

PART 5 – OWNER’S BUILDING CONSTRUCTION STANDARDS**PART 5: OWNER’S BUILDING CONSTRUCTION STANDARDS****5.1. GENERAL BUILDING DESIGN STANDARDS**

- A. Building Square Footage:** the gross square feet (GSF) in the design of the facility may not exceed the GSF specified in the program. The Architect/Engineer (A/E) must make every attempt to execute a design solution within this limitation. Exceptions to this requirement are allowed only with the approval of the College.
- B. Orientation, Height and Massing:** the orientation of each building is to optimize the balance between the execution of the Facilities Master Plan design intentions, the local site context, and the energy conservation. The height of each building is to achieve a balance between the number of stories necessary to accommodate the building program, and a height and massing that are an appropriate response to the building’s context. The massing must accommodate the space and adjacency requirements for the functions within the proposed facility.
- C. Aesthetic Considerations:** the exterior expression of each building is to be developed to be compatible with the massing, composition, aesthetic language and construction details of the campus and adjacent buildings.
- D. Access to Equipment:** Mechanical spaces must be accessible from public corridors and not require access through private spaces. Mechanical equipment, aside from roof-top units, or spaces that require rooftop access or allow access from the exterior into the remainder of the building should be avoided. All doors to mechanical spaces shall have a minimum width of 6-foot-4-inches (double doors) and a minimum height of 7-feet-2-inches. If large equipment is to be installed that can’t be broken down, then knockout panels of adequate size to accommodate passage of the equipment shall be provided.

5.2. GENERAL RESOURCE CONSERVATION AND LEED REQUIREMENTS:

All projects must comply with the requirements of the *Maryland Building Performance Standards*, and the *Montgomery County Building Code*, both of which incorporate the currently adopted version of the *ICC International Energy Conservation Code*. All projects must also comply with the *Montgomery County Code, COMCOR 08, Section 14A.01 Building Energy Design Standards and 08.26.01, Buildings – Energy Efficiency and Environmental Design*, which includes requirements for achieving a USGBC LEED Silver rating, or complying with standards approved by the Director of the Department of Permitting Services as equivalent to the USGBC Silver rating.

Projects at the Rockville Campus are also to comply with the requirements of the *City of Rockville Building Code, Chapter 5, Ordinance 8-10, Article XIV Green Building Regulations*, which incorporate many requirements of LEED for New Construction, 2009, including Energy and Atmosphere credit “EA Credit 1.”

The analysis and documentation requirements for sustainable design for individual projects are detailed in the *Instructions to the Consultant* section of the *Part 2 Facilities Construction Program for the project*.

More detailed energy conservation requirements for particular building systems are included in the systems descriptions to be found below in this document.

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1. Drainage materials: Design considerations include selection of appropriate material or product assembly to achieve flow rate required.
2. Filter fabrics: the sub-surface drainage system design is to include filter fabrics to protect drainage layers or aggregate used as a drainage layers and at aggregate around exit drainage piping.
3. *Damp proofing*: (reserved)
4. Waterproofing membranes: provide waterproofing membrane at all exterior below grade surfaces above 6” below the bottom of the slab on ground. Extend the waterproofing membrane up behind the exterior above grade wall finishes and integrate with the exterior wall air barrier and flashing system for continuous waterproofing. Protect the waterproofing membrane system per manufacturer’s recommendations. Coordinate with the College in the selection of the membrane material and product.
5. Protection board: protection board is required to be installed over all waterproofing membranes, including between membranes and drainage layers. Selection of the board type is to be based on waterproofing system manufacturer’s recommendation for matching types of installation and conditions. Protection board is to be installed as quickly as allowed per waterproofing membrane manufacturer recommendations.
6. Insulation materials: install insulation at the full height of the exterior side of all below grade walls, with an insulation value determined to be sufficient to prevent condensation at the interior of the foundation walls.
7. Waterstops: the installation of waterstops is required at all construction joints in below grade walls, footings and other elements where a waterproofing system is required.
8. Exit drainage pipe: the installation of exit drainage pipe around the foundations of all buildings, and routing and connection of the pipe for integration with the stormwater system is required. The drainage pipe is to be surrounded with free drainage granular fill, which is to be wrapped with filter fabric . The drainage pipe is to have a slope of at least 1.0%
9. The adjacent ground surface and the surface of any finishes applied on the ground are to slope away from the building a minimum of 5%, for a minimum of distance of 6’ from the building.
10. Penetrations: all penetrations through below-grade walls and slabs are to be sealed.

B. Floor Slabs:

1. Include a sub-slab drainage pipe systems with exit drains where hydrostatic pressure is anticipated at the bottom of the slab. Provide pumps if required to drain the water.
2. Include a granular drainage layer below all slabs on grade. The drainage layer is to be deep enough to accommodate the drainage pipe systems where such system is to be installed.
3. Waterproof membrane: needed where hydrostatic pressure is present and the granular drainage layer and drainage piping system are not adequate to eliminate the hydrostatic pressure on the floor slab. If a waterproof membrane is needed at a floor slab, a mud slab is to be installed below the membrane, and protection board is to be applied above the membrane immediately to protect the membrane during the preparation for and pouring of the floor slab.

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4. Vapor barrier: a vapor barrier comprised of a minimum of two layers of 6 mil polyethylene, with joints staggered and overlapped, is to be installed between the granular drainage material and the floor slab. If the vapor barrier is to be used as a radon barrier as well, it must be installed with proper laps, sealing of seams, protection during construction, and proper detailing at all terminations and penetrations.
5. Isolation, Contraction and Expansion Joints: design to include isolation, contraction and expansion joints per the current industry best practices.

C. Plazas, Tunnels and Vaults:

1. Due to the high likelihood of wear and deterioration of below grade systems, special analysis is to be performed of wearing, moisture protection and isolation and structural support systems for plazas, tunnels and vaults. “Plaza systems” refers to any supported slab that provides support for green-scape, tree planters, or vehicle or pedestrian movement over occupied space. Coordinate with the College regarding the overall design, including the selection of the wearing surface material, the fill slab, the isolation/drainage layer and the flow path system, including drainage basins. An effective sheer relief plane is to be provided between the wearing surface and the waterproof membrane. Vertical isolation is to be provided as needed to avoid damage to rigid elements. A subsurface drainage plain is to be continuous across all surfaces to the drainage basins. The drainage basins are to be selected to collect drainage at both the wearing surface and at the surface of the waterproof membrane above the structural slab. The structural slabs are to be sloped for positive drainage to drainage basins.
2. Provide drainage system of free draining granular material above tunnels and vaults. A waterproof membrane system with protection material is to be provided at all horizontal surfaces at plazas, tunnels and vaults, and at the side walls of tunnels and vaults. The waterproofing membrane is to be fully integrated with adjoining above or below grade waterproofing systems.
3. Insulation is to be provided at the outboard side of the waterproof membrane, as needed to prevent condensation on interior surfaces.

5.4. GENERAL SUPERSTRUCTURE STANDARDS (reserved)**5.5. GENERAL BUILDING ENCLOSURE STANDARDS****A. A/E Team Responsibility:**

1. Each building is a complex matrix of dynamic forces and constructed systems. Each element of the building enclosure impacts other elements. Thorough and coordinated design of all elements during the design phases of the project is essential to achieving a weather-tight and durable enclosure that is adequate for a minimum sixty year life span. Many problems with exterior enclosure assemblies are related to the use of performance specifications and delegated design. For that reason, the A/E is to provide a fully developed and coordinated design, and documentation, for the entire exterior enclosure, including below-grade, exterior wall and roofing assemblies. Each of these assemblies is to be fully coordinated within its own systems, and fully coordinated with adjacent systems to minimize air infiltration, water penetration and thermal transfer, and optimize comfort and resource conservation within the building.
2. Performance specifications and delegated design are to be employed only for enhancement of already complete system designs by the A/E. The A/E is to provide a list

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of all items that are proposed to be documented by performance specification or issued for delegated design to the College for review prior to completion of the Design Development phase of the project. The College reserves the right to prohibit performance specifications or delegated design for any or all building elements and systems.

3. The design of the exterior surfaces must be coordinated between architectural and structural disciplines in order to determine the anticipated loads and movements and adequately design the enclosure to accommodate those movements.
 4. The design of the structural systems, structural backup walls, veneer/curtain wall systems, anchorage systems, thermal insulation, air and moisture barriers and interior finishes are to be coordinated to optimize the weather-resistance and durability of the exterior wall systems.
- B. Below-Grade Systems:** see section **General Standards for Below-Grade Enclosure** for standards regarding foundation walls, floor slabs and plazas, tunnels and vaults.
- C. Exterior Wall Assemblies:** the building envelope is to be designed to meet the standards for a 60-year envelope life and the NIST standards for stainless steel flashing, cavity drainage systems, and rain screens, among other components. The walls are to be optimized for IECC Climate Zone 4, in which the College’s campuses are located. All exterior walls are to be cavity walls with an exterior cladding material, a drainage cavity, an internal drainage plane, an air and moisture barrier and an insulating layer. No single barrier systems (including EIFS, sealed aluminum panel systems, etc.) are allowed at occupiable spaces. Coordinate with College regarding possible use at mechanical penthouses and similar structures. .
1. Outside Air Infiltration: infiltration of outside air through the exterior wall is to be minimized. Coordinate with the College to confirm the reference standards for infiltration amounts at different elements of the exterior wall (glazed curtainwall, windows, doors, masonry cavity wall, others). The air barrier is to be rigid enough to survive wind loading and air pressure across it, durable enough to remain intact throughout construction, and installed in such a way that it is continuous between building elements and in three dimensions around openings, penetrations, and other changes in surface plane. The air barrier is not to have vapor barrier properties.
 2. Insulation: the primary insulation layer is to be installed on the outboard side of the air and moisture barrier and is to be of a thickness and R-value selected to maximize the likelihood that the dew point will occur outboard of the air and moisture barrier.
 3. Vapor Barrier: It is likely that a vapor barrier will be needed at the interior side of the wall, behind the interior finish, however this design decision is to be coordinated with the College.
 4. Backup Wall: the interior structure of exterior walls is to be comprised of Concrete Masonry Units (*cmu*) of a minimum 8”nominal thickness. Design the CMU backup wythe to carry full design wind loads. Use special reinforcement to carry heavier loads at opening jambs, heads, and sills. Design the CMU backup wythe for crack control to ensure a weather-tight cavity (see **NCMA-TEK 53**). Provide adequate vertical control joints, horizontal joint reinforcement, and isolation joints between the block wythe and the structural frame to accommodate movement of the frame and the block wythe. Comply with local codes regarding seismic reinforcement. In particular circumstances where it is not practical to install a CMU backup wall, a Cold-Formed Metal Stud framing system of a minimum 16 gauge thickness with G90 galvanized coating may be used. Whether built of CMU or steel studs, the backup wall is to be designed for a maximum deflection of L/600

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to L/720 under full design wind load, and to withstand all the loads on the wall. The flashing and weep system are to be fully designed and detailed to successfully route all water from the cavity to the exterior of the building enclosure. All flashing is to be stainless steel.

5. Designers should examine the material properties of each layer in their design, and specifically the vapor permeance, the air permeance, the structural rigidity, the rate of thermal gain and loss, the rate of absorption of moisture, the moisture storage capacity, the rate of wetting and drying, and the contraction and expansion rates of the material under moisture and thermal cycling. Designers will need to ensure their design will create a structure capable of accommodating movement and thermal, moisture, and air flow loads. Elements within the wet zone must be carefully examined for their susceptibility to moisture damage. Examine each element, and then the entire system, to determine if a misplaced or unintended vapor retarder exists that will inhibit the drying of the wall system after wetting events.
 6. Acoustic Performance: design the building shell to meet the Sound Transmission Class (STC) requirements of ***S12.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools. See the General Fenestration Systems Criteria section below for acoustic requirements at glazed areas of exterior walls a classrooms and other core teaching spaces.***
 7. Documentation: Construction Documents are to include thorough detailing of the entire exterior wall assembly, including the integrated air barrier system, drainage plane layer, flashing and the insulation layer. Include three dimensional details where necessary to thoroughly communicate the three dimensional extents and integration of systems.
 8. Mockups of exterior wall assemblies: (reserved)
 9. Performance testing of exterior wall assemblies: (reserved)
 10. Prevention of vermin infestation: all exterior enclosure assemblies are to be sealed against vermin infestation. All mechanical, plumbing and electrical penetrations of exterior enclosure shall be sealed or provided with screen barriers to prevent infestation.
 11. *Flashing: (reserved)*
- D. Exterior Wall Finishes:** all exterior finishes are to be selected in coordination with the College. Changes in materials and joints at the exterior skin are to be kept to a minimum in quantity. General standards for acceptable exterior wall finishes are indicated below. For further criteria, see the relevant technical standards in the ***Part 6 Technical Sections*** section of this ***College Design Standards*** document.
1. Cast-in-place concrete: (reserved)
 2. Exterior Insulation and Finish Systems (EIFS): EIFS systems are generally not allowed, particularly at the exterior wall of occupiable spaces. EIFS will be considered for the exterior finish at non-occupied spaces if unusual circumstances make other finishes unfavorable, but can only be used with specific written approval from the College.
 3. Masonry wall finishes: clay masonry units and concrete masonry units are permitted as a veneer finish in cavity drainage wall assemblies. Composite masonry walls without a cavity and drainage plane are not allowed at building enclosures, but are allowed for interior structural walls, site walls and retaining walls.
 4. Panelized metal wall finishes: through-the-face fastened metal wall, soffit and fascia panels, as well as metal-faced composite wall panels, are allowed as an exterior wall finish when used in a drainage wall system with a continuous backup membrane. Metal

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panel systems with sealed joints for use as a barrier wall finish are not allowed. A separate continuous air and moisture barrier is to be installed behind the metal wall panel system. The structural backup wall is to be comprised of concrete masonry units unless otherwise agreed to by the College. As the metal panels will contribute little or no thermal insulation value to the wall assembly, insulation is to be provided by supplementary insulation materials located elsewhere in the wall assembly.

5. Precast concrete wall finishes: precast concrete panels of limited sizes included as decorative elements in a masonry wall system are allowed, as are cast stone panels. Precast concrete wall systems are not permitted. All precast concrete panels are to be designed in accordance with PCI Design Handbook-Precast and Pre-stressed Concrete (MNL 120), Design Responsibility for Architectural Precast Concrete Projects (ACI 533.1R-02), and ACI 318 Structural Concrete Building Code. Steel elements of a wall system are designed in accordance with AISC specifications for steel construction. Precast concrete elements are designed in accordance with ACI and PCI specifications. Joints between panels must be wide enough to accommodate thermal expansion and differential movements between panels. Coordinate with the College to determine whether or not joints between panels are to be sealed to prevent water penetration in the wall cavity. The back up wall is to be covered with a continuous air and moisture membrane to provide a secondary line of protection against water penetration into the building.
6. Thin stone wall finishes: the use of thin stone wall finishes (2" or less in thickness) is discouraged. Coordinate with the College prior to proposing the use of these materials at any locations.
7. Terra Cotta Panels: terra cotta panels may be proposed for the exterior finish at a drainage wall assembly, and will be considered by the College for use.
8. *Durable Exterior Finishes: all exterior finishes at buildings are to be selected and executed to provide long term resistance to deterioration caused by water infiltration, freeze-thaw cycles, salts and other chemicals to be used on the site, and wear from normal usage. Finishes that are likely to result in a maintenance and repair burden are to be avoided. An example of an exterior finish that require excess maintenance is concrete walls formed using wood grain formwork and/or exposed formwork holes.*

E. General Fenestration Systems Criteria:

1. Daylighting and lighting coordination: (reserved)
2. Window-to-wall ratio: best practices indicate that a 30% window-to-wall ratio is optimum for a balance of daylighting and energy conservation. An exterior enclosure design that slightly exceeds this percentage for purposes of improving daylighting will be considered by the College if the energy analysis required for the project demonstrates that there are no negative impacts on energy conservation and the design meets energy code and LEED certification requirements. Such a design option must be developed and analyzed during the early phases of the project, in close coordination with the College.
3. Exterior fenestration systems at classrooms and other core teaching spaces are to achieve an STC rating of 35 or better.

F. Glazing: (reserved)

- G. Windows:** a minimum of one small operable window is required at an exterior wall of each office, classroom and computer classroom and in other occupiable spaces. Coordinate with the College to determine the type, size and locations for these windows. See the **Glazing** subsection above for glazing criteria.

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- H. Aluminum Framed Entrances and Storefronts:** (reserved)
- I. Glazed Curtainwalls:** (reserved)
- J. Sloped Glazing:** (Reserved)
- K. Exterior Doors:** Glazed entry doors are to be the Model #SL-14 “Monumental” Medium Stile Aluminum door by Special-Lite, Inc., 1 ¾” thick, with 3 5/8” stiles (confirm w/ emergency exit device), 10” bottom rail, 4” center rail (6 1/2” at doors with emergency exit devices, *and, for visual consistency, at all doors grouped in one entry area with such a door*) and 6 ½” top rails. Doors are to be constructed of minimum 1/8” aluminum wall thickness with true mortise and tenon joinery and full-width top and bottom tie rods secured with hex nuts. Glazing is to be ¼” tempered glazing. Doors to be provided with a keyed removable center mullion between paired doors. Coordinate with the College for review and approval of door products for use as part of a larger Glazed Aluminum Framed Entrance/Storefront system.
- L. Exterior Shading Devices:** (reserved)
- M. Roof Systems and Roof-Related Systems:** All roof design shall comply with the requirements indicated in **Chapter VII Standards for New Roofing**, in the Maryland Department of General Services document **Procedure Manual for Professional Services** (See **List of Reference Documents** in **Part 1: Document User Guide** of this **College Design Standards** document).
1. Roof Slope: the selection of either a steep slope or low slope roofing system shall be based on the results of a 60 year life cycle cost analysis. This analysis shall consider the scope impact on building structural, mechanical and electrical systems required to configure the building for a steep slope and for a low slope roofing system, as well as the maintenance and replacement intervals and costs for both roofing systems.
 2. For Roof Replacement Projects: the selection of the replacement roofing system shall be based on an evaluation of costs associated with factors affecting the proposed system, including span dimension, structural condition, foundation design/capacity, and disposition or accommodation of roof top equipment.
 3. Drainage: roofs on new construction shall be pitched to drains or gutters, with the roof slope achieved structurally.
 4. Asbestos: all materials used for roofing systems shall be asbestos free.
 5. Steep Slope Roofs: roofs with a minimum slope of 2-1/2 inches per foot, may be finished with a standing seam metal or sheet metal system or a fiberglass shingle system surfaced with ceramic coated mineral aggregate. All steep slope roofs must have a full width (36") of modified bitumen ice dam protection membrane installed at all eaves and valleys. Steep slope roofs shall be provided with adequate means for interior ventilation through eave or soffit louvers, ridge vents, ventilation boards and thermostatically controlled power fans to prevent moisture condensation and excessive heat under roofing or sheathing. Insulation shall be provided in the attic space above the ceiling and shall achieve an insulation value of R-38.
 - a. Standing seam metal roof systems: shall be fabricated metal panel systems from nominal 22 gauge G-90 galvanized steel conforming to ASTM A446 Grade A and ASTM A525. Alternative panel thickness of 24 gauge or 20 gauge may be considered based on an evaluation of roof framing and purlin spacing. All standing seams shall be double locked with a seam height no greater than 1½ inches. The system shall conform to the requirements of ANSI Publication A58.1, the IBC Chapter 15, and the American Institute of Steel Construction Manual. The panels shall have a UL Class

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- 120 rating and the structural uniform uplift load capacity shall be in accordance with ASTM E330. The finish shall be equal to at least 70% Kynar and shall be tested in accordance with ASTM procedures. The system shall have a 20 year manufacturer's weatherproof warranty. The Kynar color finish shall also be covered by a 20 year manufacturer's warranty.
- b. Asphalt shingle: shall be reinforced with fiberglass wind resistant type, UL Class A, and comply with ASTM D3462 and ICBO ES AC 127. Shingle manufacturer shall provide a 40 (+) year warranty covering repair or replacement of defective shingles as necessary to eliminate leaks. Where “Nailbase” insulation is used ventilation must be provided. Metal drip edges must be installed on all eave and rake edges.
6. Low Slope Roofs: shall be required to have a minimum slope of ¼ inch per foot. New buildings shall be designed to achieve the minimum slope of 1/4 inch per foot structurally. Existing buildings may have to be provided with tapered insulation to achieve the minimum slope. Lightweight concrete shall not be used to create slope.
 - a. Low slope roofs shall have a modified bitumen four ply built up roof system. For further information refer to **Section 075200 Low-Slope Roofing** of **Part 6 Technical Standards** of this **College Design Standards** document. The top ply of the built up roofing is to have white granules to achieve the Solar Reflectance Index necessary to comply with the Sustainable Sites “Heat Island Effect-Roof” credit for LEED. Provide pre-manufactured closure assemblies at all roof penetrations. Pitch pockets are not allowed.
 - b. Thermo Plastic Single Ply Roofing: the use of Thermo plastic single ply roofing is discouraged. Coordinate with the College before proposing use at any locations. If use is approved, the installation shall comply with Chapter 15 of the IBC and shall have a minimum slope of ¼” per 12” (2%). The roof covering shall comply with ASTM D6878.
 7. Roof access: permanent access is to be provided to all roofs for all buildings from the inside of the building. Comply with code-mandated egress requirements for rooftops, rooftop mechanical areas, and rooftop spaces. A roof access hatch and a “ship” type ladder are to be provided at a minimum and a stairwell and elevator to serve the roof are to be provided if affordable, or if required for egress. Multi-storey access must be provided for all multi-level roofs from the second story up. Inorganic roof walkway pads shall be provided from roof access to roof mounted equipment. Modified bitumen membrane is acceptable.
 8. Rooftop Equipment: Consideration should be given to and an evaluation performed regarding the possibility of constructing a rooftop penthouse to protect the HVAC equipment. A penthouse reduces the cost of equipment, protects the equipment better, yields longer equipment life, reduces equipment maintenance costs and reduces the quantity of roof penetrations. A penthouse, however, is generally considered part of Gross Square Footage, and generally is not achievable given the standard Net to Gross calculations. Furthermore, an occupiable penthouse is generally counted as a floor, so including such a penthouse may reduce the number of program occupied floors allowed in the building in order to stay within a height limit. Analysis and a cost comparison of the two scenarios (penthouse vs. penthouse type equipment) is to be performed, and a request is to be made for an exemption from the assignment of the Penthouse as GSF, to allow it to be classified and counted as NASF, based on the benefits of the Penthouse

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(fewer roof penetrations, less expensive equipment, reduced equipment maintenance costs, etc.). Roof mounted equipment shall be installed on curbs and shall be provided with suitable vibration isolation devices and proper flashing. If it is necessary to mount equipment above the roof, without using a curb, sufficient clearance shall be provided under the equipment to permit maintenance of the roofing system, as well as adequate clearance for future roof replacement.

9. **Roofscape:** the design of the roofscape shall be given attention at all phases to assure an orderly and attractive appearance of rooftop elements, including their location, color and shape. Additionally, roof top equipment (e.g. exhaust fans, mechanical louvers, etc.) shall be minimized and located to preclude visual exposure from the street and the proposed pedestrian mall. Equipment screens must be provided to conceal all roof top equipment.
10. **Energy Generation on Roof:** the A/E shall give consideration to, and perform an evaluation of, the benefits of installing photovoltaic panel arrays and/or wind turbines on the roof.
11. **Green Roofing Systems:** the A/E is to perform an evaluation of the benefits of installing a modular tray planted “green” roof system. All green roofing systems shall comply with the requirements of the International Building Code (IBC) (Latest Edition) Chapters 15 and 16. All systems must comply with ANSI/SPRI VF-1 and current ANSI wind design guidelines. Green roofs shall be designed for uniform design live load in the landscaped area as indicated in Section 1607.11.3 of the IBC. The weight of the landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil. The basis for design is to be systems manufactured by “LiveRoof” with “soil elevation” and “moisture portals” features. Modules are to be pre-vegetated and placed on a heavy duty, roofing grade HDPE, polypropylene, TPO, PVC or EPDM slip sheet/root barrier of 45-60 mil thickness, with effectively bonded seams. Slipsheet/roof barrier material is to be compatible with roofing system.

5.6. GENERAL INTERIOR CONSTRUCTION STANDARDS:

- A. Acoustic Performance and Design:** each space is to be designed for optimal hearing conditions. Consideration is to be given to the isolation of each space from adjacent spaces and other sources of noise to insure the successful function of the space. Spaces that will contain noise-generating sources shall be located away from spaces requiring quiet, thereby allowing for acoustic buffer spaces, or shall be adequately isolated acoustically in accordance with College standards and best practices. Meeting and gathering spaces require special design and finishes to obtain optimal hearing conditions, including appropriate reverberation levels. Consideration shall be given to the use of sculpted ceilings, acoustical flooring, non-parallel walls, and other techniques to optimize acoustic performance. Partition assemblies for each room type or condition are to be designed to achieve the STC ratings indicated in section **5.6.C.Partitions**, item **.3 Acoustic Performance** below. Horizontal assemblies separating mechanical equipment rooms from classrooms, offices and other occupiable spaces are to have an STC rating of 50 or more, and are to be designed to mitigate low frequency sound ranges not measured by STC, to reduce background noise levels to 40 dBA or less. Similarly, HVAC systems for classrooms and other core learning spaces are to be designed to limit background noise levels to 40 dBA or less.
- B. Prevention of vermin infestation:** doors and frames and all floor, ceiling and partition penetrations shall be sealed against pests and vermin. All penetrations by pipe, conduit, duct,

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etc. shall be sealed. If any form of cavity wall is selected for exterior walls, special attention must be paid to prevention of infestation in the cavity.

C. Partitions:

1. Impact and abrasion resistance: (Reserved)
2. Fire separation – UL Design Assemblies: (Reserved)
3. Acoustic performance: partition assemblies for each room type or condition are to be designed to achieve the STC ratings indicated below, as measured in field testing:
 - a. Partitions between classroom/class lab and classroom/class lab: minimum STC 47
 - b. Partitions between classroom/class lab (and other core teaching spaces) and corridors: minimum STC 50
 - c. Partitions between classroom/class lab and Recitation Room: minimum STC 50
 - d. Partitions between classroom/class lab and office: minimum STC 47
 - e. Partitions around offices: minimum STC 47
 - f. Partitions between Mechanical Room and classrooms and other core teaching spaces: STC rating of 50 or more, as needed to reduce background noise in the teaching space to 40 dBA or less. These partitions are also to be designed to mitigate low frequency sound ranges not measured by STC.
4. Documentation of proposed partition types: see the ***Instructions to the Consultant*** portion of the ***Part 2 Facilities Construction Program*** for the individual project under consideration.
5. Blocking and bracing: blocking and bracing are to be provided inside partitions to support all anticipated furnishings and equipment to be mounted on partitions. Locations, heights, material and attachment for blocking are to be indicated in the Construction Documents.

D. Doors: (Reserved)**E. Door hardware:**

1. Hardware selection: (Reserved)
2. Keying: (Reserved)
3. Coordination with electronic access control: (Reserved)

F. Built-ins, Fixtures and Equipment: the A/E is to identify in the construction documents as “built-in” all fixtures and equipment items that the Contractor is to provide and/or install. The A/E is to include in the contract documents the manufacturer, style, sizes, finishes, color, and location of all such equipment that is not provided by the College. The A/E shall require that the Contractor provide this equipment and any necessary utilities and services as part of their contract.**G. Casework: (Reserved)****H. Ceiling Layouts: (Reserved)**

- I. **Finishes:** Interior materials and finishes shall be selected to meet the following criteria: aesthetic considerations, durability, ease of maintenance, acoustical requirements, and conservation of energy. All materials and design details shall be analyzed for their durability and ease of maintenance, particularly those to be used at areas of high traffic (corridor), water or chemicals (toilets), and other special use functions. Select finishes to provide for a monolithic, scrubbable surface, free of cracks or ridges.
 1. Floor finishes are to be selected to support the function and acoustical needs of the space and to minimize maintenance needs. Unless otherwise directed by the College, epoxy terrazzo is to be used for all high impact areas, and is to include recycled materials for aggregate in the mix. Use carpet where acoustical needs and comfort are of high

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importance. Provide for the needs of the visually disabled where changing from one floor surface to another. Floor-to-wall joints must be designed to allow easy cleaning. Recessed walk-off mats are to be installed at building entrances to provide for the removal of dirt and sand.

2. Acoustic Tile Ceiling: ceiling tiles are to be “Fine Fissured” Square Lay-in, medium texture #1830 (2”x4”x5/8”) and #1831 (2”x2”x5/8”) by Armstrong World Industries, unless otherwise approved by the College. Ceiling suspension track is to be “Donn DX/DXL” Series, in white, by USG, unless otherwise approved by the College.
3. *Paint: all paint types, products and colors are to be selected in coordination with the College. Paint types, products and colors are to match College standard types, products and colors unless otherwise approved by the College.*

5.7. GENERAL SPECIALTIES STANDARDS:

- A. **Visual Display Units:** (reserved)
- B. **Wayfinding and Signage:** a ***Maryland Accessibility Code*** compliant identification and directional system is to be incorporated throughout each building. The interior and exterior graphic systems are to be designed to assist individuals moving to and within the facilities. In accordance with ***Maryland Accessibility Code*** requirements, particular attention must be given to the needs of individuals with disabilities to access the building from parking areas and walkways and to move freely throughout the building. All signage is to comply with the standards indicated in the ***Montgomery College Sign System Manual***. All signage is to be adequately illuminated. The graphic system is to include, at a minimum, the following items. Coordinate the location of each element with the College:
 1. A campus map located outside the building (*confirm need at each building with the College*).
 2. Exterior building identification signs at the main entrance(s).
 3. A building floor plan located inside the building, in close proximity to the primary entrance(s).
 4. An interior building directory at the main entrance(s) on each floor and all elevator lobbies.
 5. Room number / identification plaques for all rooms including offices, support areas, elevators, stairwells and corridors. See the ***Room and Door Numbering Standards*** section in ***Part 3: Owner’s Planning and Programming Requirements*** of this document. See the ***Montgomery College Sign System Manual*** for design standards and definition of content for the room number/identification plaques. Coordinate exact content with the College.
 6. Signs for all identification of hazardous areas, and communication of evacuation procedures and means of egress in accordance with the fire and building codes.
 7. Directional signs as required.
 8. Traditional bulletin boards in public and departmental areas as required.
- C. **Art Display:** provisions are to be made for the secure and attractive display of hanging artwork, and for appropriate lighting.
- D. **Toilet Compartments:** (reserved)
- E. **Wall and Door Protection:** (reserved)
- F. **Toilet Accessories:** (reserved)
- G. **Safety Specialties:** (reserved)
- H. **Emergency Aid Specialties:** (reserved)

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- I. **Fire Protection Specialties:** (reserved)
- J. **Storage Specialties:** (reserved)

5.8. GENERAL EQUIPMENT STANDARDS**A. Commercial Equipment:**

1. WEPA Kiosk (wireless printing): confirm all requirements with the College Office of Information Technologies
 - a. Size: 21" wide, 25" deep, 63" tall
 - b. Weight: total weight of Printer + cart (fully stocked with paper) and Kiosk + components = 400 pounds
 - c. Network requirements:
 - Internet access
 - One RJ-45 jack (highly preferred). Wifi is a backup option
 - DHCP or Static IP address per kiosk
 - Port 443 outbound
 - d. Voltage requirements:
 - 110v AC, 50hz-60hz, Grounded 3-prong outlet
 - Wattage while the WEPA Kiosk is idle: 265 watts idle
 - Wattage while the WEPA Kiosk is printing a document: 1,435 watts peak

5.9. GENERAL FURNITURE AND FIXTURES STANDARDS

- A. **General:** See **3.8 Room Planning Standards** in **PART 3: OWNER’S PLANNING AND PROGRAMMING REQUIREMENTS** of this document for a listing of the quantity of individual furniture and equipment items that are to be standard for each typical room type. Detailed product information for furniture is indicated below. Coordinate locations of furniture and electrical and IT infrastructure requirements for furniture with College team.
- B. **Movable FF&E:** The College will give direction to the A/E during the Schematic Design phase as to which furniture, fixtures, and equipment will be considered “in construction contract” versus those that will be purchased and installed separately as moveable furniture, fixtures, and equipment. Movable furniture and equipment will be selected by the College and generally will be procured *through a contract that is separate from the construction contract*. See the **Room Planning Standards** in **PART 3: OWNER’S PLANNING AND PROGRAMMING REQUIREMENTS** for preliminary lists of the furniture to be provided at each typical room type.
- C. **Cubicles:** it is the College preference to house each personnel workstation in a single or shared office. However, in instances where cubicles are to be used, the furniture is to be freestanding, separate from the cubicles. All cubicles are to be KI “WireWorks” series. The configuration and fabric selections are to be developed in coordination with the College.
- D. **Typical office furniture:** the following is a preliminary list of the standard furniture that is to be provided in each typical office. This list is intended for planning and programming phase work only. The exact furniture selection, quantity and dimensions to be provided for each office will be determined through coordination with the building occupants during the programming and design phases of the project, and in the final Furniture, Fixtures and Equipment selection process. Unless otherwise directed by the College, all furniture is to be manufactured by KI.

PART 5 – OWNER’S BUILDING CONSTRUCTION STANDARDS**1. Pencil/Box/File Drawer Pedestal:**

Product Group: ATPE All Terrain Pedestals
 Model: ATPE1523PBF Pencil/Box/File (3" Pencil Drwr, 6" Box Drwr, 10.5" File Drwr)
 Top: Steel Top
 Pull: S1 Steel/Inset Plastic Pull
 Casters: 4CW 4 Black/White Casters/2 Lock
 Color: To be determined

2. File/File Drawer Pedestal:

Product Group: ATPE All Terrain Pedestals
 Model: ATPE1524YY 10.5" File/File (Two 10.5" File Drwrs)
 Top: Steel Top
 Pull: S1 Steel/Inset Plastic Pull
 4CW 4CW 4 Black/White Casters/2 Lock
 Color: To be determined

3. Overhead Cabinets:

Product Group: WireWorks Balance Overhead
 Model: BLCS Balance Overhead w/Solid Color Upper Door, Load Bar Mount, (2 each – width to be selected based on room dimension, minimum of 36".)
 Mounting Height: Coordinate with College to confirm the mounting height, and to select rooms and mounting heights for fully ADA compliant and adaptable offices. Maximum side approach reach height is 48". Blocking is to be installed at multiple heights at adaptable stations.
 Cabinet Paint Color: To be determined

Balance Overhead Accessories:

- Universal Shelf: steel shelf divider with powder-coated finish (7 ¼"x11 ½")
- Wall Mounted Load Bar (width to be selected to match pair of overhead cabinets)
- Balance Overhead Task Light, 24" Wide for 30" and 36" Overhead
- Tackboard/Toolbar Attachment Bar, 36" Wide
- Overhead Tackboard, 20" H x 36" Wide
- Tool Rail, 42" wide x 20" high
- WireWorks Plastic Diagonal Storage Unit, Warm Grey
- WireWorks Plastic Paper Tray Unit Warm Grey
- WireWorks Plastic Pencil Cup, Warm Grey
- WireWorks Vertical Storage Warm Grey
- Wire Works Accessory Tray Warm Grey

Blocking: Construction Documents are to indicate two continuous bands of nominal ¾" thick, 12" tall plywood backing behind the partition finish, attached to the partition studs, to support the Overhead bins. The lower band is to be centered at 5'-7" AFF and the upper band is to be centered at 7'3" AFF. This blocking is to be provided for the attachment of the horizontal load bars for the Overhead bins. Verify the blocking material dimensions

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and locations with the cabinet manufacturer. Coordinate with the College for mounting heights for additional blocking at offices/stations that are to be adaptable for full ADA compliance.

4. Worksurfaces:

Model:	WorkZone “Basic Worksurface”, Laminate Top (1 each 24x30, 1 each 24x60, 1 each “standalone corner worksurface” 24x36x36x24)
Height:	29”
Edge:	PVC
Horiz. Wire Mangmt:	No wire management trough is required (optional)
Frame Style:	Beam Frame or Modesty Panel Frame
Leg Location/Type:	Standard or Transitional (6” shorter length foot for use at inside corners or other locations where leg room is required)
Leg Style:	Streamline
Grommet Option:	Worksurface grommets to be included as required by layout
Trim Color:	To be determined
Base Option:	With glides(standard)
Surface Finish:	KI Laminates “Kensington Maple”
Edge Color:	Warm Grey Edge/Grommet

Worksurface Accessories:

- Center Drawer (pencil drawer, mounts below work surface): one per office

Worksurface Notes:

- No modesty panel is to be included at work surfaces that face walls
- Wiring troughs are not consistently included or excluded
- May in some configurations need a WorkZone surface “with shared leg,” which is solution for mounting one surface to another, with hardware, rather than including a separate leg at the adjoining end of the surface.
- May use peninsula side or peninsula end work surface (radiused end) with 3” diameter metal support leg)
- Worksurfaces at offices requiring ADA compliant desk furniture are to be “Genesis Tri-pod Corner,” (24”x42”x42”x24”), “Genesis Basic Rectangular” (24”x30”) and “Genesis Basic Rectangular” (24”x60”) with crank handle height adjustment by KGE (supplied by KI) with standard finishes to match WorkZone products.

5. **Manager’s/Desk Chair:** the “Engage” chair in black, by KI is to be used in State funded projects. In projects funded from other sources the “RPM” task chair in black, by Knoll may be used. The fabric for either chair is also to be black.

6. Guest Chair:

Product Group:	TGU Torsion On The Go Chair
Model:	TGWAPB With Arm Poly Back
Color:	(BL) Black Finish
PBL	(PBL) Black Shell Color
Casters:	Carpet Caster
Seat:	(US) Upholstered Seat
Arms:	(ADL) Black Arms

PART 5 – OWNER’S BUILDING CONSTRUCTION STANDARDS**7. Two-Drawer Lateral File Cabinet (one per office):**

Product Group: ASLH All Terrain Lateral Files
 Model: ASLH3022YY 2 Drwr, 30 x 21 5/8 x 26 3/4 (w/hanging file partit.)
 Top: Steel Top (option: use 3/4" laminate top w/ 74P edge)
 Color: To be determined
 Casters: 4CW 4 Black/White Casters/2 Lock

8. Storage Tower (“Wardrobe” Unit – one per office):

Product Group: AS66 A/T Storage Towers 66" Hght
 Model: AT66302MW61BLP 66"-W61BLP MOD
 AT66302MW61B 12"W Frt. Wardrobe-RT
 Cupboard Front Face -24"D 21x22
 21" W Drawers: (3 each 12")
 (Config. May vary, coordinate with College)
 Pull: SI Steel Inset/Plastic Pull
 Top: NT No optional top (steel)
 Color: To be determined
 Casters: 4CW – 4 Black/White Casters/2 Lock

9. Bookcases:

Product Group: CIBKU Bookcases
 Series: S70 700 Series Bookcase
 Model: 30" w x 12" d (height & quantity of shelves to be determined)
 Color: To be determined
 Top: S7TP 700 Series Laminate Tops, 3012T, 30x12 (confirm steel or laminate top)
 Laminate edge: Self Edge
 Laminate color: Kensington Maple 10776-60

E. Typical General Purpose Classroom Furniture: *Unless otherwise directed by the College, all furniture is to be manufactured by KI.***1. Chair:**

Product Group: Torsion
 Model: Torsion “On the Go” Armless Chair, Upholstered
 Color: Black Poly
 Casters: 4 casters

2. Chair (tablet arm):

Product Group: Torsion
 Model: Torsion Four Leg Tablet Arm
 Color: Black Poly
 Casters: 4 casters
 Seat Finish: Upholstered

3. Chair (optional tablet arm for special use on request from College)

Product Group: *Learn2 Seating*
 Model: *Strive (cantilevered arm)*
 Worksurface: *Black Polycarbonate*
 Casters: *4 casters*
 Seat Finish: *All polyurethane (color TBD)*
 Accessories: *Rack*

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4. **Table:**
 Model: Hurryup Table, Rectangular
 Flip Top/Nesting: Confirm
 Laminate: Kensington Maple
 Edge: Warm Grey PVC Edge
 Two Station Table: 24x60
 ADA Station Table: 24x42
 Modesty Panel: (Confirm)
 Wireway: No
 Grommet: No
 Casters: 4 casters or 2 casters, 2 glides (Confirm)
 Option: ganging kit
5. **Instructor Table:**
 Model: Match room-standard table
 Accessories: Include Center Drawer
6. **Smart Instructor Workstation (SIWS):**
 MT-600 Series SchoolMate (ADA Series) by Mediatech, Inc.
 (See “Montgomery College Smart Instructor Workstation Standards”, published by MC Office of Information Technology (OIT) and included as Appendix F.3 to this document, and coordinate with MC OIT to confirm exact configuration, options and equipment accommodations)
- F. Typical Computer Classroom Furniture:** *Unless otherwise directed by the College, all furniture is to be manufactured by KI.*
1. **Chair:**
 Product Group: Torsion
 Model: Torsion Pedestal Base Armless Chair, Upholstered
 Color: Black Poly
 Casters: 4 casters
 Seat Finish: Upholstered
2. **Table:**
 InTandem Table System (powered, w/o laptop garage)
 Two-station Table: 30 x 60
 ADA station Table: 30 x 42 (with adjustable worksurface height)
 Laminate: Kensington Maple
 Edge: Warm Grey PVC Edge
 Grommet: 1 per station
3. **Instructor Table:**
 Model: Match room-standard table
 Accessories: Include Center Drawer
4. **Smart Instructor Workstation (SIWS):**
 MT-600 Series SchoolMate (ADA Series) by Mediatech, Inc.
 (See “Montgomery College Smart Instructor Workstation Standards”, published by MC Office of Information Technology (OIT) and included as Appendix F.3 to this document, and coordinate with MC OIT to confirm exact configuration, options and equipment accommodations)

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- G. Typical Conference Room Furniture:** (reserved)
 - 1. *Conference Table: to be a modular grouping of tables, selected and arranged for the occupant capacity and shape of the room, with integral ports for power and data connections. Coordinate product selection with the College.*
- H. Laboratory Equipment:** (reserved)
- I. Library Equipment:** (reserved)
- J. Food Service Equipment:** (reserved)
- K. Vehicle and Pedestrian Equipment:** (reserved)
- L. Window Treatments:** (reserved)
- M. Specialty Casework/laboratory casework:** (reserved)

5.10. GENERAL FIRE SUPPRESSION SYSTEMS STANDARDS

- A. Codes and Standards:** the suppression systems shall comply with all applicable codes, standards, engineering best practices, requirements of the authority having jurisdiction, and Montgomery College guidelines and standards. The design of the building sprinkler systems shall comply with NFPA 13 and all other NFPA standards for suppression systems.
- B. Water Supply:** the College shall provide hydrant flow data for the two fire hydrants closest to the site for determining if a fire pump is required. Provide a fire pump if the analysis of the available water supply and the projected hydraulic demand indicate the need. A fire department connection shall be provided at the fire department response point.
- C. Sprinkler and Standpipe System:** Provide a combined sprinkler/standpipe system for the entire building, including a complete automatic wet-pipe sprinkler protection system with quick response sprinklers. No flexible piping is allowed in these systems. The standpipe system shall include hose connections at intermediate stair landings, or as otherwise required by local regulations. The combined system shall be supplied by the local campus water loop. If required, a pre-action sprinkler system shall be provided for the elevator shaft, and be released by the main building fire alarm control panel. All automatic sprinkler systems shall be monitored by the fire alarm system.
- D. Commissioning:** Commissioning of all fire suppression systems shall be included in the project commissioning scope.
- E. Questions:** Contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding fire suppression systems or the standards for these systems.

5.11. GENERAL PLUMBING SYSTEMS STANDARDS

- A. General:** all plumbing systems are to be integrated with the existing campus systems and be constructed to accommodate anticipated changes in the campus systems. The current Montgomery College Utilities Master Plan and IT Master Plan documents include extensive detail regarding existing and proposed systems in the area of the proposed building site, and are to be consulted as reference documents for the planning and design of the project.
- B. Codes and Standards:** *the plumbing systems and plumbing fixture counts shall comply with all applicable codes, standards, engineering best practices, requirements of the agency having authority, and College guidelines and standards.*
- C. Water Supply:** the College shall provide information on the available water flow and pressure. If the analysis of the available pressure and the projected hydraulic demand indicate the need, a domestic water pump is to be provided as part of the project. The building is to have separate master water meters unless a master water meter is provided by the local water

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- authority. Submeters to be provided for landscaping hose-bibs, cooling tower water make-up and other non-sewered uses.
- D. **Domestic Hot Water:** provide life cycle cost analysis, as described in Energy Design Guidelines, to evaluate centralized instantaneous versus heating hot water (from boiler plant) for domestic hot water production.
 - E. **Sewage:** perform assessment to determine whether or not there is a need for a sewage ejector pump for the building.
 - F. **Plumbing Fixtures:** coordinate with the College on the selection of plumbing fixtures for conformance with College standards. Fixtures are to be durable, readily repaired, and have replacement parts readily available. Any alternate fixtures suggested must be market proven to hold up to wear and tear in the same type of occupancy and demand conditions as in the proposed building. Fixtures are to be low-flow to reduce water usage.
 - G. **Water Closet “Courtesy Flush Button” Location:** automatic flush valves that include a courtesy flush button shall be install in such a way that the button is located on the open (accessible) side of the water closet in order to provide access to the button. This requirement is to be specified in the Construction Documents.
 - H. **Natural Gas:** (reserved)
 - I. **Commissioning:** Commissioning of all plumbing systems shall be included in the project commissioning scope.
 - J. **Questions:** Contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding plumbing systems or the standards for these systems.

5.12. GENERAL HVAC SYSTEMS STANDARDS

- A. **General:** all HVAC systems are to be integrated with the existing campus systems and be constructed to accommodate anticipated upgrades to the campus systems. The current Montgomery College Utilities Master Plan and IT Master Plan documents include extensive detail regarding existing and proposed systems in the area of the proposed building site, and are to be consulted as reference documents for the planning and design of the project.
- B. **Codes and Standards:** design shall comply with applicable jurisdictional codes and jurisdictional adopted standards including ASHRAE and SMACNA and engineering best practices. The A/E is to coordinate with the College to identify the degree of environmental control needed at each space, any special heating, air conditioning and ventilation needs, and the capacity of any existing systems that are to be extended or connected to the new building.
- C. **Resource Conservation:** See the **Resource Conservation and Integrated Systems Approach** in the **Part 3: Owner’s Planning and Programming Standards** for a discussion of the mandated integrated systems approach to building design, of which HVAC design is a critical element.
- D. **Reliability:** the work shall be designed for maximum reliability. This includes the avoidance of systems which have an inadequate history of satisfactory performance. The work shall be designed for maximum maintainability. Provide adequate service clearance for all equipment.
- E. **Specifications:** All equipment manufacturers specified shall be approved by the College. A/E shall list approved equivalent model numbers from approved alternate manufacturers in the Specifications.
- F. **O & M Manuals:** The College employs a maintenance and operations staff capable of troubleshooting and repairing most mechanical, plumbing, electrical, and telecommunication systems equipment. Therefore, it is required that five copies of suitable manuals are furnished

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with the equipment and systems. The following items and information are minimum requirements:

1. Manufacturer's catalog descriptions of specific items of equipment.
 2. Manufacturer's operating and maintenance instructions.
 3. Wiring diagrams for inter- and intra- connections of components.
 4. Schematics and location drawings of components and systems with "troubleshooting" guidance.
 5. Component breakout lists for ordering replacement parts, etc.
 6. *Operations and Maintenance Manuals shall be provided to the Montgomery College Office of Facilities two weeks in advance of any testing or commissioning of any equipment.*
- G. HVAC System Criteria:** the mechanical systems, piping, and valves are to match the College's standard HVAC system criteria as follows:
1. Roof-mounted variable air volume (VAV) air handling unit. The air handling units shall be of highest quality designed for rooftop exposure. They shall be of the penthouse type with double wall construction, durable finishes, airtight doors, and internal access walkways. An actual penthouse to protect the rooftop equipment is preferred to provide better protection for high performance equipment, and should be explored as an option provided net-to-gross square footage ratios can be met.
 2. Hot water heating coils.
 3. Chilled water cooling coils.
 4. *Water treatment for HVAC systems is to be integrated with existing Central Plant treatment. The College retains an independent contractor to maintain the HVAC water treatment for the College HVAC systems. Coordinate with the College to confirm the requirements for water treatment, the project scope regarding water treatment and the connection of new systems to existing campus or building systems. Indicate clearly in the specifications that the existing campus HVAC system (or building system from prior development phase) will supply treatment to the building's new systems. Upon completion of construction of the new system, the Contractor is to flush the new system, clean system with approved cleaning agent/chemical, filter system to remove particulate and then flush again to remove all traces of cleaning agents. The Contractor's chemical treatment representative is to provide certification that the systems are properly cleaned, filled with city water and ready for startup. After that certification is provided the building systems can be opened to the campus system loop, allowing treatment from the campus plant to circulate in the new systems. All treatment products introduced to the systems after the Contractor's required flushing of the new systems are to be provided by the College's water treatment vendor.*
 5. Low temperature (approximately 40degF) supply air.
 6. Variable frequency drives to modulate the airflow.
 7. Single duct VAV terminals with hot water reheat.
 8. Return fans in the exhaust position preferred.
 9. Dampers shall be motor-operated with tight fitting stainless steel perimeter and lip seals.
 10. Air handlers are to be appropriately sound and vibration isolated with dampening and sound lining so that noise is not transmitted to the building structure or to the ductwork.
 11. Ductwork shall be of appropriate class and thickness, sound lined and insulated to minimize fan horsepower and minimize sound transmission. Ductwork shall meet the

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leakage requirements for the class of duct and minimize moisture and heat transfer. The ductwork shall be provided with access doors for inspection and duct cleaning. All ductwork from air-handling units to the terminal devices shall be of insulated, double-wall galvanized steel construction. Insulated flexible ductwork may be used on the low side of the terminal devices to the diffusers, provided the runs are limited to providing flexibility in diffuser to ceiling grid alignment. Return air shall generally flow through ceiling plenums and into return air ducts. The return air ducts shall be extended into the plenums in order to provide balanced flows throughout the building.

12. Ventilation fan systems shall be designed to provide quiet and appropriate exhaust flows. All ventilation systems shall have dampers with motor operators that are interlocked to the motor starter circuits. The dampers shall be low leakage, tightly fitting with stainless steel perimeter and lip seals. All exhaust fans shall be connected to the Energy Management Control System and interlocked with their respective air handling system.
 13. *Central Plant to building connections for heating and chilled water are to be designed to comply with the requirements indicated in the drawing sheet titled “Central Plant to Building Connection Details,” sheet M-1 (revised 12/10/2012), which is included as Appendix G to this College Design Standards document.*
- H. **Elevator Equipment & IT Rooms:** the scope is to include supplemental split systems for elevator equipment and IT rooms. Primary cooling shall be through building HVAC system, with supplemental systems to serve as backup.
- I. **Control Systems:** the scope is to include native BACnet direct digital control system. See the **General Integrated Automation Standards** below.
- J. **Commissioning:** commissioning of all HVAC systems shall be included in the project commissioning scope.
- K. **Questions:** contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding HVAC systems or the standards for these systems.

5.13. GENERAL INTEGRATED AUTOMATION SYSTEMS STANDARDS

- A. **General:** the building’s Energy Management and Control System (EMCS) shall be a stand alone Direct Digital Control (DDC) and *ASHRAE Standard 135*, native BACNet system that will be integrated to the campus-wide system only after the entire building system has been tested and is working properly. The system shall consist of DDC terminal devices networked to a Graphical User Interface (GUI) terminal through a network of intermediate control units. The GUI shall provide a real time display of all HVAC and mechanical systems, contain all of the standard DDC control programming, and provide secure local and remote operator access.
- B. **Dedicated GUI Room:** a dedicated and secure space shall be provided in the building to locate the GUI and provide sufficient work area and storage for the building’s drawings and other records. Communications through modem phone lines and a telephone shall be provided.
- C. **Real-time Networked System:** College standard control sequences and demand management capabilities will be integrated with real time utility pricing signals and “Smart Grid” technologies. BACnet Ethernet messages will be transmitted over the College’s Facilities Network (FNet), have virtual local area network capabilities (VLAN), and use the College’s standard object and network numbering scheme.

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- D. **Further Criteria:** see **Part 6: Technical Standards** section **250000 Integrated Automation** for additional information, including the typical building controls network arrangement and the object name, device instance and network number conventions.
- E. **Commissioning:** commissioning of all integrated automation systems shall be included in the project commissioning scope.
- F. **BTU Meters:** all BTU Meters are to be the System-10-BAC BTU Meter, BACnet/IP Compatible, by Onicon, Incorporated. Coordinate with College for approval of final model selection.
- G. **Flow Meters:** all Flow Meters are to be the F-3500 Series Electromagnetic Flow Meter by Onicon, Incorporated. Coordinate with College for approval of final model selection.
- H. **Questions:** contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding integrated automation systems or the standards for these systems.

5.14. GENERAL ELECTRICAL SYSTEMS STANDARDS

- A. **General:** All electrical systems are to be integrated with the existing campus systems and be constructed to accommodate anticipated upgrades to the campus systems. The current Montgomery College Utilities Master Plan and IT Master Plan documents include extensive detail regarding existing and proposed systems in the area of the proposed building site, and are to be consulted as reference documents for the planning and design of the project.
- B. **Codes and Standards:** The design shall comply with all applicable codes, standards, engineering best practices, and Montgomery College guidelines and standards. Specifically the design of the building electrical systems shall comply with **ASHRAE 90.1**, and the **National Electric Code**. The College has standardized selections for many materials, devices, fixtures, and equipment which shall be specified for use in the building. An Overcurrent Protective Device Coordination Study is required for building with large electrical demand, with large motors, pump, chillers or other large demand equipment.
- C. **Energy Efficiency:** All spaces shall be controlled to conserve energy either by sensors or by other means. All exit lights shall be low wattage LEDs. All equipment, transformers, and motors will be energy efficient types designed to minimize the production of harmonic distortion. Although energy efficiency is of major consequence, priority consideration in the design of the facility shall be given to environmental safety and operational, functional, and flexibility requirements.
- D. **Electrical Power Systems:** The building shall be designed with provisions for life safety, lighting, equipment, receptacle, HVAC and emergency power. Building power shall be segregated to the separate load classes and sized in accordance with **ASHRAE 90.1**, among other codes. All electrical power systems within buildings shall be encased in steel conduit and properly supported from the overhead structure. Intermediate Metal Conduit (IMC) conduit shall be used in mechanical rooms and anywhere that may be exposed to damage. Electrical Metallic Tubing (EMT) conduit is acceptable for use above ceilings and when concealed from harm. Compression type fittings are required for EMT. The minimum diameter allowed for any conduit is ¾.” Metal Clad (MC) cable is acceptable as a pathway from a box located in the space served to the final device. Conduits shall not be buried in the slab of the building unless it is the primary underground feed from the building transformer to the main distribution panels. Underground electrical conduits shall be Schedule 40 PVC of 2” minimum diameter. The elbows at the transition points from below to above grade shall be Schedule 80. Motors shall be premium efficiency and meet IEEE standards for Variable Frequency Drive

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compatibility. All cable and conductors are to be copper. No aluminum is allowed for use as conductor. No splices in new cable, or splices of new cable with existing cable are allowed.

- E. Exterior Below-Grade Ducts, Raceways and Junction Boxes:** see the *Exterior Below-Grade Ducts, Raceways and Junction Boxes* subsection of the *General Utilities Standards* section of *Part 4 Owner’s Site Standards* of this document.
- F. Electrical Distribution System:** The A/E shall coordinate the provision of power from the electrical utility with the College’s Office of Facilities. Power will be provided by PEPCO at 13.2 kV. A load letter is required to establish service. The service transformers shall be vault type and the service lateral shall be underground. Coordinate the size and location of the metering cabinet with the PEPCO representative to the campus. The designer shall give particular attention to the location of the primary power taps for this service. Normally the power will be stepped down by dry-type transformers to 120/208 volt, three phase service for receptacle power and other less consequential loads. In addition, the main electrical distribution systems usually consist of 480/277 volt, three phase main switchboards, distribution and branch circuit panelboards for lighting and some HVAC loads, and 120/208 volt, three phase branch circuit panelboards for receptacles, and associated appurtenances for a complete electrical distribution system. Each IT Independent Distribution Facility (IDF) room shall be provided with a dedicated 12-breaker subpanel to support the equipment that will be housed therein. The engineer of record shall determine the service entrance voltage and phasing, providing an energy and economic analysis of the factors determining the voltage and phasing.
- G. Fire Separation at Power to Fire Pump:** *the Montgomery County Department of Permitting Services has determined that due to uncertainties about the validity of the rating, fire rated cable may not provide adequate fire protection for power to fire pumps. Design documents for all College projects that include a fire pump or routing electrical power to a fire pump are to include a requirement for a 2-hour fire separation rated assembly around all power conduit to fire pumps, or a min. 2” concrete cover around the conduit. Confirm specific current requirements with the Montgomery County Department of Permitting Services and any other local authorities having jurisdiction.*
- H. Emergency Power System:** Emergency power and protection equipment will be provided to support the life safety, emergency, and fire protection requirements. The emergency power system shall include a status monitoring system with annunciation at the building’s management system. A new emergency generator shall be provided that is sized to handle emergency loads (i.e., fire pumps, emergency and egress lighting, fire alarm requirements, telephone, and security systems). A sub-base, diesel fuel tank, automatic transfer switch with provisions for manual bypass, weatherproof housing, and muffler shall be included in the generator package. The generator location shall be determined in coordination with the College. The generator may be required to support a building fire pump and domestic water booster pump and a possible sewage ejector pump, and potentially existing circuits at other nearby buildings. Note that stand-alone split system HVAC units will be used to cool elevator machine rooms, security system spaces, IDF, data, PoP and other telecommunication equipment spaces. Some or all of these DX type systems will also be backed up by the generator. *All emergency power distribution systems are to be designed to comply with the “Emergency Power Distribution System Guidelines” indicated in drawing sheet E-1, titled “One Line Diagram,” which is included in this standards document as Appendix H. Confirm current*

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code requirements and coordinate all emergency power distribution design with the College team.

- I. **Lighting:** Lighting systems shall be designed based on consideration of the normal tasks performed in the area or room, reflectance of surfaces, special lighting effects required, normal sight lines and zone control of larger surfaces. Fixture selection and layout of the lighting shall be in accordance with the latest engineering practices, IES recommendations, and ASHRAE 90.1 to meet the standards for quality and energy efficiency. Coordinate with the College for a current list of acceptable manufacturers and campus standard fixtures prior to specifying fixtures.

Daylighting and individual lighting controls shall be considered in support of energy efficiency and achieving the minimum LEED Silver status. The lighting layouts shall be coordinated with the architectural design so as to control interior and exterior brightness and glare.

Point-by-point lighting analysis is required for most spaces. The A/E shall optimize the use of natural daylight, analyze the applicability of day-light controls to turn lights off or dim them in response to natural light availability, and provide appropriate lighting controls, to include use of occupancy/vacancy sensors and interior photocells in conjunction with dimming or step switching ballasts. Lutron should be considered as the basis of design for ballasts and dimming controls.

Exterior and site lighting shall be High Intensity Discharge (HID), fluorescent or LED sources. Step lights, ground level lights and bollard lights are to be avoided where feasible. Fixture selection is to be coordinated with LEED criteria for minimizing light pollution. Site lighting is described in the **Site Lighting** subsection of the **General Site Development Standards** section of **Part 4 Owner’s Site Standards** of this document.

Interior lighting shall be fluorescent sources with high efficiency electronic programmed start ballasts (Optanium/Centium unless otherwise approved). Fluorescent fixtures in public spaces, including instructional spaces, shall be 2-tube fixtures with 3500°K T-5 lamps. Unless otherwise approved by the College in writing, recessed 2x4 fixtures in public spaces are to be the “Metalux “ 2AC by Cooper Lighting (+88% effic.), or the narrow basket “Luna 2x4” by Focal Point (+87% effic.). Wall-washing fixtures for illuminating marker boards in instructional spaces shall be the “Style 210” adjustable recessed linear fluorescent fixture by Elliptipar, with one 3500°K T5 lamp. Fixtures in corridor areas shall be 2-lamp fluorescent fixtures with 3500°K T5 lamps, on ten to fourteen foot centers. Where metal halide fixtures are to be used, the ballasts are to be Electronic Advance/Venture – pulse start, and the lamps are to be MH-frosted twin arc tubes by Venture Lighting. Coordinate with the College prior to specifying any other type of fixture. No incandescent lamps are allowed. Occupancy sensors are required for lighting control in most areas and shall include auxiliary dry contacts for connection to the spare auxiliary dry terminals on the DDC terminal equipment controllers. The actual building lighting loads shall be used to size the electrical system and HVAC system.

Lighting fixtures shall be located with regard to actual and potential locations of desks, chalkboards, marker boards or other visual display units. The location and proximity of windows and the photometric characteristics of the luminaires shall be considered when

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locating fixtures. Learning resource areas shall be accommodated in a similar manner in accordance with IES recommended design practice. The lighting systems in these areas shall also be designed so that lighting levels can be adjusted for audio/visual presentations using control banks of lights that are controlled by on/off switches. Rooms with high ceiling spaces shall be provided with suspended direct/indirect luminaires. Lighting power densities for the various areas of the building shall comply with applicable guidelines. A building-wide target value of 0.5 to 0.75 watts / square foot should be pursued.

Light switches, dimming switches and remote-controlled dimming stations are to be products manufactured by Lutron. *The basis of design for occupancy sensors shall be ceiling mounted “Omni-DT” series by Hubbell Building Automation, Inc. Wall mounted sensors shall be used only where specifically approved by the College, and shall match model “LHMTD2” by Hubbell Building Automation, Inc.*

Emergency (twenty-four hour) lighting and exit signs are to be served by emergency circuits. Battery back up units are not allowed. Exit signage shall be illuminated with LED luminaires.

Light fixtures shall be located such that all lamps and fixtures can be readily replaced without requiring building staff to work in unsafe conditions or to take expensive or extreme measures to provide safe conditions for the work. Replacement solutions for fixtures and lamps in high ceiling spaces and other locations where replacement will be challenging must be reviewed and approved by the College during Design Development Phase.

- J. Lightning Protection System:** A lightning protection analysis shall be performed to evaluate the requirement for a lightning protection system. If it is required, the lightning protection system shall be comprised of solid copper, nickel plated air terminals located around the perimeter of the roof, flat copper conductor cables, copper down leads and ground loop and copper coated steel ground rods. The down lead system is not to be connected to the building structural steel system. This system should be installed by a certified lightning installer in full compliance with *ANSI/UL 96* and *ANSI/NFPA 768* or latest editions, and have a UL Master Label when completed. Coordinate with College for selection of terminal type and fastening method.
- K. Commissioning:** Commissioning of all electrical systems shall be included in the project commissioning scope. For further information see the *Instructions to the Consultant* section of the *Part 2 Facility Construction Program* which is incorporated in the *Request for Proposal* for the specific project.
- L. Questions:** Contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding electrical systems or the standards for these systems.

5.15. GENERAL COMMUNICATIONS SYSTEMS STANDARDS

- A. General:** All communication systems are to be integrated with the existing campus systems and be constructed to accommodate anticipated upgrades to the campus systems. The current Montgomery College Utilities Master Plan and IT Master Plan documents include extensive detail regarding existing and proposed systems in the area of the proposed project, and are to be consulted as reference documents for the planning and design of the project.
- B. IT Standards:** All cabling materials, products and work, and all work at MDF and IDF Communications Rooms is to comply with the current *Voice/Data/Video Cabling MDF/IDF*

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Communications Room Standard document, issued by the Montgomery College Office of Information Technology . This document is included as Appendix F.1 to this College Design Standards.

- C. **AV Standards:** All Audio Visual materials, products and work is to comply with the current version of the *Montgomery College Audio Visual Standards*, issued by the Montgomery College Office of Information Technology (current version is 2009, update is expected in 2012). This document is included as Appendix F.2 to this College Design Standards.
- D. **Smart Instructor Work Station (SIWS):** The Smart Instructor Work Station that is used at Classrooms, Computer Classrooms and other instructional spaces is to be designed per the *current version of the “MC Smart Instructor Work Station Standards.”* This document is included as Appendix F.3 to this College Design Standards.
- E. **Commissioning:** Commissioning of all communication systems shall be included in the project commissioning scope.
- F. **Questions:** Contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are any questions regarding communication systems or the standards for these systems.

5.16. GENERAL ELECTRONIC SAFETY AND SECURITY SYSTEMS STANDARDS

- A. **General:** All communication systems are to be integrated with the existing campus systems and be constructed to accommodate anticipated upgrades to the campus systems. The current Montgomery College Utilities Master Plan and IT Master Plan documents include extensive detail regarding existing and proposed systems in the area of the proposed project, and are to be consulted as reference documents for the planning and design of the project.
- B. **Emergency Notification System:** Provide a non-coded, addressable system, with multiplexed signal transmission, dedicated to emergency notification system and fire-alarm service. System is to include unshielded twisted pair (UTP) cabling, amber visual notification appliances, message boards, PC system and monitors, radio transmitters and antenna, exterior speaker system, omni-directional and directional speaker array, central control station modular links to fire alarms system control panel. System is to comply with NFPA 72 and the following IT standards: BICSI, BellCore, NEC, TIA, EIA, TIA/EIS-568-B.2-1, TIA J STD 607, NFPA. See Technical Sections **275100 Distributed Audio-Visual Communication – Emergency Call Box** **281300 Access Control** and **282300 Video Surveillance** for further information.
- C. **Security System:** A conduit, back box, and cable system shall be installed per the College’s standard system and manufacturer’s requirements for any security system equipment and devices. At a minimum, the following system elements should be considered by the A/E and evaluated for their applicability: closed circuit television surveillance, electrically operated locks at ground level stairwell exit doors, electrical security device at each desktop computer in computer labs, intrusion alarm systems at areas subject to break-in, and proximity/card access systems to control access to various parts of the building and ground floor entrances (with door contact/door position switch at all doors on the systems). Monitoring of alarms shall be within the Office of Safety and Security. Any inter-connection between a building security system and an external monitor shall be designed in coordination with the College. The basis of design for security software should be Infographics. See Technical Sections **281300 Access Control** and **282300 Video Surveillance** for further information.
- D. **Commissioning:** Commissioning of all electronic safety and security systems shall be included in the project commissioning scope.

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- E. Questions:** Contact Montgomery College’s Office of Facilities at (240) 567-5363 if there are questions regarding electronic safety and security systems or the standards for these systems.