

2023

Capital Design
and Construction
Department

LONGWOOD
UNIVERSITY



Design Guidelines And Construction Standards

May 1, 2023

(B L A N K)

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I. DESIGN GUIDELINES

A. Introduction

Evoking respect, inspiration, admiration and excitement, the quality of exterior and interior architectural design is part of Longwood University's tradition. Structures that speak clearly to this quality are located along High Street in the historic northeast quadrant of campus and have solid ties to the original campus fabric. Respect for these structures should be maintained with each new building's design and siting, making reference to the scale, proportion, historical character, and quality of construction. It is also Longwood University's intent for the campus to remain residential in nature, evolving more fully into a pedestrian campus that encourages and engages human interaction. With each new building project, opportunities to create common areas and gathering spaces should be explored. Also, to further enhance the pedestrian experience, vehicular access ways and core campus parking should be minimized and greened appropriately through the use of traffic islands, traffic circles, and raised medians. Sustainability will have a part in the Longwood University experience. At freshmen orientation, students are introduced to the important role sustainability plays in today's environment. To foster this learning experience each new building, building renovation, and other program or process which affects the campus environment will speak to that effort by implementing the most current standards.

B. General

It is Longwood University's intent to maximize the design potential of each campus building project in terms of accommodating the programs to be served, fostering collegiality on the campus, and contributing to the public realm that defines the Longwood University campus as a unique place. Achievement of the programmatic goals for each project dictates that the design must cost-effectively overlay the specific, user-generated objectives for the project with Longwood University's goals of institutional identity, durability, longevity, flexibility, sustainability, and adaptability. Each project must, in the interest of fostering collegiality, create environments that encourage interaction and discourse among students, faculty, and staff. This potential should be recognized in the development of both interior and exterior environments. Each project also has a responsibility to the greater whole of the campus, both as an entity in itself, and as part of a thriving community. This responsibility to the public realm recognizes the importance of the architectural and planning traditions at Longwood University and strives to contribute to the further development of the campus as a highly imaginable, unique, and inspiring environment.

To achieve these goals, it is incumbent on the project design team to enable an understanding of not only immediate program goals, but also of the planning and architectural history of the campus, and the goals and objectives set forth in the [Longwood University 2025 Campus Master Plan](#).

C. Sustainability

In order to incorporate sustainable design solutions in new construction and renovation projects, Longwood University desires to follow the guidance of the LEED™ (Leadership in Energy and Environmental Design) Building Rating System during the design process. The pursuit of high performance, energy efficient, and environmentally sensitive “green” buildings will help to lower operating and energy costs, improve employee productivity, promote improved learning, and enhance the health and well-being of the students, faculty, and staff. Longwood’s goal is to obtain at least LEED Silver certification of all major construction and renovation projects. Construction designs shall comply with the Commonwealth of Virginia [Construction and Professional Services Manual](#) (CPSM) Chapter 6, High Performance Buildings Act section. All projects will address sustainability in the areas of site selection and planning; construction material use, recovery, and re-use; and energy and water efficiency. Several common sustainability capabilities unique to Longwood University are use of renewable energy, availability of the Farmville local bus system, and an integrated campus-wide approach to vehicle parking.

D. Accessibility

Longwood University’s policy is to create learning and working environments that will engender participation by all persons who visit, attend, and work at the University. Universal design that incorporates access for all persons should be a primary planning criteria. Accessibility standards should be included in the initial planning of all new facilities, not as an afterthought during a code review.

E. Character

The architecture at Longwood University generally expresses an ordered, traditional theme, drawing from a legacy of Palladian and Jeffersonian architecture in the historic northeast district of campus. All new buildings should reflect the character of Longwood University as an institution with a rich past, vibrant present, and promising future. Buildings should extend and enhance the underlying planning and architectural strengths of the campus. New buildings should balance individual expression with contextual sensitivity. Program, site, and budget parameters should all be addressed in an integrated fashion.

F. Sites and Entries

Buildings should be sited to reinforce and enhance the spatial structure of the campus and its circulation patterns. Building entries should be clear and coordinated with circulation patterns and landscaping elements. Ground level uses should consider the harmony of interior and exterior activities.

G. Massing and Design Efficiency Rating

Massing should be appropriate to the campus precinct in which the new building will be located. Buildings should be tall enough to define adjoining spaces. Bays, porches, towers, and other minor adjustments to massing are encouraged. Design efficiency ratings (see [CPSM](#)) should avoid the irregular categories as much as possible.

H. Exterior Spaces

When considering placement of new buildings, relationships to adjacent structures should help form new green spaces and appropriately sized quadrants. Efforts should be made to create exterior gathering and collaborative spaces that encourage interaction among students, faculty, and staff.

I. Roof Forms, Lines, and Silhouette

Well-developed and articulated rooflines are encouraged. Sloped roofs and flat roofs are both acceptable. Sloped roofs should be of high quality, factory finished metal. Visible roof areas must be as carefully designed as any other exterior surface of the building. It will be necessary for designers to explain all aspects of their design selection including material, color, patterning, and other details. Parapets should be well articulated. Profiles, scuppers, and other ornamental devices are acceptable and encouraged. Dormers and pediments are also acceptable and encouraged, as are cupolas, chimneys, and other traditional roofing embellishments. Their intersection with the main roof must be well detailed. These elements should not be viewed purely as ornamental elements without functional attributes. Mechanical equipment on rooftops shall be screened to prevent being seen from the ground.

J. Façades

Façades should be well-ordered. General fenestration patterns should be regular. Some vertical hierarchy is appropriate. Window openings should be subdivided to create a vertical proportion where they form horizontal groupings. The use of bays, giant order elements, or special accents to provide a large overall order is acceptable and encouraged. Special detailing materials at significant locations are acceptable and encouraged.

K. Architectural Details

Quoins, coping, string courses, and other traditional architectural details are acceptable and encouraged. The joining of dissimilar materials must be resolved carefully. Where possible, caulk joints should be placed in less visible locations such as inside corners or reveals. Careful attention should be given to design and construction of details to prevent water infiltration.

L. Masonry

Material selection should be made to reinforce existing campus patterns. Masonry design must comprehensively consider unit size, texture, color, mortar, and striking. Pre-cast concrete, poured-in-place concrete, cast stone, and GFRC may be proposed as alternatives to limestone trim. Color choices for brick must be coordinated with the existing campus and reinforce the overall campus design.

M. Exterior Doors and Windows

Wood, metal, and glass doors are all acceptable. Doors should have a quality and character appropriate to the overall façade. Vision panels are appropriate and encouraged. Window frames and glass should be set back appropriately. Sills and heads should be detailed to shed water and prevent unattractive weathering patterns.

II. GENERAL STANDARDS

A. Commonwealth of Virginia Standards and Procedures

1. General

The basic reference for all Commonwealth of Virginia construction policies, procedures, requirements, and standards is the [Construction and Professional Services Manual](#), (CPSM). Use of the term “CPSM” throughout this document refers to the most current edition of the CPSM published on the web site of the Virginia Division of Engineering and Buildings (DEB). The policies, procedures, and technical requirements stated therein are those of the Commonwealth of Virginia, and are to be used by state agencies for construction on property owned by the Commonwealth subject to any delegations and/or authorizations that may be in effect for a particular agency. If conflicts arise between the CPSM and this Longwood document, the CPSM will prevail.

2. The A/E Manual

Architects and Engineers must follow the policies, procedures, and guidance in the sections of the [CPSM](#) designated as the *Construction and Professional Services Manual for Architects and Engineers* (referred to as the A/E Manual) in providing services to state agencies in the planning, design, and execution of both capital outlay and non-capital outlay projects. The A/E Manual and all revisions thereto shall be incorporated into the “Contract Between the Owner and the Architect/Engineer.” Any deviation from the technical requirements will require a waiver from DEB. If conflicts arise between the A/E Manual and this Longwood document, the A/E Manual will prevail.

B. Space Planning

1. General

a. Space planning for Longwood facilities shall follow the guidelines contained in Section 6.1 of the [CPSM](#).

b. During the programming and schematic design phases, the Architect/Engineer shall document specific space allocations based on these guidelines and the requirements of the project in design. Following review and acceptance by the Building Committee, these space allocations will become the basis for the development of the project design.

2. Other Space Requirements

The following spaces should be incorporated into the design of new buildings to provide adequate services for the building occupants:

- a. Interior gathering and collaborative spaces that encourage interaction and discourse among students, faculty, and staff
- b. Space for recycling containers

- c. Housekeeping closets on each floor
- d. Utility and maintenance spaces or areas
- e. Restrooms
 - (1) Requirements for baby-changing facilities are contained in CSPM, Section 4.4.
 - (2) Gender-neutral restrooms will be considered for inclusion in new buildings.
- f. ADA Areas of Refuge
 - (1) As required by the appropriate building and fire codes
 - (2) At least one means of direct communication with the Longwood Police Department Emergency Communications Center shall be provided.
- g. IT equipment closets

C. Room Numbering and Data

1. Goals

- a. Identify rooms in a systematic way so they may be easily located by visitors to the building.
- b. Identify rooms for building occupants.
- c. Identify rooms for databases, state reporting requirements, and administrative identification (IT, Facilities, 911 emergency records, etc.).

2. Guidelines for Room Numbering

- a. Room numbers shall be determined and placed on building drawings during the Preliminary Design phase.
- b. Numeric designators shall be used for all discrete rooms, contiguous spaces, and suites. The same room numbering sequence should be used on all floors of the same building with lower room numbers at one end of the building and higher room numbers at the other end of the building. Even room numbers should be on one side of the primary hallway and odd room numbers on the other side in so far as possible. Ascending numeric designators shall be used starting with the floor of the formal building entrance. A designator of Ground (G) shall be used for the floor below the first floor if it has an on-grade building occupant entrance (e.g. G01). A designator of Basement (B) shall be used for the floor below the first floor if it is a subterranean floor (e.g. B01).
- c. Rooms in similar locations on different floors should have similar room numbers whenever possible so that room numbers are coordinated on a vertical as well as horizontal basis in the entire building. For example, rooms 115, 215, and 315 should all be located directly above or below each other or as close as possible to ensure ease of navigation.

d. All non-assignable rooms (including bathrooms, corridors, stairs, elevators, janitor closets, mechanical, and electrical rooms) should be denoted with alphas off of the adjoining hallway or suite (e.g. G01A).

e. A 3-digit room number should be used unless there are more rooms on a floor than this scheme will accommodate.

f. All interior rooms accessed from a primary room have an alphabetical character (“A”, “B”, etc.) following the primary room number. Alpha designators shall ascend in a logical flow, clockwise or counter clockwise, as dictated by the design of the space. Alpha X, prefaced by the adjoining hall number will designate all stairwells. In instances of multiple stairwells off of the same hall alpha Y may be used. Alpha W, prefaced by the adjoining hall number, will designate elevators; if a second elevator is present in the same hall, alpha V will be used. Mechanical rooms accessed from the building’s exterior will be designated by the last room number in that floor’s series followed by alpha Z.

3. Room Data

A list of all spaces with room number, square footage, and use for each will be provided to the Longwood Assistant Director for Space Planning and Business Information Systems. Contact the Assistant Director for the data template.

D. Transportation

1. Overall Access and Connectivity

The building and site access plans and connections with existing campus vehicle and pedestrian routes must conform to the guidance contained in the Campus-Wide Framework chapter of the [Longwood University 2025 Campus Master Plan](#).

2. Vehicular Circulation and Parking

The overall building and site design must conform to the Vehicular Circulation and Parking section of the Campus-Wide Framework Chapter.

3. Pedestrian and Bicycle Circulation

The general campus-wide approach to bicycle and pedestrian connectivity and routes is contained in the Pedestrian and Bicycle Circulation section of the Campus-Wide Framework Chapter.

4. Streetscapes

Street plans and streetscape design must conform to the Streetscapes section of the Campus-Wide Framework Chapter, and to the Exterior Scapes section of this document.

5. Electric Vehicles

Parking spaces and charging stations must be provided in accordance with Appendix G of the [CPSM](#).

E. Signage

1. General

For capital projects, the cost of the interior and exterior signage will be included in the construction cost. The A/E must submit an electronic version of the floor plans to the Project Manager six months prior to substantial completion of construction in order to begin interior signage planning.

2. Standards

a. Longwood standards for exterior campus building signs and parking lot signs are available in [Longwood University Sign Standards](#).

b. Contact the Project Manager for design standards and specifications for interior building signs.

3. Site Signage

a. Site planning concepts should include suggested exterior signage locations. Typically, no signs will be attached directly to the exterior of a building, except for the building address sign.

b. Should the Contractor choose to have a construction sign, the sign must be approved in advance by the University.

4. Wayfinding

Specific wayfinding information must be included in the overall building and site plans. Wayfinding plans should be in consonance with the Longwood University and the Region section of the [Longwood University 2025 Campus Master Plan](#), and with the [Longwood University Sign Standards](#).

F. Graphics and Branding

1. General

a. Longwood University is committed to consistency in the use of its marks, typography, and colors. Therefore, Longwood has established a graphic identity, which is detailed in the University's Graphic Identity Standards, as well as a brand that designates secondary colors and fonts. Longwood University Athletics also has established a set of marks, colors and typography that dovetails with the overall university graphic identity.

b. Among the University's marks are the official university seal and the Rotunda symbol.

(1) The official university seal is reserved for formal uses, including publications, for occasions such as commencement, inaugurations and convocations, as well as for other formal documents such as diplomas and honorary degrees. Use of the seal is also appropriate for permanent architectural features on the campus. A Latin version also exists, but should not be used without specific coordination with the [Longwood University Office of Marketing, Communications, and Engagement](#).

(2) The Rotunda symbol is intended for wider use, either with or without the official Longwood wordmark in approved combinations that are shown in the Graphic Identity Standards. Examples of uses where the Rotunda symbol is appropriate include publications for recruiting students or promoting university events and activities; merchandise such as T-shirts, coffee cups and notebooks; campus and vehicle signage; and other less formal instances where Longwood identification is desired.

2. Specific Information and Guidance

- a. Official University seal – Appendix A.
- b. [Longwood Logos](#)
- c. [The Longwood Brand Guide](#)
- d. [The Longwood Visual Brand Guide](#)
- e. Additional information and guidance is available from the [Longwood University Office of Marketing, Communications, and Engagement](#), and from the [Longwood University Athletics Department](#).

G. Memorials, Commemorative Items, and Naming Opportunities

1. General

- a. Longwood University Policy 4003 [Commemorative Naming of University Facilities and Programs](#) set policy and procedures for commemorative naming.
- b. The location and design of memorial or commemorative items that will be installed either inside or on the outside of buildings under construction or renovation must be coordinated with Longwood’s Vice President for Institutional Advancement before the start of construction.
- c. The Vice President for Institutional Advancement should also be consulted no later than the Preliminary design phase if naming opportunities are anticipated.

2. Existing Memorials at Construction Sites

Existing memorials (non-vegetative) will be removed and stored as directed by the Project Manager. If the memorials cannot be returned to their previous locations at the conclusion of the project, their disposition will be determined by the Longwood Space Planning and Management Committee. The disposition or replacement of vegetative memorials will be determined by the Longwood Space Planning and Management Committee, which will notify the Vice President for Institutional Advancement. Decisions of the Space Planning and Management Committee will also be provided to the Project Manager.

H. Utility Efficiency

1. General

Longwood University is committed to the principles of conservation, efficiency, and sustainability. All construction and renovation designs shall comply with the Virginia High Performance Buildings Act ([CPSM](#) Sections 4.8 and 6.1, and Appendix V). Buildings shall be equipped with individual sub-meters for electricity, domestic water,

and steam; sub-meters shall be compatible with the Tridium control system. See Section III. Divisions 25 and 33.

2. Energy

a. Longwood University will employ the following energy reduction strategies in the construction, renovation, operation, and maintenance of its buildings:

(1) Utilize the campus biomass-fueled steam generating plant to provide as much of the campus' heat and hot water requirements as possible.

(2) Update and extend the campus Building Automation System to control as many of the buildings' environmental, lighting, and other operational systems and functions as possible.

(3) Pursue the consolidation of air conditioning system chillers and major auxiliary equipment among adjacent buildings.

(4) Connect exterior campus light fixtures to the campus central control system.

(5) When utilizing the LEED certification process for construction and renovation projects, specify a minimum required rating of Silver.

b. Landscape design should strive to incorporate fast-growing deciduous trees on the south-facing side of the building to improve shading in the summer.

c. Primary entry doors should include, whenever feasible, a vestibule to minimize external air infiltration.

3. Water

a. Longwood's overall, long-term goal is to reduce internal and external potable water use in all buildings and operations in all areas of the campus. Water system designs will utilize multiple conservation techniques that are synergistic within the individual project and are fully-integrated with existing campus facilities and operations.

b. Many water conservation and re-use standards and techniques have been developed and are migrating into codes, design standards, and construction specifications. These standards and techniques will be considered in the initial design process, and will be incorporated into the final design after careful consideration of operational efficiencies and long-term cost effectiveness.

c. Building designs should consider the following techniques:

(1) Low-flow domestic water fixtures, in particular, two-stage flushing toilets and automatically activated/shut-off sinks (not battery-powered)

(2) Non-potable water uses such as HVAC condensate re-use

d. External designs should consider the following techniques

(1) Native and water-efficient landscaping

(2) Rainwater recovery and reuse systems

(3) Water recovery and re-use on artificial turf surfaces

e. Irrigation systems will be installed only when necessary. They will utilize Longwood standard equipment and will be fully integrated into the campus-wide irrigation control system.

I. Stormwater Management

1. General

a. Because of the density of buildings on Longwood's campus, and the large area of impervious surface, stormwater management for new projects is essential. Longwood's approach to stormwater management encompasses campus-wide, neighborhood, and individual building techniques. Project designs must include not only techniques for the individual project, but also must seamlessly integrate the project design with the campus-wide system.

b. For additional information, see [Longwood University Stormwater Master Plan](#) , [Longwood University Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management](#) , and Section III Division 01 H of this publication.

2. Specific Techniques

Use of the following building and site-specific techniques is particularly encouraged:

- a. Green roofs
- b. Roof disconnects
- c. Hardscape disconnects
- d. Bioretention systems
- e. Porous, permeable, and pervious materials
- f. Stormwater recovery and reuse
- g. Stormwater control ponds
- h. Stormwater credits – those already existing on campus and potential future credits purchased by the Longwood University Real Estate Foundation for use by the University.

J. Exterior Scapes

1. General

a. The site and landscape design guidelines herein support the enhancement of the campus open space environment as described in the [Longwood University 2025 Campus Master Plan](#).

b. New landscape design should open views to historic and architecturally significant existing buildings.

c. Site development should create a variety of open space types and experiences for campus users.

d. Site amenities and plantings should enhance campus security through careful attention to circulation routes, lighting, and visibility.

e. The site development plan must demonstrate consideration for unique site features including topography, hydrology, and existing vegetation, and must utilize acceptable methods to preserve aspects of the site deemed desirable by the University.

f. Clear-cutting or grading of a site to the extent that all native or existing conditions are lost is prohibited.

g. Utility lines shall be installed underground for new construction projects, and shall be relocated underground for major renovation projects, whenever possible.

h. Utility and service areas will be minimized in number and size and will be screened to match building exteriors.

i. Exterior trash dumpsters and exterior trash storage areas will be minimized in number and size and will be screened.

2. Greenscapes

a. Design philosophy and specific requirements for Longwood greenscapes are contained in Section III, Division 32 (Exterior Improvements).

b. For additional information, see the Longwood University [Tree Management Plan](#).

3. Hardscapes

a. Hardscapes provide a durable, all-weather surface to accommodate pedestrian activity and outdoor gatherings and activities.

b. Materials shall be chosen to maximize pervious surface area.

c. Design philosophy and specific requirements for Longwood hardscapes are contained in Section III, Division 32 (Exterior Improvements).

4. Lighting

a. Longwood standard fixtures shall be specified for all campus applications, unless specifically required for a unique situation.

b. Building-mounted lighting fixtures shall not be utilized for area illumination, unless specifically required for a unique situation.

5. Furnishings

a. Longwood standard furnishings shall be specified for all campus applications, unless specifically required for a unique situation.

K. Art

1. General

Longwood's Arts on Campus program, managed by the Longwood Center for Visual Arts (LCVA), is an exciting and important aspect of educational and life experiences for the entire Longwood community. Art displays in buildings provide many positive visual and cultural enhancements, but also raise significant design and cost implications. Consideration of art displays shall be included in the earliest planning stages of new building construction and major renovation projects.

2. Planning

a. If art galleries and/or display areas are desired in new construction or major renovation projects, A/E personnel will meet with the Director of the LCVA, the Director of the Capital Design and Construction (CD&C) Department, and the Director of the Facilities Operations Department to determine the physical requirements for these areas.

b. As part of the Schematic Design process, the A/E will determine if the scope of the proposed art display portion of the project fits within the preliminary design, cost estimate, and identified funding.

c. Inclusion of the art display areas must be agreed to by the Building Committee of that building during the Schematic Design phase.

d. Changes to the location, type, or size of art display areas will not be made after completion of the Schematic Design phase of the project. Change orders during the construction process will be limited to minor scope only and must be agreed upon by the Directors of the LCVA and CD&C Department. Change order funding must be available within the project budget.

3. Handling and Moving Longwood Artwork

Installing, relocating, removing, re-installing, or otherwise handling Longwood artwork will be performed only by LCVA personnel, or contractors hired and supervised by LCVA personnel.

L. Physical Security

1. General

The requirements for protecting the populations of institutes of higher education have changed dramatically in the twenty-first century. The types, locations, and participants in higher education communities' activities are now much broader in scope, and the possible threats have expanded and intensified. Therefore, protective measures must likewise adapt. While specific operational plans, equipment, and procedures are beyond the scope of this document, preparing to meet physical security requirements must start with the overall project design. Longwood's strategy is a multi-disciplinary approach of consulting with subject experts at all appropriate times in the design process. In particular, law enforcement and security consultants with experience in protecting higher education facilities and communities must be included, starting with the Schematic Design Phase Basis of Design.

2. Specific Design

Specific design requirements will depend on the type and use of the facility, whether the project is new construction or a renovation, its location, adjacent facilities and their activities, the facility's interaction with the surrounding community, and the characteristics of the occupants throughout the day. Each of these aspects must be thoroughly researched and completely understood in order to incorporate preventive

protective measures in the design. The Longwood Project Manager will facilitate interaction with appropriate Longwood personnel to gather this information.

3. Systems

Refer to Division 28 (Electronic Safety and Security) for policies and specifications for campus electronic security systems. These systems include, but are not limited to:

- a. Video surveillance systems
- b. Building access systems
- c. Emergency police call boxes (“blue phones”)
- d. University emergency notification systems
- e. Key cabinets – See Division 10 (Specialties) for requirements.

M. Drawing

1. General

[CPSM](#) Section 5.2 “General Requirements for Drawings” and Appendix S “DEB Electronic Document Review Process Document Submittal Requirements” are very specific. The requirements of these sections must be complied with precisely for all drawings and submissions.

2. CAD Drawings

- a. A separate .dwg file must be provided for each floor of the building. Each file must be self-contained (no overlays, Xrels, etc.) and use standard CAD fonts. File components must be flattened. The drawing name should indicate which floor it represents.
- b. Layers should be classified by design type (walls, elevators, doors, windows, stairs, etc.), and each entity designated by color, line weight, and line type.
- c. Polylines, blocks, and objects should be utilized to compress the files to the maximum extent possible.
- e. The ROOM layer should contain a polyline outlining each space in the building. The polyline should follow the inside wall surface of each room or space.
- f. External references should be bound to the CAD drawings.

3. Final Drawings

- a. Final Working Drawings and Specifications shall be provided to the University in PDF format.
- b. Final Working Drawings shall also be provided to the University in CAD files on removable media.
- c. If a BIM model for the project was produced, that model shall be provided to the University.

N. Project Documentation – Imagery

1. General

a. Periodic high-quality digital image documentation of all capital projects shall be accomplished during the construction phase. This documentation process shall be included as a requirement of the Construction Administration Contract.

b. The intent of the digital portfolio is to support maintenance, repair, and rehabilitation of the building, and future renovations and additions.

c. All images should be taken in a 360-degree progression from the same latitude and longitude point for the duration of the project.

d. Frequent slideshows on a consistent periodicity shall be submitted to the University, the A/E, and the General Contractor.

2. Scope of Work

a. Regular interior progressions which will include, but not be limited to, substantial framing, early rough-in stage, and final progression occurring at the finished interior.

b. Regular exterior progressions which will include, but not be limited to, 360 degrees around the project to include all elevations and building envelope on monthly intervals.

c. Detailed pre-slab exact-built of the slab on grade.

d. Detailed exterior skin exact-built of all wrapping of exterior of the building, window installation to include flashing of the windows, and roofing to include overlapping photos of every square inch at waterproofing stage.

e. Detailed interior MEP exact-built of the entire building to include documentation of all mechanical, electrical, and plumbing systems, to be conducted after rough-ins are complete, just prior to insulation and/or drywall installation.

O. Project Documentation – GIS

1. General The purpose of collecting GIS data is to build an accurate spatial database of the Longwood University campus.

2. Specific

a. Longwood personnel will be notified and given the opportunity to GPS new utility lines installed as part of a project before they are buried.

b. All GIS files must be submitted in a format that is compatible with ArcGIS 10.8.

c. Digital files must be drawn and submitted in the correct spatial registration using NAD_1983_HARN_StatePlane_Virginia_South_FIPS_4502_Feet.

d. Metadata must include pertinent information related to the layer, including but not limited to the issue date of the Record Drawings, the project's AE of Record, and date of project completion.

III. CONSTRUCTION STANDARDS

VIRGINIA CONSTRUCTION AND PROFESSIONAL SERVICES MANUAL

The basic reference for all Commonwealth of Virginia design, procurement, and construction policies, procedures, requirements, and standards is the [Construction and Professional Services Manual](#) (CPSM). The term “CPSM” used throughout this document refers to the most current edition of the CPSM published on the web site of the Virginia Division of Engineering and Buildings (DEB). The policies stated therein are those of the Commonwealth of Virginia, and are to be used by state agencies for construction on property owned by the Commonwealth. In case of conflicts between this publication and the CPSM, the CPSM will govern.

DIVISION 00 – PROCUREMENT AND CONTRACTING

A. General

1. [CPSM](#) Section 5.3, “Specification Standards,” must be followed without exception in the preparation of project specifications, the Construction Contract, and bid documents.
2. All Invitations for Bids for construction and addenda thereto must be posted on the “Public Postings” page of the Longwood University Material Management web site, regardless of any other method the A/E may use to communicate with potential bidders.

B. Specific

1. Procurement of Furniture, Fixtures, and Equipment (FF&E) may be included as part of the construction contract, or the University may procure the FF&E separately, or a combination of these methods may be specified by the University. Items typically included in the construction contract include carpet, window treatments, marker boards, fixed seating, and signs (both code-required and room identification signs).
2. Longwood University’s preferred method of procuring building automation systems and energy monitoring and control systems is Sole Source Separate Procurement (Method 3 in [CPSM](#) Section 6.15.2.4).
3. Longwood University’s only proprietary specification authorization is for Best lock cores and lock cylinders. All other product specifications must be written using performance specifications or as a list of three acceptable manufacturers and models.

DIVISION 01 - GENERAL

A. Summary of Work

1. In all cases, the work to be performed by the Contractor will be governed by the [CPSM](#) and the General Conditions of the Construction Contract (Form CO-7).
2. Work by the University may include, but not necessarily be limited to, the following:
 - a. Asbestos and lead surveys
 - b. Asbestos and lead abatement
 - c. Water flow tests

B. Payment Procedures (Approval of Form CO-12)

1. Sections 19 and 36 of the General Conditions of the Construction Contract (CO-7) apply to this section.
2. Three days prior to the Monthly Pay Meeting, the Contractor shall submit an electronic draft of the Schedule of Values and Certificate for Payment (Form CO-12) and Monthly Project Report (Section 19d) to the A/E, the University's Project Manager, and the University's Inspector for review.
3. The A/E, Project Manager and Inspector will endeavor to review the CO-12 and Monthly Project Report, and return comments/changes to Contractor the next day.
4. The Contractor shall bring three copies of the revised and signed CO-12 and approved Monthly Project Report to the Monthly Pay Meeting.
5. It is the University's intent to approve pay requests at the conclusion of the Monthly Pay Meeting,

C. Project Management and Coordination

1. Section 7.5 of the [CPSM](#) and Sections 17 and 50 of the General Conditions of the Construction Contract (CO-7) apply to this section.
2. A Preconstruction Meeting will be held in accordance with Section 7.5.5 of the [CPSM](#). The meeting will be scheduled and conducted by the A/E. An agenda based on appropriate sections of the General Conditions of the Construction Contract shall be prepared by the A/E and approved by the Project Manager in advance of the meeting. Contact the Longwood Project Manager for a template of the Longwood document Preconstruction Meeting Agenda.
3. Monthly Progress and Pay Meetings will be held in accordance with Section 7.5 of the [CPSM](#). The meetings will be scheduled and conducted by the A/E. The agenda for the meetings shall be in accordance with Paragraph M of the A/E Contract – Memorandum of Understanding, and shall be indicated in this section of the Project Manual.

4. Pre-installation Meetings will be held to ensure both the quality and timeliness of various construction activities. The Contractor and appropriate Subcontractors shall schedule and conduct the pre-installation meetings in accordance with the requirements of the Project Manual. Given their knowledge of the project design documents, the A/E shall identify in this section, as a minimum, specific construction activities requiring a pre-installation meeting.
5. Contractors shall adhere to the requirements of [Longwood University's Standards for Campus Construction Projects](#) and the [Construction Safety](#) page of the Longwood University Environmental Health and Safety Department.
6. Contractors shall adhere to the provisions of Longwood's contractor identification badge and building access policy, as specified by the Longwood document [Contractor Identification Cards](#).

D. Construction Progress Documentation

1. Sections 19 and 36 of the General Conditions of the Construction Contract (CO-7) apply to this topic.

E. Vehicular Access and Parking Areas

1. Sections 25 and 31 of the General Conditions of the Construction Contract (CO-7) apply to this section.
2. Parking on the University campus is regulated for all vehicles ([Campus Parking Map](#)). The Longwood University's Police Department strictly enforces [Longwood University Parking Regulations](#). Violations of parking regulations could result in parking tickets, wheel booting, or vehicle towing. The following rules, procedures, and requirements apply to contractor parking on campus
 - a. Parking within the construction fencing of a capital project is allowed without restriction. Company and private vehicles may be parked inside the fence without a permit. All efforts should be made to keep contractor parking within the fenced area. Parking on site after the project is deemed substantially complete and the construction fence is removed requires written approval by the Capital Design and Construction Department and/or an appropriate parking permit.
 - b. Prior coordination with the Longwood University Campus Police Department (434 395-2091) is required should the need arise for additional contractor parking. The University will designate a parking lot on campus for use by contractors. The designated contractor lot will be the only lot on campus in which contractor parking is allowed. The University, at its discretion, reserves the right to change the designated contractor lot to any other lot on campus during the term of the contract. Parking will only be allowed in the designated contractor lot on campus

during the term of the contract. Parking in the designated contractor lot requires the purchase of a vendor/business/contractor permit from the Campus Police Department for both company and privately owned vehicles. These rates may change on an annual basis.

- c. The hours of use of the designated contractor lot are generally reserved for normal daytime hours of work (7 am to 5 pm, Monday-Friday). The potential need for occasional night and weekend work is recognized and accepted, providing that the lot is not used for overnight storage of vehicles. The lot will not be used to store equipment or industrial vehicles unless specifically approved by the Project Manager. Also, there will be occasions, typically on weekends, when the lot must be completely vacated for special activities such as graduation. The Campus Police Department will inform the Capital Design and Construction Department in advance of the special events dates and notices will be posted at the entrance to the lot. Vehicles left in the lot on these occasions are subject to being towed at the owners' expense.
- d. Contractors will abide by all traffic regulations at Longwood University. Construction sites must make consideration for the flow of pedestrian traffic around the site. Coordination for vehicle and pedestrian traffic must be made with the Police Department prior to occupation of the site. Large deliveries that cannot be accommodated within the staging area may be briefly off-loaded in the roadway ONLY with prior coordination with the Police Department (434 395-2091) at least three working days in advance.
- e. No activities will be permitted at the construction site during University graduation ceremonies. Limitations to deliveries and other site-specific activities may be imposed during major events throughout the academic year, such as student move-in and move-out, fall and spring festivals, etc.

F. Site Security

1. Before the bid documents are issued, the A/E shall consult with the Project Manager and other Longwood personnel designated by the Project Manager to determine requirements for construction site security. Security measures beyond the normal site fences and controlled access points may be required.
2. Additional security measures may include such items as special fencing, perimeter and area site lighting, additional vehicle control measures, and security guards during certain periods of the day.

G. Temporary Barriers and Enclosures

1. Construction Site Fence
 - a. Prior to initiating any on-site construction activities, the General Contractor shall erect a temporary construction fence as indicated in the contract documents. The Contractor will meet with the Longwood Project Manager and A/E prior to the start of the installation to discuss timing, work conditions, and pedestrian routing.
 - b. The Contractor shall call Miss Utility before driving any posts for the fencing.
 - c. Signs shall not be posted on the fence system except as follows: “No Trespassing” signs 50’ intervals; safety-related signs required by OSHA; and visitor site entry rules as required by the Contractor. Advertising signage is strictly prohibited.
 - d. The Contractor shall keep plant growth from around the base of the fence by either trimming or chemical treatment.
 - e. The fence shall be maintained for the duration of the project, and shall not be removed without the Longwood Project Manager’s permission.
2. Fence Design and Materials
 - a. The minimum height for all temporary fencing shall be 6’.
 - b. The fencing shall be of galvanized 11-1/2 gauge chain-link construction with a minimum of 1-5/8” O.D. tubular steel posts and top rails.
 - c. Privacy netting to screen construction activities shall be used on all projects, or as specified in the contract documents. Privacy screen material shall be green, equal to the weave of US Netting’s Windscreen, polyethylene netting.
 - d. Panels are to be adequately braced to resist wind and ice loading, and shall be continuously connected to prevent access by the public. The University may require panel graphics. The design of the panel graphics must be approved by senior Longwood leaders. Consult with the Longwood Project Manager before commencing design.
 - e. Barbed wire shall not be used.
3. Gates
 - a. Entrance/exit gates are limited to no more than two locations, unless otherwise approved by University’s Project Manager.
 - b. Gates shall be a minimum of 12’ in width to allow access for emergency vehicles.
 - c. Where other transportation authorities need to review gate locations and operation, communication with those authorities will be coordinated through the University’s Project Manager.

- d. Gates shall be closed and locked at all times the site is not occupied, unless otherwise directed by the University where emergency vehicle passage through the site is needed to access existing occupied buildings. The University will add their own padlock to the General Contractor's padlock.

H. Protecting Existing Facilities During Construction

1. Roof Protection
 - a. Before working over or moving equipment, materials, or personnel over a new or existing roof, the General Contractor and any of their agents and/or Subcontractors must thoroughly and completely protect the roof system from damage and excessive wear during and following the roofing work.
 - b. Construction activities over or the movement of equipment, materials, or personnel over a new or existing roof without approved roof protection shall be cause for the University and/or A/E to stop work until the protection is provided and any damage to the roof system is corrected.
2. The General Contractor is responsible for locating and marking all utility lines within the project boundaries. The Miss Utility service must be used to mark public utilities. University-owned utility lines must be located and marked by a separate specialized company or other means.
3. Project designs and specifications shall adhere to the erosion and sediment control requirements contained in section 4.17 of the [CPSM](#), [Longwood Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management](#), Virginia Department of Environmental Quality (DEQ) regulations, and Town of Farmville regulations. Project designs and specifications must also meet the stormwater management standards of the [Longwood University Stormwater Master Plan](#) and of the Virginia DEQ.
 - a. Longwood University has the overall responsibility for meeting all applicable federal, state, and local requirements for stormwater management and erosion and sediment control.
 - b. Plan reviews and site inspections will be conducted by University personnel.
 - c. The Contractor is responsible for obtaining all applicable DEQ and Town of Farmville permits, and for providing and properly displaying the Storm Water Pollution Prevention Plan (SWPPP).
4. Requirements for protecting trees and significant vegetation in and immediately adjacent to construction zones are contained in Division 32 "Exterior Improvements."

I. Construction Waste

1. Means and methods for identification and proper disposal or recycling of hazardous building components and construction materials must be specifically coordinated with the Longwood University Project Manager.
2. Any leftover hazardous materials must be removed by the Contractor unless specifically approved in writing by the appropriate Longwood University person.
3. Leftover construction materials shall be removed by the Contractor unless other arrangements are made with the appropriate Longwood University supervisor. For example: Left over full paint containers may be delivered to the Longwood Paint Shop only with supervisor approval. No paint containers may be left in the building.

J. Close-Out Submittals

1. General
 - a. Close out submittals, including As-Built Drawings, Operations and Maintenance manuals, and required product manuals must be submitted to and approved by the A/E prior to achieving Substantial Completion.
 - b. As-Built Drawings must reflect the exact final construction configuration.
 - c. All close-out documentation will also be provided in electronic versions. Contact the Longwood University Capital Design and Construction Department for specific requirements. Final Working Drawings and Specifications shall be submitted in PDF format.
2. Operations and Maintenance (O&M) Manuals
 - a. Prior to the demonstration of equipment, the Contractor shall submit operations and maintenance manuals to the A/E for approval.
 - b. Two complete sets of O&M manuals shall be provided in individually bound volumes, and in digital versions, as indicated below:

Division 1-13	Architectural
Division 14	Conveying Equipment
Division 22	Plumbing
Division 23	Heating, Ventilating, and Air Conditioning
Division 25	Integrated Automation
Division 26	Electrical

- c. Manual binders shall accommodate 8 ½" x 11" pages, and will be heavy-duty three-ring type with the project name lettered on the spine.
- d. All pages shall be 8½" x 11". Larger pages, if used, shall be neatly folded to 8½" x 11" and be used as pullouts or foldouts.

- e. As appropriate, each manual shall include:
 - i. Names, addresses and trades of all Subcontractors, manufacturers, and suppliers who participated in the construction or who furnished materials and equipment.
 - ii. Complete maintenance instructions from the manufacturer's local representative for each item of operable equipment as well as the name, address, and telephone number of the installing Subcontractor.
 - iii. Catalog data on all items submitted, and other pertinent data such as mortar colors, bricks selected, and color selected for all finished materials and fabrics. Contact the Longwood Project Manager for examples of a Schedule of Finishes template or a finishes log.
 - iv. Catalog data on all plumbing fixtures, valves, water heaters, heating equipment, temperature controls, fans, electrical panels, service entrance equipment, light fixtures, similar equipment and systems. Manufacturer's advertising or promotional literature is not acceptable.
 - v. Manufacturer's name, model number, service manual, spare parts lists, and descriptive literature for all components.
 - vi. Preventive maintenance instructions and schedules for all major equipment.
 - vii. List of most frequently encountered breakdowns and repairs.
 - viii. Instructions for starting and operating the actual system as installed.
 - ix. Detailed one-line, color-coded wiring diagrams.
3. Warranties and Guarantees
 - a. Copies of all warranties and guarantees shall be bound into a single, heavy duty, three-ring binder to accommodate 8 ½" x 11" pages. Three such binders shall be provided.
 - b. Binders will contain a table of contents and warranty sections with marked tabs in the order of the specifications.
4. Spare Parts and Materials
 - a. Lists of spare parts, maintenance material (including filter types and sizes), and attic stock shall be provided to the University's Project Manager.
 - b. The spare parts, maintenance material, and attic stock shall be delivered as directed by the University's Project Manager prior to Substantial Completion.

K. Building and Equipment Data

Longwood University utilizes Asset Essentials (AE) asset management system to maintain its major systems and equipment data. The data collected will be migrated into AE for Longwood Facilities Department use. This data is to include systems in the electrical, plumbing, and HVAC specification divisions, as well as roofs and elevators. Contact the Operations and Services Assistant Director for Space Planning and Business Information Systems for a copy of the template to record the data. This data must be provided no later than the project's substantial completion date (email to businessinfosystems@longwood.edu).

L. Commissioning

1. Overview

- a. Review Section 5.16 of the [CPSM](#) for a general view of the commissioning process.
- b. Commissioning, as used in these standards, is the systematic process of review, documentation, inspection, and performance testing, to assure that the facility and its systems meet the University's requirements. Starting with design, the process extends through the facility's construction and occupancy phases. The Commissioning Authority shall ideally be an independent, third-party consultant hired by the University, responsible for the conduct of the commissioning scope of work.
- c. Longwood desires to employ the "Enhanced Commissioning" process in accordance with LEED standards. This process shall include a review of design documents.
- d. The objective of commissioning of Longwood University facilities is to ensure proper, reliable and safe operation of major building operating systems upon occupancy of each facility. Commissioning may also be utilized to assure the proper selection, installation, and operation of other building systems, such as architectural systems, at the University's discretion.
- e. For most projects, Longwood University will hire an independent, third-party Commissioning Authority to provide the scope of commissioning services defined herein. These sections are intended to illustrate the scope of commissioning for which the Contractor will be responsible to cooperate and facilitate within the Project Documents. On all projects, unless otherwise approved, the contract documents shall include specifications which require the Contractor to cooperate; provide labor, assistance, materials, supplies and information; and otherwise facilitate the work of a third-party, independent Commissioning Authority (or to provide for and coordinate with the Commissioning Authority for

commissioning services, where contractor commissioning is specified).

Where third-party commissioning is used, the independent Commissioning Authority will normally develop the Commissioning Specifications sections for inclusion in the Project Documents by the A/E of record. The University shall be consulted on each project to determine the applicability and appropriateness of third-party commissioning, and to identify the specific systems to be commissioned for the particular project.

2. On typical projects the following systems are to be commissioned, as applicable:
 - a. Air Handling Units
 - b. Terminal Boxes
 - c. Airflow Control Valves
 - d. Exhaust and Supply Fans
 - e. Sound Attenuation and Control Systems
 - f. Fume Exhaust Fans, Fume Hoods, and Controls
 - g. Heating Units
 - h. Steam and Hydronic Systems
 - i. Hot Water Heaters and Converters
 - j. Pumps
 - k. Variable Frequency Drives
 - l. Space Airflow and Temperature Control
 - m. Chillers, Cooling Towers, and Condenser Water
 - n. Heat Recovery Systems
 - o. Laboratory Pressurization Controls
 - p. Building Automation and Controls
 - q. Emergency Generators and Transfer Switches
 - r. UPS and Backup Electrical Power Systems
 - s. Domestic Water Balancing Valves
 - t. Other Special Systems, as required
3. On most projects the Commissioning Team shall consist of the following members:
 - a. University's Representative(s) (from Capital Design and Construction Department and from Facilities Operations Department as specified)
 - b. Third Party Commissioning Authority or Agent
 - c. Architect and Engineer of Record
 - d. Mechanical Contractor
 - e. Electrical Contractor
 - f. General Contractor
 - g. Test and Balance Subcontractor
 - h. Controls Contractor
 - i. Other Installers or Suppliers, as needed

4. Responsibilities of Team Members – Each team member shall have specific responsibilities in support of the commissioning process clearly defined in the project specifications, and made a part of the Contract Documents and Requirements.
5. Commissioning Scope of Work – Most projects shall include the following minimum scope of commissioning work in the Specifications, which obligates the Contractor and the Contractor’s Subcontractors to participate and cooperate with the Commissioning Authority:
 - a. Provide Submittals and other documents for review
 - b. Completion of Installation Verification Checklists
 - c. Cooperate with Pre-Functional Testing of Systems
 - d. Participate in Scheduled Commissioning Meetings
 - e. Respond to Commissioning Issues and Field Reports
 - f. Provide other commissioning-related information, as requested
 - g. Assist in conduction of Functional Systems Performance Testing
 - h. Submit O&M Manual Documentation for review
 - i. Assist in development and conduction of Owner training
 - j. Provide all other reasonable and requested assistance to the Commissioning Authority
6. Contractor Responsibility
 - a. The Contract Documents shall require the General Contractor and Subcontractors to cooperate, provide labor, materials, supplies and information where required to facilitate (or conduct, in the case of “contractor commissioning”) the specified scope of commissioning work. The Contractor shall provide all specified assistance in a timely manner, at no extra cost to the University, and shall incorporate all commissioning activities and milestones into the overall Project Construction Schedule.
 - b. Satisfactory completion and acceptance of all commissioning tests and reports shall be a condition for granting Final Completion of the project. Ideally, all functional performance testing shall be completed in order to grant Substantial Completion of the project.
7. Project closeout requirements shall include the review and recommendation of approval by the Commissioning Authority of O&M Manuals and Warranty Information. Project closeout requirements shall include the completion of all testing and submission of all commissioning-related reports, certifications and manuals.
8. Contract documents shall require the Contractor to provide assistance, materials and services required to conduct training of the University’s personnel in the operation and maintenance of all major equipment and controls, and to cooperate with the Commissioning Authority in developing the training agenda

and methods. Training sessions shall be electronically recorded for future use by the University.

DIVISION 02 – EXISTING CONDITIONS

(Reserved for future use.)

DIVISION 03 – CONCRETE

A. Concrete (Cast in Place)

1. Interior and/or exterior structural concrete surfaces should not be scheduled to receive a sandblasted finish unless specifically approved by the University.
2. Building interior structural concrete painted surfaces should not be scheduled to receive a rubbed finish. If a smooth plaster-like finish is desired, specify a thin coat of veneer plaster over the concrete substrate.
3. Building exterior expressed concrete structural frame should be detailed (incorporating insulation and finish systems) to prevent thermal loss or gain.
4. Exposed interior concrete floors should be sealed. A hardener is required where the floor surface is subject to heavy impact and/or rolling loads.
5. A sample panel of exterior exposed “Architectural” concrete should be provided to establish an acceptable standard of workmanship/quality concerning finishing, texture of formed material, etc. The concrete used in the sample panel should be furnished by the project concrete supplier and should represent the approved mix for strength and texture.

DIVISION 04 – MASONRY

A. General

1. Existing exterior masonry will be retained to the maximum extent feasible during renovations of existing buildings.
2. Information on Drawings and in Specifications establishes requirements for both aesthetic effects and performance of the masonry. Aesthetic effects relative to formal characteristics are indicated by dimensions, arrangement, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction.
3. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect’s written approval and only to the extent exclusively needed to

comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to the Architect for review.

4. Retain mock-ups during construction as the standard for judging completed stonework. When directed, demolish mock-ups and remove from site.
5. Provide separate specifications for stone and concrete block installations.
6. Provide specifications for supplemental testing and inspection of materials and mixed mortars.
7. Provide an agenda for the masonry pre-installation meeting. Obtain specific requirements from the Project Manager.
8. Installation
 - a. Mortar shall be ASTM C270 type N mixed to the proportion specifications using Portland cement and hydrated lime. Masonry cement mortars shall not be used.
 - b. Mortar shall be mixed to and used in a masonry mortar type consistency. "Dry pack" type mortar will not be permitted.
 - c. All head and bed joints shall be completely and neatly filled with mortar.
 - d. Brick joint width should be as narrow as possible, $\frac{3}{4}$ " plus $\frac{1}{2}$ " minus $\frac{1}{4}$ ". Joint is to be finished with a $\frac{1}{2}$ " flat struck joint.
 - e. Flashings are to be stainless steel or lead-coated copper terminating evenly on shelf angles or precast members day-lighting to at least $\frac{1}{2}$ " drip. Consider using two piece flashings. Install Mortar Net™ or equal in two continuous courses directly above flashing.
 - f. Clean finished brick surface of mortar droppings and projections by bucket and brush method within seven to ten days of completion of the panel. Pre-clean brick of dust and residue prior to setting.
 - g. Provide silicone sealed joints, prepped, primed for all details between dissimilar materials such as brick to precast, metal to brick or precast, and block to precast. Specify sealant testing to be performed and submitted by the Contractor prior to construction. The submittal should include a list of sealants used, results of adhesion and staining tests, and required primer usage if any.

DIVISION 05 – METALS

(Reserved for future use.)

DIVISION 06 – WOOD, PLASTICS, COMPOSITES

A. General

1. This section includes, but is not limited to, dimensional lumber, engineered wood products, plywood, medium density fiberboard, particleboard, and rot and insect resistant wood.
2. Sustainable Considerations: When possible, specify products from sustainable sources, such as FSC Certified Wood or regionally manufactured from abundant species. Avoid wood from overharvesting, poor forestry practices, and toxic-treated sources. Products shall be free of urea-formaldehyde binders, copper, and arsenic.
3. Best practice standards for care of the material will be provided by the Contractor to the University.

B. Finish Carpentry / Cabinets / Countertops

1. This section includes, but is not limited to, interior millwork, paneling, caseworks, and countertops.
2. Sustainable Considerations: Avoid depletion of natural resources by specifying wood species from sustainable sources, such as FSC Certified Wood or regionally manufactured from abundant species. Avoid use of exported or exotic species that are limited in supply or not sustainably harvested. Products shall be free of urea-formaldehyde binders, copper, and arsenic.
3. Countertops may include non-wood products such as recycled glass, cast concrete, recycled content synthetic cast slabs, regionally quarried stone, recycled plastic solid surfacing, or plastic laminates.

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

A. Building Insulation

1. Fiberglass batt insulation shall be installed to minimize exposed fiberglass in areas needing to be accessed for inspections, maintenance, etc. Designs should encapsulate fiberglass using foil or pre-applied backing, or plastic or gypsum board covering.
2. Roof insulation shall achieve a minimum of an R-30 rating, for both flat and sloped roofs.
3. Sustainable considerations: maximize insulation value to conserve energy; avoid insulation containing formaldehyde or ammonium sulfate or foams expanded with hydrochlorofluorocarbons (HCFCs); consider insulation with recycled content.

B. Roofs, Gutters, and Downspouts

1. Refer to Appendix A of the [CPSM](#) for Commonwealth roofing policy and technical standards.
2. The preferred roofing style for Longwood buildings is a high slope red standing-seam metal roof.
3. If design and/or budget considerations preclude the use of high slope metal roofs, the preferred alternative is low slope TPO or EPDM single-ply, 60 mil minimum thickness.
4. Roofs shall have a 30-year warranty preferred, 20-year warranty minimum.
5. Flat roofs shall be white in color. Solar reflectivity shall meet Virginia Energy Conservation and Environmental Standards (VEES).
6. Single-ply roofing systems should be specified for low slope (less than 4 in 12 pitch) applications. TPO or EPDM single-ply, 60 mil minimum thickness adhered systems are required. Ballasted systems shall not normally be used.
7. Specify service walkways (minimum 2'0" wide) appropriately located to service all roof top equipment from the roof access.
8. Specify thin wall 16 gauge copper flashing between parapet walls and capstone.
9. The preferred material for gutters and downspouts is Galvalume or equivalent. Copper may be specified in special circumstances; if so, it shall be a minimum of 16 gauge.
10. Downspouts shall tie directly to an underground storm drainage system.
11. Snow guards shall be installed over entrances on all roofs with a slope of 6 in 12 or greater.
12. Specify roof hatches that are insulated and lockable.

DIVISION 08 – OPENINGS

A. Exterior Doors

1. Handicapped-accessible entry doors should be power operated. Operators should be electro-mechanical, and equal to Horton 4000 for exterior applications and Horton 7000 for interior applications. Sliders should be Assa Abloy SL 500, Horton 3150 or equal. Both doors in a vestibule configuration should be power operated. Power operated egress doors shall have electronic strike or latch to allow power operation during times when the building is locked.
2. Power operators shall have auxiliary contacts to allow for card reader and proximity reader activation of the openers.

B. Interior Doors

1. Interior doors will be 3'0" x 7'0" x 1-3/4" hardwood, stain grade, solid core.
2. All doors in new construction shall have lever handles that comply with ADAAG requirements. When renovation work requires changing door hardware or which hardware change is requested for functional change, all replacement hardware shall include ADAAG compliant lever handles.

C. Fire Shutters, Barriers, and Doors

1. Fire shutters, doors, and other barriers shall be capable of being quickly re-opened and reset by Longwood personnel following activation.
2. The Longwood University standard reset key is Best Core.

D. Locksets and Hardware

1. Longwood University standards are contained in the document [Longwood University Door Hardware Design Guidelines](#).
2. Longwood University uses a proprietary master key core system – CORMAX – manufactured by Best Access Systems. Cylindrical locksets must accept a Best CORMAX 7-pin interchangeable “Peaks” core. No substitutes will be allowed.
3. The University key shop personnel shall accomplish the final keying and installation of cores. Construction cores may be installed by the Contractor during construction, but must be removed prior to beneficial occupancy.
4. Closers shall be Von Duprin LCN 4041 Door Closure, or equal.
5. Panic Exit Devices shall be Von Duprin 99/33 series, Precision, or Sargent. For lever handle application, Von Duprin 33 or 99 series, or equal, shall be used.
6. Only hardware that cannot be secured with chains or other devices to prevent exit from the room and/or building will be utilized.

E. Windows

1. Exterior windows shall be Jen-Weld or equal. Exterior and interior trim will match exterior and interior finishes and designs.
2. All exterior glass sheeting (tempered or not) shall be “Low E” or “Comfort E.”
3. The University will specify operable or non-operable windows depending on the individual project.
4. Screens shall not normally be installed, but shall be installed on operable windows. Security screens may be required on ground floor windows. Verify these requirements with the Project Manager before starting the design.

F. Interior Wall Penetrations

1. Penetrations shall be sealed in accordance with current International Code Council requirements for the wall assembly type.

DIVISION 09 – FINISHES

A. General

1. Extravagant, costly, and/or high maintenance finishes should be limited to entrances and special function spaces.
2. The University must approve the color selections of all finishes.
3. Finishes that have minimal tolerances and place unrealistic expectations on the installing contractor(s) should be avoided.
4. Best practice standards for care of the material will be provided by the Contractor to the University.

B. Sheetrock

1. Mold-resistant sheetrock is the preferred choice for all wall construction unless physical restrictions will prevent its use.
2. If the use of another type of sheetrock in certain locations is desired, the A/E must obtain specific concurrence from the University.

C. Paint

1. Types and colors will, as much as feasible, match existing Longwood paints. Contact the Longwood University Facilities Department for the paint specifications.
2. Low VOC paint will be utilized for all interior applications unless a specific exemption is authorized during the de/sign process.

D. Carpet

1. Unless otherwise directed by the University, carpet shall be procured and installed by the General Contractor.

DIVISION 10 – SPECIALTIES

A. Safety Equipment

1. First aid equipment will be provided by the University and installed by the Contractor.
2. Automatic external defibrillators (AED) will be provided by the University and installed by the Contractor. They will be installed in a white AED wall case on the building's main floor in a publically accessible location. AED cases may not extend into building egress routes. The Longwood standard device is Zoll AED Plus.

3. Longwood uses Viking Electronics E-1600-60A emergency telephones in building areas of refuge. This equipment will be provided by the University and installed by the Contractor.

B. Fall Prevention

1. Fall prevention features shall be incorporated in accordance with OSHA regulations. Fall protection shall be accomplished by a mixture of
 - a. Parapet walls of at least 42 inches in height
 - b. Guard rails
 - c. Cage style guards
 - d. Engineered fall protection anchors
2. Installed fixed ladders taller than 24 feet shall employ a ladder safety or personal fall arrest system, not a cage or well around the ladder.
3. The preferred roof edge fall protection is roof parapets that are a minimum of 42 inches tall. Options include guardrails, safety nets or personal fall protection systems anchored outside the designated area. Areas around skylights and roof access hatches must also be protected.

C. Key Cabinets

1. Requirements for key cabinets are contained in the document [Longwood University Door Hardware Design Guidelines](#).
2. Key cabinets must not protrude into egress routes.

D. Restrooms

1. Dispensers for paper towels, soap, and toilet paper will be provided by the University and installed by the Contractor.
2. Screens, partitions, pilasters and doors shall be constructed of high density polyethylene (HDPE). Metal shall not be used.
3. Stall hardware and fittings are to be prepared with suitable internal reinforcement and pre-drilled to accommodate all hardware and fittings. Each compartment is to be complete with all hardware, door hinges, door latches, stops and keepers, coat hooks, and necessary fittings and fastenings for a complete installation.
4. Wall and pilaster brackets shall be heavy Zamac #3 chrome plated die casting. The dividing partitions and pilasters shall be attached to the wall with two brackets of double EAR or one EAR type depending on wall conditions. Dividing partitions shall be attached to the pilasters with two "U" brackets. All hinge brackets, strike, and keeper will be through-bolted with one-way theft-proof heads. All other hardware and fittings are to have appropriate screws. All fastenings are to have a highly polished chrome finish.

5. Partition locks shall be slide bolt latches equal to SURFACO, 3-1/2" Bet screw #9G0136.
6. Handicapped grab bars shall be stainless steel and sized to fit the layout of room.
7. Mirror glass shall be 18" x 24", vandal proof, with stainless steel frame, or 18" x 36" in ADA applications.
8. Permanently-mounted baby-changing facilities must be installed in certain locations in accordance with Section 4.4. of the CSPM.

E. Classrooms

1. Classroom specialties vary significantly depending upon the ultimate use of the space. The A/E must work closely with University personnel to identify the needs of each room.
2. IT/audiovisual systems and equipment designs will utilize University standards unless specifically required otherwise.
3. Chalkboards will not be installed. Dry marker (whiteboards) and/or magnetic boards will be utilized instead.
4. Tack boards, if specified, will be installed above or adjacent to whiteboards
5. Fixed seating, if required, shall be included in the contract documents and be included in the A/E "design to" budget.

F. Exterior Specialties

1. Contact the Project Manager to obtain the exact specifications for exterior fixtures that will be purchased for the project. Do not order fixtures without the Project Manager's approval.
2. Exterior recycling containers placed on campus shall be Wausau Tile, style – MF3211, color – blue with white lettering, or equal.
3. Trash receptacles shall be Wausau Tile model MF 3203 (31 gal), color – black, or equal.
4. Bicycle storage loops shall be model BL-36 Bike Loop manufactured by Wabash Valley Inc. of Silver Lake Indiana, color – black, or equal. Base foundation slab sizing and installation details will be provided by the University.
5. Bicycle shelters shall be Velodome, Ridgefield style, with a black metal frame and a dark red standing seam metal roof, or equal.
6. Exterior handrails and ornamental fences shall be metal, color – black, constructed to match existing campus handrails and fences.

G. Battery Recharging Stations

1. These requirements apply to lead-acid battery charging stations located inside buildings.
2. A safety shower or eye wash station shall be provided.

3. Ventilation or lower explosive limit detectors with alarms shall be provided.

H. Flammable Gas Distribution

1. Propane distribution piping shall be painted yellow and labeled “Propane Gas” at least once in every room it passes through.

I. Pressure Vessels

1. Refer to Chapter 6 of the [CPSM](#) for information concerning the design of pressure vessels.

DIVISION 11 – EQUIPMENT

A. Food Service

1. ARAMARK food service equipment, design, and installation standards shall be specified unless specifically required otherwise.

DIVISION 12 – FURNISHINGS

A. General

1. Building furnishings including, but not limited to desks, chairs, tables, lockers, lecterns, etc. shall be identified by the A/E but will not be included in the construction contract.
2. Furnishings shall be reflective of Longwood University’s overall design philosophy and standards, as well as the interior design intent of the project. Do not commence interior design work or furniture selection without first coordinating closely with the Longwood Project Manager.

B. Exterior Site Furnishings

1. Contact the Project Manager to obtain the exact specifications for outdoor furniture that will be purchased for the project. Do not order equipment without the Project Manager’s approval.
2. Benches shall be Wausau Tile model MF2200, color – black, or equal.
3. Table and bench combinations shall be Park n’ Pool model 11TA-136PM or 11TA-135 (ADA use), color – black, or equal.
4. Round tables and separate chairs shall be the following types by Landscapeforms or equal:
 - a. Tables: Catena model, round, 36 inches diameter, perforated top, black, round cast-iron base

- b. Chairs: Traverse model, arms, perforated metal seat, black
5. Pay particular attention to the provision of the CSPM Section 4.2 regarding “Proposed Accessibility Guidelines for Pedestrian Facilities in the Public right-of-Way (PROWAG).”

DIVISION 13 – SPECIAL CONSTRUCTION

A. Custodial Closet

1. At least one 7’x 8’ closet or equal space will be located on each building floor. Two closets are required on floors larger than 15,000 sf. Additional space may be required depending on the building floor square footage.
2. One wall will have at least three shelves, spaced a minimum of 18” apart and at least 18” deep. The bottom shelf will be a minimum of 24” from the floor. The shelves will be the same length as the wall. The shelving can be either wood or steel. The shelves will not be mounted on the same walls as the sink.
3. There will be one mop sink located in a corner furthest from the door. A mop holder able to accommodate up to three mops will be mounted over the sink.
4. A separate cold water sill cock with a vacuum breaker shall be supplied for the soap dispensers to prevent cross-over between hot and cold water systems.
5. There will be one light fixture suitable to properly illuminate the closet; the walls will be painted a shade of white to enhance the lighting. The closet will be ventilated. The floor will be sloped to a center floor drain sized for this space. The floor will be sealed concrete. The closet door should be hinged to open out and not into the closet.
6. Sprinkler system components, roof accesses, serviceable electrical and mechanical building equipment (i.e. electrical panels, motors, etc.) will not be located in this space.

B. Custodial Supply Closet

1. One supply closet will be located on a floor level accessible from a service entrance or loading dock (not within the proximity of any custodial closet), containing a minimum area of 100 square feet.
2. One wall will have adjustable shelving that is 24” deep (four total) with the bottom shelf being 24” from the floor. Shelving will be made of wood that has been treated with a wood sealer (not pressure treated) or painted steel..
3. Lighting will be gauged to properly illuminate the room. The wall will be painted a shade of white. There will be at least one duplex receptacle, 120 VAC. The room shall be ventilated.

4. Sprinkler system components, roof accesses, or serviceable electrical and mechanical building equipment (i.e. electrical panels, motors, etc.) will not be located in this space.

C. Maintenance and Attic Stock Storage Area

1. If possible, create space in a mechanical room accessible from the building's interior to store operations and maintenance manuals, maintenance material, attic stock, and spare parts.

D. Trash Rooms

1. The requirement for trash rooms in buildings should be considered during the schematic design phase, particularly in the case of residence halls. At least one trash room shall be provided on each floor of residence halls, with convenient access to elevator(s), and with appropriate ventilation. Trash rooms on the ground floor shall have convenient access to both the inside and the outside of the building.

E. Recycling Space

1. Space and container requirements shall be incorporated in the design of new and renovated buildings to facilitate waste stream separation and removal.
2. Alcoves, recessed, or designated areas shall be provided for the following containers
 - a. Office paper
 - b. Newspaper/magazines
 - c. Plastic
 - d. Aluminum
 - e. Domestic trash

F. Loading Docks

1. Exterior loading dock areas should be located near the mid-section of the building, rather than at either end.
2. Loading docks should be enclosed with an overhead door, or at a minimum, sheltered from the elements by an overhanging roof.
3. Loading docks should be directly accessible by an internal elevator.
4. Bumpers and a dock leveler will be provided.
5. Floor space shall be provided for multiple recycling storage containers.
6. Docks that are 48 inches or more above the lower level must have fall protection, preferably a guard rail with safety gate(s) that can be opened with one hand.

G. Outdoor Storage

1. Storage for furnishings, supplies, and equipment that will be utilized outside a building will be incorporated into the building structure, with separate exterior door(s) for access.
2. Stand-alone or attached outdoor storage sheds will not be specified.

H. Biosafety Level One and Two Laboratories

1. Include a separate sink for handwashing.
2. Bench tops must be impervious to water and resistant to moderate heat and chemicals used to decontaminate work surfaces and equipment.
3. Space must be provided between furniture and fixed equipment to be accessible for decontamination. Furniture must be covered in a non-fabric material that can be easily decontaminated.
4. Exterior and hallway doors must close and lock automatically.
5. Laboratory staff must have access to equipment that can decontaminate biological waste, depending on the biological risk assessment.
6. Refer to Division 23 Section D for requirements for biological safety cabinets.

DIVISION 14 – CONVEYING EQUIPMENT

A. Elevators

1. Submittals shall include shop drawings, schematic wiring diagram, product data and maintenance manuals. Maintenance manuals are required and shall include operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing for major and critical components, and emergency instructions. Three sets of maintenance manuals shall be provided to the University after approval of all shop drawings.
2. Hydraulic elevator jack cylinders shall be installed inside a PVC pipe. Jack cylinders shall be provided with dielectric protection.
3. Prior to the University's acceptance of the installation, an inspection must be performed and acceptance tests must be witnessed by an independent elevator inspector to verify conformance with code requirements. The Contractor shall employ the independent elevator inspector. All deficiencies shall be corrected by the Contractor at no cost to the University.
4. New elevators shall be provided with a 12 month warranty that begins on the date of the building's Certificate of Occupancy. New elevators will be added to the University's existing elevator maintenance and repair contract at the expiration of the initial warranty.

5. Hydraulic elevator piping shall be installed above ground where possible. Underground piping shall be schedule 80 and shall be covered with permanent protective wrapping. Shut-off valves shall be installed in the machine room.
6. Contract documents shall require a letter from the elevator manufacturer (on manufacturer's letterhead) verifying that the manufacturer acknowledges and will comply with all requirements of the specifications relative to repair and maintenance tools. Specifically, the letter shall include language that acknowledges the acceptance of the following items:
 - a. Any and all maintenance diagnostic tools, electrical schematic wiring diagrams, and any access codes and passwords required to perform any maintenance function over the life of the equipment such as diagnostics, adjustments or parameter reprogramming shall be provided to the University on the date of Substantial Completion. Tools may be handheld or built into the control system and shall function for the life of the equipment without the requirement to return them to the manufacturer.
 - b. Complete operations and maintenance manuals and maintenance training manuals including diagnostics instructions for troubleshooting the microprocessor system shall be provided. The University shall not be required to sign licensing agreements related to the use of maintenance or repair tools.
 - c. It is the intention of the University to obtain competitive bids for all maintenance and repair services and material for the elevator provided. Accordingly, the use of proprietary equipment or equipment requiring the use of any proprietary items throughout the life of the equipment is unacceptable. Any special tools, prints, technical data, layouts, hardware, software, etc. required throughout the life of the equipment, and which cannot be obtained from multiple suppliers, must be provided by the manufacturer to the University at the date of Substantial Completion of the project.
7. Elevator equipment rooms shall not be used for access to roofs or other parts of the building unless elevator equipment is fenced or walled in.
8. The preferred location for the machinery of traction-type elevators is overhead, rather than in a machine room.
9. Hydraulic machine-room-less elevators shall not be installed in Longwood University buildings.
10. Elevator pits shall have sump pumps and adequate drains to prevent the accumulation of water. Drains shall not be connected to building sewers.
11. Elevator cab floors shall be rubber floor tile with "lo-disc" raised circular design for a non-slip surface. Acceptable manufacturers are Roppe Rubber Co.,

Johnsonite, and Musson Rubber Co. An alternate acceptable floor covering is carpet.

12. A sweep will be installed on the machine room door to provide dust protection.
13. Residence hall elevators shall have stainless steel type 5WI (vandal proof) cab interiors and vandal resistant hall call stations, light fixtures, car stations, position indicators, and an in-car video surveillance camera.
14. Conduit will be installed for analog telephone wiring from the telephone backboard to the elevator controller. Power for the elevator telephone must be on an emergency circuit.
15. All electric motors on elevator or conveying equipment shall be "Premium Efficiency".
16. Hydraulic elevators shall be provided with emergency battery back-up elevator lowering devices such that, in a power outage, the elevator will lower to the main landing and doors will open.
17. An emergency telephone shall be an integral part of the elevator.
18. All elevators shall be provided with emergency lighting.
19. Longwood University's standardized fire service key is FEOK 1.
20. The Longwood University Facilities Operations Department will provide the appropriate statement for the inspection statement.
21. A means of attachment shall be provided for full-length wall protection material to protect cab walls when the elevator is used to carry freight or furniture. The wall protection material will be provided by the Contractor.

B. Chair Lifts

1. Chair lifts shall not require keys for operation.

DIVISION 21 – FIRE SUPPRESSION

A. General Requirements

1. Longwood University Environmental Health and Safety Department personnel will be provided an opportunity to review the system installation near the project completion date, preferably during a State Fire Marshal inspection. Noncompliant items shall be repaired by the contractor.
2. During renovations of buildings that will remain occupied or partially-occupied, all systems serving the occupied portion shall remain operational, or the contractor shall provide a continuous fire watch for the duration of the outage.
3. All system devices must have labels that are visible from the normal walking surfaces in the building.

B. Sprinkler Systems

1. A separate water service for sprinklers, fire pumps, and standpipes shall be provided, and shall not be sourced through the domestic water service.
2. A separate backflow protection device must be provided for the sprinkler system water source. Prevention devices must be mounted within three feet of the finished floor, or must be otherwise easily accessible. Overhead mounting is strongly discouraged.
3. Whenever the code allows a choice, use of ball valves is preferred over gate valves.
4. Fire pumps should be sized so that its maximum pressure does not require a pressure relief valve. Water from system flow should be able to drain into a four inch floor drain without overflowing.
5. All component identification tags and signs must be readily readable from floor level, or a secondary label must be affixed in a visible location.
6. All hydraulic design data plates shall be marked in a manner that will be legible for a minimum of 20 years. Imprinted metal is preferred.
7. In all buildings with fire alarm systems, all control valves, including post indicator and wall indicator valves, shall be electronically supervised by the fire alarm panel.
8. At all locations where control valves are concealed above ceilings or behind access doors, a sign shall be provided on the ceiling below the valve or the access door indicating the location of the control valve.
9. In residential buildings, all control valves located in spaces accessible by the occupants of the building shall be provided with lockable tamper prevention devices and locks specified by the University.
10. Control valves shall only be installed in corridors, stairwells, mechanical rooms, fire pump rooms, and sprinkler valve rooms, and shall be easily accessible. The control valves shall be accessible by a 5' tall person with the use of no more than a 6' stepladder. Access doors 24" x 24" shall be provided to valves located above inaccessible ceiling types.
11. Control valves shall not be installed above or below ceilings in classrooms, offices, conference rooms, custodial closets, or any dormitory living quarters.
12. Each control valve shall be supplied with a sign indicating the area of the building that is served by the valve.
13. At all locations where inspector test valves (ITV) are concealed above ceilings or behind access doors, a sign shall be provided on the ceiling below the valve or on the access door indicating the location of the ITV.
14. ITVs shall only be installed in mechanical rooms, corridors, stairwells, fire pump rooms, sprinkler valve rooms, and custodial closets, and shall be easily

accessible. The ITVs shall be accessible by a 5' tall person with the use of no more than a 6' stepladder.

15. ITVs 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.
16. ITV discharge shall be piped to a drain capable of handling the discharge at full flow, or to the exterior of the building.
17. Drain valves shall only be installed in corridors, stairwells, mechanical rooms, fire pump rooms and sprinkler valve rooms, and shall be easily accessible. The drain valves shall be accessible by a 5' tall person with the use of no more than a 6' stepladder.
18. Drain 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 area.
19. The main drain discharge shall be piped to a sanitary sewer with a diameter sufficient to drain the entire building's sprinkler pipes within 10 minutes without overflow onto the floor.
20. Auxiliary drain valve discharge shall be piped to a drain capable of handling the discharge at full flow, or to the exterior of the building.
21. In addition to building code requirements, in buildings more than two stories tall all stairways that have an exterior exit shall be provided with standpipes and fire department hose valves on each level.
22. No sprinkler heads which incorporate a rubber O-ring shall be installed in University buildings without approval by the Virginia Division of Engineering and Buildings.
23. A digital set of as-built sprinkler system plans shall be provided. Every individual sprinkler head location shall be noted on the plans, and shall include the manufacturer, model, temperature rating, and date of manufacture for the head that was actually installed. A digital summary shall also be provided which lists all the individual types of heads installed for the entire building, and the total number of each type actually installed. It is the responsibility of the Sprinkler Contractor to verify in the field that the inventory accurately represents the heads that were actually installed. Reliance solely on the approved shop drawings is not acceptable.
24. Sprinkler piping shall be flushed before final occupancy.

C. Fire Extinguishers and Cabinets

1. Fire extinguisher cabinets shall be incorporated into all projects.
2. Longwood University's standard fire extinguisher type is a 10-pound equivalent, multipurpose dry chemical, rechargeable device in a steel container. Other types may be required for unique applications.
3. Fire extinguishers will be Contractor-provided and Contractor-installed.

D. Other Systems

1. Suppression systems in campus food preparation facilities shall be designed in modules with excess and/or expandable capability to accommodate future requirements.
2. Exhaust systems from woodworking and other sawdust generating equipment shall be provided with a fire suppression system. If this type of equipment will be included in the project, the design team is urged to consult with Longwood Environmental Health and Safety Department personnel.
3. Residential-style stoves shall be equipped with a dry chemical fire suppression system incorporated into an exhaust hood that is exhausted to the building's exterior.
4. Inerting gas suppression systems
 - a. Halon-like systems shall be provided for server rooms.
 - b. CO₂ systems shall be provided for sawdust storage facilities.
 - c. If these types of systems will be included in the project, the design team is urged to consult with Longwood Environmental Health and Safety Department personnel to ensure compatibility with existing systems.

DIVISION 22 – PLUMBING

A. Drinking Fountains

1. Drinking fountains shall be Elkay or equal.
2. Drinking fountains located in hallways shall be located in recessed alcoves.
3. Drinking fountains located in areas of high pedestrian traffic will be equipped with an Elkay EZH₂O or equal bottle filling station.

B. Connection Labels

1. Connections to all plumbing fixtures will be labeled with the location and name of the isolation or shut-off control supplying that connection.

C. Valves

1. Sufficient zone isolation/shut-off valves will be installed in cold/hot water, heating hot water, chilled water, steam, and other service piping to allow maintenance and replacement of terminal equipment without interrupting service to large sections or the entire building.
2. Valves shall be installed on all lines that penetrate the floor from below.
3. Valves shall be installed on all branch lines of main lines.
4. Valves shall be installed on all lines at locations such that each floor can be isolated from the main building.
5. Any equipment such as showers, darkrooms, etc., requiring mixing of hot and cold water shall utilize a pressure-compensated mixing valve rather than a temperature-compensated mixing valve.
6. Control valves shall be installed so they can be reached from floor level where possible.
7. All valves and steam devices used on steam lines shall be rated for a minimum of 500° F and 1.5 times the working pressure.
8. Butterfly Valves
 - a. Only high-performance type shall be used. Acceptable manufacturers are Bray Series 41, Xomox, and DeZurk.
 - b. High performance butterfly valves shall be double offset design in accordance with ANSI Class 150, 300 or 600, as required and MSS-SP68 “face to face”.
 - c. Valves will have blow-out proof stems in accordance with API 609.
 - d. Valves will have a full lug end pattern.
 - e. Double dead-end bi-directional zero leakage must exceed ANSI Class IV leakage standard.
 - f. Valves 2 ½” and smaller shall be provided with lock handles.
 - g. Valves 3” and larger shall be provided with manual hand wheel worm gear.
9. Ball valves shall be Xomox, Kromback, or Crane Class 150 full port threaded or flanged. No sweat valves will be used. All ball valves shall be brass.
10. Any point that the piping of supply and return water is connected on chilled water or heating water shall be equipped with hand-operated isolation valves. Control valves shall not be used for isolation.

D. Piping Specialties

1. Sufficient air vents shall be installed in chilled and hot water piping systems to easily bleed entrapped air, and shall be piped to a floor drain or other suitable drain line.

2. Pipe chases should be of sufficient size to accommodate maintenance personnel (at least three feet wide). Pipe chases shall not be located in custodial closets.
3. Differential pressure indicators (manometers) shall be installed at serviceable filters, located where it can be readily observed. The "clean" and "replace filter" points shall be marked.

E. Pumps

1. Parallel pumps, two per system, shall be installed in all primary pumped building systems, such as chilled water, heating, domestic hot water, etc.
2. Pumps shall be Bell & Gossett, or equal.
3. Pump motors greater than one HP shall have variable speed drives.

F. Restrooms

1. Floor drains shall be installed in all restrooms, centrally located, floor slightly sloped toward drain, 6" inlet with 2" outlet, chrome-plated brass or nickel bronze.
2. Tank-type commodes
 - a. Shall be low-flow vitreous china, floor-mounted, siphon jet, elongated closet bowl with 1-1/2" top spud with 5-1/4" floor to center outlet.
 - b. Kohler products are preferred.
 - c. Dual-flush valves shall be utilized whenever possible.
3. Sloan or equal touchless faucets or valves shall be specified for sinks, urinals, and flush-valve commodes. These valves shall be powered by a low-voltage hard-wired electricity supply, not by batteries.
4. All floor flanges shall be screwed to the floor.
5. All fixtures shall be caulked.
6. Waterless urinals shall not be installed.
7. Trap primers shall be connected to the water supply of a water closet in the vicinity.

G. Laboratories

1. Drain and waste lines shall be chemical- and heat-resistant.

H. Custodial Sinks

1. Service sinks shall be floor mounted, of concrete or stone construction, 8" maximum height from floor to rim, and minimum size of 24" x 24". Faucet-vacuum breaker, integral stops, spout with pail hook and nose end, top single brace, renewable units and valve seats Eljer 749-1200 or 749-1400 or equal shall be included.

I. Domestic Water

1. Shut off valves are required on each floor, on take-offs from all vertical risers, and at the connection to each piece of equipment.
2. Dielectric fittings shall be used with connecting piping of dissimilar metals.
3. Drain valves shall be installed in accessible locations at all low points in the piping system.
4. Pressure reducing valves shall be installed in new and renovated buildings due to the high pressure of the Town of Farmville's water supply.
5. No iron pipe or fittings (including galvanized) shall be used in any potable water system.

J. Safety Showers and Eyewash Stations

1. A floor drain shall be located within ten feet of this equipment.
2. A drench hose shall not be substituted for a dedicated eyewash station.

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING

A. General Design and Requirements

1. Indoor design conditions for cooled and heated spaces shall be 74°F dry bulb with 50% relative humidity for summer and 68°F dry bulb for winter. Summer outdoor design temperature shall be 94°F dry bulb and 74°F wet bulb. Winter outdoor design temperature shall be 16°F. Design altitude shall be 417 feet for all design calculations.
2. Provide stand-by or redundant equipment, cycled or alternating lead-lag sequence for critical needs (e.g. standby compressors on refrigeration for food storage).
3. Use dual independent refrigeration circuits on HVAC equipment where available, particularly when serving essential areas.
4. Utilize semi-hermetic compressors rather than hermetic compressors for all HVAC/refrigerant equipment larger than ten nominal tons where available.
5. Provide a minimum five year parts and labor warranty on HVAC compressors.
6. New or renovated buildings shall have a chilled water interface designed in accordance with the Longwood Chilled Water Master Plan design template (shown in Appendix B of this document).
7. The use of aluminum tubing in HVAC coils is unacceptable.
8. All air handlers and fan coil units shall be located with provisions for sufficient space to service the units, (e.g.: change filters, sheaves, bearings, motors and coils; lubricate components; and replace belts).

9. Provide high-limit on steam humidifiers to prevent spraying liquid condensate into the duct system.
10. Avoid utilizing rooftop air handling units whenever feasible.
11. Steam traps shall be Spirax Sarco or equal.
12. Air handling unit fans should be specified operate at a mid-range speed instead of near maximum speed. Units should be sized so that the motor will have less horsepower than the maximum allowed for the fan size.
13. Specify variable frequency drives on fan motors instead of vortex dampers for air flow volume control.
14. Piping and conduit shall be run parallel and perpendicular to building structure (walls, ceilings, floors).
15. Drain pans in air handling units and fan coil units shall be double layer insulated, tilted in two directions so it will drain no matter how the unit is set. Pans will be equipped with a water alarm or cut-off switch.
16. All hydronic control valves shall be selected with a minimum close-off pressure capacity of 45 - 50 psig.
17. Drain lines that carry condensate from two or more units shall be minimum 1¼" diameter.
18. Cooling coils shall be selected at a face velocity that will permit all condensate to drain into the drain pan and will not allow blow over.
19. Heating and cooling coils in air handling units shall be adequately separated (minimum 15") to properly install the freeze-stat. When possible, factory-install the freeze-stat across the coil and route to a connection outside of the unit housing.
20. For steam humidifiers located in air handling units or in supply air ducts, the source of steam shall be the Longwood University steam system where practical. Factors including the humidifier location relative to the steam lines, first cost operation, and maintenance costs shall be considered in the selection of the humidifier.
21. Temperature sensors shall be installed on the discharge side of all coils.
22. Steam condensate return lines that have more than one steam trap connected to them shall be 1-1/2" minimum.
23. Face and bypass dampers are required in air handling units that supply 100% outside air and have a steam pre-heat coil.
24. Design heating valves to fail in the open position. In areas where an over-temperature condition may be as damaging as freezing condition, provide a high temperature limit to de-energize air handling equipment.
25. Provide thermostatically-actuated control valves on all radiation heating units, in addition to outside air or zone resets.

26. Locate thermometers, gauges, and controls where they can be readily observed and reached from floor level.
27. Local sensors will be analog.
28. Accessible doors to crawl spaces shall be located as close as possible to the mechanical equipment in the spaces.
29. In atriums or other multi-story open spaces, maintenance and accessibility should be a consideration when mounting fans, vents, and other equipment above the floor.
30. Provide bound, indexed operation and maintenance manuals. Manuals shall be organized by systems and fully indexed by equipment type. They must contain original manufacturer's bulletins and manuals – copies are not acceptable.
31. Process cooling requirements shall be addressed by a dedicated process cooling system. Process cooling shall not be achieved using the building chilled water system or the building domestic water system.
32. New HVAC systems (especially utilizing 100% outside makeup air) shall include a heat pipe or heat wheel for heat recovery.
33. Cogged belts will be utilized. V belts will be utilized only where the application warrants, for example, high torque installations.
34. Outdoor smoking areas and shelters shall be located at least 25 feet away from building air intakes, operable windows, doorways, and other entrances.

B. Variable Frequency Drives

1. All HVAC system fan motors greater than one HP shall be equipped with a variable speed drive.
2. Acceptable manufacturers are Eaton (preferred), Honeywell, or ABB.
3. All variable frequency drives shall be provided with a manual constant speed bypass circuit. The bypass circuit shall be provided in the drive enclosure. A harmonic analysis shall be performed by the drive manufacturer based on the system documentation, and included in the design submittal.
4. Isolation transformers shall be provided in a separate enclosure.
5. Electrical output for variable speed drives shall not exceed 10% THD.

C. Air Distribution

1. Restroom grilles and diffusers shall be stainless steel type 304, or aluminum, satin or brushed finish.
2. Transferred return air for ventilation (second hand ventilation air) is unacceptable.
3. No interior duct insulation (liner) shall be used on supply ducts.
4. Ductwork that is exposed to the weather shall be double wall, smooth inside and out, insulated, with flanged connections. Joints shall be insulated and the

outside panel will be either painted with weather resistant paint or constructed of stainless steel exterior.

5. Air filtration shall be minimum 80% efficiency for air handling systems serving general classroom and office spaces.
6. Fire dampers must be drop-testable with a powered reset capability. If dampers are located in a concealed location, an access panel of a minimum size of 18' by 18' must be located within one foot of the damper.
7. Buildings must be turned over to the University upon project completion with clean air handling equipment and duct systems, including a clean set of air filters installed in the air handling equipment. A quantity of filters for one additional change will be left in the building.

D. Laboratories, Studios, and Shops

1. Commingling, or mixing of general laboratory exhaust and exhaust directly from fume hoods, is allowable as long as it is accomplished in compliance with all applicable building and life safety codes.
2. Heat recovery wheels (or any technology that does not completely separate the exhaust and intake airstreams) will not be specified for energy recovery from building exhausts that handle fume hood exhaust, whether combined or not.
3. Lab exhaust fan speed control will be accomplished using variable frequency drives equipped with a manual bypass.
4. Emergency generators shall be sized to provide adequate power for all exhaust fans serving combined fume hood and general room exhaust systems. Supply air handler outside air intake louvers shall "fail-open" or "power-open" to prevent excessive negative building pressurization upon loss of primary power. Supply air handlers need not be included in emergency generator capacity. Where fume hood exhaust is separate from general room exhaust, only fume hood exhaust fans need to be included in calculating emergency generator capacity.
5. Hoods
 - a. Hoods must have a capture velocity averaged across the working opening of 100 linear feet per minute when in use.
 - b. VAV systems may auto-reduce flow based on occupancy sensors.
 - c. Low flow hoods may be proposed if their documentation shows that they can adequately capture contaminants.
 - d. Room air supply systems must keep the room at a slightly negative pressure from the adjacent hallway.
6. Biological Safety Cabinets
 - a. Biological safety cabinets shall be Class II or Class III design that is compliant with ANSI-49.
 - b. Cabinets may not have an air recirculation rate of more than 70%.

- c. The air intake velocity averaged across the working opening must be at least 75 linear feet per minute.
 - d. If the cabinet is intended for use with vapors and gases, the exhaust must be connected to the building hood exhaust system.
7. Paint Spray Booths
 - a. Room air supply systems must keep the room at a slightly negative pressure from the adjacent hallway.
 - b. A drying area adjacent to the booth should be provided to allow for parts drying so spraying can continue in the booth.
8. Other Fume Generating Activities
 - a. This category includes activities such as brazing, glass blowing, printing, ceramic glazing, and handling fuming liquids.
 - b. Equipment must be provided to capture and safely remove fumes from the working area. Devices such as slot hoods or elephants trunk exhausts are acceptable.
9. Woodworking and Sawdust Generating Activities
 - a. Appropriate dust exhaust and collection systems must be provided.
 - b. See also Division 21, Fire Suppression.

E. Cooling Towers

1. Cooling towers will be packaged induced draft cooling tower(s) for installation on steel structural supports.
2. Acceptable manufacturers are Marley, Baltimore Air Coil, and Tower Tech.
3. The cooling tower(s) shall be induced draft, cross flow, vertical discharge, draw through type, factory assembled.
4. Structural components of the tower, including the cold water basin, basin heater, side stream filtration, framework, mechanical equipment supports, casing, hot water basins, fan deck, and fan cylinder shall be fabricated of heavy gauge steel (basin and floor shall be a minimum of 16 gauge and sides shall be a minimum of 11 gauge). These components shall be protected against corrosion by G-210 galvanizing, or equal, that meets the requirements of salt fog testing in accordance with ASTM B 117. Factory welded components shall be hot-dip galvanized after completion of fabrication to a zinc thickness equivalent to G-210. Cold galvanizing will not be acceptable.
5. Provide appropriate guards meeting all OSHA recommendations for all rotating and/or nip points.

6. Basin Sections

- a. Minimum 16 USSG galvanized steel.
- b. Cold water basin with side outlet connections consisting of suction, overflow and drain piping. Heat tape shall be installed on manual sump drain piping.
- c. Condenser water outlet connections with a clog resistant, lift out strainer with perforated openings sized smaller than spray nozzle orifices, mounted with an anti-cavitation device.

7. Basin Specifications

- a. Basins shall be open gravity type distribution basins using replaceable polypropylene or PVC diffusing type metering orifices. Heavy duty flow regulator valves shall be provided at the discharge into each hot water distribution basin to equalize water flows. These valves shall be disc type with cast iron bodies and stainless steel stems. Valves shall be right-angle type precluding the need for inlet fittings.
- b. Basin cover(s) shall be removable galvanized steel panel(s) supported by basin sides, top of cover flush with the basin.
- c. Provide electric immersion heaters and controls to prevent freezing in the collection basin. One or more stainless steel immersion heaters shall be installed in threaded couplings provided in the side of the basin. A NEMA 4 enclosure shall house a magnetic contactor to energize heaters; a transformer to provide 24 volt control circuit power; and a solid state circuit board for temperature and low-water cut-off shall be provided. A control probe shall be located in the basin to monitor water level and temperature. The system shall be capable of maintaining 40°F water temperature at an ambient air temperature of -10°F.

8. Fan Sections

- a. Single fan propeller type with corrosion resistant cast aluminum blades, adjustable pitch, individually attached to a cast aluminum or cast iron hub.
- b. Hot-dipped galvanized steel fan cylinder with close, but adequate tolerance for fan blade tips.
- c. Heavy gauge hot-dipped galvanized wire grill fan guard over fan cylinder.
- d. Provide the fan with a vibration switch to de-energize fan in the event of excessive vibration.
- e. Heavy duty roller type bearings integral with gear reducer.
- f. Fan shall be driven through helical gear reducer. The gear reducer shall have synthetic rubber oil seals and shall be designed to require oil changes on five year intervals. Speed reducers employing pulleys and

belts shall not be acceptable unless manufacturer warrants such speed reducing equipment to be maintenance free for a five year period.

- g. Motor(s) shall be TEFC, 1.15 service factor, variable speed, variable torque, and specially insulated for cooling tower duty. Motors shall operate in the shaft-horizontal position and nameplate horsepower shall not be exceeded at design operation.
9. Casings
 - a. Casings shall be heavy gauge steel protected against corrosion by G-210 galvanizing, or equal, with lapped joints sealed watertight.
 - b. Large galvanized steel access doors will be located in each end wall casing for entry into the cold water basin and fan plenum area. Access doors shall be operable both from inside and outside the tower
10. The tower and all its components shall be designed to withstand a wind load of 30 psf, as well as a Zone 4 seismic load, per UBC. Fan deck and hot water basin covers shall be designed for a 50 psf live load or a 200 pound concentrated load. Fork lift slots shall be provided.
11. Guardrails, handrails, catwalks, and ladders shall be galvanized steel. Guardrails shall be capable of withstanding a 200 pound concentrated load in any direction.
12. Tower Fill and Drift Eliminators
 - a. Fill shall be lightweight and manufactured of non-corrosive material.
 - b. Drift eliminators shall be two-pass manufactured of non-corrosive honeycomb type material supported in galvanized steel framing. Maximum allowable drift loss shall be less than 0.2% of the water circulated.

F. Air Conditioning

1. Chilled water shall be used as the cooling medium for all new buildings unless an alternate method is specified in the design specifications.
2. New or renovated buildings shall have a chilled water interface designed in accordance with the Longwood Chilled Water Master Plan design template (shown in Appendix B of this document).
3. For projects in an existing building, chilled water shall be used as the cooling medium for any new or renovated spaces as long as sufficient capacity is available in an existing chilled water system.
4. Direct Exchange (DX) systems shall not be used except after specific approval by the University. The total refrigerant charge shall be listed on the unit.

5. The A/E shall include the following work in the scope of all projects for:
 - a. Chiller replacement: The Contractor shall be responsible for flushing the chilled water loop and the condenser water until clean, cleaning and replacing all filters, and cleaning the cooling tower sediment basin.
 - b. Cooling tower replacement: The Contractor shall be responsible for flushing the chilled water loop and the condenser water until clean, cleaning or replacing all filters, and cleaning the chiller tubes.

G. Cooling Coil Condensate

1. Cooling coil condensate shall be piped to drains, either sanitary or connected to a separate and isolated piping system serving a recovery and re-use system.
2. Cooling coil condensate lines shall be equipped with traps and associated cleanouts that allow access to all branches of the condensate drain system.
3. Cooling coil condensate lines shall be minimum 1¼" ID.

H. Chemical Treatment

1. The Architect/Engineer shall coordinate with the Project Manager and the University's Chemical Treatment Consultant as to the required specifications for chemical cleaning and equipment to be furnished by the Contractor. The chemicals to be used by the Contractor for the specified initial treatment shall be furnished by the University. All chemical treatments shall be performed by the University after systems have been cleaned, flushed, and filled.
2. After cleaning and chemically treating the HVAC system, the Contractor shall furnish the University in writing, the following information
 - a. Date of initial treatment
 - b. Type of chemical(s) used for treatment
 - c. Estimated date that further treatment or testing will be required.

DIVISION 25 – INTEGRATED AUTOMATION

A. Building Control Systems

1. Longwood's Campus Wide Building Automation System utilizes the Tridium N4 Platform. The campus system is managed by a central server that holds building graphics, long term trends, schedules, demand response controls, user management, and other centralized tasks.
 - a. Two servers are installed. One is the "live" or production server, the other is the developmental server.
 - b. All construction related activities will occur in the developmental server. The Longwood Building Automation Services personnel or their

designated systems integrator are the only personnel authorized to connect new buildings' systems to the live server.

2. Longwood's Campus Wide Building Automation System standards and specifications are available from the Building Automation Services shop in the [Longwood University Facilities Department](#) .
3. It is Longwood's goal to implement a Niagara-based open system that will allow products from various suppliers to be integrated into a unified system in order to provide flexibility for expansion, maintenance, and service of the system. Longwood shall be the named license holder of all software associated with any and all incremental work on the project. Only Niagara N4-based products from Honeywell or Distech will be utilized.
4. Longwood shall receive ownership of all job-specific configuration documentation, data files, and application-level software developed for the project. These items shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use with the Network Access Controller (NAC), FMCS Server(s), and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to Longwood.
5. The Niagara Compatibility Statement (NICS) for all NACs shall allow open access and be set as follows: Accept Station In = *; Accept Station Out = *; Accept Tool In = *; Accept Tool Out = *. In any case Longwood shall be free to direct the modification of any software license, regardless of supplier, by Tridium Inc.
6. HVAC controls will be separate from Tridium controls. No NDIO or remote NDIO boards will be used without approval by the Longwood Building Automation Services personnel.
7. LON is the preferred communication protocol for HVAC equipment. BACnet, MSTP/IP, Modbus RTU or TCP/IP, Zigbee, and EnOCean are acceptable third party protocols.
8. DALI is the preferred protocol for lighting control systems.
9. The preferred JACE is the JACE8100 line.
10. When lighting and HVAC control systems are present in the same building, each system will have a dedicated JACE. System intermingling will be permitted only with approval of Longwood Building Automation Services personnel.
11. The Campus Wide Building Automation System engineer or contractor will provide a point table in Excel format for all new systems to Longwood Building Automation System personnel. The Longwood Building Automation Services personnel will provide the naming, trending, and alarming information in the table.

12. Longwood will specify devices and functions to be connected to building automation systems, as well as the maintenance and repair concepts.
13. Any piece of equipment that is monitored and/or controlled via the Campus Wide Building Automation System shall not require a reset from that system in order to operate as long as the equipment has hard-wired safeties.

B. Sub-Metering

1. All sub-metering devices will communicate to a central SCADA JACE. Sub-meters for electricity will be Owner-provided and Contractor-installed. All other sub-meters will be Contractor-provided and Contractor-installed.

DIVISION 26 – ELECTRICAL

A. General

1. Provide separate electrical and telecommunications closets. Custodial closets shall not be used to house electrical or telecommunications equipment.
2. Electrical and data cables shall not be installed in or immediately adjacent to steam tunnels.
3. In demolition associated with renovations, all wire shall be removed back to the panel board and all accessible conduit shall be removed.

B. Raceways

1. Minimum conduit size shall be $\frac{3}{4}$ ". Flexible metal conduit shall be used only for whips to lighting fixtures and equipment. All empty conduit shall have a 65 pound test polymer (or equal) pull string tied off at both ends.

C. Conductors

1. Use of MC and BX cable is not permitted (BX cable is an MC cable).
2. All conductors shall be copper. All power conductors shall be awg #12 or larger. Minimum control wire size shall be awg #14, and minimum signal wire size shall be awg #18.
3. Neutral wires shall not be undersized.
4. Multi-wire circuits shall not be installed.

D. Wiring Devices

1. All wiring devices shall be industrial heavy duty specification grade, rated a minimum of 20A, 125V.

E. Emergency Generators

1. Emergency generators shall be loaded to a minimum of 30% of their rated KW capacity. Load must be verified at the conclusion of new construction and major renovation projects, since replacement LED light fixtures draw lower loads.
2. Emergency generators shall be powered by diesel fuel. Propane fuel will be considered for very small and/or off-campus buildings.
3. Natural gas is not available in the Farmville area.
4. Generator installations shall comply with NFPA 110.
 - a. All generator and transfer switches will have remote start/stop and monitoring capability.
 - b. The installation shall provide for remote monitoring of the generator's fuel tank level.

F. Service and Distribution

1. A line diagram of the building electrical system shall be posted in the switchgear room or in the vicinity of main distribution panel.
2. Panel boards shall be flush mounted only in areas with grid type ceilings or open ceilings. Panel boards shall not be located in custodial closets.
3. A clear safety zone in front of panels shall be designated by distinctive floor markings or color.
4. Distribution panel boards shall be provided complete with all mounting hardware for mounting any size breaker that the panel will accept. Breakers shall be bolt-in type.
5. Provide a minimum of one 100 ampere, 30 pole panelboard per laboratory.
6. Provide 50% spare breaker space in each distribution panel in all new buildings. Provide 20% spare breaker space in each panel board.
7. All panel board indices shall identify all equipment served by each circuit, (i.e. Rcpt - Rooms 111, 112, 115).
8. All panel board spaces shall be fully bussed.
9. Circuit breaker trip ratings shall be documented at panel boards and on as-built drawings.
10. All receptacles and equipment shall be permanently marked with the supplying panel and circuit number.
11. All branch circuit junction boxes shall be permanently marked with the circuit number(s) of the wires contained within.

G. Interior Lighting Systems

1. All light fixtures shall be LED, unless otherwise specified by the University.
2. Standard ceiling light fixtures shall be Cooper Accord light emitting diode (LED) recessed lighting fixtures or equal. The color temperature will be appropriate for the type of space and its use.
3. Non-catalog and custom lighting fixtures are to be avoided whenever possible.
4. Emergency egress lighting
 - a. Exit signs shall be LED. Only red lettered exit signs will be used.
 - b. Emergency egress lighting and exit signs should be connected to the building's emergency power system, and shall not contain integrated batteries.
 - c. Emergency egress lighting and exit signs shall be supplied by a dedicated electrical circuit supplying the entire building or an entire floor.
 - d. Longwood University Environmental Health and Safety Department personnel will be provided an opportunity to review the system installation near the project completion date, preferably during a State Fire Marshal inspection. Noncompliant items shall be repaired by the contractor.
5. In atriums or other multi-story open areas, accessibility and maintenance should be a consideration when specifying lighting fixtures and their placement.
6. Occupancy sensors shall be utilized in accordance with current International Energy Conservation Code (IECC) and ASHRAE standards. Sensors shall be the Wattstopper DSW-301 style or equal. Typical locations for occupancy sensors include small rooms such as individual restrooms, one-person offices, and small storage rooms like closets, supply rooms or recycling rooms, areas of rescue assistance, and conference/ classrooms. Ceiling-mounted occupancy sensors shall be provided in conference rooms and classrooms. Wall switches will also be provided in conference rooms and classrooms so that lights may be controlled by switches when the space is occupied.
7. Lighting control systems shall be installed.
 - a. All lighting control systems shall be capable of integration into the campus-wide building control system.
 - b. Lighting control systems will not be installed on JACEs connected to the building's HVAC system; they will be connected to a dedicated JACE.

H. Exterior Lighting Systems

1. Lanterns shall be Hanover "Grande Manor" 6134, color – black, or equal.
2. Lenses shall be Louvers International Inc. part L121A-C48-0125, or equal.
3. Poles shall be Hanover 305-12-BLK anchor base with fluted taper and decorative base, color – black, or equal.

4. Lamps or arrays shall be light emitting diode (LED) 4000K-5000K color temperature, producing light directed in a downward direction.
5. For retrofitting existing exterior fixtures, utilize Hanover or equal arrays and drivers.
6. Exterior lighting fixtures shall be switched by groups from a centralized means such as a lighting contactor. There will be no use of independent photocells in individual fixtures.
7. Illumination of parking lots and parking structures shall meet the requirements of Virginia Department of Engineering and Building (DEB) Notice 110310 – Parking Illumination. Exterior lighting design shall give consideration to the standards of the [CPSM](#) (Section 6), IECC, ASHRAE, the Illuminating Engineering Society (IES), and the International Dark Sky Association. The preferred parking lot illumination fixture is Philips Gardco EcoForm Gen-2 or equal.

I. Motors and Controls

1. All motor variable frequency controls shall meet IEEE recommended practices and requirements for harmonic control in electrical power systems. See IEEE standard 519-1992.
2. Motors of $\frac{3}{4}$ HP and larger shall be 3-phase power of the highest available and appropriate voltage. All such motors shall be equipped with permanently lubricated bearings.
3. Motors of 1HP and larger shall be “Premium Efficiency.”

DIVISION 27 – COMMUNICATIONS

A. General

1. The project A/E shall coordinate all Information Technology (IT) design and construction work with the Longwood University Information Technology Services Department.

B. Wiring Standards

1. Longwood University’s IT wiring and connectivity standards are available at [Longwood University Wiring Standards](#).

C. Coaxial Cable

1. Although the end of the use of coaxial cable can be envisioned in the near to mid-term, Longwood will continue to require that coaxial cable systems be installed in all buildings until further notice.

D. Wireless Communications

1. It is Longwood University's policy to provide wireless communications to members of the Longwood community as much as feasible in campus buildings and throughout campus grounds.
2. The term "wireless communications" encompasses cellular telephone service, wireless data access points, and internal building signal booster systems for public safety radio equipment.
3. Starting at the commencement of work, the engineering and design of wireless systems must be incorporated in the building design process. The A/E shall include an appropriate wireless engineering consultant in the process, and shall incorporate the results of the consultant's work into all project drawings and specifications. Longwood's Information Technology Services Department will participate in the design and location of wireless access points. The contractor shall be carefully monitored to ensure that cables, equipment and antennas are procured, installed, and positioned exactly as specified. The location of data access point antennas shall not vary from the position shown on the Working Drawings by more than two feet.
4. Public safety radio booster systems shall be designed to provide coverage of all areas within the building.
5. Wireless access shall be provided in building mechanical rooms.
6. The appearance and location of internal and external building wireless antennas shall be carefully considered in conjunction with the building's general design. Antenna size, type, and location shall be chosen to minimize their visual impact. Antennas must be disguised or concealed as much as possible if required by design considerations.
7. The location and design of larger external wireless communication antennas will be included in the project's submission to the Virginia Art and Architecture Review Board.

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

A. Video Surveillance Systems

1. Equipment standards, guidelines, and installation requirements are contained in [Longwood University Surveillance Camera System Standards](#).

B. Building Access Control System

1. Longwood University utilizes the current version of RS2 Access It! Universal.NET software from RS2 Technologies, LLC. Verify the status of the project building's

equipment and software with Longwood Facilities Department before starting the design phase.

2. Longwood University standards are contained in the document [Longwood University Door Hardware Design Guidelines](#).

C. Emergency Police Call Boxes (“Blue Phones”)

1. Longwood uses Talk-a-Phone equipment for exterior locations, and Viking Electronics E-1600-60A for building areas of refuge. This equipment will be provided by the University and installed by the Contractor.
2. The location of emergency call boxes shall be determined as early as possible in the design phase.

D. Emergency Notification Systems

1. Visual and audio emergency alerts are provided inside most campus buildings by the Alertus system.
2. The Project Manager will provide specific information and requirements as required.

E. Fire Alarm Systems

1. Type
 - a. Fire alarm systems shall be fully-addressable using microprocessor controlled intelligent reporting equipment that forms a complete and coordinated system.
 - b. The system components shall include, but not be limited to, alarm initiating devices, alarm notification appliances, fire alarm control panel, auxiliary control devices, annunciators, and wiring.
2. Sources
 - a. Systems and components shall be completely compatible with the existing Longwood University campus reporting system.
 - b. The system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001.
 - c. Equipment must be able to be serviced by several different contractors through partnerships, supplier programs, or other means. System parts and data may not be entirely proprietary. The award of maintenance contracts must not be restricted to only one provider.
 - d. Acceptable manufacturers are Siemens, FCI, and Edwards. The Siemens system shall be the basis of design.
 - e. FIKE and Simplex-Grinel systems, due to their sole-source proprietary nature, are not to be used.

3. Systems shall:
 - a. Comply with the requirements of NFPA Standard 72 for protected premises signaling systems except as modified by specific project specifications.
 - b. Be electrically supervised and monitor the integrity of all conductors.
 - c. Be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard for fire alarm applications.
 - d. Have the capability for automatic sensitivity control of smoke detectors.
 - e. Incorporate electrical surge protection.
 - f. When a choice exists between horns or speakers, speakers are preferred to facilitate integration with a future campus-wide alerting system.
4. Installation
 - a. All equipment shall be new and the latest models from the manufacturer.
 - b. The system shall be installed under the direct, on-site supervision of NICET certified (minimum Level III Fire Alarm Technology) technicians.
 - c. The installation shall comply with the UL listing.
 - d. The installer must provide manufacturer's certification that all components have been tested as, and will operated as, a complete system.
 - e. Fire alarm panels should not be co-located with security-sensitive IT infrastructure.
 - f. Longwood fire alarm panel locks have been standardized to a T-45 key.
 - g. Smoke detectors and smoke alarms within living units should be located as far as legally possible from shower areas.
 - h. In residential rooms Longwood prefers smoke detectors powered by the building's electrical system and hard-wired into the building's alarm system.
 - i. All system devices must have labels that are visible from the normal walking surfaces in the building.
 - j. All devices shall be located in such a manner that they are readily accessible by a 5' tall person using a 6' ladder, or there must be a pathway for a man lift.
 - k. All devices must have labels that are visible from the normal walking surfaces in the building.
5. Operational logic for detection devices installed in residential buildings
 - a. Activation of a single device shall send a trouble alert to the building's system.
 - b. Activation of a second device shall activate the building's fire alarm.
6. Longwood University Environmental Health and Safety Department personnel will be provided an opportunity to review the system installation near the project

completion date, preferably during a State Fire Marshal inspection.

Noncompliant items shall be repaired by the contractor.

7. During renovations of buildings that will remain occupied or partially-occupied, systems serving the occupied portion shall remain operational, or the contractor shall provide a continuous fire watch for the duration of the outage.
8. University fire alarm systems are monitored by a third party contractor who communicates alarms to the Town of Farmville emergency services dispatch center. Some buildings simultaneously send alarms to the same center via the University's building access control system.

F. Refrigerant and Gas Leak Detection and Reporting Systems

1. Longwood University Environmental Health and Safety Department personnel will be provided an opportunity to review the system installation near the project completion date, preferably during a State Fire Marshal inspection.
Noncompliant items shall be repaired by the contractor.
2. Detection devices shall utilize photoacoustic infrared technology.
3. Oxygen depletion alarms shall be incorporated into the system.
4. Preferred system manufacturers are Chillgard, Haloguard, or Trane.
5. Alarms, if not otherwise monitored, must be connected to the building fire alarm panel.
6. All devices shall be located so that they are readily accessible by a 5' tall person using a 6' ladder.
7. All devices must have labels that are visible from the normal walking surfaces in the building.
8. Door signs to equipment spaces must be provided and marked in accordance with ASHRAE 15.

DIVISION 31 – EARTHWORK

A. Demolition

1. The Contractor shall be responsible for satisfying any and all erosion control and storm water management requirements for any land disturbing activities, including but not limited to on-site or off-site borrow, on-site or off-site stockpiling or disposal of waste materials.
2. The Contractor shall provide the name of the Responsible Land Disturber to the Project Manager prior to commencement of work.
3. The Contractor shall be responsible for obtaining rights of way to any waste disposal areas. The Contractor shall be responsible for all tipping fees when materials are disposed of in a location not provided by Longwood University.

B. Site Preparation

1. All tree stumps, trees, limbs, and rubbish shall be removed from the construction area. Controlled burning shall not be permitted.
2. Topsoil shall be removed from the construction area, and if it meets the requirements of the [Longwood Landscape Topsoil Specifications](#) will be stockpiled in an approved area for use during final site grading and restoration.

DIVISION 32 – EXTERIOR IMPROVEMENTS

A. Landscape Design

1. The project architect shall retain a Landscape Architect to provide the University with a complete landscape plan, details, and specifications to be included in the project bid documents, as well as a cost estimate. The Landscape Architect must consult with the Capital Design and Construction Department and the Landscape and Grounds Management Department throughout the landscape design process.
2. The Landscape Architect should consult the [Longwood University 2025 Campus Master Plan](#) for discussion of landscape plans and design guidelines prior to starting the design process.
3. The Landscape Architect must become familiar with, and follow the provisions of, the Longwood University [Tree Management Plan](#), throughout the design and construction phases of the project. Specific attention is directed to Appendix A “Prohibited Trees,” and Appendix B “Protection Procedures.”
4. The Landscape Architect shall conduct a preconstruction meeting with the landscape subcontractor, and shall conduct periodic inspections during the landscape installation. A final landscape installation inspection shall be conducted, and a punch list provided to the Contractor and Project Manager. Final landscape installation shall be approved by the Directors of the Capital Design and Construction Department and the Landscape and Grounds Management Department.
5. The documents Longwood [Landscape Topsoil Specifications](#) and “Longwood Preferred Tree and Shrub List” (available from the Director, [Longwood Landscape and Grounds Management Department](#)) provide specific guidance and requirements about these topics.

B. Hardscape

1. Hardscape provides a durable, all-weather surface to accommodate pedestrian traffic and outdoor gatherings and activities. Hardscape materials shall be chosen to maximize pervious surface area.

2. Hardscape comprises sidewalks and paths, plazas/building entrances, transit stops, and gathering places adjacent to building or building groups. Materials should be chosen based on the activities intended for the location, including such considerations as the use of a combination of materials for prominent locations and compatibility with the materials and styles of adjacent buildings.
3. All hardscape designs must comply with code requirements for ADA accessible paths unless specifically exempted.
4. Most sidewalks and paths require only scored concrete, while more prominent pedestrian areas, such as a concourse, may require additional accent surfaces, such as brick pavers, to visually reflect their importance. Such walks may also include brick banding.
5. Sidewalks on main pedestrian routes between buildings, and sidewalks designated as cart paths, shall be a minimum of eight feet wide. Other sidewalks shall be a minimum of six feet wide. Construction will consist of 4000 psi, six-inch thick concrete over a four-inch #57 stone base. Limited areas of five-inch thick concrete may be allowed by exception.
6. To the extent possible, walkways shall be used as the edge of planting beds to reduce the need for lawn edging.
7. A combination of hardscape materials shall be used to distinguish building entrances, public spaces, and gathering places.
8. All walkways for building entrances, plazas, and feature areas shall consist of compacted dense grade base, concrete sub slab, mortar bed and brick pavers, or concrete topping slab.
9. A suitably sized, all-weather surface shall be provided along with furnishings for transit stops.

C. Surface Parking

1. Surface parking areas shall be minimized from public views, to the degree practicable, by location and/or through landscape screens. Parking areas shall be arranged properly for vehicular and pedestrian safety and landscaped for shade and scale.
2. Surface parking areas should be located away from open spaces and streets. Preferably, parking lots should be located behind buildings, to share access and use of the lot among neighboring buildings.
3. Convenient pedestrian paths should be designed into the arrangement of large parking lots to direct pedestrians to designated crossings and pedestrian linkages.
4. Landscaping shall be provided along the perimeter and within the interior of surface parking lots. Landscaped areas shall be protected from vehicle encroachment.

- a. Landscaping shall be provided along the perimeter of parking areas not bounded by a building.
 - b. Landscaping islands and circulation should be arranged to break down the overall scale of a large surface parking area.
 - c. Landscaping islands shall be sized to provide sufficient root growth for canopy /or understory trees.
 - d. Internal landscape islands shall be a minimum of 160 square feet (9 feet x 18 feet, typical).
 - e. Understory and canopy trees shall be used in surface parking areas for shade and to reduce heat islands. Parking spaces should be within 100 feet of a shading tree, which may include trees within perimeter landscaping areas. See “Longwood Preferred Tree and Shrub List” (available from the Director, [Longwood Landscape and Grounds Management Department](#)).
5. Stormwater drainage should be integrated with the landscape design to include opportunities for on-site retention, such as through rain gardens, bioretention cells, or swales.
 6. Fixed concrete bumpers shall be installed in all pull-in spaces.

D. Planting Design and Materials

1. Comprehensive and well-coordinated plantings are an essential component of a successful campus appearance. Plant selection, quality of plant material, and maintenance requirements should be consistent throughout the campus to convey the visual image of a single integrated open space. Plant material used for landscaping purposes under these guidelines shall be selected under ANSI Z60.1-2012 American Standard for Nursery stock and from the “Longwood Preferred Tree and Shrub List” (available from the Director, [Longwood Landscape and Grounds Management Department](#)).
2. Planting and irrigation design shall promote water conservation through selection of plant materials with low water requirements, by grouping plants with similar water needs together, and by utilizing water-conserving irrigation design and equipment.
3. High maintenance or “showplace” areas shall be limited to building entrances and other easily-accessible, prominent locations.
4. Yard inlets and area drains in landscaped areas shall be located in grass areas, where practical, instead of in planting beds.
5. A list of recommended planting material will be provided to the Landscape Architect at the beginning of the project design process. The list will include ornamental trees, understory trees, canopy trees, groundcovers and vines, shrubs, ornamental grasses, and annuals.

6. Plant Selection

- a. See “Longwood Preferred Tree and Shrub List” (available from the Director, [Longwood Landscape and Grounds Management Department](#)) for guidance.
- b. Evergreens plants shall be a primary selection in open space designs.
- c. Emphasis should be placed on selection of native trees and trees with spring and/or fall color.
- d. All trees shall be hand-selected by the University’s representative at the growing source to ensure consistent quality.

7. Trees shall be used to provide shade, define edges of street paths and open spaces, and support the intended pedestrian-scale of the campus.

8. Street and Path Trees.

- a. Street trees shall be located within the planting strip between the sidewalks and curb. The strip shall be of sufficient width to prevent damage to hardscape due to root spread. For planting guidance see the Longwood University [Tree Management Plan](#).
- b. Streetscapes with building setbacks of 25 feet or more (measured from curb) shall include canopy trees to reinforce the intended street width proportions described in tree management plan. Streets with narrow setbacks may use ornamental or understory trees.
- c. Off-street paths shall be lined with ornamental trees, spaced between 40-80 feet.

9. Trees in Open Spaces.

- a. Trees located within open spaces shall be arranged consistently with the intended geometry of the open space and shall be located so as to preserve intended views across or through the space.
- b. Larger open spaces should include a combination of understory and canopy trees.
- c. Understory trees are sufficient for most plazas.
- d. Sufficient room shall be provided in tree wells to accommodate the expected root spread of the tree type.

10. Shrubs

- a. Shrubs shall be used to define spaces as needed but shall not interrupt the open flow of grassed areas.
- b. Select shrub material that performs well with limited pruning.
- c. All shrubs shall be planted a minimum of five feet from buildings.

11. Existing Plantings

- a. The University places a high value on its existing tree canopy, and requires its partners in development, contractors, and vendors working on campus to respect and preserve existing trees.

- b. Only those existing trees that absolutely must be removed to complete the construction project shall be removed.
- c. Removal of trees having a diameter at chest height of four inches or more is discouraged.
- d. The methods in the [Tree Management Plan](#) shall be used to protect all trees and significant plant material designated by the University during construction. The entire area below or within the tree drip line shall be enclosed within fencing to protect root systems.
- e. The University will monitor protection fencing and will assess damages as specified in the construction contract if tree protection fencing is not kept in place and maintained during construction.

E. Topsoil

1. The document Longwood [Landscape Topsoil Specifications](#) contains specific requirements for topsoil.
2. Subsoil must be mechanically loosened to a minimum depth of 12" prior to topsoil spreading.
3. All debris and extraneous plant material shall be removed from the subsoil prior to topsoil spreading.
4. Topsoil will be spread to 6" minimum depth after subsoil preparation.

F. Irrigation Systems

1. General requirements
 - a. All irrigation systems shall be supplied by separate water meters that do not serve Longwood buildings, so Town of Farmville sewer use charges will not be incurred.
 - b. All irrigation systems shall be automatic.
 - c. All systems components of the same function shall be a uniform brand.
 - d. All automatic irrigation systems shall be designed to be controlled by the Longwood Landscape and Grounds Maintenance Department's central control computer.
 - e. All systems shall have rain shut-off and soil moisture shut-off sensors.
2. Field controllers
 - a. All controllers shall be Hunter model ACC-99D2 two-wire, or equal, with a compatible IMMS radio control system, and a plastic stand-alone cabinet with an internal transformer and a 99-station capability.
 - b. Radio tests must be performed and approved by manufacturer-qualified irrigation system personnel before installation to ensure a sufficient radio link to the central control system.

- c. Controllers must be fully grounded and certified in order to validate the warranty.
3. Site design and requirements
 - a. All slopes greater than 30 degrees shall be watered by stream spray, rotor, drip, or other low precipitation irrigation heads if the controller cannot cycle at least two minutes several times a night.
 - b. All laterals shall be sized so as to not exceed a 10 percent pressure drop from the nearest to farthest head of any valved lateral, and so as to not exceed a velocity of five feet per second in any section.
 - c. All remote control valves shall be sized for a minimum pressure drop of two psi for the given flow rate of lateral and installed per irrigation drawing specifications.
 - d. Plant materials of differing watering requirements shall not be serviced by the same valve. In no case shall turf be on the same valve as any other plant material, unless specifically approved during the design process.
 - e. In-line subsurface drip irrigation is to be used for shrubs in rows or closely spaced groups. If individual emitters must be used, there should be a minimum of two per plant.
 - f. Irrigation heads of different precipitation rates shall not be serviced by the same valve.
 - g. Where irrigation is solely dependent upon quick-coupling valves, they shall be spaced no more than 50 feet apart.
 - h. Complete irrigation coverage of planted areas is required.
 - i. Valve boxes and other irrigation boxes shall be green in lawn areas and black in other areas (such as shrubs, groundcovers, and mulched areas).
 - j. Flow sensors and master valves shall not be located under concrete or asphalt. Flow sensors and master valves shall be located in areas such as soil or lawn where digging can occur to provide access for maintenance and repair.
 - k. In areas of high vehicular traffic such as driveways, parking lots, walkways, or fire lanes, and in any location that vehicles may intentionally or unintentionally drive over or through, concrete sprinkler blocks shall be installed on sprinkler heads adjacent to the vehicular areas.
4. The irrigation contractor shall provide as-built irrigation drawings to the Project Manager in accordance with University specifications.

DIVISION 33 – UTILITIES

A. General

1. All direct-burial utility lines, conduits, pipes and duct banks shall be covered with plastic marking tape containing integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to three feet deep.
2. As-built documentation of underground utilities within the project site or connecting to the project building(s) shall be provided to the University.
3. Supply connections to campus buildings shall be designed in accordance with the University standard configuration, which will be provided by the University during the early design phase.
4. Sub-metering
 - a. Sub-meters and associated control systems will be connected to the Longwood Building Automation System. Refer to Division 25 (Integrated Automation) for BAS information.
 - b. Sub-meters for electricity will be Owner-provided and Contractor-installed. All other sub-meters will be Contractor-provided and Contractor-installed.
 - c. All hardware and software costs associated with sub-metering systems shall be included in the project budget.

B. Valves

1. Shop drawings shall include manufactures' names, class of materials, pressure rating, catalog, and engineering data showing compliance with the specified requirements.
2. Upon completion of the work, the Contractor shall provide two sets of corrective and preventive maintenance instructions, including recommended spare parts.
3. Gate valves shall have right-hand threads.

C. Water Systems

1. Water supply to Longwood University is provided by the Town of Farmville. The A/E shall coordinate the location and design of the connections with the Town. Typically, the Town will provide the service line, including the tap and a meter vault containing the meter, a meter by-pass, and a backflow preventer.
2. The domestic water supply to each building shall be sub-metered, with multiple meters if appropriate, such as for food service areas or specific equipment.
3. Backflow preventers shall be installed at all building service meters and all outside hydrants and sprinkler supply connections.
4. Freeze-proof hose bibs shall be installed on all sides of buildings and located so as to facilitate watering of planting areas and routine cleaning of areas such as

building entries. A similar bib shall be installed on the roof if mechanical equipment is located on the roof.

5. Pressure reducing valves shall be installed in new and renovated buildings due to the high pressure of the Town of Farmville's water supply.
6. See Division 32 Section F. for irrigation system requirements.

D. Sanitary Sewer Systems

1. Sanitary sewer service for Longwood University is provided by the Town of Farmville. The A/E shall coordinate the location and design of the service connections with the Town.

E. Steam Systems

1. The steam supply to each building shall be sub-metered. Sub-meters should also be considered for food service or other commercial areas within buildings.
2. Spirax Sarco valves or equal shall be utilized.
3. Condensate pumps shall be steam powered.
4. Condensate tanks shall be equipped with a gauge glass.

F. Electrical Systems

1. Electrical service to Longwood University is provided by Dominion Energy. The A/E shall coordinate the design of the electrical service with Dominion Energy, and shall provide a load letter.
2. The electricity supply to each campus building shall be sub-metered. Sub-meters should also be considered for food service or other commercial areas within buildings.

Appendix A

Longwood University Official Seal

LONGWOOD UNIVERSITY SEAL

GUIDE FOR ARCHITECTURAL USE



Everything shown in black should **always** be recessed, engraved, inpainted, etc.

Longwood Blue = PMS 282

Always provide a lip of the base material outside the outer ring of the seal to frame the seal against its background.

The proportion illustrated is the minimum standard.

Everything shown in white should **never** be recessed, engraved, inpainted, etc. — it is the base material.

This base material should **always** read as white.

Silver colored metals should be used.

Brushed finishes are preferred.

Matt McWilliams
Assistant VP, Communications

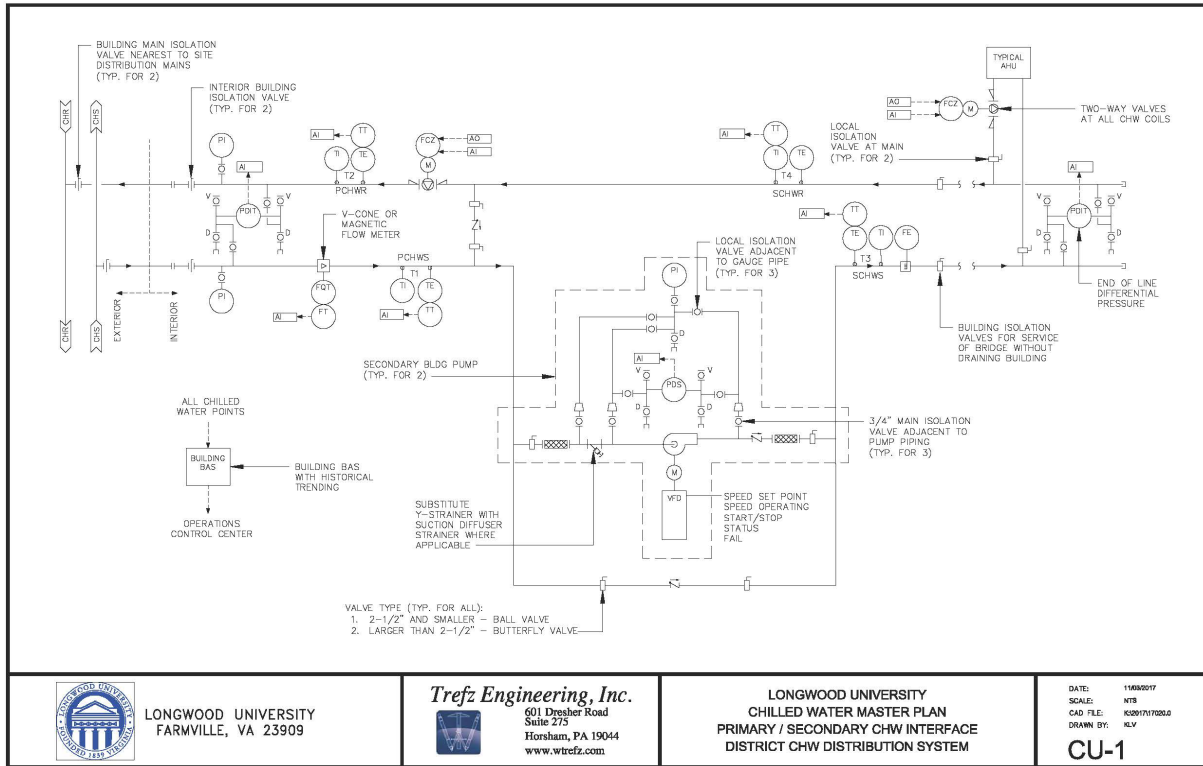
Longwood University
201 High Street
Farmville VA 23909

(434) 395-2026 mcwilliamsmj@longwood.edu

Appendix B

Building Chilled Water Interface Design

Longwood University Chilled Water Master Plan May 20, 2018 Appendix K page 1 of 2



LONGWOOD UNIVERSITY
FARMVILLE, VA 23909

Trefz Engineering, Inc.
 601 Dresher Road
 Suite 275
 Horsham, PA 19044
 www.wtrefz.com

LONGWOOD UNIVERSITY
 CHILLED WATER MASTER PLAN
 PRIMARY / SECONDARY CHW INTERFACE
 DISTRICT CHW DISTRIBUTION SYSTEM












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 CAD FILE: K0201711020.d
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Appendix B

Building Chilled Water Interface Design

Longwood University Chilled Water Master Plan May 20, 2018 Appendix K page 2 of 2

LEGEND	ABBREVIATIONS
 - BUTTERFLY VALVE  - BALL VALVE- 2" & SMALLER  - BUTTERFLY VALVE- 2-1/2" & ABOVE  - FULL PORT BALL VALVE  - V-PORT BALL VALVE  - SUPPORT CHECK VALVE  - FLANGE  - STRAINER  - ECCENTRIC REDUCER  - ELECTRIC MOTOR DRIVEN  - PUMP	AI - ANALOG INPUT AO - ANALOG OUTPUT DI - DIGITAL INPUT DO - DIGITAL OUTPUT FE - FLOW ELEMENT FO - FLOW ORDN FQT - FLOW QUANTITY FT - FLOW TRANSMITTER HB - HAND SWITCH IS - CURRENT SWITCH M - MOTOR ME - HUMIDITY ELEMENT HT - HUMIDITY TRANSMITTER PDI - DIFFERENTIAL PRESSURE INDICATOR/TRANSMITTER PI - PRESSURE INDICATOR (GAUGE) SC - SPEED CONTROL SCA - SPEED CONTROL ALARM TE - TEMPERATURE ELEMENT TI - TEMPERATURE INDICATOR (THERMOMETER) TT - TEMPERATURE TRANSMITTER TV - TEMPERATURE OPERATED POSITIONER VPO - VALVE POSITION VV - VALVE POSITION

 <p>LONGWOOD UNIVERSITY FARMVILLE, VA 23909</p>	<p><i>Trefz Engineering, Inc.</i></p>  <p>401 Dasher Road Suite 273 Economa, PA 19041 www.trefz.com</p>	<p>LONGWOOD UNIVERSITY CHILLED WATER MASTER PLAN LEGEND AND ABBREVIATIONS</p>	<p>DATE: 1/20/2017 SCALE: 0/0 SIA FILE: 0/0/0/0/0/0 PAGES: 0/0 0/0 CU-0</p>
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