment.

**WARNING**

Electrical shock hazard exists. Use a ground fault interrupter for any electrical connections of equipment used in a wet environment.

- Floor tiles must be wetted (misted with hand sprayer) before actual removal begins (unless heat will be used to remove tiles).

**WARNING**

Resilient flooring becomes slippery when wet with the specified liquid dishwashing detergent solution. Use caution to contain the solution in the immediate work area.

- Starting at the doorway or a floor ventilation vent, locate a joint in an underlayment board.
- Start the removal of the tile at the underlayment joint by carefully wedging the scraper in the seam of two adjoining tiles and gradually forcing the edge of one of the tiles up and away from the floor. Do not intentionally break off pieces of the tile, but continue to force the balance of the tile up by working the scraper beneath the tile and exerting both a forward pressure and a twisting action of the blade to promote release of the tile from the adhesive and the floor. Continue to remove tiles in this manner at all underlayment joints until all board joints are exposed.
- After the tiles are removed place them, without further breakage into smaller pieces, in a heavy-duty impermeable trash bag or closed leak-tight container which will be used for disposal. Removed tiles can be placed in empty tile cartons first and then placed in heavy-duty, impermeable, trash bags. To prevent tearing of the heavy-duty, impermeable, trash bag, place only one full carton of removed tile in a bag.
- With the removal of the first tile, accessibility of the other tiles is improved. Force the scraper under the exposed edge of another tile, and continue to exert a prying, twisting force to the scraper as it is moved under the tile until the tile releases from the underlayment. Remove and dispose of each tile in the manner above. Minimize walking on the exposed adhesive to the extent feasible. Worker footwear must be cleaned or removed before leaving area. Close full bags or leak-tight container tightly and seal securely for disposal. Identify with an appropriate label stating, for example "Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Dispose in an approved landfill only.
Some tiles will release quite easily while others require varying degrees of force. Where the adhesive is spread heavily or the tile is bonded tightly, it may prove easier to force the scraper through the tightly adhered areas by striking the scraper handle with a hammer, using blows of moderate force while maintaining the scraper at a 25° to 30° angle to the floor.

If you encounter areas where even the above methods will not remove the tiles, the removal procedure can be simplified by thoroughly heating the tiles with a hot-air gun or a radiant heat source until the heat penetrates through the tile and softens the adhesive.

When using automated infrared heating machines, follow the manufacturer’s instructions.

**WARNING**

Handle the hot-air gun or radiant heat source carefully to avoid burn injury. Do not handle the heated tiles or adhesive without suitable glove protection. Do not use a blowtorch or open flame. Use caution not to burn or char tiles. Work area must be adequately ventilated.
REMOVAL OF WOOD UNDERLayment BOARDS

WARNING

Do not sand, dry sweep, dry scrape, drill, saw, beadblast or mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic "cutback" adhesive, or other adhesive. See "Warning Statement" on page one.

- After all felt from sheet flooring has been wetscraped or tiles removed from the underlayment joints, drive a chisel, using a hammer or mallet, between the underlayment board and the subfloor. Use the chisel to pry up the underlayment enough to insert a pry bar and remove the chisel. Slowly and carefully use pry bars to pry up the underlayment board a little at a time until the board is completely loose and can be removed.

- Caution must be used to avoid breaking the underlayment board. The underlayment board should be removed in one piece. If the underlayment board breaks, slice through the sheet resilient flooring at the break and spray any exposed felt with the specified liquid dishwashing detergent solution. Allow the specified liquid dishwashing detergent solution to penetrate for a few minutes, then continue lifting the broken underlayment. In the case of a broken underlayment board with tile adhered, wet (mist) the broken tile and carefully remove any loose pieces.

- Wear heavy gloves and be careful of wood splinters and fasteners sticking out of the back of the underlayment. Each underlayment board (or piece of board) should be removed from the work area as soon as it has been pried up to avoid injuries (such as stepping on a nail). Fasteners protruding from removed board should be flattened with a hammer. Place removed underlayment boards on skids with the nails pointing downward. Wrap skid with 6-mil polyethylene plastic sheeting and secure with duct tape. Identify with an appropriate label stating, for example "Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health." Dispose in an approved landfill only.
• If the underlayment panel extends under cabinets or wall partitions, it will be necessary to slice through the flooring with a knife as close to the vertical surface as possible. Deeply score the panel. This should allow for removal.

• After each panel has been removed, pull out any nails or fasteners still in the subfloor.

• A chisel is not needed to start the removal of boards after the first board has been removed. Simply work the pry bar under the exposed edge of the next board.

• When removal of the underlayment under the existing floor is complete, thoroughly check the exposed subfloor. Renail loose areas and reset any “popped” nails or fasteners.

• Vacuum up any residue using the HEPA vacuum cleaner with the metal floor attachment.

• After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturer’s instructions and placed in a heavy-duty, impermeable, trash bag or leak-tight container with an appropriate label stating, for example “Caution—Contains Asbestos. Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health.” Close and seal the trash bag or container securely for disposal. Dispose in an approved landfill only.

• Prepare the subfloor by installing new underlayment and or floor covering according to the manufacturer’s installation instructions.

---

RFCi
Resilient Floor Covering Institute
115 Broad Street, Suite 201
LaGrange, GA 30240
706.882.3833

October 2011

This book replaces all prior editions of the RFCi and Armstrong Recommended Work Practices publications. Future editions of these work practices may be issued to replace this publication.
**Design & Construction Standards**

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Division 02: Existing Conditions

Facilities Management Tree Preservation & Protection Standards

Technical Guidelines

WHO SHOULD READ
- Project Managers
- Architect & Project Managers
- Grounds Department

TREE PRESERVATION AND PROTECTION

Draft, March 22, 2012

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STANDARD DETAILS

Standard Number

Title

Tree Protection Detail

Bridging Tree Roots

Temporary Tree Protection Detail

Rock Chimney

Draft, March 22, 2012
TREE PRESERVATION AND PROTECTION

PART 01 – GENERAL

A. Related Documents:
The General Provisions of the Contract, including General and Supplementary Conditions and
General Requirements, apply to the work specified in this Section.

B. Description of Work:

Purpose:
The purpose of this section is to provide protection for existing trees on public and/or private
property during University sponsored construction projects. VCU will ensure tree protection
measures meet or exceed City code where it applies.

C. Work Included in this Section:
Construction of Tree Protection Barricades, Replacement of Damaged Trees, Pruning, Curb and
Gutter Repair, Replacement and Construction, and Sidewalk Repair and Construction.

PART 02 – PRODUCTS

A. Non-Woven Textile Fabric:
A needle-punched nonwoven geo-textile composed of polypropylene fibers that form a network
does not allow the fibers to shift. Examples of this type include Mirafi 140 NL, Thrace-UNQ 130
EX, or an approved equal. Fabric must be UV stabilized and resistant to most chemicals found in
the soil, mildew and insect damage. Samples must be submitted and approved by the Project
Manager. Product Physical Properties:
Technical Guidelines

WHO SHOULD READ

- Project Managers
- Architect & Project Managers
- Grounds Department

TREES PRESERVATION AND PROTECTION

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B. Woven Textile Fabric:

Woven geo-textile fabric with a minimum tensile strength of 200 lbs. shall be used under 6 inches of washed stone or suitable alternative whenever construction traffic must pass over the root systems of existing trees in unpaved areas. Landscape Filter Fabric shall be Class 2 Filter Fabric as defined in the AASHTO M 288 Geotextile Specification.

Samples of Filter Fabric shall be submitted to the Project Manager for approval prior to installation.

Product Specification:

- Type: 100% Polyester
- Minimum Tensile Strength: 200 lb
- Elongation: 15% Min.
- Minimum Burst Strength: 400 psi
- Minimum Puncture Strength: 80 lb
- AOS (min/max): 30/130
- Minimum Ultra Violet Exposure Strength: 140 lb
- Fungus Resistance: No Growth

Tree Protection Barricade Fencing:

Barricades shall be constructed of wood, in accordance with Part 03 B of these specifications. Orange safety fencing, three feet high, or a suitable alternative may be used in lieu of wood rails.
PART 03 – EXECUTION

Trees designated for Tree Protection on VCU-funded or VCU-sponsored construction projects shall have their critical root zone protected by tree barricades installed according to the VCU Tree Protection detail and where applicable, by the use of the VCU Bridging Tree Roots detail, the VCU Temporary Tree Protection detail, the VCU Curb Placement at Existing Tree detail, and the VCU Rock Chimney detail.

When trees are located within the street right-of-way, they shall be protected from damage and/or removal per the VCU Tree Protection Standard and/or City requirements, whichever is greater. Trees located on VCU property shall be protected according to the VCU Tree Protection Standard. Any proposed construction adjacent to Public Right-of-Way involving trees or root systems in the right-of-way should be approved by the City Arborist.

This includes the following: storm drainage, underground utilities, driveways, sidewalks, etc. The Grounds Superintendent shall review and approve construction plans for trees on VCU property.
A. Boring and Trenching:

Open trenching, including pilot and/or receiving holes, closer to a tree than:

<table>
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<th>Trees Diameter (D.B.H.)</th>
<th>Radial Distance (feet)</th>
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<tr>
<td>Less than 6</td>
<td>Limb spread</td>
</tr>
<tr>
<td>6&quot; - 9&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>10&quot; - 14&quot;</td>
<td>10'</td>
</tr>
<tr>
<td>15&quot; - 19&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>20&quot; - 30&quot;</td>
<td>15'</td>
</tr>
<tr>
<td>Over 30&quot;</td>
<td>20'</td>
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will be considered harmful to the trees unless a boring construction method is performed. Any exceptions must be approved by the Project Manager in coordination with the Grounds Superintendent. Utilities may be tunneled in the root zone at a 24” minimum depth providing that plans are approved showing the location and method.

C. Curb and Gutter Repair and Construction:

When working to install curb and/or guttering within 10 feet of any tree (12 inches or larger in diameter), plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed back of curb unless the Grounds Superintendent has provided approval. Root pruning will be in accordance with Tree Preservation and Protection Standards, Part 03-L, entitled “Root Pruning”. If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place.
C. Sidewalk Repair and Construction:

When working within 10 feet of any tree 12 inches or larger in diameter, plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed edge of the sidewalk unless the Grounds Superintendent has provided approval. Root pruning will be in accordance with Tree Preservation and Protection Standards, Part 03-L entitled “Root Pruning.” If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place. Narrow sections of sidewalk will be constructed in accordance with directions from the Project Manager and no less than 40 inches in width. Bridging of large roots will be in accordance with the VCU Bridging Roots detail.

D. Barricade Fencing:

Barrier fences shall extend around trunk as shown on Landscape the VCU Tree Protection detail to encompass the Critical Root Zone. So defined, it shall encompass the trees with a radius of not less than one foot (1’) for every one inch (1") of trunk diameter (critical root zone) unless otherwise detailed in plans. When a circular or nearly circular area of this radius cannot be protected due to project design constraints, then an asymmetrical Critical Root Zone area shall be encompassed in the barricade fencing and shall be constructed around the tree which encompasses an equal area (square footage) of critical root zone. Barricade fencing shall not be placed closer than four feet (4’). Deviations from this must be approved on an individual basis by the Project Manager and Grounds Superintendent.

All tree protection barriers shall be installed prior to any grading or other land disturbing activity. They shall be constructed from any material substantial enough to designate the protected area and to protect the roots, trunk, and crown of the tree. Example: 2 x 4 standards and 1 x 4 rails; 3’ high orange safety fencing, etc.
E. Trunk Protection:

See VCU Temporary Tree Protection Detail. Batter boards and sand bags will be installed when working within 10 feet of any tree 12 inches or larger. The purpose of these items will be to protect the trunk or root flare from damage during construction.

F. Temporary Access:

Permission may be granted to allow temporary (30 days) access across the critical root zone.

Mulch 8 to 12 inches deep with woven geo-textile as specified in “Tree Preservation and Protection,” Part 02 – Products, or approved equivalent laid underneath, shall be required in these areas to act as a cushion to prevent soil compaction. Mulch and fabric shall be removed after construction is complete.

G. Root Zone Protection

Tools, materials or machinery in any portion shall not be stored within the critical root zone.

H. Fill Around Existing Trees to Remain:

No fill dirt greater than two inches (2”) shall be allowed over the critical root zone of the tree. Deviations from this must be approved on an individual basis by the Project Manager and Grounds Superintendent.

I. Clearing within Critical Root Zone:

In the critical root zone, the removal of any portions of old sidewalk, driveway, and/or curb shall be done with extreme care so as not to damage any portion of the branches, trunk, or roots.
In the critical root zone, any stumps, dead trees and shrub growth to be removed shall be cut flush or ground out. Stump grinding will be performed only when necessary with appropriate equipment to a depth of 12 inches. All holes will be backfilled completely the same day of the operation. Stumps to be ground out will be designated by the Project Manager. No grubbing is permitted in the critical root zone areas.

J. **Tree Damage:**

Climbing irons, spurs or spikes shall not be used on trees to be pruned and are only allowed on trees to be removed. Any tree damage caused by the Contractor is to be repaired immediately at no additional expense and to the satisfaction of the University. Any damages resulting in the disfigurement and/or shortened life expectancy of a tree will be evaluated by the Grounds Superintendent. The entire value of the tree will be pro-rated by the loss of life expectancy and that value assessed to the Contractor. Trees damaged beyond repair, as judged by the Grounds Superintendent, are to be removed at no expense to VCU, and replaced by trees of size and species designated at no additional expense to VCU; or the dollar value of such damaged trees as determined by the Grounds Superintendent is deducted from the monies owed the Contractor. The tree values will be determined by using the guidelines in the Tree Evaluation Guide by The International Society of Arboriculture.

A MINIMUM FINE OF $50 WILL BE ASSESSED FOR EACH INCIDENT OF BARK AND CAMBIUM DAMAGE OF 4" WIDTH OR LESS WHERE RESTRICTIONS ARE VIOLATED. IF DAMAGE IS LARGER, DAMAGES WILL BE ASSESSED USING L.S.A. TREE EVALUATION GUIDE PROCEDURES. FINES WILL BE DEDUCTED FROM THE MONIES OWED THE CONTRACTOR.

K. **Discontinuance of Work:**

Any practice obviously hazardous to people or harmful to the trees, as determined by the University, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice to discontinue such practice.
H. Root Pruning:

Root pruning shall be kept to an absolute minimum. In no case shall any root be pruned that is 1 1/2 inches in diameter or greater without the express permission of the Project Manager or Grounds Superintendent.

All roots proposed to be cut shall be located in advance at a point 6-12” outside the proposed cut by using a shovel, a probe, a high-pressure stream of water, air excavation tool or other approved method. The cut is to be made no more than 6” behind the back of the curb, wall, or other structure to be built. Pruning shall only be performed to the minimum depth required for the structure. The roots shall be cut cleanly leaving a smooth surface. Root pruning equipment shall be kept sharp to ensure that roots are cut cleanly and are not broken or torn by dull or unsuitable equipment.

M. Pruning and Thinning of Existing Trees:

All pruning shall be in accordance with ANSI A300 for Tree Care Operations: Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices.

N. Tree Preservation:

The Grounds Superintendent must approve all tree removals from VCU-owned property. The City Arborist must approve all tree removal from the City right-of-way. Signature of an authorized representative of the Grounds Superintendent or City Arborist on final construction plans and documents constitutes the express approval of the Grounds Superintendent or City Arborist.

O. Clean Up:

Remove all barriers upon completion of project and fill the holes left by vertical posts of fencing with suitable soil. Restore area to original condition.

END OF SECTION
SEE APPROVED TREE PRESERVATION PLAN FOR REQUIRED RADIUS OF TREE BARRIER

PLAN VIEW OF ROOT ZONE

FOR PRUNING SEE INTERNATIONAL SOCIETY OF ARBORCULTURE SPECS.

DEAD TREES AND SCRUB OR UNDERGROWTH SHALL BE CUT FLUSH WITH ADJACENT GRADE. NO GRUBBING ALLOWED UNDER DRIP LINE.

2" x 4" STANDARDS OR 1" x 4" RAILS OR ORANGE SAFETY FENCING MAY BE USED.

ONE FOOT FOR EACH INCH OF TRUNK DIAMETER OR 1/2 HEIGHT OF TREE WHICHEVER IS GREATER

6" MINIMUM WIDTH FOR 3" CAL TREES

DRIP LINE

6" BARK MULCH. PLACE BARK MULCH AT AREAS NOT PROTECTED BY BARRIER.

NOTES:
1. REMOVE ALL BARRIERS UPON COMPLETION OF PROJECT.
2. LANDSCAPING PLANS SHALL SHOW THE LOCATIONS OF ALL TREE PROTECTION FENCES.
3. REFER TO THE VCU LANDSCAPE CONSTRUCTION STANDARDS FOR GENERAL SPECIFICATION REGARDING TREE PROTECTION.
NOTES:
1. THIS TREE BUMPER DETAIL SHALL BE USED WHEN WORKING WITHIN 10’ OF AN EXISTING TREE TO BE PROTECTED.
2. ALL TREES SHALL BE SAVED UNLESS NOTED OTHERWISE ON THE PLANS OR DIRECTED BY THE PROJECT MANAGER.
3. LUMBER, WIRE, SANDBAGS MAY BE REUSED AT OTHER TREES.
4. THE INTENT OF THIS DETAIL IS TO PROTECT EXISTING TREES FROM DAMAGE DURING CONSTRUCTION ESPECIALLY FROM BACKHOE ARM SWING. AN ALTERNATE APPROACH MAY BE USED IF APPROVED IN WRITING BY THE PROJECT MANAGER AFTER CONSULTATION WITH THE GROUNDS SUPERINTENDENT OR HIS DUTY AUTHORIZED REPRESENTATIVE.
Division 02: Existing Conditions

Facilities Management Tree Preservation & Protection Standards

NOTES:
1. NOT TO SCALE.
2. APPLICATION DESIGNED FOR TREES NO LESS THAN 12” IN DIAMETER.
3. FILL WITH VCU APPROVED PLANTING MIX, APPLY TO A DEPTH OF FOUR (4) INCHES AT BASE OF TREE, TAPER TO GRADE, SEED AND MULCH ACCORDING TO VCU STANDARDS.
4. STONE -- #5, WASHED. MAINTAIN EXPOSED SIX (6) INCH WIDTH AT TRUNK OF TREE. PLACE TO MINIMUM DEPTH OF TWELVE (12) INCHES AND A MAXIMUM OF TWENTY-FOUR (24) INCHES AT THE BASE OF THE TREE AND TAPER OUTWARD TO NO LESS THAN TEN (10) FEET.
5. FABRIC -- NON-WOVEN GEOTEXTILE FABRIC, SUCH AS MIRAFI OR EQUIVALENT, PLACED BETWEEN STONE AND FILL. IT IS NOT TO COVER STONE EXPOSED AT TRUNK OF TREE.

End of Division 2
### Division 03: Concrete

#### 03.1 Concrete Formwork

- The CPSM contains requirements for cast-in-place concrete. These requirements must be incorporated into all projects. In case of a conflict between the standards herein and the CPSM, the CPSM shall take precedence.  

- A comprehensive concrete placement specification should be used on all projects.
- Minimum concrete compressive strength shall be not less than 3,000 psi.
- Exposed aggregate surfaces shall not be used.

See CPSM § 6.3

ACI 301, Specification for Structural Concrete for Buildings (current edition) shall be incorporated by reference. “Comprehensive” project specific specifications include but are not limited to coordinating work, submittal requirements, mix designs, reinforcing criteria, placement tolerances, finish requirements, curing, testing and inspection criteria.

#### Quality Control Procedures

- The Project Inspector and or testing agency should establish a Standard Quality Control check list to monitor the placement and finishing of all concrete surfaces.

See Section 1704.4 of the Virginia Construction Code (VCC) for minimum building code requirements for structural tests, and special inspections for concrete.

- Individuals performing the field tests of fresh concrete shall have proper training, qualifications, and be certified as a Concrete Field Testing Technician-Grade I by the American Concrete Institute (ACI) or other recognized entity.

#### 03.2 Concrete Reinforcement

**Reinforcing Bars**
## Division 03: Concrete

### 03.2 Concrete Reinforcement

**Reinforcing Bars (continued)**

- Comply with Concrete Reinforcing Steel Institute’s (CRSI) recommended practice for the placing of reinforcing bars.

**Secondary Reinforcement**

- To control surface cracking in exposed concrete slabs, the use of polypropylene fibrillated fiber is encouraged and is acceptable for other exposed concrete, when approved in writing by the Facilities Management Division.
- Polypropylene fibrillated fiber is not a substitute for structural reinforcing and expansion and or contraction requirements.

### 03.3 Cast-in-Place Concrete

**Finish Quality**

- Even though finish quality is described in the specifications, it is critical that the project specifications require a pre-installation conference attended by the A/E, Project Manager, Project Inspector, Testing Firm, Contractor, and relevant Subcontractors review project requirements, and establish acceptable quality levels for all concrete surfaces prior to the placement of any concrete on the project.
- Attention is required to assure that flatness and levelness requirements are specified for concrete floors scheduled to receive finishes. The concrete specification must match the requirements of the finish material and subsequent construction.

**Curing**

- Wet – The use of wet curing is the preferred method.
- Curing compound: The use of a curing compound is to be limited where application of moisture is impractical. Such compounds shall not jeopardize the appearance of concrete, or bond to additional concrete. Further, curing compounds shall be used where concrete surface is to
### Division 03: Concrete

#### 03.3 Cast-in-Place Concrete

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<td>be finished with paint, tiles, waterproofing, roofing, or chemical seal. Compatibility with proposed finishes must be confirmed. Curing compounds shall be used and applied with uniform thickness and other recommendations by manufacturers is type 1. When surfaces are exposed to sunlight, then type 2 curing compound shall be used.</td>
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#### 03.5 Cementitious Decks & Toppings

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<td><strong>Design:</strong> All sidewalks at VCU should be designed to accommodate vehicular traffic load. Since many of the sidewalks are installed on City of Richmond property, the specifications must meet or exceed City of Richmond Standards. Otherwise, the minimum are as follows.</td>
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</tbody>
</table>
| • 4000 PSI, air-entrained  
• 6” minimum thickness  
• Reinforced with 6 x 6 – W 1.4 x W 1.4 sheet  
• Keyed contraction joints  
• Doweled expansion joints |

Sub slabs for brick pavers to meet same specifications as above, with the exception that thickness can be reduced to 4”.

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<td>All sidewalks should have a perpendicular broom finish to the direction of travel after the edges have been framed. Tooled joints and edges.</td>
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<tr>
<th>Stair Treads &amp; Landings</th>
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<tr>
<td>• Ensure that the placement and or screening method for stairwells and landings is uniform, flat, and or properly sloped. Stair treads are to slope down 1/8 “per ft. interior, 1/4” per foot exterior, riser to nose. A screed template is to be used for stair treads to assure consistency.</td>
</tr>
</tbody>
</table>
**Design & Construction Standards**

### Division 03: Concrete

#### 03.5 Cementitious Decks & Toppings

**Stair Treads & Landings (continued)**
- A/E should monitor and coordinate with the Project Manager to ensure that the requirements for floor finishes are acceptable on all concrete filled stairs.
- All exterior concrete stairs shall have cast aluminum nosings provided with integral anchors. Bituminous paint is to be applied to concealed surfaces of nosings.

**Strip Waterstops**
- All waterstops shall be 3/4” x 1” and shall contain bentonite material.
- Strip waterstops shall be used where they are shown on drawings, and where new concrete pours meet existing concrete or masonry surfaces.

**Maintenance, Cleaning, & Tightening**
- Forms and adjacent surfaces that will receive the concrete shall be thoroughly cleaned. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

**Penetrations & Openings**
Penetrations and openings shall be located on structural drawings. Penetrations and openings larger than 6” shall have appropriate diagonal reinforcement around them.

---

End of Division 3
### 04.0 General

**Stone & Brick Selection**
- Preliminary Design Phase: In context with the surrounding buildings, the A/E shall select an acceptable brick, mortar and joint tooling, approved by the University Architect as part of the agreed design criteria.
- If fewer than three brick manufacturers and or mortars are selected, then performance specifications for size, type of brick, color, range, strength and permeability shall be used; citing as the basis of design one or more manufacturer’s brick products. Mortar shall be selected and specified, likewise.
- The specifications shall require the Contractor to erect at least one, but no more than three sample wall panels size 4'-0" x 4'-0".
- The final selected and proposed bricks, mortar, masonry and or steel stud back-up, wall ties, insulation and limestone, and or precast stone trim, flashing, including termination bars, and drip edges, etc., applicable to the project, shall be displayed in a mock-up wall panel size 4'-0" x 4'-0". This mock-up wall panel is separate from the sample panels, and is to be used to set standards for quality, along with final confirmation of exterior materials selection. A larger mock-up wall panel can be specified, however, variance from the standard size needs approval by the University Architect prior to incorporation into the contract document.
- The Architect of Record and University Architect shall review and approve the mock-up wall panel for workmanship and conformance prior to the materials order by the Contractor. The Architect of Record shall advise the University prior to approving or not approving a mock-up prior to notifying the Contractor.
- Additions to existing buildings shall match the existing mortar and brick in size, color, texture, and compressive strength, unless otherwise approved by the University Architect. The A/E is to clearly delineate an

*Recommendation is to vary mortar colors a shade lighter and a shade darker on the initial three sample wall panels, to verify initial selection.*

*For large projects, consider an integrated wall mock-up that includes window openings, complete with framing and flashings.*
## Division 04: Masonry

### 04.0 General

**Stone & Brick Selection (continued)**
existing 4-foot square or greater wall area containing a minimum of 100 existing bricks to be matched, and include that information in the bid documents. The wall area location selected by the A/E shall be approved by the University Architect prior to bidding.

### 04.1 Mortar & Masonry Accessories

**Brick Types & Mortar**
- All brick types, shapes, colors, and mortar type and color, shall be approved by the University Architect.
- Colored mortar shall be premixed; not jobsite mixed.
- Mortar admixtures must have both A/E and Facilities Management approval prior to specification and or usage.
- When the existing building has a historic significance as determined by the University, special attention shall be paid to the process of reviewing and approving the materials by the University and the Virginia Department of Historic Resources (DHR), because the masonry design must comprehensively consider unit size, texture, color, patterns, mortar, and striking.

**Masonry Accessories**
- Concrete masonry control joints shall be built-in rubber type or grout keyed type, with face joint kept clear for installation of sealant.
- Dovetail slots and anchors shall be used for masonry veneer over concrete walls.
- Wire ties of pintle and eye-hook design shall be used for masonry veneer over concrete masonry or framed walls.
- Where required by seismic or wind-loading criteria, provide continuous horizontal wire reinforcement to secure brick veneer to wall ties.

Clearly show locations and detailing of masonry control and expansion joints on drawings (elevations and floor plans). Reliance on specified location criteria is not recommended.
# Design & Construction Standards

## Division 04: Masonry

### 04.1 Mortar & Masonry Accessories

**Masonry Accessories (continued)**

- Weep holes for solid masonry shall be rope wicks.
- Weep and vent holes for brick veneer shall be manufactured vents. Do not use open head joints.
- Gauge and materials should be standard weight, hot-dip galvanized, or stainless steel.
- Mortar cavity drainage mesh should be used.
- Flashing should be 7-oz/ft². copper laminated flashing with hemmed metal drip edge, or sealant stop as approved by University Architect.
- Miscellaneous steel lintels, shelf angles, attachments, etc. embedded or incorporated into masonry construction, shall be hot-dipped galvanized or stainless steel. Exposed to view, e.g., window lintels, items are to be finished to match adjacent construction.

Clearly show locations and detailing of flashing on drawings. Show extent and alignment of flashing locations with other building elements, and openings on elevations. Indicate end dam locations. Specify molten zinc galvanizing repair if necessary for cut or abraded miscellaneous steel embedded in masonry. Paint-type repairs or non-galvanized miscellaneous steel items are not acceptable.

### 04.2 Unit Masonry

**Masonry Standard**

Comply with the American Concrete Institute (ACI) 530.1 / American Society of Civil Engineers (ASCE) 6 / The Masonry Society (TMS) 602, as referenced by the Virginia Construction Code (VCC) as the baseline standard.

Specify additional requirements for installation and workmanship, such as tighter joint width tolerances as required.

**Veneer Masonry**

Face brick and other masonry veneers shall be backed for their full extent with masonry units, or steel stud back-up as is appropriate for the building design and selected structural system.

**Veneer Anchors**

Specify veneer anchors capable of transferring horizontal wind loads through continuous insulation and sheathing materials to back-up structure.
### Division 04: Masonry

#### 04.2 Unit Masonry

**Parapet Walls**
Parapet walls up to 3’ in height shall be flashed from coping to roofing. Parapet walls over 3’ in height shall be faced with brick masonry, or other approved exterior material other than exposed concrete masonry.

*Preference is for roofing membrane to extend up and over parapet, and to terminate to exterior face of wall.*

#### 04.9 Masonry Restoration & Cleaning

Water Repellent Coatings: Use of water repellent coatings on exposed above-grade masonry is prohibited.

*This includes not selecting new masonry materials that require a field-applied sealer or coating for proper long-term performance.*

End of Division 4
### Division 06: Wood, Plastics, & Composites

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>06.0 General</strong></td>
<td>Refer to Sustainability section for specific target goals. Specify that panel products shall not be manufactured with binder resins, or adhesives that contain urea formaldehyde. Specify that field-use adhesives shall not contain urea formaldehyde, or excess Volatile Organic Compounds (VOC), as indicated for specific purpose.</td>
</tr>
<tr>
<td><strong>06.1 Rough Carpentry</strong></td>
<td>Use the current (reduced) design values for Southern Yellow Pine as published by the Southern Pine Inspection Bureau.</td>
</tr>
<tr>
<td><strong>06.2 Finish Carpentry</strong></td>
<td>Do not use Polyvinyl Chloride (PVC) trim materials (i.e. Fypon). VCU has experienced material failures due to excessive thermal movement of these types of materials, especially when painted in traditional dark historic colors. Provide chair rail systems in rooms and spaces with seating located against a wall. Specify chair rail systems that provide a cleanable surface. When appropriate for the design, provide appropriate</td>
</tr>
</tbody>
</table>

*Last Updated August 1, 2017*
# Design & Construction Standards

## Division 06: Wood, Plastics, & Composites

### 06.2 Finish Carpentry

wainscot materials that can be similarly cleaned.

May also be specified in “Division 10 Specialties” section.

Provide corner guards on outside corners within areas subject to typical traffic.

Examples include corridors, lobby spaces, classrooms, waiting rooms, and similar areas subject to traffic. Private offices, dorm rooms, and similar spaces would not require these features. May also be specified in Division 10.

### 06.3 Wood Treatment

Avoid use of treated wood materials to the greatest extent possible. If it must be used, comply with manufacturer’s treatment recommendations regarding design value adjustment factors.

Consider alternative detailing and other more appropriate materials.

Provide hot-dipped galvanized and or stainless steel fasteners and connectors, typical for any type of treated wood.

Typical recommendation is a .030” thick high-temperature “peel and stick” membrane or similar flashing type material. Polyethylene sheet is not recommended.

Where preservative-treated wood is used, provide separation membrane between wood materials and metals.

If fire-retardant materials must be used, confirm manufacturer’s treatment requirements regarding appropriate use, detailing, and environmental limitations.

Confirm specific structural uses with VCU Project Manager, and Authority-Having-Jurisdiction (AHJ).

### 06.4 Architectural Woodwork

All ornamental stair or other railing systems shall be specified using standard, easy to replace parts.

Fabrications that can be easily replicated locally, or by on-site
## Division 06: Wood, Plastics, & Composites

### 06.4 Architectural Woodwork

<table>
<thead>
<tr>
<th></th>
<th>trade personnel are preferred. Custom fabricated components such as tempered glass used either as guard infill or to support rails, should not be used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acoustic wall panels must not be less than 96” above adjoining walking surfaces, or 84” above walking surface where fixed seating is located in front of or adjoining panels. Locate panels high enough to deter vandalism.</td>
<td>Acoustic wall panels must be located so as to not be easily accessible from adjacent walking or standing surfaces, and high enough when adjoining a seating area, to not be damaged or stained by people resting their heads against the wall.</td>
</tr>
</tbody>
</table>

End of Division 6
**Division 07: Thermal & Moisture Protection**

### 07.0 General

**Storm Water Drainage**
Provide storm water drainage that connects directly to storm water management facilities, without “daylighting” drainage across paved or landscaped areas.

See “Division 18 Sustainability” section for suggested water harvesting strategies and practices.

### 07.2 Insulation

Multi-story wall assemblies utilizing combustible foam plastic insulation (either board or spray-applied), shall comply with requirements of NFPA 285 (National Fire Protection Association) when tested as an assembly.

Provide design and detailing to completely separate foam plastic insulations from the interior of the building, with appropriate thermal barriers.

Roof insulation shall achieve a minimum of an R-30 rating, for both flat and sloped roofs.

See VCC Chapter 26.

**Note:** Constructed assemblies must not deviate from tested assemblies.

### 07.3 Steep Slope Roofing

Provide lead-coated copper or terne-coated stainless steel for counter flashing, cleats, drip edges, exposed metal trim, and or ridge cap, cant strips, and exposed metal valleys, typical.

See “Division 7 Flashing and Sheet Metal” section for roof drainage items.

Snow guards are required for all roofs with a slope of 6” - 12” or greater, and over all entrances regardless of slope. A minimum of three staggered rows is required. Snow guards shall be copper, stainless steel, or bronze butterfly type. Adhered plastic snow guards are not acceptable. Wire snow guards are acceptable only with specific project approval by the Roofing Project Manager.

Confirm design and layout of snow guard system as appropriate for size and slope of roof. Larger roofs may require intermediate rows of snow guards.

### 07.5 Low Slope Roofing

Specific project approval by the Roofing Project Manager is required for the use of the following:
### Division 07: Thermal & Moisture Protection

#### 07.5 Low Slope Roofing

Specific project approval by the Roofing Project Manager is required for the use of the following: (continued)

- Phenolic foam insulation (board and spray-applied).
- Organic fiberboard insulation, including use as tapered edges.
- Non-structural glass mat face, non-combustible, water-resistant treated gypsum core panels in ballasted roof systems.

Vapor retarders shall have a perm rating of 0.5 or below, in accordance with ASTM E96 (American Society for Testing and Materials). Typically, two-ply organic membranes are recommended under hot applied system; a polyethylene sheet under single plies.

Maximize insulation value to conserve energy; avoid insulation containing formaldehyde, ammonium sulfate, or foams expanded with Hydrochlorofluorocarbons (HCFCs); consider insulation with recycled content.

Polyisocyanurate board insulation shall have a nominal average compressible strength of 25 psi. Material provided shall be labeled to show compliance with this requirement.

Maximum single board thickness for flat insulation shall be 2”.

Board insulation shall be installed with a minimum of two layers. The first layer shall be set with the long joints in a straight line, and the end joints staggered in running bond. Subsequent layers shall be applied in the same manner with the joints staggered from the first layer to prevent thermal bridging. Fit boards together with no gaps to achieve a complete thermal envelope.

Chlorinated Fluorocarbons (CFCs) are permitted in insulation blowing agent only, with specific project approval by the Roofing Project Manager.

Pull tests shall be required for all mechanical fasteners. Mechanical...
## Division 07: Thermal & Moisture Protection

### 07.5 Low Slope Roofing

Fasteners may be used for post-tensioned concrete decks, or pre-stressed concrete panels subject to specific project approval by the roofing Project Manager.

### 07.6 Flashing & Sheet Metal

All buildings shall have a positive means of conducting rainwater from the roof to an underground storm water system. On sloped roofs, adequately sized and securely installed gutters and downspouts of minimum 16 oz. copper shall be specified, unless otherwise established by Facilities Management.

A minimum slope of 1/16” per foot for gutters shall be required. A minimum of two downspouts for each drain area shall be provided. Downspouts shall be securely fastened to the vertical plane, emptying into a cast iron boot at grade connected to a storm water system.

Down leader protective baskets shall be provided to keep leaves away from drain inlets in gutters. Built-in or concealed gutters are discouraged for new construction.

Built-in metal gutter liner shall be terne-coated stainless steel, non-magnetic, with both sides coated with a terne alloy. Minimum thickness shall be 0.015” (28 gage). Built-in gutter liners shall have 3/4” wide formed expansion folds spaced every two linear feet prior to fabrication of gutter profile.

Built-in reglets shall be used for all wall-flashing terminations. Surface applied reglets shall only be used on existing buildings where installation of built-in reglets is not possible.

Solder all non-expansion joints in metal work.

Exposed metal shall be:
- Lead-coated copper, 16 oz. (0.216” thick) unless otherwise indicated
<table>
<thead>
<tr>
<th><strong>Division 07: Thermal &amp; Moisture Protection</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>07.6 Flashing &amp; Sheet Metal</strong></td>
</tr>
<tr>
<td>Exposed metal shall be: (continued)</td>
</tr>
<tr>
<td>• Terne-coated stainless steel, non-magnetic sheet, both sides coated with terne alloy, minimum thickness of 0.015” (28 gage) unless otherwise indicated.</td>
</tr>
<tr>
<td>Copper sheet metal shall be used for flashing, scuppers, and eyebrow roof vents.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>07.7 Roof Accessories &amp; Specialties</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Roof Access</strong></td>
</tr>
<tr>
<td>Roof access for buildings less than 3 stories: Provide a 48” roof hatch with a ships ladder and an A frame hoist sized to lift at least 300 lbs.</td>
</tr>
<tr>
<td>• Roof hatches shall be insulated and feature thermally broken construction.</td>
</tr>
<tr>
<td>• Ships ladder shall be fixed, or if portable, shall be located where it is accessible and available at all times.</td>
</tr>
<tr>
<td>• Per OEHSP Fire and Safety Department provide frangible (break away) type padlocks.</td>
</tr>
<tr>
<td>Note: For service access also provide an oversize (42”) door at the ground floor level as well.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>07.9 Joint Seals</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Color and appearance of joint seals shall be approved by VCU as part of the overall design review.</td>
</tr>
</tbody>
</table>
## Design & Construction Standards

### Division 07: Thermal & Moisture Protection

<table>
<thead>
<tr>
<th>07.9 Joint Seals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use high quality 30+ years warranted products where possible.</td>
</tr>
<tr>
<td><em>Specify preconstruction and field adhesion testing where appropriate.</em></td>
</tr>
</tbody>
</table>

End of Division 7
## Division 08: Openings

### 08.0 General Door & Frame Requirements

#### Durability

Doors and frames must be sturdy enough to resist racking associated with the placement of magnetic locks at the upper corner of the frame. VCU has had trouble with the durability of some recently installed doors. This has been particularly problematic for tall storefront doors (over 7'-0") with magnetic locks. People will pull on the locked door and warp the door.

Possible solutions include:
- Latching mechanism at the door handle
- Continuous hinges
- Latching at top and bottom

For single doors, a possible solution is to install full length vertical housings, and locate two magnetic locks at the top and bottom corners on the lock edge. This would not work for a pair of doors.

#### Environmental Conditions

VCU has encountered several problems with doors being blown open and hinges being damaged by wind. Although not all wind conditions can be anticipated, there are some areas where we can reasonably assume these could be wind caused by a venturi effect. The Architect should take care to observe the microclimate and take into consideration the effects of wind pressures on door operations accordingly.

- All door closers must be equipped with a hydraulic back-check function or a brake.

For severe use conditions consider specifying auxiliary overhead holders / stops and closers with enhanced back-check functionality.

Because of use of floor cleaning and ice-melting chemicals and difficulty of service and replacement, do not use floor mounted door closers or pivots.
**Vestibules**  
To enhance energy efficiency the University requires that exterior doors be arranged as a vestibule or “airlock” to avoid excessive exchange of conditioned indoor and unconditioned outdoor air.

For primary building entrances, automatic sliding doors are preferred.  
For high-traffic locations adjoining occupied such as a lobby incorporating a waiting area, consider the use of an air curtain located within the vestibule to reduce infiltration.

**Access Control & Security**  
Typical access controlled exterior doors are provided with both a mechanical exit device and a magnetic locking system. For normal operation, the mechanical exit device is disabled (crash bar is dogged open) and building access and door locking are controlled by the magnetic locking system. In the event the access control system is taken out of service, the exit device is enabled to provide building security.

Electro-mechanical hardware (electric strikes, electric-latch retraction, etc.) may be considered on a case-by-case basis, and when mandated by the AHJ, but is not a preferred access control and security solution.

All exterior doors must be equipped with a mechanical locking system to secure out-of-service and vacant facilities.

Preference for access control and electronic locking systems, is to be equipped with uninterruptible power supply (UPS) battery back-up and connected to standby power system.

**Architect / Engineer (A/E) Responsibility**  
The A/E shall be responsible for:  
- Egress door operation code compliance  
- Hardware coordination  
- Specifying and indicating appropriate pathways / conduits for access control and Closed-Circuit Television CCTV systems.  
- Conducting one or more meetings with representatives from VCU and the AHJ, coordinating and resolving conflicting requirements and showing requirements on the construction documents.

See additional information under “Division 28 Electronic Safety & Security” section.
## Division 08: Openings

### 08.1 Metal Doors & Frames

Hollow metal door frames are preferred, unless existing building has wood frames. All hollow metal frames should be knock-down for interior renovations, and welded for new construction. Door frames fabricated from steel shapes shall not be used unless authorized. In general, comply with Steel Door Institute (SDI) or Hollow Metal Manufacturers Association (HMMA) standards as appropriate.

Specify A-40 (ZF 120) metallic coated steel sheet with factory primed finish after fabrication for standard interior door frames. VCU often wet-cleans flooring surfaces, and standard primed frames do not offer enough corrosion resistance. The A-40 (aluminized) finish has replaced G-60 galvanizing as the industry standard for light-weight metallic coatings.

Specify G-90 galvanized coating for high moisture interior and all exterior frames. G-90 finish must be specified and may be a custom order. Typically not available factory primed; must be field primed.

All steel frames shall be minimum 0.053”, 1.3 mm, 16 ga. steel prior to application of metallic coating, reinforced for scheduled hardware. Reinforce all frames for door closers whether scheduled or not.

Exterior metal frames shall be fully grouted. Note: Specify shop-applied asphaltic frame undercoating for surfaces of frames that will be in contact with grout.

Hollow steel doors shall be insulated.

Hollow metal exterior, stairwell, and other heavy use doors shall be minimum 0.053”, 1.3 mm, 16 ga. face sheets. Other interior hollow metal doors shall be minimum 0.42”, 1. mm, 18 ga. face sheets. Reinforce all doors for door closers whether scheduled or not. Corresponds to SDI “Extra Heavy Duty” for exterior and heavy use application, and SDI “Heavy Duty” for all other applications.
## Division 08: Openings

### 08.1 Metal Doors & Frames

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stile reinforcement shall be at least 5” wide to accommodate standard</td>
<td>Expectation is that doors will be relocated and hardware will be replaced</td>
</tr>
<tr>
<td>mortise and cylindrical hardware. Specify standard 1 3/4” thick doors.</td>
<td>and or retrofitted over the useful life of the door.</td>
</tr>
<tr>
<td>Exterior hollow metal doors shall have sealed inverted top channels and</td>
<td></td>
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<tr>
<td>weeps.</td>
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<tr>
<td>Exterior door heights shall not exceed 8’-0”.</td>
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</tbody>
</table>

### 08.2 Wood & Plastic Doors

Addressed by VCU Project Manager as needed.

### 08.4 Entrances & Storefronts

| Preference for main exterior entrance doors is for sliding automatic         | Standard 7’-0” is preferred                                                  |
| entrance doors.                                                            |                                                                               |
| Aluminum entrance doors should not exceed 7’-6” in height.                  | Preference is for a door fabricated of standard extrusions capable of         |
|                                                                             | resisting racking and twisting.                                              |
| Aluminum entrance doors should have vertical stiles at least 6” wide,      |                                                                               |
| top and bottom rails at 8” wide, and center rail at least 8’-10” wide.     |                                                                               |
| Do not use full-glass (“Hurculite”) doors.                                  | Full-glass doors are easily damaged and difficult to secure, repair, and      |
| Do not use concealed closers; use surface mounted heavy duty closers with   | replace.                                                                     |
| auxiliary door stops.                                                       | Traditional heavy duty surface mount closers are preferred for ease of service |
| Provide for coordination between storefront installers, and electronic      | and repair.                                                                   |
| access control installers. All cabling must be fully concealed within       | Use concealed power transfers where necessary, to transfer power to door      |
| framing members of completed installation.                                 | mounted hardware.                                                            |
# Design & Construction Standards

## Division 08: Openings

### 08.4.2 Automatic Sliding Entrance Doors

Use of automatic sliding entrance doors for high-traffic areas is preferred. However, specify a push button operator (not motion detector) on the exterior for sliding doors fronting directly on sidewalks, to avoid unintended door operation triggered by passing pedestrian traffic.

Automatic sliding entrance doors shall be connected to standby power.

### 08.6 Roof Windows & Skylights

The use of skylight structures, unit skylights, and clerestory windows, shall be approved as part of the Schematic or Preliminary design process. VCU approvals include the Architect for VCU and or the Director of Facilities Planning and Construction.

When approved, skylights shall have exterior grills or guards to provide fall protection. Drawings and specifications for skylights or clerestory windows shall indicate dimensioning, flashing, sealants, gaskets, joints, and other quality criteria intended to prevent leaks and minimize maintenance. All skylights shall have a minimum 5" high curb on sloped roofs; 12” on flat roofs.

### 08.7 Hardware, Locks, & Access Control

All hardware shall be heavy-duty, commercial grade hardware. Include a Primus full size interchangeable core (FSIC) as part of the door hardware for any keyed trim. Primus cores can be used with Schlage B600, B700, L, and ND series locks.

Standard hinges are 5-knuckle ball bearing hinges, listed and labeled for fire door use. Do not use plain bearing hinges.

Use continuous hinges for high-traffic locations, and for doors equipped with low-power operators.

Operational Grade 1 hardware required.

Provide non-removable pins (NRP) for out swinging secured doors.
## Division 08: Openings

### 08.7.1 Low-Powered Operators

Although not required by the building code or by the Americans with Disabilities Act (ADA), VCU’s policy provides at least one automatic door opener at each major public entrance on the new facility. If there are a series of doors, both doors in the series must have automatic openers.

Recommend the Record 8100 series control and operator or equivalent.

Automatic Door openers must be connected to standby power.

### 08.8 Glazing

- Window glazing shall not be patterned, but instead be a continuous monochromatic sheet. There shall be a clear border surround with application.
- All windows shall have an energy star rating. Double glazing shall be required, with a vacuum seal and low E-glass.
- Skylights shall be used sparingly.

End of Division 8
# Design & Construction Standards

## Division 09: Finishes

### 09.1 General

All products selected on any project shall meet LEED certification requirements. The level of certification will be decided per project. The most environmentally compliant finishes should be provided when possible.

Refer to “Division 18 Sustainability” standards document and project specific requirements.

All removed gypsum board partitions, acoustic ceiling systems, and carpet products shall be recycled to the greatest extent possible.

All products shall be readily available. Imported products may be used only with the approval of a VCU Project Manager. Conditions of approval include but are not limited to demonstrated compliance with VCC requirements, and continued available of products for maintenance purposes.

All products shall withstand heavy usage and be easy to maintain. Cleaning method specifications shall be provided to the VCU Project Manager.

Attic Stock shall be provided for all products used on every project. The VCU Project Manager shall determine quantity of attic stock, and storage location.

### 09.2 Plaster & Gypsum Boards

Provide blocking and supplemental concealed supporting materials as required to adequately support suspended and supported items such as light fixtures, audio visual equipment, rails, grab bars, cabinets, and casework.

Verify noise isolation and acoustical privacy requirements, and show specific requirements on plans.

Fire rated construction shall comply with fire rated designs as indicated on plans, as approved by VCU and the designated building official.
### Division 09: Finishes

**09.2 Plaster & Gypsum Boards**

Protect materials from moisture. Replace moisture or mold damaged materials.

Minimum acceptable finish for exposed to view and painted gypsum board is ASTM C840 Level 4. Provide Level 5 finish where required by manufacturer of high performance coatings and were directed by VCU Project Manager.

| Level 5 may be either provided as a skim coat, or as a heavy-based primer designed to impart a Level 5 finish. |

**09.3 Tiling**

Ceramic floor tile grout must always be sealed. Do not select or use white or light colors.

Epoxy grout is recommended for areas subject to staining, such as self-serve soda fountains and similar food service areas.

Specify appropriate installation materials for application in accordance with current Tile Council of North America (TCNA) installation methods, and associated American National Standards Institute (ANSI) standards.

Specify mortars with shear strengths, sag-resistance, and working times appropriate for tile size, type, and installation location.

**09.5 Ceilings**

Design and construct bulkheads and soffits of gypsum board supported on appropriate framing. Do not fabricate bulkheads from ceiling grid and acoustic ceiling panel materials.

Suspended ceiling grid module shall be 24” x 24”, typical.

Specify and provide standard 15/16” wide grid unless otherwise directed by the VCU Project Manager.

If other grid types are provided, coordinate selection of lighting, HVAC diffusers, and other grid-mounted items for compatibility with specific grid provided.
## Division 09: Finishes

### 09.5 Ceilings

Provide commercially available and locally stocked acoustic ceiling panels for standard use, per VCU stock items unless otherwise directed by VCU Project Manager.

The following acoustic ceiling panel products are currently preferred:

- Armstrong Fissured Square Lay-in
- Armstrong Cirrus Angled Tegular
- Armstrong Cirrus Scored Classic Step Tegular
- Armstrong Cortega 704A

Match existing in-use products within each building whenever possible. Verify availability of attic stock prior to bidding.

Where new product is required, attic stock is not available and a need for regular individual panel replacement is ongoing, consider replacing an entire room or space to create a new supply of attic stock from existing salvageable panels and components.

Provide upgraded tegular panels, 24” x 24”, in upgrade use areas per direction of VCU Project Manager.

Current preference is for Armstrong “Optima” product.

Provide hold-down clips near exterior entrances and operable windows to prevent panel displacement by wind.

### 09.6 Flooring

Require that installer verify concrete slabs for acceptable moisture content, and pH levels prior to flooring installation.

Specify replaceable carpet tile type entry mats at entrance vestibules. Do not specify recessed slat-type walk-off mats at vestibules.

Where feasible, building entrances protected by canopies are preferred.

Provide vinyl or rubber wall base in continuous roll with job-formed corners fabricated from same lot of running material, installed in each space.

Corners should be formed by reverse scoring if necessary, and bending without producing discoloration (whitening) at bends.
**Division 09: Finishes**

### 09.6 Flooring

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return dimension should be as long as practical, preferably a minimum of 12” from the corner to a running joint, to assure continued in-service adhesion of corner to substrate.</td>
<td></td>
</tr>
<tr>
<td>Terrazzo flooring systems shall be epoxy-resin types.</td>
<td></td>
</tr>
<tr>
<td>Provide a minimum of two coats of sealer and two coats of wax on all Vinyl Composition Tile (VCT).</td>
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</tr>
<tr>
<td>Provide carpet tile, unless broadloom is approved by the VCU Project Manager.</td>
<td></td>
</tr>
<tr>
<td>If broadloom carpet is approved in lieu of carpet tile, provide product with an upgraded attached backing system.</td>
<td></td>
</tr>
<tr>
<td>Do not install carpet in below grade or basement locations unless specifically authorized by VCU Project Manager.</td>
<td></td>
</tr>
<tr>
<td>Do not specify or install a separate carpet pad, unless authorized by VCU Project Manager.</td>
<td></td>
</tr>
<tr>
<td>Allow adequate time for sufficient curing, drying, or settling of floor installations per the manufacturer’s recommendations, prior to furniture and equipment installation.</td>
<td></td>
</tr>
</tbody>
</table>

### 09.8 Acoustic Treatment

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom edge of acoustic wall panels shall be above seated head height, unless authorized by VCU Project Manager.</td>
<td></td>
</tr>
<tr>
<td>At locations subject to passing traffic and potential standing and leaning against wall surfaces, locate bottom edge of acoustic wall panels above head height. A suggested</td>
<td></td>
</tr>
<tr>
<td>Division 09: Finishes</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td><strong>09.9 Painting &amp; Coating</strong></td>
<td>location is a few inches above top of prevailing door frame height.</td>
</tr>
<tr>
<td>Require painting applicator to verify acceptability of surfaces to be prepared and painted. Specify appropriate preparation, including where necessary removal of existing finishes or coatings.</td>
<td></td>
</tr>
<tr>
<td>Provide high quality paint products with consideration of resins, binders, and pigments. Preferred products are Benjamin Moore and Sherwin Williams.</td>
<td></td>
</tr>
<tr>
<td>Provide a minimum of one primer coat and two finish coats on all rolled or brushed paint applications.</td>
<td></td>
</tr>
<tr>
<td>Provide one primer coat and three finish coats on sprayed paint applications.</td>
<td></td>
</tr>
<tr>
<td>Provide high performance paint at locations directed or specified by VCU Project Manager.</td>
<td>Current preferred product is Scuffmaster.</td>
</tr>
<tr>
<td>Provide a minimum 100 square foot test sample of each type and color of paint specified per project, for review and approval by VCU Project Manager.</td>
<td>Sample painting should extend across a typical gypsum board wall joint to verify acceptability of substrate finish.</td>
</tr>
<tr>
<td>Provide 5% additional product rounding-up to nearest full gallon for each type and color of painting specified on the project, for touch-up painting after project completion. Label cans with finish designations and colors.</td>
<td></td>
</tr>
</tbody>
</table>

End of Division 9
### 10.0 General

**Custodial Planning Standards**

The following applies to the design of spaces required for custodial services:

- Provide one central custodial room per building accessible from the service entrance or loading dock. Minimum size not less than 130 square feet.
- Provide built-in shelving as directed by Physical Plant. Generally all stored consumable materials must be stored off the floor.
- Provide janitor closets for each 15,000 to 18,000 square feet of assignable building area, but not less than one per each floor, equipped with mop basin, fire-resistive, Fiber-Reinforced Plastic (FRP) wainscoting at basin location, shelf accessory with three mops or broom holders and hooks, clear floor space (minimum 3’ x 5’ to accommodate one wheeled service cart), one floor machine, and two stepladders.
- Provide 2 Ground-Fault Circuit Interrupters (GFCI) duplex outlets 24” Above Finished Floor (AFF) in accessible locations in each room.

### Verify space requirements with actual items of material and equipment (stocked supplies, carts, floor machines, vacuum cleaners, ladders, etc.) that will be required to maintain specific facility and size custodial facilities as required.

*Preferred janitor closet is similar to those in the first floor of the School of Nursing building.*
## Division 10: Specialties

### 10.0 General

**Physical Plant Storage**
Coordinate with Physical Plant to provide adequate ventilated storage space for storage of building-specific items, including but not limited to attic stock materials, spare parts, lamps, seasonal maintenance equipment, equipment specific tools, and similar non-custodial items necessary for maintenance of the specific building.

Space and configuration for Physical Plant storage needs to be determined as applicable to the tenants and or function of space(s) in each building.

### 10.14 Signage

Interior signage shall be provided by contract or by Facilities Management personnel as directed by the Project Manager. The Project Manager shall provide the A/E, or the interior designer and or signage consultant, the established VCU interior signage standards. Signage criteria vary depending on location, such as Monroe Park Campus, MCV campus, etc.

### 10.28 Toilet Accessories

See attached toilet room accessory and dispenser specifications.

*Note:* The specifications differ between campuses.

For accessories not indicated (i.e. grab bars, shower seats, etc.) specify standard, readily available, heavy-duty commercial units. Select manufacturer’s “quick-ship” products when appropriate so that replacement units can be more readily obtained.

Avoid custom units. Verify selections with VCU project manager.
Cormatic® Mechanical Designer Series Roll Towel Dispenser

High capacity, key-locking towel dispensing system solution provides an attractive, hygienic, hands-free, portion-control solution.

Item Description:

High-capacity Cormatic® mechanical roll towel dispenser helps you control costs with style. Our completely hands-free roll towel dispensers feature no buttons, levers or cranks that can serve as germ reservoirs, which helps you meet higher public health standards, assist in pollution prevention and control your operating costs through waste and maintenance reduction. This self-locking dispenser is designed to discourage pilferage while making towel dispensing a breeze. Choose our Cormatic® dispenser for a cost-effective system solution that is suitable for any washroom. Only available via one-time, lifetime, Lease Agreement with GP or authorized distributor.

Features & Benefits:

- High capacity dispenser reduces maintenance intervals and reduces the risk of run out for tenant satisfaction
- Attractive design coordinates with washroom to enhance facility image
- Portion control mechanism reduces solid waste by 25-35 percent by limiting the amount of product dispensed each time to lower towel costs

Product Details

<table>
<thead>
<tr>
<th>Brand Owner</th>
<th>Georgia-Pacific</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFG Item#</td>
<td>HD8200B</td>
</tr>
<tr>
<td>Design</td>
<td>Black</td>
</tr>
<tr>
<td>UP - UPC</td>
<td>036500303082</td>
</tr>
<tr>
<td>Each Per Ship Unit</td>
<td>1 Each</td>
</tr>
<tr>
<td>Items Per Each</td>
<td>0 Each</td>
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<tr>
<td>Case Total</td>
<td>1 Each</td>
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<tr>
<td>Dispenser (WxHxD)</td>
<td>13.800” x 9.200” x 13.800”</td>
</tr>
<tr>
<td>UNSPSC</td>
<td>47131791</td>
</tr>
<tr>
<td>LEEA B&amp;I&amp;M</td>
<td>ID</td>
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<tr>
<td>Buy Multiple</td>
<td>1 EA</td>
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</table>

Case Shipping Info

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<thead>
<tr>
<th>GTIN</th>
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<tbody>
<tr>
<td>Case Gross Wt</td>
<td>8.050 lbs</td>
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<tr>
<td>Case Net Wt</td>
<td>7.300 lbs</td>
</tr>
<tr>
<td>Case Dimensions</td>
<td>14.500” x 14.125” x 9.700”</td>
</tr>
<tr>
<td>Case Volume</td>
<td>1.156 CFT</td>
</tr>
</tbody>
</table>

Unit Shipping Info

| Ti-Obj/Layer | 9                |
| High-Layers/Unit | 5               |
| Unit Qty     | 45               |
| Unit Dimensions (LxWxH) | 43.560” x 42.750” x 48.750” |

Last Updated August 1, 2017
Cormatic® Automated Designer Series Towel Dispenser

New automated Cormatic® system provides a hygienic solution, operational efficiencies, and enhances your facilities image.

**Item Description:**

The new Cormatic® automated towel dispenser delivers the image of the Designer Series with patented, automatic, one-at-a-time dispensing. Powered by four long-lasting standard D-cell batteries providing for easy and low maintenance requirements, just move your hand in front of the dispenser's sensor. The result: enhanced image and hygiene with reduced towel usage and maintenance. Only available via one time, lifetime, Lease Agreement with GP or authorized distributor.

**Features & Benefits:**

- Reliable, hygienic touch free dispensing reduces risk of cross-contamination
- Operationally efficient - Reduces usage and waste to help your bottom line and the environment
- Adjustable settings allow you to customize towel length, sensor range, time delay and hang mode
- Uses long-lasting, standard D-cell batteries or optional AC power kits for easy and low maintenance requirements
- ADA compliant when mounted properly
- Warranty Program - covers workmanship and parts; while normal wear and tear and vandalism are not covered
- UL Listed

**Product Details**

- **Brand Owner:** Georgia-Pacific
- **Brand:** Cormatic®
- **MFG model:** AD5200B
- **Design:** Black
- **UPC:** 036500302948
- **Each Per Ship Unit:** 1 Each
- **Items Per Each:** 8 Each
- **Case Total:** 1 Each
- **Dispenser (WxHxD):** 14.250" x 9.100" x 15.000"
- **UNSPSC:** 47131791
- **LEED EB&OM:** 10
- **Buy Multiple:** 1 EA

**Case Shipping Info**

- **GTIN:** 10036500302945
- **Case Gross Wgt:** 18.660 lbs
- **Case Net Wgt:** 9.372 lbs
- **Case Dimensions:** 15.775" x 12.175" x 19.025"
- **Case Volume:** 2.200 CFT

**Unit Shipping Info**

- **Tray Qty/Unit:** 6
- **High Layer Qty:** 7
- **Low Layer Qty:** 42
- **Unit Dimensions (LxWxH):** 47.335" x 39.560" x 85.230"

---

*Last Updated August 1, 2017*
### Compact® Vertical Four Roll Coreless Tissue Dispenser

New vertical Compact Quad™ tissue dispenser with 50% increase in capacity over Compact High Capacity dispensers for continuous service and reduced risk of run-out.

#### Item Description:
Attractive Compact Quad™ four roll vertical coreless bathroom tissue dispensing system holds up to 8,000 2-ply or 12,000 1-ply sheets while maintaining your professional look. Rolls face forward to minimize tubbing and comes with a dependable roll advancing system for extended service and increased patron satisfaction.

#### Features & Benefits:
- Reduces maintenance costs with more capacity and less waste versus jumbo junior tissue rolls and dependable roll advancing system feature provides users with continuous service
- Holds 6,000 2-ply or 12,000 1-ply sheets by utilizing four large diameter rolls. 50% more than Compact High Capacity.
- Delivers user satisfaction & ease of use through high-quality 2-ply or high capacity 1-ply and sturdy dispenser system conveys upscale fashionable look appropriate for any decor
- Reduces waste and free up valuable space (vs. standard bath tissue.) No wrappers, No cores, & fewer stub rolls to discard. Smaller cases is easier to handle and fits storage closets better.
- Optional mounting brackets provide for easy installation and cleaning.

#### Product Details

<table>
<thead>
<tr>
<th>Brand Owner</th>
<th>Georgia-Pacific Compact®</th>
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</thead>
<tbody>
<tr>
<td>MFG Item#</td>
<td>56744</td>
</tr>
<tr>
<td>Design</td>
<td>Quad™ Translucent Shade</td>
</tr>
<tr>
<td>UP - UPC</td>
<td>073315957440</td>
</tr>
<tr>
<td>Each Per Unit</td>
<td>1 Each</td>
</tr>
<tr>
<td>Items Per Each</td>
<td>8 Each</td>
</tr>
<tr>
<td>Case Total</td>
<td>1 Each</td>
</tr>
<tr>
<td>Dispenser (WxHxD)</td>
<td>11.750” x 6.900” x 13.250”</td>
</tr>
<tr>
<td>UNSPSC</td>
<td>47137110</td>
</tr>
<tr>
<td>LEED EB&amp;OM</td>
<td>IO</td>
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<tr>
<td>Replaces Item</td>
<td>56778</td>
</tr>
<tr>
<td>Buy Multiple</td>
<td>1 EA</td>
</tr>
</tbody>
</table>

#### Case Shipping Info

| GTIN | 10073315957447 |
| Case Gross Wgt | 4.625 lbs |
| Case Net Wgt | 4.150 lbs |
| Case Dimensions | 6.900” x 11.750” x 13.250” |
| Case Volume | 6.715 CFT |

#### Each Shipping Info:

| Each Gross Weight | 4.62 LBS |
| Each Dimensions | 6.900” x 11.750” x 13.250” |
| Each Volume | 0.710 CFT |

#### Unit Shipping Info

| Ti-Qty/Layer | 12 |
| High-Layer/Unit | 6 |
| Unit Qty | 72 |
| Unit Dimensions (LxWxH) | 47.500” x 41.625” x 40.980” |
Description:
Attractive Compact® side-by-side coreless bathroom tissue dispensing system provides up to six times the capacity of single standard 2-ply rolls while maintaining your professional look. This dispenser delivers up to 6,000 sheets of tissue for continuous service and increased patron satisfaction. Featuring a transfer paddle to prevent access to a new roll before the current roll is completely used up, this dispenser offers one of the most cost-effective solutions for high-capacity bath tissue dispensing. Translucent Smoke color makes this dispenser the perfect choice for coordinating with the innovative Motion® automated touchless towel dispensers.

Features & Benefits:
- Delivers 3000 sheets of 2-ply or 6000 sheets 1-ply tissue to improve customer satisfaction, maximize staff efficiency and control labor costs
- Transfer paddle deters early access to new roll, reducing stub roll waste
- Coreless roll in durable, locking dispenser prevents pilferage

Product Details
- Brand: Compact®
- MFG Item#: 56784
- Design: Translucent Smoke
- UPC - UPC: 073300067846
- Each Per Ship Unit: 8 Each
- Items Per Each: 0 Each
- Case Total: 8 Each
- Dispenser (WxDxH): 10.125" x 6.750" x 7.125"
- UNSPSC: 47131708
- LEED: 10
- EB&OM: 29
- Replaces: 5371101, 53701, 53702, 53703, 53704
- Buy Multiple: 9 EA

Case Shipping Info
- GTIN: 10073310067843
- Case Gross Wgt: 18.930 lbs
- Case Net Wgt: 14.400 lbs
- Case: 24.000" x 15.500" x 14.875"
- Case Volume: 3.200 CFT

Each Shipping Info:
- Each Gross Wgt: 1.94 LBS
- Each Net Wgt: 1.8
- Each: 7.625" x 7.188" x 11.750"
- Each Volume: 0.370 CFT

Unit Shipping Info
- Ti- Qty/Layer: 40
- High-Layers/Unit: 3
- Unit Qty: 120
- Unit: 48.000" x 39.500" x 44.630"

Monroe Park Campus Toilet Accessories
Monroe Park Campus Toilet Accessories

GOJO® FMX-12™ Dispenser

Holds a 1250 ml sealed refill in a remarkably small footprint. Great for locations where a smaller, more traditional dispenser is preferred. Delivers more than 1,700 uses per refill. Features skylight with an extra-large site window. ADA compliant, one hand push operation, optional key lock included.

<table>
<thead>
<tr>
<th>SKU</th>
<th>Dispenser</th>
<th>Case Pack</th>
<th>Color</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>5150-06</td>
<td>GOJO® FMX-12™ Dispenser</td>
<td>6</td>
<td>Dove</td>
<td>Handwash Counter Refill Alert Wall Plate</td>
</tr>
<tr>
<td>5155-06</td>
<td>GOJO® FMX-12™ Dispenser</td>
<td>6</td>
<td>Black</td>
<td>Handwash Counter Refill Alert Wall Plate</td>
</tr>
</tbody>
</table>

Available Refills

- GOJO® E1 Foam Handwash
- GOJO® E2 Foam Sanitizing Soap
- GOJO® Green Certified Foam Hand Cleaner
- GOJO® Light Foam Hair Conditioner
- GOJO® Luxury Foam Antibacterial Handwash
- GOJO® Luxury Foam Hair & Body Wash
- GOJO® Luxury Foam Handwash
**Monroe Park Campus Toilet Accessories**

**Sanitary Napkin Receptacle 11SS Wal Mount**

**Specifications:**
- Dimensions: 10"W x 11"H x 5"Dp
- Weight: 4 lbs.
- Finishes: #304 Stainless Steel
- Carton Pack: One per carton
- UPS: Can Ship UPS
- Constructed of heavy duty bonderized steel
- Made of 30% recycled steel and is 100% post consumer recyclable.

**Unique Features & Benefits:**
- All #304 stainless steel construction.
- Release catch at bottom permits waxed bag to drop directly into collection receptacle so personnel need not reach inside.
- Attaches securely to a stall or wall with included mounting hardware.
- 3 waxed bags shipped with receptacle.
- Lift knob on both sides so the receptacle can be mounted on either side of stall.

http://www.unitedreceptacle.com/11ss.htm
FINALLY...
A FAST HAND DRYER.

FAST! Dries Hands Completely in 10-15 Seconds
Excel's research team has developed the XLERATOR® with patented technology that delivers three-times-faster hand drying performance. Conventional hand dryers take from 30 to 45 seconds to get a user's hands totally dry, and very few of us are willing to wait that long. With the automatic sensor-activated XLERATOR, not only do your hands get dry in 10 to 15 seconds, but consumer test participants report that their hands also feel warm, soft and ready dry.

Uses 80% Less Energy.
Not only does the XLERATOR dry hands in one third of the time required by conventional hand dryers, our hand-drying system is designed to run on 15-amp service (making it great for older buildings). The combination of these two factors results in 80% less energy cost per use vs. conventional hand dryers.

GreenSpec® Approved and Qualifies for LEED® Credits.
- XLERATOR® is the first hand dryer to be GreenSpec Listed because it meets a number of GreenSpec standards; conserves energy, has low maintenance requirements and reduces waste.
- XLERATOR helps your facility qualify for LEED (Leadership in Energy and Environmental Design) Credit EA Credit 1 - Optimizes Energy Performance, now a mandatory credit for any LEED certified facility.
- XLERATOR also lowers a facility's Carbon Footprint. Ask us to see our Life Cycle Assessment (LCA) Study Results.

95% Cost Savings vs. Paper Towels
Converting to the XLERATOR® hand dryer will result in more than a 95% savings vs. paper towel costs. In addition to paper towels, the following costs are also eliminated: ordering, storing, replenishing, collecting and disposing of bacteria-laden paper towel waste. This results in a Payback of Less Than One Year!

Setting a New Standard
After seven years in the marketplace, the XLERATOR® hand dryer has received numerous awards and designations, appeared in case study articles done by prestigious trade publications, and has been featured on national television programs! Because of its proven performance and customer satisfaction, XLERATOR® is being specified in many high-profile facilities and has become... THE NEW INDUSTRY STANDARD!

XLERATOR® IS RECEIVING A LOT OF ATTENTION

Ask about our Promotional Video
As seen on CNN Headline News
hosted by Terry Bradshaw.

(Available on CD. Or view this and other videos on our web site.)

TELEVISION APPEARANCES

AWARDS
Best New Product - Technology (International Hotel, Motel and Restaurant Show)
Top Ten Green Product (Environmental Building News)
Award for Design Excellence (ADEX)
(Design Journal ARRS Platinum Award)
Citation of Excellence
(Buildings Product Innovations Awards)
FEATURING ARTICLES
The Wall Street Journal
Today's Facility Manager
American School and University
Environmental Design and Construction

Excel Dryer has been awarded a contract by the GSA (General Services Administration) which offers special pricing to all Federal Government Agencies.

Contact Holder
GSX-07F-00077

Last Updated August 1, 2017
Division 10: Specialties

Monroe Park Campus Toilet Accessories

XLERATOR® HAND DRYER

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Surface-mounted</th>
<th>Automatic</th>
<th>Material</th>
<th>Color</th>
<th>Model Code</th>
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</thead>
<tbody>
<tr>
<td>XL-GW</td>
<td>Surface-mounted</td>
<td>Automatic</td>
<td>White</td>
<td>Gator Cover</td>
<td>XL-GW</td>
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<tr>
<td>XL-W</td>
<td>Surface-mounted</td>
<td>Automatic</td>
<td>White</td>
<td>Quick Dry Cover</td>
<td>XL-W</td>
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<tr>
<td>XL-GR</td>
<td>Surface-mounted</td>
<td>Automatic</td>
<td>Graphite</td>
<td>Natural Painted Cover</td>
<td>XL-GR</td>
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<td>XL-C</td>
<td>Surface-mounted</td>
<td>Automatic</td>
<td>Chrome</td>
<td>Chrome Plated Cover</td>
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<tr>
<td>XL-BR</td>
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<td>Automatic</td>
<td>Brushed Stainless Steel</td>
<td>Brushed Stainless Steel</td>
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<td>XL-GR</td>
<td>Surface-mounted</td>
<td>Automatic</td>
<td>Copper</td>
<td>Copper Plated Cover</td>
<td>XL-GR</td>
</tr>
</tbody>
</table>

**Units**

- 110/120V 1.25 Amp 60 Hz
- 208V 7.0 Amp 60 Hz
- 220/240V 6.5 Amp 60 Hz
- 277V 5.5 Amp 60 Hz
- 220/240V 6.5 Amp 50 Hz

**Recess Kit (Optional)**

- Dimensions: 15 3/8" wide x 20" high x 3 3/8" deep (41 cm wide x 51 cm high x 8 cm deep)
- Weight: 11 lbs (4.99 kg)

**MECHANISM**

- Motor: Sola 1/75 HP, 120V, 60 Hz, 0.52 Amp, 12,000 RPM
- Fan: 3-speed, 12 volt DC motor
- Airflow: 12,000 L/min
- Noise level: 75 dB

**LIMITED WARRANTY**

- The dryer shall be guaranteed to be free from defects for a period of five (5) years.

**QUANTITY RECOMMENDATIONS**

- One dryer for every two washrooms is sufficient for most applications. If restroom traffic is unusually heavy, we suggest one dryer per washroom in small installations and two dryers for every three washrooms in larger installations. When a 54" washroom is used, we suggest four to five dryers.

---

**EXCEL DRYER INC.***

357 Chestnut Street • P.O. Box 366
East Longmeadow, MA 01028 U.S.A.
Tel: (413) 525-4531, Fax: (413) 525-2853
Email: sales@exceldryer.com
www.exceldryer.com
Division 10: Specialties

Monroe Park Campus Toilet Accessories

Rubbermaid Commercial Products - Rubbermaid Waste : 3546 Untouchable® Round Co...

3546 Untouchable® Round Container

Available in round, half-round and square shapes to fit every application.
- Durable and crack resistant, even under tough indoor/outdoor conditions.
- Perfect for hotel lobbies, offices, restrooms, shopping malls, restaurants and other public locations.

AVAILABLE COLORS

<table>
<thead>
<tr>
<th>Order #</th>
<th>Color</th>
<th>Product UPC/ UCC Code</th>
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SPECIFICATIONS

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<tr>
<td>Square:</td>
<td>Volume Capacity (Nom):</td>
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<td>Volume Capacity (Max):</td>
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<td>Carton Width:</td>
<td>Carton Height:</td>
</tr>
<tr>
<td>Carton Cube:</td>
<td>Ship Weight/Carton:</td>
</tr>
</tbody>
</table>

Pack Quantity: 4
Cartons Per Pallet: 9
Material: LLDPE
Process: Injection Molding

ADDITIONAL INFORMATION:

Products in Untouchable® Containers

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<tr>
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<tbody>
<tr>
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<td>Untouchable® Round Container</td>
</tr>
<tr>
<td>3548</td>
<td>Untouchable® Half Round Container</td>
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<tr>
<td>3555</td>
<td>Untouchable® Square Container</td>
</tr>
<tr>
<td>7920-20</td>
<td>Untouchable® Square Container with Swing Lid Combo</td>
</tr>
<tr>
<td>3548</td>
<td>Untouchable® Round Container</td>
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<tr>
<td>3558</td>
<td>Untouchable® Square Container</td>
</tr>
<tr>
<td>3559</td>
<td>Untouchable® Square Container</td>
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</table>

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Diameter</th>
<th>Square</th>
<th>Volume Capacity</th>
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<tr>
<td>16 1/4 in</td>
<td>21 in</td>
<td>15 in</td>
<td>15 1/2 in</td>
<td>26 in</td>
<td>21 gal</td>
</tr>
<tr>
<td>16 1/4 in</td>
<td>15 1/2 in</td>
<td>10 1/2 in</td>
<td>18 1/2 in</td>
<td>30 1/4 in</td>
<td>21 gal</td>
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<tr>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>27 5/8 in</td>
<td>22 gal</td>
</tr>
<tr>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
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Accessories for 3546:

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<tr>
<td>2672</td>
<td>Untouchable® Round Swing Top for 2647, 3546 Containers</td>
</tr>
<tr>
<td>3548</td>
<td>Untouchable® Round Funnel Top for 2647, 3546 Containers</td>
</tr>
</tbody>
</table>

## Division 10: Specialties

### Monroe Park Campus Toilet Accessories

Rubbermaid Commercial Products - Rubbermaid Waste - 3548 Untouchable® Round Funnel Top for 2947, 3546 Containers

### AVAILABLE COLORS

<table>
<thead>
<tr>
<th>Order #</th>
<th>Color</th>
<th>Product UPC/ UCC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG354800</td>
<td>GRAY</td>
<td>08686760253271 10086876025324</td>
</tr>
</tbody>
</table>

### SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>U.S.</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>20 1/8 in</td>
<td>52 cm</td>
</tr>
<tr>
<td>Width</td>
<td>20 1/8 in</td>
<td>52 cm</td>
</tr>
<tr>
<td>Height</td>
<td>6 1/4 in</td>
<td>16 cm</td>
</tr>
<tr>
<td>Diameter</td>
<td>16 1/8 in</td>
<td>42 cm</td>
</tr>
<tr>
<td>Square</td>
<td>16 1/8 in</td>
<td>42 cm</td>
</tr>
<tr>
<td>Carton Length</td>
<td>1.33 ft</td>
<td>0.40 m</td>
</tr>
<tr>
<td>Carton Width</td>
<td>5 1/2 lb</td>
<td>2.40 kg</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

- **Hygienic tops for attractive, hands-free waste disposal.**
- **Funnel style lid for "no touch" refuse disposal.**
- **Controls waste, odors and smoking debris.**

### Work Smarter.

---

Rubbermaid Commercial Products, LLC
3124 Valley Avenue, Winchester, VA 22601
www.rcpworksmarter.com


Last Updated August 1, 2017
**Division 10: Specialties**

**MCV Campus Toilet Accessories**

- **TOP DISPENSING**
  - Innovative design with push pad at top

- Can see soap being dispensed - **LESS WASTE**, up to 20% savings of soap & water

- No-Leak Guarantee
  - Conserves Resources

- ADA Push Compliant

- Large View Window with Attractive Label

- Dove Gray or Black

- Proprietary System

---

7650 Camargo Rd. / Cincinnati, OH 45243
1-800-543-4641 / 513-527-5500
www.kutol.com
**Wausau Paper: Bay West: Products**

**MCV Campus Toilet Accessories**

**Wausau Paper**

**Products**
- Overview
- Product Selector
- Comparison Guide

**PRODUCT TYPES**
- Roll Towels
- Folded Towels
- Bath Tissue
- Facial Tissue
- Household Paper Towels
- Industrial Wipers
- Duster Towels
- Windshield Towels
- Seat Covers
- Soap

**Dispensers**
- Controlled Use
- Universal
- ADA Compliant

**OUR BRANDS**
- Select a Brand

---

**16000 Silhouette® Universal Roll Towel Dispenser**

**Description**
The Silhouette® universal roll towel dispenser accommodates most universal roll towels and provides at-a-glance maintenance. The push dispensing mechanism makes the dispenser easy to operate.

**Features/Benefits**
- Large capacity allows dispenser to go longer between refills
- Sturdy plastic construction to withstand years of commercial use
- Accommodates most universal roll towels

**Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Universal Roll Towel Dispenser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Black Translucent</td>
</tr>
<tr>
<td>Dispenser Size</td>
<td>10 5/8 x 15 3/4 x 8</td>
</tr>
<tr>
<td>Dispenser Weight</td>
<td>6.7 lbs</td>
</tr>
<tr>
<td>Case Size</td>
<td>18 1/8 x 10 15/16 x 10 1/4</td>
</tr>
<tr>
<td>Case Shipping Weight</td>
<td>8 lbs</td>
</tr>
<tr>
<td>Dispenser Case Cube</td>
<td>1.2</td>
</tr>
<tr>
<td>Cases Per Unit</td>
<td>72</td>
</tr>
<tr>
<td>UPC</td>
<td>0 85805 16000 4</td>
</tr>
</tbody>
</table>
### Twin 9" JBT

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Capacity</th>
<th>Core Diameter</th>
<th>Dimensions (In)</th>
<th>Color Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>R40097TBK</td>
<td>(2) 9&quot; JBT rolls</td>
<td>3.25&quot; (83mm) x 5.25&quot; d</td>
<td>12&quot; x 15&quot; w</td>
<td>4</td>
</tr>
<tr>
<td>R40097TB</td>
<td>(2) 9&quot; JBT rolls</td>
<td>3.25&quot; (83mm) x 5.25&quot; d</td>
<td>12&quot; x 15&quot; w</td>
<td>4</td>
</tr>
<tr>
<td>R40097TBK</td>
<td>(2) 9&quot; JBT rolls</td>
<td>3.25&quot; (83mm) x 5.25&quot; d</td>
<td>12&quot; x 15&quot; w</td>
<td>4</td>
</tr>
<tr>
<td>R40097TB</td>
<td>(2) 9&quot; JBT rolls</td>
<td>3.25&quot; (83mm) x 5.25&quot; d</td>
<td>12&quot; x 15&quot; w</td>
<td>4</td>
</tr>
</tbody>
</table>

**Description / Benefits**
- San Jamar - Smart | Safe | Sanitary

**Related Products**
- Washroom
- Towel Dispenser
- Paper Towels

**Download CAD Drawing & PD**

Sanitary Napkin Receptacle 11SS Wal Mount

Specifications:

- Dimensions: 10"W x 11"H x 5"Dp
- Weight: 4 lbs.
- Finishes: #304 Stainless Steel
- Carton Pack: One per carton
- UPS: Can Ship UPS
- Constructed of heavy duty bonderized steel
- Made of 30% recycled steel and is 100% post consumer recyclable.

Unique Features & Benefits:

- All #304 stainless steel construction.
- Release catch at bottom permits waxed bag to drop directly into collection receptacle so personnel need not reach inside.
- Attaches securely to a stall or wall with included mounting hardware.
- 3 waxed bags shipped with receptacle.
- Lift knob on both sides so the receptacle can be mounted on either side of stall.

http://www.unitedreceptacle.com/11ss.htm
**Division 10: Specialties**

**MCV Campus Toilet Accessories**

Rubbermaid Commercial Products - Rubbermaid Waste : 3546 Untouchable® Round Co...

**Available Colors**

<table>
<thead>
<tr>
<th>Order #</th>
<th>Color</th>
<th>Product UPC/ UCC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG354600</td>
<td>GRAY</td>
<td>086676023480 / 10086676023487</td>
</tr>
<tr>
<td>FG354600</td>
<td>BEIG</td>
<td>086676023450 / 10086675023450</td>
</tr>
</tbody>
</table>

**Specifications**

- **Length:**
  - U.S.: 30 1/8 in
  - Metric: 76.5 cm
- **Height:**
  - U.S.: 15 3/4 in
  - Metric: 40.0 cm
- **Volume Capacity (Nom):**
  - U.S.: 22 gal
  - Metric: 82.3 L
- **Volume Capacity (Max):**
  - U.S.: 24 gal
  - Metric: 90.3 L

**Additional Information:**


Products in Untouchable® Containers

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Diameter</th>
<th>Square</th>
<th>Volume Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2847</td>
<td>Untouchable® Round Container</td>
<td>21 in</td>
<td>15 3/4 in</td>
<td>15 3/4 in</td>
<td>18.5 sq ft</td>
<td>41.5 gal</td>
<td></td>
</tr>
<tr>
<td>3546</td>
<td>Untouchable® Half Round Container</td>
<td>21 in</td>
<td>15 3/4 in</td>
<td>15 3/4 in</td>
<td>18.5 sq ft</td>
<td>21 gal</td>
<td></td>
</tr>
<tr>
<td>3546A</td>
<td>Untouchable® Square Container</td>
<td>16 in</td>
<td>16 in</td>
<td>16 in</td>
<td>25.9 sq ft</td>
<td>23 gal</td>
<td></td>
</tr>
<tr>
<td>7620-20</td>
<td>Untouchable® Square Container with Swing Lid Combo</td>
<td>16 in</td>
<td>16 in</td>
<td>16 in</td>
<td>25.9 sq ft</td>
<td>22 gal</td>
<td></td>
</tr>
<tr>
<td>3545</td>
<td>Untouchable® Round Container</td>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>27 5/8 in</td>
<td>39.5 sq ft</td>
<td>36 gal</td>
<td></td>
</tr>
<tr>
<td>3559</td>
<td>Untouchable® Square Container</td>
<td>19 1/2 in</td>
<td>19 1/2 in</td>
<td>34 1/4 in</td>
<td>50 gal</td>
<td>19 1/2 in</td>
<td></td>
</tr>
</tbody>
</table>

Accessories for 3546:

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2672</td>
<td>Untouchable® Round Swing Top for 2847, 3546 Containers</td>
</tr>
<tr>
<td>3548</td>
<td>Untouchable® Round Funnel Top for 2847, 3546 Containers</td>
</tr>
</tbody>
</table>

Division 10: Specialties

MCV Campus Toilet Accessories

Rubbermaid Commercial Products - Rubbermaid Waste : 3548 Untouchable® Round Fun...  Page 1 of 1

Waste > Indoor Utility

3548 Untouchable® Round Funnel Top for 2947, 3546 Containers

Hygienic tops for attractive, hands-free waste disposal.

- Funnel style lid for "no touch" refuse disposal.
- Controls waste, odors and smoking debris.

### AVAILABLE COLORS

<table>
<thead>
<tr>
<th>Order #</th>
<th>Color</th>
<th>Product UPC/ UCC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG354000 GRAY</td>
<td>GRAY</td>
<td>0465780235377 / 100958760235234</td>
</tr>
</tbody>
</table>

### SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>U.S.</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height:</td>
<td>16 1/4 in</td>
<td>41.3 cm</td>
</tr>
<tr>
<td>Diameter:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carton Length:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carton Width:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carton Height:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carton Cubic:</td>
<td>1.33 ft³</td>
<td>0.04 m³</td>
</tr>
<tr>
<td>Ship Weight/Carton:</td>
<td>5 1/2 lb</td>
<td>2.49 kg</td>
</tr>
<tr>
<td>Pack Quantity:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Cartons Per Pallet:</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Material:</td>
<td>HPOPE</td>
<td></td>
</tr>
<tr>
<td>Process:</td>
<td>Injection Molding</td>
<td></td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

Chemical Resistance Guide: [chem.pdf](#)

Products in Untouchable® Container Tops and Accessories

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Diameter</th>
<th>Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>3548</td>
<td>Untouchable® Round Funnel Top for 2947, 3546 Containers</td>
<td>18 1/4 in</td>
<td>4.44 ft³</td>
<td>18 1/4 in</td>
<td>18 1/4 in</td>
<td>18 1/4 in</td>
</tr>
</tbody>
</table>

### 3548 Is an Accessory to:

No. Description | Diameter | Square | Length | Height | Volume Capacity | Width |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3547</td>
<td>Untouchable® Round Container</td>
<td>18 3/4 in</td>
<td>64 in</td>
<td>18 3/4 in</td>
<td>4.00 ft³</td>
<td>18 3/4 in</td>
</tr>
<tr>
<td>3546</td>
<td>Untouchable® Round Container</td>
<td>18 3/4 in</td>
<td>64 in</td>
<td>18 3/4 in</td>
<td>4.00 ft³</td>
<td>18 3/4 in</td>
</tr>
</tbody>
</table>

Division 10: Specialties

MCV Campus Toilet Accessories
## Division 11: Equipment

### 11.0 General

All requests for audio visual equipment shall be coordinated with VCU Construction Management, Planning & Design, and Media Services.

All Information Technology requests shall be coordinated with VCU Construction Management, Planning & Design, Technology Services, and the General Contractor. See “Division 27 Communications” sections for Media Support space planning requirements.

### 11.5 Laboratory Equipment

Where research and teaching labs are required to have Emergency Eye / Face Wash and Emergency Showers, provide a recessed barrier-free swing-down eye / face wash with drain pan, and shower safety station with ceiling mounted exposed shower head combination unit. Reference the preferred product by Guardian Equipment, model GBF2150, as an attachment in “Division 22 Plumbing” section.

Where research and teaching labs are required to have Emergency Eye / Face Wash only, provide a recessed barrier-free swing-down eye / face wash with drain pan unit. Reference the preferred product, by Guardian Equipment, model GBF1735DP, as an attachment in “Division 22 Plumbing” section.

Where surface mounted Emergency Eyewash / Faucet combination units are required to supplement recessed swing-down emergency wash units, provide Faucet Eyewash Combo unit with the following features:

- Combined gooseneck faucet with independently operated eye-wash
- Twin aerated eyewash sprays, with flip-top dust covers
- Eyewash activation by clearly delineated handle
- Faucet handles shall have at minimum 4” wrist blade handles for hot and cold water supplies, operating quarter-turn ceramic cartridges (25 year cartridge warranty).
- Eyewash faucet location shall be further identified by appropriate wall mounted or ceiling suspended signage. Reference the preferred product, by Speakman, model SEF-1800-CA-8, as an attachment in “Division 22 Plumbing” section.

End of Division 11
Design & Construction Standards

Division 12: Furnishings

12.0 General

All furniture will meet LEED standards or other accepted standards that are designed for sustainability.

VCU strives for 100% compliance in purchasing level-certified products.

The VCU Interior Designer or interior design consultant shall secure the following items, and turn them over to the Physical Plan Zone Leader upon occupancy:

• Cleaning and maintenance information provided on all products purchased.
• Furniture requiring operation shall be accompanied by operational standards.

All furnishings will meet respective fire and life safety codes, and proof of compliance is required.

Project costs will include removal and or disposal of any surplus items left in the space by the previous user.

Manufacturer warranties must be provided for all furnishings purchased, and related services provided. Warranties shall be for a minimum of 1 year.

12.9.3 Site Furnishings

The placement of bike racks will be coordinated through VCU Physical Plant Grounds, and will be placed in close proximity to off-site bike circulation paths and building entrances when applicable.

All exterior furnishings shall meet the requirements of the VCU Campus Amenity Guidelines-Summer 1999.

End of Division 12
## Division 14: Conveying Systems

### 14.2 Elevators

#### General Elevator Standards
- Comply with the following code requirements:
  - Virginia Construction Code
  - American Society of Mechanical Engineers – Safety Code for Elevators & Escalators (ASME A17.1)
  - Assuring Dependability in Architecture-based Adaptive Systems (ADAAS)
- VCU elevators tend to be very heavily used. Therefore, both public and freight elevators should be designed with durable, vandal resistant, low-maintenance finishes. Parts and components should be easy to replace in the event of damage.
- For buildings with color-coded floors, such as parking decks, the elevator call buttons shall be colored to match the color of the floor.
- All elevator shafts with glass shall be designed so that the glass can be cleaned safely and inexpensively.
- Fire service key shall be standardized. Coordinate with VCU Project Manager for key required.

#### Warranties & Service Contracts
All new elevators will have a 1 year service contract, with at least 4 possible annual extensions to include 24/7 response within 4 hours.

#### Operation & Maintenance (O&M) Manuals & Non-proprietary Equipment Requirements
- All elevator systems, including controllers, individual components, and software, shall be non-proprietary.
- Provide 4 sets of O&M manuals, to include operating features and diagnostic information, and all other necessary data for elevator system diagnosis, interpretation, and modification. Include in each copy of the O&M manual “as-installed” straight line wiring diagrams, showing all electrical connections. Differentiate between factory-installed and field-installed wiring.

See CPSM for additional elevator specification requirements.

Requirements for non-proprietary components and systems are mandatory, to allow for service and maintenance by VCU personnel.
### Division 14: Conveying Systems

#### 14.2 Elevators

<table>
<thead>
<tr>
<th><strong>Operation &amp; Maintenance (O&amp;M) Manuals &amp; Non-proprietary Equipment Requirements (continued)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide all proprietary diagnostic tools to VCU upon Substantial Completion, so that the elevators may be maintained by appropriately qualified VCU staff or other contracted elevator service providers. Provide all passwords and other necessary accessory items, so that individuals servicing the elevators can perform all adjustments on-site.</td>
</tr>
<tr>
<td>• Diagnostics, programming, adjustment tools, associated software, and information, must be non-expiring, fully functional, and usable throughout the life of the equipment. Upgrades and replacements for diagnostic tools, software, periodic update training, and other information, shall be provided to VCU at no additional cost on a perpetual basis for the life of the equipment installation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Elevator Types</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Machine-roomless elevators are acceptable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Required Elevator Equipment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide hall lanterns with floor position indicators at all elevator lobbies.</td>
</tr>
<tr>
<td>• Equip pits of hydraulic elevators with sumps for use of a portable sump pump during maintenance activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Final Acceptance</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Require Contractor to provide a full Acceptance and Inspection Test in accordance with ASME/ANSI A17.1, conducted by a Qualified Elevator Inspector (QEI) as a condition of final acceptance by the Owner.</td>
</tr>
<tr>
<td>• VCU’s AHJ should accompany the QEI certified inspector during final testing.</td>
</tr>
</tbody>
</table>

End of Division 14
## Design & Construction Standards

### Division 18: Sustainability

#### 18.0 General

The cumulative impact of the design, construction, and operation of built environments, has profound implications for human health, the environment, and the economy. VCU intends to minimize this impact, and will endeavor to create a positive impact whenever possible. A continuing focus on sustainable design of the built environment, will help VCU achieve its Sustainability goal for the year 2025 and 2050, per the VCU Climate Action Plan and VCU Quest for Distinction.

While sustainable building features may cost more initially than those found in a typical building, implementation of sustainable construction methods typically generates a pay-back in a rather short period of time, and will continue to generate cost savings over the life of the specific sustainable building element.

Costs, including projected energy and operational costs, must be evaluated as part of the design and value engineering project phases. Sustainable design elements that increase operational costs or generate significant or unusual maintenance activities, will require further justification and approval of VCU.

Implementation and application of these guidelines are intended to reflect compliance with Commonwealth of Virginia Executive Order No. 19: Conservation and Efficiency in the Operation of State Government:


#### 18.1 Goal

**Buildings**

All new VCU buildings with exception to parking garages, shall be designed and constructed to obtain a minimum of LEED Silver certification or equivalent.

Equivalent programs may include the Virginia Energy Conservation and Environmental Standards, based in part on the International Green Construction Code (IgCC),
### 18.1 Goal

**Buildings (continued)**

Buildings shall be designed to comply with the LEED Rating System and the Green Building Initiative’s Green Globes program. Refer to CPSM 6.1.3.

**Parking Facilities**

All new parking facilities shall implement the following sustainable features:

- Install photovoltaic solar panels on the top of parking decks, unless the sun is impeded and the top deck is shaded by nearby structures. Alternate green power generation technologies may be implemented. Aim to achieve at least net zero power consumption, and preferably assist in powering of nearby structures.
- Facilitate covered bicycle racks, and provide compressed air for bicycle tire inflation.
- Facilitate free premium covered parking for scooters and motorcycles, preferably near vehicle entrances and exits of parking facilities.
- Facilitate free electric vehicles parking. (Minimum Number and or Percentage of spaces).
- Install at least two Level 2, 30 Amp, electric vehicle battery charging stations per parking garage.
- Facilitate preferred parking for alternate fuel vehicles and hybrid vehicles.
- Facilitate free parking for Shared transportation vehicles.

Retrofitting of solar arrays to existing structures, requires engineering evaluation of existing structures to validate capacity to sustain additional gravity and wind loads.

Ideally, parking for scooters, motorcycles, and bicycles, will be located to minimize mixing these types of vehicles into the automobile and light truck traffic flow within the parking facility.

**Note:** Preferential parking locations stated herein are subordinate to providing the required number of accessible parking spaces, including van-accessible spaces and providing accessible routes serving all such accessible parking spaces, as required by accessibility codes and the ADA Accessibility Guidelines.

### 18.2 Sustainable Purchasing Guidelines

VCU shall specify the use of environmentally preferable sustainable...
18.2 Sustainable Purchasing Guidelines

Purchasing guidelines for new construction and renovation projects, to encourage the purchase and use of materials, products, and services that incorporate social, community, and environmental responsibility.

**Electric Powered & Electronic Equipment**

- Achieve sustainable purchases of at least 40% (by cost) of total purchases of electric-powered equipment including, office equipment (computers, monitors, printers, copiers, scanners, fax machines, etc.), appliances (refrigerators, dishwashers, microwave ovens, water coolers, etc.), external power adapters, televisions, and other audiovisual equipment.
- Energy Star-rated appliances and equipment must be purchased (or leased) when an Energy Star designation is available.  
- All new copiers, faxes, printers, and other such office equipment purchased or leased equipment, must be recycled paper compatible.

**Furniture**

Achieve sustainable purchases of at least 40% of total purchases of furniture by cost. Sustainable purchases are those that meet one or more of the following criteria:

- Purchases contain at least 10% postconsumer and or 20% postindustrial material
- Purchases contain at least 70% material salvaged off-site or outside the organization
- Purchases contain at least 70% material salvaged on-site, through organization’s material and equipment reuse program
- Purchases contain at least 50% rapidly renewable material
- Purchases contain at least 50% Forest Stewardship Council (FSC) certified wood
18.2 Sustainable Purchasing Guidelines

Furniture (continued)
- Purchases contain at least 50% material harvested and processed, or extracted and processed within 500 miles of the project.

Mercury-Containing Lamps
Target for the overall average of mercury content in lamps of 90 pictograms per lumen-hour or less, which include lamps for both indoor and outdoor fixtures. At least 90% of installed lamps must comply with this target (as measured by the number of lamps).

Plumbing Fixture Guidelines
New buildings and future indoor plumbing renovations shall utilize the most current Uniform Plumbing Code (UPC) and International Plumbing Code (IPC) standards, or meet the latest EPA WaterSense Standards wherever possible for the particular application:

<table>
<thead>
<tr>
<th>Fixture</th>
<th>UPC &amp; IPC Standards</th>
<th>2011 EPA WaterSense Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Closet</td>
<td>1.6 GPF</td>
<td>1.28 GPF</td>
</tr>
<tr>
<td>Urinal</td>
<td>1.0 GPF</td>
<td>0.5 GPF</td>
</tr>
<tr>
<td>Public Lavatory Faucet</td>
<td>0.5 GPM</td>
<td></td>
</tr>
<tr>
<td>Private Lavatory Faucet</td>
<td>2.2 GPM</td>
<td>1.5 GPM</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.5 GPM</td>
<td>2.0 GPM</td>
</tr>
<tr>
<td>Kitchen Sinks</td>
<td>2.20 GPM</td>
<td></td>
</tr>
<tr>
<td>Metering Faucets</td>
<td>0.25 GPM</td>
<td></td>
</tr>
</tbody>
</table>

(GPF - Gallons Per Flush)
(GPM - Gallons Per Minute)
## 18.2 Sustainable Purchasing Guidelines

### Plumbing Best Practices
The following are types of recommended high-performance plumbing fixtures and fittings:
- Dual flush toilets which meet EPA WaterSense Standards, must be used and labeled as such.
- Use low-flow flush toilets approved by the EPA WaterSense Standards.
- All faucets must be approved by the EPA WaterSense Standards.
- Use faucet aerators.
- Use kitchen faucet spray aerators.

### Paints & Sealants
- Paints and coating shall have VOC emissions not exceeding the VOC and chemical component limits of Green Seal’s Standard GS-11 requirements.
- Adhesives, sealants, and sealant primers must comply with South Coast Air Quality Management District (SCAQMD) Rule 1168, based on VOC limits effective July 1, 2005, and rule amendment dated January 2, 2005.
- Preference is for brushed or rolled on paint procedures. Avoid spraying of paints and sealants whenever possible.

Painting and coating systems should be selected from products that can be maintained, repaired, and recoated using easily available low-VOC, low-odor materials.

Where spray-application of paints and coatings must be used, preferred use of High Pressure Low Volume (HPLV), or similar spray systems that minimize over-spray. Effective isolation and ventilation of work areas is required.

## 18.3 Solid Waste Management

### Solid Waste Management Goals
- Protect the environment and public health
- Conserve natural resources
- Minimize land-filling and or incineration to reduce toxicity
### Design & Construction Standards

<table>
<thead>
<tr>
<th>Division 18: Sustainability</th>
</tr>
</thead>
</table>

#### 18.3 Solid Waste Management

**Solid Waste Management Requirements**
- Reduce waste from facility alterations and new construction by at least 80% by weight.
- Reuse and or recycle demolition debris by at least 80%; maximize reuse of existing on-site material whenever possible.

#### 18.4 Pest Management Plan

Refer to the VCU External and Internal Integrated Pest Management Plans for best practices during new construction. Inquire at Contract Administration for location of plans at (804) 828-1482.

#### 18.5 Heat Island Reduction

**Heat Island Reduction Goals**
- Reduce “heat islands” created by building roofs to minimize impacts on microclimates, and human and wildlife habitats.

**Roofs**
- “White roofs” or vegetated roofs must be specified for all new construction projects
- White roofs shall be used when replacing existing roofs.

**External Walkways & Driveways**
- Use alternate paving methods to minimize “heat island” effect.

**Portions of roofs exposed to view in historic areas, or that are otherwise visible to the public are exempt from this “white roof” requirement. However, material selection must be taken into consideration for the reduction of the “heat island” effect through selection of appropriate materials and finishes.**

#### 18.6 Landscape

The following are the recommended landscape practices that help improve water quality, reduce storm water management loads, and...
### Division 18: Sustainability

#### 18.6 Landscape
relieve the demand on the locality storm water drain systems:
- Substitute permeable surfaces for traditional paving methods.
- Apply pervious material whenever practical for walkways and parking spaces.
- Use Xeriscaping and no lawn landscaping methods.
- Plant native and adapted plants.
- Use best practice methods for high efficiency watering, such as programmed drip systems and soil moisture content meters.

#### 18.7 Water Harvesting
Water harvesting and sustainable erosion control practices should be applied to all new construction projects. Each newly constructed building shall implement at least two of the following strategies:
- Cistern strategies
- HVAC condensate water harvesting
- Grey water harvesting and reuse
- Bio-retention strategies
- Green screens, and living walls
- Rain gardens
- Bioswales

See also 13VAC5-63-320 Plumbing Systems and 9VAC25-740 Water Reclamation and Reuse Regulation, for regulations relative to rain water and gray water use and recycling strategies, in the USBC.

#### 18.8 Sustainable Building Features
The following sustainable features should be incorporated during the planning and design phase of new building projects wherever feasible:
- Energy consumption indicators, such as Dash Board and Kiosks, should be placed near main entrance locations to attract the attention of the building users.
- L-2 Electric Vehicle battery chargers should be considered for feasibility according to area, and parking access to allow for battery charging.

Items listed are not inclusive of all potential sustainable building features. Identification of other sustainable building features, including alternative features to those listed during project programming is encouraged.

Last Updated August 1, 2017
18.8 Sustainable Building Features

The following sustainable features should be incorporated during the planning and design phase of new building projects wherever feasible: (continued)

- Covered Bicycle Racks, compressed air for inflating bicycle tires, dual chuck inflator valve, and scooter parking accommodations should be provided.
- Showers within 200 yards from the new building for men and women should be available to all faculty, staff, and students, to allow for showering and changing. If showers are not currently available, the new building shall facilitate showers as such.
- Recycle bins should be placed at convenient locations in the building.
- Water Bottle Filling Stations should be implemented http://www.elkayusa.com/cps/rde/xchg/elkay/hs.xsl/ezh2o.aspx
- Electrical sub-metering should be included as part of the design; see EPA WaterSense for guidance.
- Water sub-metering should be included as part of the design.
- Specify the Purchase of WaterSense Labeled plumbing Products.
- Electrical Consumption: new buildings should be designed to consume the least possible power.
- New buildings shall meet or surpass the EPA Energy Star certification rating.
- Where the use of Light-Emitting Diode (LED) lamps are not feasible, high efficiency and low mercury lamps must be specified with the following criteria: 90 picograms per lumen-hour or less, which include all lamps for both indoor and outdoor fixtures.
- On-site Green Power Generation: every new building must have on-site sustainable power generation to reduce power demand on the power grid.
- Natural ventilation should be explored as potential partial substitute for mechanical cooling.

Regardless of any particular feature or set of features identified, all must be evaluated in relation to the specific project program, project budget, and operating budget.

Use of appropriate criteria listings, such as the United States Green Building Council (USGBC) LEED rating system scorecard, or corresponding criteria sheets from Green Building Initiative (GBI) Green Globes, used to identify and document the overall sustainable design approach for a given project is encouraged.
### 18.8 Sustainable Building Features

The following sustainable features should be incorporated during the planning and design phase of new building projects wherever feasible:

(continued)

- All HVAC equipment must meet the highest industry efficiency standards.
- CO2 sensors should be installed in classrooms, large meeting rooms, and rooms designed for group gathering. These sensors should be integrated into the building airflow standard to ensure efficient ventilation.
- Use occupancy activated lighting.
- Solar Hot Water Heaters should be installed whenever the roof design permits.
- Consider installation of Tubular day lighting.
- Use low-water use or waterless urinals.
- Use toilet dual flush valves.
- Use motion activated hand wash faucets.
- Avoid using paper towel dispensers, prefer to use reusable roll towels wherever practical.
- All new buildings shall undergo Enhanced Commissioning, and Opposite Season Enhanced Commissioning programs.

### 18.10 Waste Receptacles

#### Indoor Waste Containers

The University has two standards for indoor waste containers:

- 20 gallon container for landfill
- 40 gallon container for recycling

Both indoor waste containers will have University's symbol for recycling on the top, and on the side. See indoor waste containers specifications on the next pages.
### Division 18: Sustainability

#### 18.10 Waste Receptacles

**Indoor Waste Containers**

**Furniture Specifications**

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Item: 20 Gallon Container for Landfill Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer:</td>
<td>Magnuson Group</td>
</tr>
<tr>
<td>Style/Model No.:</td>
<td>VA1809L</td>
</tr>
<tr>
<td>Description:</td>
<td>20 gallon steel unit with internal rigid liner and integrated bag arms, adjustable glides, 34 lbs.</td>
</tr>
<tr>
<td>Lid:</td>
<td>Open &quot;Waste&quot; Top for landfill items</td>
</tr>
<tr>
<td>Icon:</td>
<td>White &quot;LANDFILL&quot; icon, 3&quot; wide, 4&quot; high, to include &quot;waste&quot; pictogram and curved text above, as illustrated in inset below. Text to be single word, only, in English and all capital letters. Font to be Frutiger 65 Bold. 48 pt.</td>
</tr>
<tr>
<td>Location:</td>
<td>On all 4 sides, in location shown below, centered side to side. 5.5&quot; from top of container to top of curved text.</td>
</tr>
<tr>
<td>Warranty:</td>
<td>2 Year</td>
</tr>
<tr>
<td>Tag:</td>
<td>M1A</td>
</tr>
</tbody>
</table>

**Dimensions:**

9" x 18", 33-3/4" high
Opening: 4-1/4" x 13-3/16"

**Finish:**

Dark Anthracite body with Dark Anthracite top, baked on enamel

**Additional Information:**

Manufacturer Rep: Michael Toomey
Email: admns@vcu.com
Call: 202.674.4663

**Note:** Disregard illustrated icon on photograph

**Landfill Icon**

**Note:** Estimated cost for quantity of 1 is $498.00. A set up charge of $224.00 for custom icon design and development will be charged to the first order. Larger quantities may provide lower per item cost.

*Last Updated August 1, 2017*
## 18.10 Waste Receptacles

### Indoor Waste Containers

**Furniture Specifications**

<table>
<thead>
<tr>
<th>Item: 20 Gallon Container for Recyclable Items</th>
<th>Quantity:</th>
<th>Location (keyed to plan)</th>
<th>Tag: M18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer: Magnuson Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Style/Model No.: VA1809L &quot;Valuta&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description: 20 gallon steel unit with internal rigid liner and integrated bag arms, adjustable glides, 34 lbs. LId: Paper/Circle combo opening Icon: White &quot;RECYCLING&quot; icon, 3&quot; wide, 4&quot; high, to include “arrow” pictogram and curved text above, as illustrated in inset below. Text to be single word, only, in English and all capital letters. Font to be Futura 65 Bld. 48 pt. Icon Location: On all 4 sides, in location shown below, centered side to side, 5.5” from top of container to top of curved text. Warranty: 2 Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions: 9” x 18”. 33-3/4” high</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening: varies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish: Dark Anthracite body with Dark Anthracite top, baked on enamel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Information: Manufacturer Rep: Michael Toomey <a href="mailto:office@bu.edu">office@bu.edu</a> Cell: 202.674.4663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photograph/Line Drawing:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Estimated cost for quantity of 1 is $498.00. A set-up charge of $224.00 for custom icon design and development will be charged to the first order. Larger quantities may provide lower per item cost.
## 18.10 Waste Receptacles

### Indoor Waste Containers

<table>
<thead>
<tr>
<th>Item: 40 Gallon Container for Landfill Items</th>
<th>Quantity:</th>
<th>Location: (Keyed to plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer: Magnuson Group</td>
<td></td>
<td>Tag: M2A</td>
</tr>
<tr>
<td>Style/Model No.: VA1818L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description: 40 gallon steel unit with internal rigid liner and integrated bag arms, adjustable glides, 54 lbs. Lic: Open “Waste” Top for landfill items Icon: White “LANDFILL” icon, 3” wide, 4” high, to include “waste” pictogram and curved text above, as illustrated in inset below. Text to be single word, only, in English and all capital letters. Font to be Frutiger 65 Bold, 48 pt. Icon Location: On all 4 sides, in location shown below, centered side to side, 5.5” from top of container to top of curved text. Top Lid Labels: White “LANDFILL” labels on two opposite sides of top, centered side to side and facing outward. Font to be Frutiger 65 Bold, 48 pt. Warranty: 2 Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions: 18” x 18” square, 33-3/4” high Opening: 11-1/16” x 11-1/16”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish: Dark Anthracite body with Dark Anthracite top, baked on enamel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Information: Manufacturer Rep: Michael Toomey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photograph/Line Drawing:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Estimated cost for quantity of 1 is $635.00. A set up charge of $224.00 for custom icon design and development will be charged to the first order. Larger quantities may provide lower per item cost.
18.10 Waste Receptacles

Indoor Waste Containers

Furniture Specifications

<table>
<thead>
<tr>
<th>Item: 40 Gallon Container for Recyclable Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer: Magnuson Group</td>
</tr>
<tr>
<td>Style/Model No.: VA1818L “Valuta”</td>
</tr>
<tr>
<td>Description: 40 gallon steel unit with internal rigid liner and integrated bag arms, adjustable glides, 54 lbs. Lid: Paper/Circle combo opening Icon: White “RECYCLING” icon, 3” wide, 4” high, to include “arrow” pictogram and curved text above, as illustrated in inset below. Text to be single word, only, in English and all capital letters. Font to be Frutiger 65 Bold, 48 pt. Icon Location: On all 4 sides, in location shown below, centered side to side. 5.5” from top of container to top of curved text. Top Lid Labels: White “RECYCLING” label on two opposite sides of top, centered side to side and facing outward. Font to be Frutiger 65 Bold, 48 pt. Warranty: 2 Year</td>
</tr>
<tr>
<td>Dimensions: 18” x 18” square, 33-3/4” high Opening: varies</td>
</tr>
<tr>
<td>Finish: Dark Anthracite body with Dark Anthracite top, baked on enamel</td>
</tr>
<tr>
<td>Additional Information: Manufacturer Rep: Michael Toomey <a href="mailto:cdtimes@vcu.com">cdtimes@vcu.com</a> Cell: 202.674.4663</td>
</tr>
<tr>
<td>Photograph/Line Drawing: Recycling Icon Note: Disregard illustrated icon shown on photograph</td>
</tr>
</tbody>
</table>

Note: Estimated cost for quantity of 1 is $650.00. A set up fee of $224.00 for custom icon design and development will be charged to the first order. Larger quantities may provide lower per item cost.
18.10 Waste Receptacles

Outdoor Waste Containers
The University’s standard for outdoor waste containers is a square, black 59” W x 24” D x 45” H unit, with a larger section for recycling than for landfill, to encourage recycling behavior. The outdoor waste containers are to have the “VCU Office of Sustainability” logo on three sides, and is made of recycled milk jugs.

See “VCU Office of Sustainability” logo below:

See photos of outdoor waste container below:
Elkay Specifications Cooler / Bottle Filling Station

**EZH2O™ System**

**Cooler/Bottle Filling Station**

Models EZS8WS and EZSTLR8WS

**PRODUCT FEATURES**

- Complete cooler and bottle filling station in a consolidated space saving ADA compliant design
- Sanitary, no-touch sensor activation with automatic 20-second shut-off timer
- Flexi-Guard® or Vandal-Resistant StreamSaver™ Bubbler
- Silver ION anti-microbial protection
- Quick fill rate is 1 gpm for refrigerated units and 1.5 gpm for non-refrigerated units
- Laminar flow provides minimal splash
- Real drain system eliminates standing water
- Visual user interface display includes:
  - Green Ticker™ counting the quantity of bottles saved from the landfill

**IMAGES**

- Model EZ88WALK shown. Includes single cooler with bottle filling station.
- Model EZSTWS8L shown. Includes bi-level cooler with bottle filling station.

**APPLICATIONS**

- Ideal for use in:
  - Educational facilities
  - Healthcare facilities
  - Sport and fitness centers
  - Airports
  - Office buildings
  - Other commercial buildings

**OPTIONAL ACCESSORIES**

- Vandal-resistant StreamSaver™ Bubbler
- 36292C Receptacle Adaptor Plug

**SUGGESTED SPECIFICATION**

Unit shall provide 8.0 gph of 50°F water at 90°F ambient and 80°F inlet water. Bottle filling unit shall include an electronic sensor for no-touch activation with an automatic 20-second shut-off timer. Shall include bottle counter. Shall provide 1-1.5 gpm flow rate with laminar flow to minimize splashing. Shall include antimicrobial protected plastic components to prevent mold and mildew. Cooler shall include pushbar, activation and water-efficient StreamSaver™ bubbler. Bottle Filling unit shall meet ADA guidelines for parallel approach. Cooler shall meet ADA guidelines for frontal or parallel approach. Unit shall be lead-free design which meets Safe Drinking Water Act and is certified to NSF/ANSI 61 and California AB1953. Unit shall be certified to UL399 and CAN/CSA 22.2 No. 120.

**Third Party Certified to:**

- UL399 and CAN/CSA 22.2 No. 120
- Lead-free compliance including NSF/ANSI 61 and CA AB1953
**Division 18: Sustainability**

**Elkay Specifications Cooler / Bottle Filling Station**

**EZH2O is designed to fit on an EZ Cooler which is properly installed per the EZ Spec Sheet rough-in design.**

*Rated for indoor Use Only*

---

**Installation Notes:**
- Unit will mount on bracket attached to wall by 6 holes (as shown above)
- Water and electrical will connect through a hole punched into basin. Basin will be pre-punched.
- Refer to page 3 for EZ single cooler rough-in.
- Refer to page 4 for EZ bi-level cooler rough-in.

---

**Specs and measurements are subject to change without notification.**

Please visit elkayusa.com for most current version.

**EZH2O**

**ROUGH-IN DIMENSIONS**

---

**Model EZS8WS and EZSTL8WS**

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**Last Updated August 1, 2017**
**Division 18: Sustainability**

**Elkay Specifications Cooler / Bottle Filling Station**

---

**LEGEND:**

- **A** = Recommended Water Supply Location. Shut-off Valve (not furnished) To Accept 3/8 O.D. Unplated Copper Tube. 3" (76mm) Maximum Out From Wall.
- **B** = Recommended Location For Waste Outlet To Accommodate 1-1/2" Nominal Drain. Drain Stub 2" Out From Wall.
- **C** = 1-1/2" Trap (Not Furnished)
- **D** = Electrical Supply (3) Wire Recessed Box Duplex Outlet
- **E** = Insure proper ventilation by maintaining 6" (152mm) minimum clearance from cabinet louvers to wall.
- **F** = 7/16" Bolt Holes For Fastening Unit To Wall

*Reduce Height By 3" For Installation Of Children’s ADA Cooler*

*Rated for Indoor Use Only*

---

Last Updated August 1, 2017
Elkay Specifications Cooler / Bottle Filling Station

*Rated for Indoor Use Only

*Reduce Height By 3" For Installation Of Children's ADA Cooler

LEGEND:
A = Recommended Water Supply Location. Shut-Off Valve (not furnished) To Accept 3/8 O.D. Unplated Copper Tube. 3" (76mm) Maximum Out From Wall.
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F = 7/16" Bolt Holes For Fastening Unit To Wall

End of Division 18
21.0 General

Sprinkler Standards
Sprinkler systems must meet code minimums. Any design that goes beyond the code minimum, must be signed-off by VCU prior to approval.

- All control valves must be accessible by a 6’ ladder.
- All control valves must be butterfly valves; no gate valves.
- All inspector’s test drains must be the appropriate size, and drain into an express drain.
- All sprinkler heads must be quick response sprinkler heads.
- Control valves shall only be installed in corridors, stairwells, mechanical rooms, fire pump rooms, sprinkler rooms, and shall be easily accessible.
- Inspector’s test valves shall not be installed above or below ceilings in classrooms, offices, conference rooms, dormitory living quarters, or in any area requiring entry through a classroom, office, conference room, or any dormitory living quarters.
- Avoid pre-action systems when possible, especially in high rise buildings.

See “Division 28 Electronic Safety & Security” for fire alarm standards.

End of Division 21
**Division 22: Plumbing**

### 22.0 General

Refer to “Division 18 Sustainability” for fixture GPM requirements.

Pipe sleeves at floors should extend 2” above adjoining finished floor.

Natural gas (mass flow) meters are required for all boilers.

**Backflow Prevention**

- Comply with requirements of the City of Richmond or other water supply authority requirements.
- Backflow assemblies shall meet the requirements of: United States Code (USC) American Society of Safety Engineers (ASSE) Std. 1013; American Water Works Association (AWWA) Std. C511; Canadian Standards Association (CSA) B64.4.
- A reduced pressure zone assembly shall be installed at each potential health hazard location, to prevent backflow due to back-siphonage and or backpressure.
- The assembly shall consist of an internal pressure differential relief valve, located in a zone between two positive seating check modules with captured springs and silicone seat discs.
- Seats and seat discs shall be replaceable in both check modules, and the relief valve.
- Valve body and check modules shall be brass.
- There shall be no threads or screws in the waterway exposed to line fluids.
- Service of all internal components shall be through a single access cover secured with stainless steel bolts.
- The assembly shall also include two resilient seated isolation valves, four resilient seated test cocks, and an air-gap drain fitting.
- Provide access for backflow preventers that are installed in obscure places, to allow removal of the entire unit for service and replacement.
- Floor drain pipe size to be determined and evaluated before installation of backflow preventer, to ensure that floor drain is capable of handling backflow to prevent flooding.
## Division 22: Plumbing

### 22.0 General

**Electric Motors**

Integral horse power electric motors shall have Totally Enclosed Fan Cooled (TEFC) premium efficiency. Open Drip Proof (ODP) motors are not acceptable.

### 22.4 Plumbing Fixtures

**Flush Valves**

- For all restrooms in new construction and major renovation projects, provide solenoid-actuator flush valves, actuated by electronic sensor for toilets (water saver) and urinals (low consumption). Hardwired installations are preferred. Battery powered units may be provided where installation of hardwiring is not feasible.
- VCU accepted manufacturers are Sloan, American Standard, and Toto, or approved equal.

**Faucets**

Provide solenoid-actuated touchless faucets.

**Floor Drains**

Provide trap primers for floor drains, typical.

**Water Cooler / Bottle Filling Station**

For new construction and major renovation projects, provide one water cooler / bottle filling station on the first floor.

See “Division 18 Sustainability” to reference specifications for the preferred product, Elkay EZH20 Cooler / Bottle filling station, but may provide equivalent product.

### 22.4.5 Emergency Plumbing Systems

Where research and teaching labs are required to have Emergency Eye / Face Wash and Emergency Showers, provide a recessed barrier-free swing-down eye / face wash with drain pan, and shower safety station with ceiling mounted exposed shower head combination unit.

Reference the preferred product by Guardian Equipment, model GBF2150, as an attachment in “Division 22 Plumbing” section.
# Division 22: Plumbing

## 22.4.5 Emergency Plumbing Systems

Where research and teaching labs are required to have Emergency Eye / Face Wash only, provide a recessed barrier-free swing-down eye / face wash with drain pan unit.

Where surface mounted Emergency Eyewash / Faucet combination units are required to supplement recessed swing-down emergency wash units, provide Faucet Eyewash Combo unit with the following features:

- Combined gooseneck faucet with independently operated eye-wash
- Twin aerated eyewash sprays, with flip-top dust covers
- Eyewash activation by clearly delineated handle
- Faucet handles shall have at minimum 4” wrist blade handles for hot and cold water supplies, operating quarter-turn ceramic cartridges (25 year cartridge warranty).
- Eyewash faucet location shall be further identified by appropriate wall mounted or ceiling suspended signage.

## 22.6 Compressed Air Systems

Air-cooled rotary screw compressors are preferred for system needs greater than 50 cfm.

Preferred manufacturers include Quincy, Ingersoll-Rand, LeROI, and Sullair.

Ascertained that proper ventilation is available for compressor location. Provide liquid-cooled compressors when ventilation is inadequate.

Provide a redundant compressor for a source of control air for all installations to allow for maintenance and outage of either source. Electrical feeders for each compressor shall be independent all the way back to the originating power source (Motor Control Center (MCC) or Main Distribution Panel (MDP)). Control air pressure shall be monitored and alarmed through the Data Communications Channel (DCC) when

Last Updated August 1, 2017
**Division 22: Plumbing**

### 22.6 Compressed Air Systems

The pressures are outside the range of acceptable pressures, as determined by the Owner.

Control air compressors shall have the following features:
- External, disposable, cartridge-type oil filter
- Positive pressure lubrication system
- Load-less starting
- Automatic condensate purge piped to drain

Compressed air systems shall have refrigerated driers.  

The preferred manufacturer is Hankison.

Unless otherwise indicated, compressed air system shall be of “instrument” quality, as further modified by other requirements stated herein.

Uses requiring “Process” quality and medical air “breathing” quality air, require further development of project-specific criteria.

Compressed air system shall have redundant P3 filtration, followed by redundant coalescing air filtration.

Compressed air dew point shall be reduced to 40° F.

Existing pneumatic instrument air system in existing buildings, shall be used while providing upgrades as needed.

Piping for compressed air systems shall be Type L copper.

Provide a certificate issued by an appointed examiner, or recognized inspection body in respect to the air receiver certifying the inspection during construction of the air receiver and its’ auxiliary equipment.
Recessed Laboratory Units

GBF2150

- **GBF2150**: Recessed Safety Station with Drain Pan, Stainless Steel Shower Head
- **GBF2150PCC**: Recessed Safety Station with Drain Pan, Chrome Plated Brass Shower Head

**Application**: Recessed barrier-free eye/face wash and shower safety station with ceiling-mounted exposed shower head and drain pan. Stainless steel cover provides attractive appearance and protects unit when not in use. When activated, cover serves as pan to collect waste water and return it into unit for drainage.

**ADA Compliance**: When installed at recommended mounting heights, unit complies with ADA requirements for accessibility by handicapped persons.

**Shower Head**: 10” diameter stainless steel (GBF2150) or 8” diameter chrome plated cast brass (GBF2150PCC).

**Shower Valve**: 1” IPS brass stay-open ball valve with stainless steel “panic bar” actuator.

**Cover/Drain Pan**: 18 gauge stainless steel combination cover and drain pan. Grasping “panic bar” handle and opening cover pulls spray head assembly down from vertical to horizontal position, activating water flow. While unit is in operation, waste water is collected in drain pan and returned into cabinet for drainage. Unit remains in operation until cover is returned to closed position.

**Eye/Face Wash Spray Head Assembly**: Two FS-Plus spray heads mounted on supply arms. Each spray head has individually adjustable flow control and filter to remove impurities from water.

**Eye/Face Wash Valve**: 1/2” IPS brass rotating plug-type valve. Furnished with Teflon® coated O-ring seals and in-line strainer to protect valve from debris and foreign matter.

**Mounting**: 18 gauge stainless steel cabinet with flanged rim for recessed mounting in wall. Unit fits in standard 3 5/8” deep wall.

**Pipe and Fittings**: Exposed pipe and escutcheon are brushed stainless steel (GBF2150) or polished chrome plated brass (GBF2150PCC).

**Supply**: 1” NPT female inlet.

**Waste**: 2” NPT female outlet.

**Sign**: Furnished with ANSI-compliant identification sign.

**Quality Assurance**: Unit is completely assembled and water tested prior to shipment.

**U.S. Patent**: 5,768,721

**Available Options**:

- AP250-065 Modesty Curtain
- AP280-230 Electric Light and Alarm Horn
- TMV G3800 thermostatic mixing valve

---

*Note: Shown with optional AP280-230 electric light and alarm horn unit (sold separately).*

---

**GUARDIAN EQUIPMENT**

650 North Union Street
Chicago, IL 60610
info@gesafety.com

Phone 312 733 2626
Fax 312 733 4684
gesafety.com
GBF1735DP Recessed Laboratory Units

- **GBF1735DP**: Swing-Down Eye/Face Wash with Drain Pan, Recessed Mounted
- **GBF1736DP**: Swing-Down Eye/Face Wash with Drain Pan, Surface Mounted

**Application:** Wall mounted barrier-free swing-down eye/face wash with drain pan. Stainless steel cover provides attractive appearance and protects unit when not in use. When activated, cover serves as pan to collect waste water and return it into unit for drainage.

**ADA Compliance:** When installed at recommended mounting height, unit complies with ADA requirements for accessibility by handicapped persons.

**Spray Head Assembly:** Two FS-Plus™ spray heads mounted on supply arms. Each spray head has individually adjustable flow control and filter to remove impurities from water.

**Cover/Drain Pan:** 18 gauge stainless steel combination cover and drain pan. Grasping "panic bar" handle and opening cover pulls spray head assembly down from vertical to horizontal position, activating water flow. While unit is in operation, waste water is collected in drain pan and returned into cabinet for drainage. Unit remains in operation until cover is returned to closed position.

**Valve:** 1/2" IPS brass rotating plug-type valve. Furnished with Teflon® coated O-ring seals and in-line strainer to protect valve and spray heads from debris and foreign matter.

**Mounting:** 18 gauge stainless steel cabinet, GBF1735DP cabinet has flanged rim for recessed mounting in wall. Unit fits in standard 3 5/8" deep wall. GBF1736DP cabinet is designed for mounting on wall surface.

**Supply:** 1/2" IPS female inlet.

**Waste:** 2" NPT female outlet.

**Sign:** ANSI-compliant identification sign.

**Quality Assurance:** Unit is completely assembled and water tested prior to shipment.

**Available Options:**

- **AP280-230 Electric Light and Alarm Horn** Flashing light/alarm horn unit is recess mounted in finished wall. Light is illuminated and horn sounds when shower is activated.

- **TMV G3600 thermostatic mixing valve** precisely blends hot and cold water to deliver warm (tepid) water as provided by ANSI Z358.1-2004.
GBF1735DP Recessed Laboratory Units

NOTES:
1. EACH FS-PLUS SPRAY HEAD HAS AN ADJUSTABLE INTERNAL FLOW CONTROL AND FILTER TO REMOVE IMPURITIES FROM THE WATER FLOW.
2. UNIT IS FURNISHED WITH IN-LINE STRAINER TO PROTECT SPRAY HEADS AND VALVE COMPONENTS FROM DEBRIS IN WATER LINE.
3. INLET CAN BE POSITIONED TO SUPPLY UNIT FROM TOP OR BOTTOM.

GUARDIAN EQUIPMENT
660 North Union Street
Chicago, IL 60610
Phone 312-733-2220
Fax 312-733-4084
gesafety.com

This space for Architect/Engineer approval

ETL Listed 101-459
Units have been tested to and comply with
ASSE 2306-1-2004

Due to continuing product improvement, the information contained in this document is subject to change without notice. All dimensions are 1/16" (mm).
SPEAKMAN®
SEF-1800-CA-8
EYESAVER® FAUCET SPECIFICATIONS

DESCRIPTION
The SEF-1800-CA-8 Eyesaver® faucet combines a gooseneck faucet with an independently operated eyewash. The faucet features ¼ turn Speakman ceramic valves while the eyewash offers twin aerated sprays and flip-top dust covers. Lead free brass construction.

SPECIFICATIONS
EYEWASH
Activator: Pull handle with graphics
Spray heads: (2) aerated yellow plastic spray outlets with flip-top dust caps
Performance: 2.6 gpm @ 30 psi
Compliance: ANSI Z358.1

FAUCET
Supply: ½" male connections for hot and cold inlets
Widespread Valves: ¼ turn ceramic cartridges covered by a 25-year warranty
Center Distance: Adjustable center of 6" to 12"
Activator: Vandal resistant 4" wrist blades handles with color-coded indexes or single handle lever
Performance: 2.2 gpm
Counter thickness: Up to 2" thick
Compliance: ASME A112.18.1, CSA B125-98 and CA AB1953
Universal Emergency Sign Included

OPTIONS
☐ BO Vandal resistant 0.5 gpm flow control
☐ D7S Cross handles
☐ FP Foot pedal activation
☐ LF Laminar flow outlet 2.2 gpm
☐ ST Serrated tip with vacuum breaker
☐ TW Addition of SU-370 thermostatic mixing valve
☐ 6WH 6" wrist handles
☐ SL Two handle valves replaced with single lever valve
☐ NA Non aerated eyewash
* Not available in Lead Free option

Job Name:
Location:
Architect/Engineer:
Sales Representative:
Wholesaler:
Date:

End of Division 22

Last Updated August 1, 2017
23.0 General

General Heating Standards

- Central plant steam shall be used to the exclusion of all other sources where available.
- Humidifiers or autoclaves shall be used where central plant steam is not available, and total boiler horsepower installed, exceeds 40 bhp or where there is a single pass, 100% outside Air Handler Units (AHU).
- Steam coils with face and by-pass dampers shall be used. The use of hot water for pre-heats in air handler units shall be strictly prohibited.
- Hot water shall be the preferred medium, and shall be generated via a steam to water converter.
- The use of steam in direct radiation such as cast iron or fin coil radiators is not prohibited.
- The use of steam for heating coils in terminal equipment shall be prohibited.
- All freezestats shall be hard wired. Freezestats in the BAS programing logic shall not be acceptable.
- Steam Piping: All welded joints on exterior steam lines shall be radio-graphed by a third party for at least 25% of the welds. When a streamline is under a street and expected to be under a future building or otherwise inaccessible, then 100% of the welds shall be radio-graph tested. Due to the nature of the weld, socket welded pipes shall be tested using the dye penetrant method.
- For projects in existing buildings requiring modifications to the HVAC system, the design engineer shall use a recent Test and Balance (TAB) report as the basis of design rather than using “As-Builts”, Record documents, design capacities shown on the faceplate of equipment, anecdotal information, or any other information as the basis of design. The TAB report shall be completed within 6 months of the start of the design.
### Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

#### 23.0 General

**General Cooling Standards**
- Air handler units shall have economizer cycles to allow the use of outside for cooling, when the exterior temperature is low enough.
- Where the load for the structure is 20 tons or less, air cooled Direct Expansion (DX) shall be used, provided that the lengths of refrigerant piping are short enough to ensure oil return.
- Where the load for the structure is greater than 20 tons but less than 100 tons, an air cooled chiller is acceptable. Water cooled chilled water systems shall be considered if space for cooling towers is available.
- A water cooled chiller shall be the preferred source for cooling where the load exceeds 100 tons.

**Exceptions (continued)**
- For Vivarium or critical laboratory units, DX cooling shall be provided as a secondary back-up where chilled water is the primary source. In this case, the chilled water coil must be ahead of the DX Coil to prevent the chilled water coil from freezing.
- DX cooling shall not be used as the primary means of cooling for units over 5 tons, where the air handling units are 100% outside air (single pass).
- Chilled water shall be preferred over any other source of cooling from a central plant.

**Mechanical Penthouse Rooftop Enclosures**
The University wants to protect rooftop mechanical equipment from premature deteriorations caused by exposure from the elements, therefore, an enclosure is required. The enclosure need not be an extension of the building’s architecture, what is traditionally called a “mechanical penthouse”, but it needs to provide walls and a roof. The enclosure does not necessarily need to be fully enclosed, nor climate controlled. The size and construction of the enclosure should consider...
## 23.0 General

**Mechanical Penthouse Rooftop Enclosures (continued)**

accessibility to the equipment, and the ease with which future equipment can be removed and replaced.

## 23.3 Motors & Variable Speed Drives

### Electric Motors

Integral horse power electric motors shall have TEFC premium efficiency. ODP motors are not acceptable.

### Variable Speed Drives (VSD)

Warranty period stating the dates and warranty service contract information shall be clearly labeled next to the VSD data plate.

**Variable Speed Drive units shall have the following:**

- Alpha-numeric and replaceable displays
- Non-proprietary fuses
- Integral bypass feature that lets motor operate if drive is inoperable
- Drives on all three contactor bypasses
- Fused input line with disconnect means in door
- Modbus / Lon Works communications interface
- Direct Current (DC) inductor filter or line reactors

## 23.5 Meters & Gauges for HVAC

### Steam

All steam entering into a building shall be metered with a vortex swirl meter that has an integral temperature sensor and a remote meter-head. Equal to an ASEA Brown Boveri (ABB) model SR4000 (SR43131xxQ23A2EC1AB).

### Steam Condensate

- Steam condensate leaving the building shall be metered by a turbine type meter with a pulse output rated for 250° F or better.
### 23.5 Meters & Gauges for HVAC

**Steam Condensate (continued)**
- The pulse output shall be measured in gallons and equal to American Meter Company (AMCO) H 4300.
- Meter output shall be transmitted to, and readable over the Building Automation System (BAS).
- When installing the condensate meter, a check valve shall be installed up-stream with a strainer and 5 pipe diameters of straight pipe before it. The downstream shall be 3 pipe diameters in length of straight pipe, have a check valve and a ball valve before it leaves the building.

**Natural Gas**
- The meter shall be mounted horizontally, and easily accessible for service and reading.
- The meter shall be supplied by emergency power where available. The electrical disconnecting means shall be lockable. A 120V to 24V DC power supply rated at 50 watts per meter. The meter output shall be transmitted to and readable over the BAS.
- Buildings with independent boilers shall have individual gas meters (mass flow) for each boiler, which shall transmit to and be readable over the BAS.

### 23.11 Facility Fuel Piping

Fuel oil piping for diesel-generators or boilers shall be carbon steel ASTM A106 Type S schedule 80. 2 1/2” or larger shall be welded. Fittings for 2” threaded or less shall be Association of American Railroads (AAR) Malleable Iron Extra Heavy. 2 1/2” or larger shall use either ball valves conforming to API 607, or gate Valves conforming to API 605. 2” or smaller shall use ball valves conforming to API 607. Threaded joints shall use joint compound especially made for fuel oil service equal to “Gasoila”. 
### Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

#### 23.20 HVAC Piping & Pumps

For any service, butterfly valves 4” and larger, shall be fitted with hand wheel gear operators. Butterfly valves in horizontal lines shall be installed with the stem horizontal.

Steam condensate piping 4” or smaller, shall not be less than seamless ASTM A106, A53 or API 5L schedule 80 in thickness. Threaded steam condensate lines shall use cast iron fittings. The use of malleable iron fittings is prohibited for steam condensate.

The use of non-rising stem valves for any service shall be prohibited. All threaded gate or globe valves shall have union bonnets. The use of threaded class 125 valves for any service shall be prohibited. The minimum acceptable rating for threaded valves shall be class 150.

The service entrance valve that is 2 1/2” or larger, isolating the building from the central district steam system, shall be flanged cast steel Outside Screw and Yoke (OS&Y) gate valve class 150 where the pressure is 150 psig or less, and class 300 where higher.

All condensate pumping packages shall be equipped with drains and discharge check valves.

#### 23.27 HVAC Insulation

Cellular Glass shall be used for chilled water lines 2” or larger. Chilled water lines less than 2” may be insulated with Closed Cell Elastomeric. Use of fiberglass on chilled water lines shall be specifically prohibited. Chilled water coil condensate lines and domestic cold water lines shall be insulated with Closed Cell Elastomeric.

Steam lines (any pressure) shall be insulated with Calcium Silicate.

Insulation outdoors or otherwise exposed to weathering, shall be protected with metal jacketing.
### Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

#### 23.27 HVAC Insulation

Fiberglass pipe insulation is acceptable for heating hot water service.

#### 23.30 HVAC Air Distribution

Double wall insulated duct shall be used. The use of inside lined duct for any purpose shall be specifically prohibited.

Double wall insulated terminal boxes shall be preferred. Boxes used in humid environments like cage wash or autoclave rooms, shall be made of stainless steel inside and of epoxy or non-corrosive non-metallic exterior.

Terminal boxes shall have no exposed insulation inside.; a foil liner is not acceptable. Terminal boxes in laboratories and vivaria shall allow exterior sanitizing by wet chemical compounds, or alcohol solutions.

#### 23.50 Meters

**Steam Flow Meters**

All new buildings shall have meters installed where steam enters the building. The following steam flow meter guidelines apply:

1. Meters shall be one of the below named products:
   - ABB SR400 (Basis of design)
   - Onicon F-2600
   - Emerson Rosemount 8800
   - Spirax Sarco VLM10
2. Type: In-line Vortex or Swirl (Swirl preferred)
3. Wetted material shall be stainless steel 316
4. External pressure transmitter will supply flow sensor assembly downstream.
5. Internal temperature compensation will be ordered with meter.
6. Digital Communication output protocol shall be BACnet or FOUNDATION fieldbus. Highway Addressable Remote Transducer
# Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

## 23.50 Meters

### Steam Flow Meters (continued)

(HART) shall be used for device commissioning.  
7. Output shall communicate directly with the BAS with integrators.  
8. Meter output Liquid Crystal Display (LCD) display shall be mounted amount 5’-0” above finished floor, so it is readable from a standing position for most persons.  
9. Meter shall be factory calibrated to National Institute of Standards and Technology (NIST) traceable standards, and shipped with applicable documentation.  
10. All factory installation requirements must be followed without exception.  
11. Each meter shall have a flanged sensor connection design with unit completely insulated.  
12. Meters shall be suitable for 500° F superheated steam measurement process.

### Chilled Water BTU (British Thermal Unit) Meters

All new buildings shall have meters installed. The following Chilled Water BTU Meter guidelines apply:  
1. Meters shall be one of the below named products:  
   - Onicon F-3100  
   - Approved equal (system 10 electromagnetic in-line flow meters, system with remote temperature detector)  
2. Meter shall be factory calibrated to NIST traceable standards, and shipped with applicable documentation.  
3. Digital Communication output protocol shall be BACnet or FOUNDATION fieldbus (HART for device commissioning).  
4. Output shall communicate directly with the BAS with integrators.  
5. Meter output LCD display shall be mounted amount 5’-0” above finished floor so it is readable from a standing position for most persons.
Chilled Water BTU (British Thermal Unit) Meters (continued)
6. Meter accuracy shall be +/- 0.4% of reading from 3.3 to 33 ft/sec, +/- 0.8% of reading from 1 to 3.3 ft/sec and +/- 0.0075 ft/sec at flows less than 1 ft/sec.
7. Minimum installation clearance shall be no more than 3 pipe diameters upstream, and 2 pipe diameters downstream.

23.50 Meters

Potable Water Flow Meters (continued)
All new buildings shall have meters installed at the main potable water supply where it enters the building. The following guidelines apply:
1. Meters shall be one of the below named products:
   - Onicon F-3100 BTU
   - Approved equal (system 10 electromagnetic inline flow meters, system with remote temperature detector)
2. Meter shall be factory calibrated to NIST traceable standards and shipped with applicable documentation.
3. Digital Communication output protocol shall be BACnet or FOUNDATION fieldbus (HART for device commissioning).
4. Output shall communicate directly with the BAS with integrators.
5. Meter output LCD display shall be mounted amount 5’-0” above finished floor, so it is readable from a standing position for most persons.
6. Meter accuracy shall be +/- 0.4% of reading from 3.3 to 33 ft/sec, +/- 0.8% of reading from 1 to 3.3 ft/sec and +/- 0.0075 ft/sec at flows less than 1 ft/sec.
7. Minimum installation clearance shall be no more than 3 pipe diameters upstream, and 2 pipe diameters downstream.

23.57 Heat Exchangers

It is mandatory to use 316 stainless steel plate and frame heat exchangers.
## Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

### 23.65 Cooling Towers

Cooling towers shall be made of 316 stainless steel construction for the tower and basins, and provide meter on make-up water. Acceptable meter manufacturers by the City of Richmond are the following:

- Sensus
- International
- Neptune Meter Company
- Hersey Meter Company
- Badger Meter Company

They shall provide access for safe, routine maintenance for the cooling towers. Cooling towers shall be made of 316 stainless steel construction for the tower and basins, and provide meter on make-up water. Acceptable meter manufacturers by the City of Richmond are the following:

- Sensus
- International
- Neptune Meter Company
- Hersey Meter Company
- Badger Meter Company

They shall provide access for safe, routine maintenance for the cooling towers.

The impact of cooling tower fan noise on the surrounding area shall be considered in the selection of the fan and shroud. To minimize the noise impact on surrounding areas, a low noise type of fan and or fan shroud shall be specified when necessary.

The pipe and valve controlling the make-up of the cooling tower shall be sized by the engineer, and located at or within 5’ of the cooling tower. Mechanical float type make-up control shall be preferred over electronic sensor types. This make-up to the cooling tower shall be in addition to hose bibs required for roof service. Cooling towers shall be

*Last Updated August 1, 2017*
### Division 23: Heating, Ventilation, & Air-Conditioning (HVAC)

#### 23.65 Cooling Towers

<table>
<thead>
<tr>
<th>Description</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Towers</td>
<td>Selected using an 80° F wet bulb temperature. Towers using belt drives for their fans shall have provision for shielding the belt from the wet air stream.</td>
</tr>
<tr>
<td>Electric Motors</td>
<td>Electric motors shall be of the TEFC or Totally Enclosed Air Over (TEAO) types. ODP motors are not acceptable. All disconnecting means and electrical control cabinets and enclosures related to the cooling tower and located outdoors, shall be of type by National Electrical Manufacturers Association (NEMA) 4X. All outdoor wiring related to the cooling tower shall be in either rigid conduit, or liquid tight flexible conduit. All cooling tower sumps shall be equipped with sump heaters to prevent freezing. Exterior condenser water lines shall be insulated and heat traced as well.</td>
</tr>
</tbody>
</table>

**Cooling Tower Sub-Meters:** Please utilize the link below to the City of Richmond’s Department of Public Utilities website to direct designers to the design requirements: [http://www.richmondgov.com/dpu/documents/DPUForm_CoolingTowerSub-MeteringPermit.pdf](http://www.richmondgov.com/dpu/documents/DPUForm_CoolingTowerSub-MeteringPermit.pdf)

End of Division 23
## Division 25: Building Automation System (BAS)

### 25.0 General

**Uninterruptible Power Supply (UPS)**
An Uninterruptible Power Supply is required for each Network Area Controller with a minimum of 15 min. battery time. This UPS shall be powered by the building emergency power system with a dedicated circuit breaker.

This is not a life / fire safety issue, or even a comfort issue since heating and cooling will be off in a power outage, but it is difficult, complex, and time consuming for Physical Plant to reset a controller in the event of a power outage.

**Building Automation System**
This standard applies to all new construction, all mechanical / electrical infrastructure renovation and replacement projects, and all major renovation projects. For smaller renovation projects, the VCU Project Manager shall evaluate the feasibility of system change-over on a case-by-case basis with Physical Plant Utilities. These guidelines apply:

1. The following are the only acceptable manufacturers:
   - Johnson Controls (Metasys)
   - Automated Logic (WEBCTRL)
   - Siemens (Apogee)

2. All materials shall be new, the best of their respective kind, and shall consist of the manufacturer’s latest technology at the time of equipment submittal. All materials shall be undamaged.

3. The supplier shall provide laminated control drawings, including system controls schematics, sequences of operation, and panel termination drawings for major pieces of equipment. Terminal unit drawings shall be located in the central plan equipment panel, or mechanical room panel. The drawings shall accurately record the actual controller programming and settings at the time of occupancy for the building.

4. For spaces that house animals, the BAS shall monitor and record at a minimum temperature, humidity, lights (on/off), and air pressure of space, to building reference point showing positive or negative.

In a letter dated April 13, 2016, Richard F. Sliwoski, VCU Associate Vice President for Facilities Management, authorized use of three acceptable suppliers (vendors named in Item 1) for new construction and major renovations.
### Division 26: Electrical

#### 26.0 General

**Codes**  
Comply with requirements of the National Electric Code (NEC) NFPA 70E, edition currently incorporated by reference into the VCC.

**Basic Electrical Installation Requirements**  
- No shared neutrals  
- No cut bushings  
- All conduits 4” and larger shall be bushed  
- Branch wiring, including neutral wires, shall be labeled on each end.  
- Parking Decks are considered exterior applications.

**Electric Motors**  
Integral horse power electric motors shall have TEFC premium efficiency. ODP motors are not acceptable.

#### 26.5 Conductors & Cables

Conductors except grounding wires shall be stranded.

Branch circuits shall be a minimum size of #12 AWG (American Wire Gauge), unless used for control wiring.

Conductors shall be copper, typical. Aluminum conductors are not acceptable.

All branch circuits shall have a separate equipment grounding conductor.

Raceways used in lieu of separate grounding conductors are not acceptable.

#### 26.9 Instrumentation & Controls for Electrical Systems

Lighting shall be controlled by and integrated with the BAS.

Provide photocell circuit control for exterior lighting.
## Division 26: Electrical

### 26.9 Instrumentation & Controls for Electrical Systems

Provide occupancy sensor (motion sensor) control for classrooms and conference rooms, and similar shared space lighting.

Use of mechanical time clocks for lighting control is prohibited.

Fluorescent fixtures controlled by dimmer devices shall be burned in for a minimum of 100 hours at full capacity prior to being dimmed.

Dimming devices shall have a range of 1 to 100% dimming capacity.

**Communications Interfaces**

Provide Modbus / LonWorks communication interfaces for the following:

- Generators
- Transfer Switches

**Coordinate functions (points) required to be monitored and or controlled with the VCU Project Manager and A/E.**

### 26.20 Low-Voltage Electrical Transmission

**Building Electrical Systems - General**

- The preferred distribution voltage inside structures of 5000 square feet or larger shall be 480 / 277V Wye 3 phase.
- Where 120 / 208V 3 phase or 120 / 240V single phase is required, it shall be supplied by means of step down transformers.
- Installer shall properly torque all factory connections within panels, distribution panels, switchgear, and motor control centers.
- Multiple single pole breakers shall not be used for multiple pole applications.
- Engrave label attached with screws on each panel and disconnect shall be provided.
- Information on label shall include the electrical feed origin of the panel / disconnect.
- Distribution panels for lighting and power shall include a minimum of 30% spare capacity and spaces for future use.
### Division 26: Electrical

#### 26.20 Low-Voltage Electrical Transmission

**Building Electrical Systems - General (continued)**
- Electrical distribution panel covers shall be of hinged type for access.
- Service entrance switchboards shall have provision to attach an external generator of a size sufficient to power the entire building.

**Wiring Devices**
- Ground pigtails shall be used to ground devices to equipment grounding conductor.
- Devices shall not be used to continue circuit feed to other devices.
- Pigtails and joints shall be used to continue circuits to feed other devices.
- All receptacles shall be rated 20 amp minimum, and shall be commercial specification grade in commercial applications.
- All receptacles shall be labeled with a panel number and a circuit number.
- All switches shall be rated 20 amp 120V / 277V, and shall be commercial specification grade in commercial applications.
- Enclosures for motor starters, control cabinets, or other device enclosures used where they may be subject to any overhead leaks, flooding, or infestation by vermin or wildlife, shall be a NEMA 4X enclosures at outdoor locations and NEMA 4 at indoor locations.

See picture below:
### Design & Construction Standards

#### Division 26: Electrical

#### 26.20 Low-Voltage Electrical Transmission

**Standby Generators**

All new buildings shall have a standby generator with a fuel source approved by the VCU Project Manager. The following guidelines apply:

1. Emergency power systems shall have two sources of power:
   - Normal
   - Standby back-up connected with an automatic transfer switch

2. The list of items to be connected to the standby generator includes, but are not limited to:
   - Fire alarm detection
   - Alarm systems
   - Emergency Egress and exit lighting
   - Public safety and voice communication systems
   - Fire pumps
   - At least one elevator

3. If the building code requires other items to be connected, they shall be connected per Virginia Construction Code.

4. Standby power must be available within 10 seconds of failure of the normal power supply.

5. The standby power supply shall be available for operation of the rated loads for a minimum of 24 hours without refueling.

6. The standby power generator shall have programmable logic controller mounted on the unit, and shall interface with the Building Automation System using BacNet protocol.

**Gas fired standby generators may be acceptable, but must be on uninterruptable service. Care should be taken to verify that the City has adequate capacity to feed new buildings. In one instance, the start-up of one of VCU’s generators depleted gas feeds to nearby residential customers.**

**Diesel generators may be acceptable, but VCU’s air permit limits the amount of exhaust we can generate. Therefore low or no emissions diesel generators must be used.**

**Diesel Generators**

Warranty period stating dates and warranty contact service information shall be clearly labeled next to generator data plate. Data plates should be engraved in metal and also:

- Shall be capable of power transfer within 10 seconds of power failure.
- Shall be tested at the factory and on-site, to ensure that all devices shall be standby duty rated for the specified load including radiator fan and all parasitic loads. The generator should be sized to operate at the specified load at a max ambient of 77°F, and altitude of 500 feet.
## 26.30 Facility Electrical Power Generation & Storing Equipment

**Diesel Generators (continued)**

and auxiliary equipment work and that the automatic operation of the system is functional.
- The door to the room where the generator is located shall be labeled “Indoor Installations”.
- The training date and the startup date should be the same date.
- The generator should have a remote fill indicator for indoor installations 80%, and 90%.

A minimum warranty shall be five years from the date of acceptance by Owner against defective parts and or workmanship, and shall provide parts and labor to fulfill this warranty at no cost to the Owner. Preventive maintenance shall be required the first year of the warranty period.

Diesel generator units shall be provided with the following:
- Modbus / LonWorks communications interface
- Battery powered 24V / 12V lighting in walk-in units
- Access platforms for units higher than 24” above finished floor
- Sound attenuated enclosures on all enclosed machines
- Spare filters included with each machine
- “Algae-X” type recirculating fuel filter systems on all units
- External load bank / tap 4X cabinets for all installs that can connect to a temporary remote generator set, or a load bank to test the existing installed generator set.
- Sight glass on radiator
- Common fault from the generator must go to fire alarm panel.
- Generators must have shunt trip breakers.
- Global reset for enunciator panel.
- Enunciator panel must be located adjacent to fire alarm panel, and must mimic the generator panel (example: if the generator panel is alarming the enunciator panel, it must also be in the alarm).
- If enunciator panel lights are present, they must be in operation when there is an option to be connected.
- Generator must have sufficient flow from front to back for cooling.

VCU uses a third party to monitor its’ generators, and report to the appropriate responsible parties when generators must come online in actual emergencies. To facilitate this monitoring, the generators must have two sets of contracts and the automatic transfer switches must have a set of contacts dedicated to this cause. The two sets of contracts for the generator are for general fault status and run status. The set for the automatic transfer switches is to prove that it has transferred.
### Division 26: Electrical

#### 26.30 Facility Electrical Power Generation & Storing Equipment

- All normal automatic transfer switch breakers must be located in main switch gear room.
- If the generator has louvered openings with control dampers for intake and exhaust, they must be fail open and powered close.
- One spare set of fuel and air filters turnover.
- Pad lock latches must be on generators.

Provide sufficient on-site fuel capacity to operate diesel generators for a minimum of 24 hours at full rated load.

#### Transfer Switches

Provide units with the following features:

- Full control display pads (start, stop, test)
- Modbus / LonWorks communications interface
- Maintenance bypasses for automatic transfer switches are greater than 200 amp.

#### 26.50 Lighting

Preferred voltage is 277V for lighting in structures larger than 5,000 ft².

Provide LED fluorescent, low mercury content lamps, typical.

Fluorescent lighting shall have a color temperature of 5000 K. Other colors may be used with approval when necessary.

Unless specifically required for a special purpose, do not use incandescent or halogen lamps.

Provide LED lighting for all exit signs.

Arrange and locate fixtures for easy accessibility for maintenance purposes.

All Exit Lights containing radioactive material (tritium) shall not be used on any VCU project.

End of Division 26
## Division 27: Communications

### 27.0 General

**Media Support Spaces**
- Programming and Schematic design shall meet the requirements established through the Project Manager and VCUAIT (Virginia Commonwealth University Academic Information Technology). VCUAIT equipment rooms shall be dedicated for information technology, and telecommunications use (telephone, data, etc.).
- Be within 295 feet of cable run distance from the most remote site.
- Must have lockable doors.
- HVAC capacity to maintain ambient room temperature over the range 50 - 85°F, 30 - 75% relative humidity (non-condensing), positive pressure with air exchange sufficient to dissipate heat generated by equipment.
- Fire treated 3/4” plywood from floor to 8” - 0” above finished floor.

### 27.5 Distributed Communications & Monitoring Systems

**Alertus Devices**
- Provide Alertus Devices in all classrooms with 20 or more seats.
- Devices will be wall mounted at the front of the classroom area near the whiteboard, or other “front” location in the room.
- Devices require network and electric power connections. Network needs will be determined by Technology Services with Project Manager and coordinated with through Physical Plant.
- Device must be installed with a “VCU Alert!” emergency sign.

**ERTZ Emergency Response Phones**
ERTZ phones are to be provided at parking areas and main entrances for each building. Each ERTZ phone requires both electrical power and phone connections. These requirements should be planned as part of the project to avoid surface mounted conduit.

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**Reference**
- *Alertus Alert Beacon Unit Installation Instructions document in “Division 27 Communications”.*
- *Confirm type of phone connection, Voice over Internet Protocol (VoIP) or analog, required for installation location.*
Alertus Alert Beacon Unit Installation

Installation Overview
1) Determine desired mounting location
2) Determine power source
3) If necessary, install electrical box / wire mold to supply power to the Alert Beacon
4) Affix mounting bracket to the wall
5) Connect power / cables to the Alert Beacon
6) Set DIP switches, if applicable
7) Record the Unit ID and location description
8) Snap the unit into the mounting bracket
9) Test the unit

This guide provides typical installation instructions. Please bear in mind that building codes vary and the technician installing the Alert Beacon units is responsible for compliance with any relevant codes.

General Mounting Guidelines
Recommended locations for installing Alert Beacon units include:
1) Heavily trafficked building corridors
2) Lobbies and points of egress
3) Administrative desks

For optimal coverage, each hallway and common area should contain at least one unit. Suggested mounting height is 48" above the floor, in accordance with accessibility recommendations.
Power Options

The Alert Beacon units can be powered by 12-24 Volts AC or DC, or by Power over Ethernet (PoE). The rear mounted, optional, NiMH rechargeable batteries serve as a back up in the event of a power outage. Note that due to the multitude of power options, Alertus does not include any power supplies with the Alert Beacons.

DC (not recommended for wall-mount installs): The most straightforward way to power an Alert Beacon is through the use of a plug-in DC power supply (commonly known as ‘wall-warts’). These supplies connect to the barrel plug on the back of the unit, as shown in Figure 2. This is most appropriate when the unit will not be mounted on a wall. DC output must be between 13.4V and 24V, with a capacity of at least 400mA. The barrel plug is 5.5mm x 2.5mm. Alertus recommends Digi-Key part #271-2574-ND.

DC power supplies are not suitable for all installations, however. They have a limited cable length, and the type of wire is not meant to be run inside walls. For mounted installations, an AC transformer is a better option.

AC transformer: Using an AC supply allows for a customizable cable length, and (when using plenum-rated cable) wiring can be run inside the wall. An AC transformer with an output between 13.4V and 24V is required. The installation details depend on the type of location.

Optional Backup Batteries: The Alert Beacon can use 6 standard ‘AA’ sized Nickel-Metal Hydride (NiMH) rechargeable batteries. Alertus recommends the use of batteries equivalent to Panasonic battery model HR-210AAC4B. IMPORTANT: DO NOT USE NON-RECHARGABLE BATTERIES (i.e. alkaline batteries) as this may result in hazardous conditions, damage to the beacon hardware, and/or personal injury. Batteries are not provided by Alertus unless specifically ordered.
Install location with a drop ceiling: the preferred method is to install an electrical outlet in the ceiling, and use a plug-in AC transformer (e.g. Mouser Part # 507-XT2420, or AllElectronics Part # ACTX-2420). This presents a number of advantages:

- Plug-in transformers include a locking screw to prevent accidental unplugging.
- Power can be disconnected without needing to turn off the mains; simplifies maintenance (i.e. if power supply needs to be replaced)
- The power supply for an external siren or strobe can be connected to the second outlet, providing for future expansion.

AC plug-in transformers do not come pre-wired, so it is necessary to obtain crimp-on spade lugs for the transformer connection, a compatible "Euro-block" style connector (Digi-Key Part # ED2779-ND or ED1701-ND) for the Alert Beacon connection, wire strippers and an appropriate crimp tool. See the section on "Connecting Power", below.

Install location without a drop ceiling: This typically requires a standalone step-down transformer. These are often slightly more expensive than the plug-in type, and are more complicated to install. However, this method is sometimes necessary if there is no place to install an outlet, or for aesthetic reasons. While a full install procedure for a hardwired transformer is beyond the scope of this document, the following are some UL-approved models known to function well with the Alertus Alert Beacons:

- Foster Transformer, Model 15343
- Grainger Item #6WLU91 (fits inside a deep double-gang box)

The sample photos at the end of this document illustrate examples of installations using hardwired AC transformers.

Power-over-Ethernet: If the Alertus System is being deployed using Ethernet communications, a third option is to use Power-over-Ethernet (PoE). This minimizes the necessary wiring, but requires PoE-capable network switches (or in-line power injectors.) The Alert Beacon is a Class 0 PoE device; it typically draws approximately 10 watts of power.

See the Alertus Support page at http://support.alertustech.com/wiki/Power_Over_Ethernet for more info.
Mounting Options and Accessories

Select a suitable mounting option from the three options below. Installation examples of each mounting option are provided at the end of this manual.

Flush Mount Bracket
The low-profile flush mount bracket is included standard with every Alert Beacon. By itself, this bracket is suitable for mounting the unit on drywall, or anytime the power cables can be run inside the wall. It attaches directly to a double-gang electrical box using 2 to 4 #6-32 screws. Note that the box must be recessed into the wall; if this is not an option (i.e. on masonry walls) then the additional Surface Mount Adapter should also be used.

Surface Mount Adapter
If it is not feasible to recess the electrical box inside the wall, then a Surface Mount Adapter may be required. This extension combines with the standard Flush Mount Bracket to increase the total depth, allowing the Bracket to mount on a double-gang surface mount Wiremold box. The inner rim of the Surface Mount Adapter has punchouts on the top and bottom to allow cable entry via Wiremold conduit.

If you have received a Surface-Mount Adapter as part of a first article kit, please note that while there is no additional charge for these parts, they are not included unless requested. If you have determined that your installation will require Surface Mount Adapters, please make your sales representative aware of the quantity you would like to receive.
Wire Desk Stand
The desk stand provides a simple and easy option for deploying Alert Beacons at administrative desks or in offices, as well as in temporary locations. Other stand options are also available; contact Alertus for details.

Optional Accessory: Wire Guard
To protect against theft, vandalism, or accidental damage (in locations such as a gymnasium) Alertus offers a wire guard cage as an optional accessory.

Mounting the Bracket
The procedure for attaching the bracket depends on the bracket type.

Flush Mount Bracket
The low-profile, "Flush Mount" bracket is designed to mount to a standard double-gang electrical box. The box should be installed as normal, i.e. recessed into the wall so that the mounting tabs are flush with the wall surface. All required wiring should be run into the box before proceeding.

Once the box is securely mounted to the wall, attach the flush mount bracket using 2 to 4 #6-32 screws (1 ½” length suggested.) The inner-most holes on the bracket should line up with the appropriate holes on the double-gang box. Figure 3 shows an installed Flush Mount bracket.
Surface Mount Bracket
The Surface Mount bracket mounts to a "shallow" surface-mount receptacle box such as Wiremold part #V5747-2, as shown in Figure 4. #6-32 screws (1 ½" long) are required. The inside of the bracket includes prefabricated punch-outs for a variety of wiring conduit sizes, allowing connections from the top or bottom.

Connecting Power to the Beacon
After determining the desired mounting option, the next step is to make the power connections. Select the procedure appropriate for the chosen power source.

Connecting DC Power
The Alert Beacon can operate on DC power from 13.4V to 24V, and requires a maximum of approximately 15W. The required barrel plug dimensions are 2.5mm inner diameter and 5.5mm outer diameter. To use DC power, simply connect the barrel plug to the appropriate jack on the Alert Beacon, as shown in Figure 2 (see page 2 of this guide.) After connecting power, proceed to the next section to select the appropriate DIP switch settings.

(Note: While it is possible to use a DC adapter for a wall-mount installation, this is not recommended. If 13.4V-24V DC is available, it can be connected using the Auxiliary Port connections similar to the AC power connection method described below, although care must be taken to observe the proper polarity.)

Connecting AC Power
AC power connections are made through the Alert Beacon's Auxiliary Port (green Euroblock connector.) Either a 12-position or 2-position plug can be used (typically, Alertus will ship a 2-position plug with the Alert Beacon when the customer is using AC power.) Make the connections according to the procedure below.

For more information on the specifications and pinout of the Auxiliary Port, refer to the Alert Beacon Manual page on the Alertus support site at http://support.alertustech.com/wiki/Beacon_Manual

1) Attach one end of a two-conductor cable to the AC power source. Refer to the Power Options section on page 2 for a list of suitable AC transformers, if required.

2) Strip the wires carrying the low voltage AC power and insert them into the terminal block plug, as shown in Figure 5 (above.)

3) Insert the plug into the terminal block on the back of the Alert Beacon.
The Alert Beacon should now be receiving AC power. Proceed to the next section to select the appropriate DIP switch settings.

**Connecting Power over Ethernet (PoE)**
When using PoE, the only required connection is the data/power cable from the PoE data equipment. Use Category 5e or Category 6 cabling, with standard RJ-45 connectors. After connecting the cable as shown in Figure 6, proceed to the next section to select the appropriate DIP switch settings.

**DIP Switches**
Certain aspects of the Alert Beacon’s behavior can be configured using DIP switches, located on the back of the unit as shown in Figure 7.
The switches are numbered from 1-3, and function as follows:

- **DIP1** – Set to ON for Low Power Siren mode. This limits the maximum siren intensity and should be set when the Alert Beacon is installed in small or enclosed areas.

- **DIP2** – Set to ON to allow the siren to be muted by pressing both front buttons. This is NOT recommended when installing in public areas! It is intended for use when the unit is installed in an administrative office (such as a police dispatch center) where continued siren operation may interfere with emergency response operations.

- **DIP3** – Reserved for future use. This switch should remain set to OFF.

**Power Switch**
The last step before attaching the Alert Beacon to a Mounting Bracket is to set the Power Switch to ‘ON’
Attaching an Alert Beacon to the Mounting Bracket

Once all required connections have been made and the appropriate DIP switches have been set, attached the unit to the mounting bracket using the following procedure:

1. While tilting the Alert Beacon towards the bracket as shown, attach the clips on the top rear under the slots on the bracket.
2. Once the top clips are in place, rotate the bottom edge of the unit towards the bracket while continuing to apply slight upwards pressure.
3. After the Alert Beacon is fully aligned, apply firm pressure towards the wall until the unit is caught by the retaining clip. Ensure that the clip is holding the unit securely.

**Security Screws**

While the standard mounting bracket provides sufficient attachment for most locations, the bottom of the bracket also includes threaded inserts for security screws. These can be installed as a deterrent to accidental or malicious removal of the unit, or to provide additional tamper protection for units in isolated areas. These inserts require pan head #6-32 screws, 3/8" long (screws over 1" long may interfere with the electrical box.) For additional security, use tamper-proof screws such as the #6 spanner head (Screws and driver available from McMaster-Carr: P/N 94066A151 (screws) and 94062A114 (driver.).) Note: Alertus does not include screws for this purpose due to the wide variety of tamper-proof screw designs on the market, and the fact that many organizations already have a preferred bit/driver type.

**Post-Install Tasks**

In order to properly configure the localized notification capabilities of the Alertus Notification system, administrators must have a record of the Unit ID and location of each Alert Beacon. Alertus provides Alert Beacon Install Logs for this purpose.

After completing an installation, record the 4-digit Unit ID (found on the white label on the rear of the unit, highlighted in Figure 8) and a short description of the unit’s location, such as “Mathematics Building, East hallway near lobby” or “Smith Dorm, near main entrance.”
Removing an Alert Beacon

The release mechanism operates similar to a standard fire alarm. To remove an Alert Beacon, first remove the security screws (if applicable.) To release the retaining clip, insert a small flat-head screwdriver (or similar tool) into the slot on the bottom of the Alert Beacon housing. Press gently but firmly until the clip releases; continue to hold the clip while tilting the Alert Beacon upwards out of the mounting bracket. The stages of the release procedure are illustrated in the images below.
Example: Flush Mounting (Hardwired AC transformer, FM Datalink)

1. Hardwired a step down transformer in a double gang electrical box.

2. Drilled holes in faceplate for wires to come through. Two screws hold the face-plate and two screws secure the mounting bracket (next photo).

3. Installed mounting bracket onto double gang box with the transformer located inside.

   (Note: The unit in this example received data over a wireless FM datalink; the green wire on the right was an antenna.)
Example: Surface Mounting (Hardwired AC transformer, FM Datalink)

1. 120VAC from a nearby emergency exit sign was brought into an electrical box installed above the drop ceiling.

2. 500 Series Wiremold was brought down from the electrical box.

3. A Wiremold double-gang surface mount box was installed.

4. The Surface Mount Backplate screws into the Wiremold box.
Example: Surface Mounting (Ethernet Datalink, with PoE)

1. 500 Series Wiremold installed with Cat6 Ethernet wiring inside.
2. Surface Mounting Bracket attaches to junction box (as above.)
3. Cat6 cable linked to appropriate PoE-enabled port in local wiring closet.
Alertus Alert Beacon Unit Installation Instructions

Appendix: Dimensional Drawings

Alert Beacon, front view
Alertus Alert Beacon Unit Installation Instructions

Flush Mount Only

6.14" 156mm

0.75" 19mm

End of Division 27

Last Updated August 1, 2017
### Division 28: Electronic Safety & Security

#### 28.0 General

**Access Control Coordination**
- A/E shall meet with the VCU Physical Plant Access Control Shop, and in consultation with the VCU Police and the VCU Lock Shop, to coordinate the access control system installation with the construction documents.

**Note to A/E:** If unable to arrange necessary meetings within a reasonable period of time, notify VCU Project Manager to request assistance, and if necessary an appropriate extension of time.

**A/E Responsibility**
- A/E shall be responsible for all the hardware coordination.
- A/E shall be responsible for specifying all access control system pathways, conduit, access control and CCTV.
- A/E shall be responsible for coordinating the requirements from the access control coordination with VCU, and specifying them on the construction documents.

**Access Control Security Closet**
- Provide an access control and security closet for all new construction projects, separate from other required communications and data closets. The closet shall be a minimum of 6’ x 4’. Full height 3/4” fire-rated Oriented Strand Board (OSB) shall be installed on all 3 walls. Conduit size shall be 3/4” minimum or larger, as required per the access control coordination.
- HVAC capacity to maintain ambient room temperature over the range 50 - 85°F 30 - 75% relative humidity (non-condensing), positive pressure with air exchange sufficient to dissipate heat generated by equipment.

#### 28.1 Electronic Access Control & Intrusion Detection

**Access Control System**
- An access control system will be included in each new construction project and designated renovation projects.

_Last Updated August 1, 2017_
### Division 28: Electronic Safety & Security

#### 28.1 Electronic Access Control & Intrusion Detection

**Access Control System (continued)**
- The access control system shall be powered by emergency power or standby generator, if available. Number of circuits will be determined based on equipment requirements provided by VCU. Sharing of neutral wires will not be allowed.
- Web-based access control programs shall be password protected.
- VCU Access Control Shop shall be involved in the testing of the Access Control System.

#### 28.2 Electronic Surveillance

**Closed-Circuit Television (CCTV) System**
- VCU may provide a CCTV system in areas it deems appropriate.
- A/E shall meet with the VCU Police and the VCU Access Control Shop to coordinate the CCTV system installation with the construction documents.
- The access control system shall be powered by emergency power or standby generator, if available. The number of circuits will be determined based on equipment requirements provided by VCU. The sharing of neutral wires will not be allowed.

#### 28.3 Fire Detection & Alarm

**Fire Alarm Standards**
- Fire alarm systems must meet code minimums. ANY design that goes beyond the code minimum must be signed off on by VCU prior to approval.
- All fire alarm systems must be fully addressable.
- All fire alarm systems must transmit alarm and trouble signals to the central monitoring station immediately.
- All Fire Alarm Control Panels (FACP) must be located near the main entrance to the building.

*See “Division 21 Fire Suppression” section for fire sprinkler system standards.*
### Division 28: Electronic Safety & Security

#### 28.3 Fire Detection & Alarm

**Fire Alarm Standards (continued)**

- All fire alarm systems with an annunciator panel must make sure that the annunciator panel is fully operational.
- Smoke detectors are not to be installed in mechanical rooms, electrical rooms, transformer rooms, telephone equipment rooms, or similar rooms that are protected by an approved sprinkler system.
- Unless otherwise specified by the code, all buildings will have partial coverage fire alarm systems. (ex: R use group)
- When mounted above the ceiling, duct detectors must have a keyed remote indicator mounted below the ceiling.
- Use ceiling mounted horn / strobes when code allows.
- The University has four acceptable fire alarm manufactures:
  - Siemens
  - Simplex
  - Notifier
  - Firelite
- The A/E consultant shall specify that a pre-programing meeting be held with the fire alarm system installer, the VCU Project Manager, and the VCU Fire Safety representative.
- For complex applications, VCU may require the Contractor to mock-up the fire alarm system in their shop to verify ahead of time that the installation will meet VCU needs.
- Install dual lock Knox boxes on outside of building at main entrance. The dual lock Knox boxes must be tamper resistant, and be in the 4400 Series.
- Do not mix old fire alarm systems with new fire alarm systems; only one FACP per building.

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*VCU has had problems with the integration of fire alarm systems in the past, even if they are from the same manufacturer. These problems are due to the programming of the system when it is installed. By having VCU Fire Safety personnel present at the pre-programming meeting, we can ensure integration.*

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End of Division 28
32.8 Irrigation

Irrigation - General
• Irrigation equipment shall be:
  - Hunter
  - Rainbird
  - Toro
  - or equivalent.
• Plans for all landscape and irrigation designs shall be reviewed and approved by VCU Facilities Management - Physical Plant Grounds Supervisor.
• All commercial lawn irrigation systems shall require a pressure backflow preventer 12” above ground, and comply with water supply utility or authority requirements.
• All landscaped areas in new construction shall require irrigation systems.

End of Division 32