UAMS®

TECHNICAL DESIGN & CONSTRUCTION STANDARDS

TECHNICAL
DESIGN & CONSTRUCTION STANDARDS

VERSION 1

PUBLISHED February 2024

DESIGNERS: This supplementary guide shall be issued in all project manuals under Specification Section 01 35 13.19 Special Project Procedures for Healthcare Facilities.

CONTRACTORS: Value Analysis / Value Engineering shall be carefully vetted to ensure no standards published herein are compromised.

STATEMENT OF INTENT

The mission of UAMS is to improve the health, health care and well-being of Arkansans as well as others in the region, nation, and the world. One of the ways this is accomplished is by providing first class facilities that reflect the high level of patient and family-centered health care provided. This document has been created to serve as a guideline for planning of both on and off campus facilities.

The contents of the document have been outlined using the Construction Specifications Institute's (CSI) master format which is widely used by design professionals and contractors in the industry. The contents include preferences in level of design and construction of the built environment, manufacturers acceptable for existing campus systems, and various requirements from past "lessons learned".

This document is meant to serve as a supplementary design guide to designers/contractors. All national and local codes, hospital certification entities, as well as qualifications for reimbursement requirements are still applicable.

00

DIVISION 00

GENERAL CONDITIONS

DIVISION 00 – GENERAL CONDITIONS

00 21 00 Instructions to Bidders

To the extent possible, when bidding on work for UAMS, contractors and subcontractors should utilize contracts awarded by UAMS (IDIQ) and those available through our GPO provider Vizient.

00 65 00 Close-out Forms (also see section 01 78 00)

Contractor will provide the Architects of record a marked as-built document. Architects will be required to submit to the owner a final as-built record drawing in PDF and BIM format. Final payment will be withheld until all close-out information has been provided to the owner.

A. Included in the as-built drawings will be a life safety set. These items identified should be based on NFPA 101 chapter 6 definitions.
    1. Occupancy details and boundaries (size, locations, separations, identify if for sleeping)
    2. Fire and smoke rated barriers and compartments identified.
    3. Areas that are sprinkled.
    4. Hazardous materials storage areas.
    5. Locations of dampers, cutes, and shafts.
    6. Life safety device locations e.g. eye wash stations, fire extinguishers (free or in a cabinet), alarm pulls, smoke detectors, strobes or audible devices, exterior exits, and exit lights.
    7. Egress distance to smoke barrier access and exits.
    8. Any CMS or Joint Commission waiver

00 72 00 Form of General Conditions

A. The most current version of AIA Document A201 or AIA102 shall be used for UAMS projects requiring contract for construction. Additionally, construction under the Job Order Contracting (JOC) program will be accomplished with the University of Arkansas Job Order Contracting standard agreement and associated JOC order.
B. Confirm with UAMS PDC manager for any modifications to be made on a project-by-project basis.

00 73 16 Insurance Requirements

A. Minimum insurance requirements for renovation projects for the duration of construction will be:
    a. General Liability $1,000,000 per occurrence and $2,000,000 annual aggregate.
    b. Umbrella $1,000,000
    c. Commercial Auto Liability $1,000,000 CSL
    d. Builders Risk for amount of contract
    e. Worker's Compensation at Statutory limit.
    f. Include a waiver of subrogation.
    g. Additional coverage will be required when the value of the work increases above $2,000,000.

END OF DIVISION 00

01

DIVISION 01

GENERAL REQUIREMENTS

DIVISION 01 – GENERAL REQUIREMENTS

01 33 29 Sustainable Design Reporting

A. Sustainable design initiatives outlined in the most current version of the "Leadership in Energy and Environmental Design" (LEED) rating system shall be considered and discussed for every new construction and remodel project in the UAMS system.
B. The design team along with UAMS representatives shall meet to establish primary LEED rating goals that align with the level of formal accreditation that will be pursued along with the appropriate rating system to be selected. These rating systems include:
    a. Building Design and Construction
    b. Interior Design and Construction
    c. Building Operations and Maintenance
C. The design, as well as the construction team, shall have a LEED certified accredited professional on staff and involved in the project.

01 35 00 Special Procedures

C. UAMS issued contractor identification badges shall be required for all contractor employees working on-site at UAMS. Contractors must attend OH&S training to obtain a badge. These classes are held at 7:30 am on Wednesday mornings in G141 of the ED II building.
D. Emergency notifications - contractors shall immediately notify UAMS staff of any occurrences potentially dangerous to staff, patients or building occupants.
E. Tobacco Products are not allowed on the UAMS campus, those found using any tobacco products are subject to personal fines and/or dismissal from the project.
F. Contractor and subcontractors shall insure that any and all Arkansas State agencies having jurisdiction, as well as UAMS Engineering and Operations departments, are notified for inspections/observations at various stages during construction for code enforcement purposes. These inspections should be scheduled in advance to mitigate any delay.
G. Contractor and subcontractors shall follow all UAMS permitting requirements (using ATG online system) necessary. These include the followings:
    a. Hot Works
    b. ICRA/ILSM
    c. Lockout/Tagout
    d. Above Ceiling Permit
    e. Utilities Shutdown (**contractors need to notify the assigned UAMS project manager well in advance of any potential shutdown for campus coordination and announcements**). Utility shutdowns can have major impacts for patient care so these must be carried out to minimize any potential issues. An approved UAMS Method of Procedures (MOP) must be provided to the Project manager 3 Weeks in advance for review and to Campus Alert to be sent out prior to the proposed Utility Shutdown
H. Contractor shall be responsible for daily inspections and sign-offs of mitigation techniques for compliance with all Infection Control Risk Assessment (ICRA) and Interim Life Safety Measure (ILSM) efforts. Inspections will be conducted through the ATG online permitting process and/or by paper sign-off as dictated by the project manager.

1 40 00 Quality Requirements

A. Certified Healthcare Constructor - Required for construction in patient areas.

01 42 19 Reference Standards

A. This document is meant to serve as a supplementary design guide. All national and local codes, hospital certification entities, and qualifications for reimbursement requirements are still applicable. These include but are not limited to the following:
    a. International Building Code
    b. ADH Rules for Hospitals and Related Institutions in Arkansas
    c. Arkansas Mechanical Code
    d. ADPS Arkansas Fire Prevention Code
    e. AEDC Arkansas Energy Code for New Building Construction
    f. FGI Guidelines for the Design and Construction of Hospitals and Outpatient Facilities
    g. NFPA 70 National Electrical Code
    h. NFPA 99 Health Care Facilities Code
    i. NFPA 101 Life Safety Code
    j. NFPA 110 Standard for Emergency and Standby Power Systems
    k. NFPA 780 Standard for the Installation of Lightning Protection Systems
    l. ASHRAE Standard 170: Ventilation of Healthcare Facilities
    m. CMS Center for Medicare & Medicaid Services

    Current Adaptation:
    - 2012 NFPA 99: Health Care Facilities Code
    - 2012 NFPA 101: Life Safety Code
    - 2014 Arkansas Energy Code
    - 2018 International Plumbing Code
    - 2018 International Fuel Gas Code
    - 2021 International Mechanical Code
    - 2021 International Fire Code
    - 2021 International Building Code

01 55 00 Vehicular Access & Parking

A. Contractors must adhere to all parking requirements. Free parking is available at War Memorial with a shuttle bus to transport to campus or contractors can visit the parking office on the 3rd Floor of the Central Building to purchase a pass to a parking facility. Coordinate parking needs with the Project Manager.

01 61 16 Volatile Organic Compound (VOC) Content Restrictions

A. Designers shall make every effort to ensure indoor air quality is championed on all projects by choosing materials, adhesives, and sealants that meet the VOC limits outlined in the most current rule 1168 of the South Coast Air Quality Management District.

01 78 00 Closeout Documents

A. Contractor and architect shall be responsible for uploading project documents in electronic form to the Owner's project management system prior to final payment.
B. Documents shall be organized and named according to the Owners naming conventions Owner's internal folders shall consist of the following:
    a. List (in Excel TMA import template provided by owner) of contractor or owner purchased and contractor installed equipment.
    b. Operations & Maintenance Manuals - Documents shall be further organized by spec section and alphabetical by manufacturer.
    c. Inventory of stock parts and tools to be transferred that are purchased from project funds under general conditions.
    d. Arkansas Department of Health Tables

e. As-built drawings - These should be organized by volume as they were issued.
    i. Individual drawing pdfs in addition to a collective pdf by volume should be included.
    ii. A current and accurate Life Safety drawing denoting features of fire safety and related square footage.
        1. Fire safety features include the following:
        2. A list of all designated Occupancies based on NFPA 101 chapter 6 definitions.
        3. Size and boundaries of each identified Occupancy.
        4. Location of all Occupancy separations and Building separations.
        5. Areas of the building that are fully sprinklered (if the building is partially sprinklered).
        6. Locations of all hazardous storage areas.
        7. Locations of all fire-rated barriers.
        8. Locations of all smoke-rated barriers.
        9. Sleeping and non-sleeping suite boundaries, including the size of the identified suites.
        10. Locations of designated smoke compartments.
        11. Location of designated fire compartments.
        12. Locations of chutes and shafts.
        13. Locations of all Fire Extinguishers, Fire Extinguisher Cabinets, Alarm Pulls, Smoke detectors, Strobes/Audible Devices, Fire/Smoke Dampers, Exterior Exits & Exit lights.
        14. Egress distance to Smoke Barrier door and Egress distance to designated Exits.
            i. Any approved CMS or TJC equivalencies or waivers.
f. BIM model - Up to date with all changes made during construction.
g. Bonds
h. Required Certifications
i. Commissioning (Cx) Documents (including the Equipment-Web TMA Export Template) filled out and completed on the template and order provided.
j. Maintenance Agreements - Documents shall be further organized by spec section and alphabetical by manufacturer.
k. Test and Balance Reports
l. Warranties - Documents shall be further organized by spec section and alphabetical by manufacturer.
m. Progress Photos/Videos

01 81 00 Performance Requirements

A. Performance requirements must be documented in the Owner Project Requirements and Basis of Design.
I. New construction or renovation projects must comply with energy performance requirements and be reported under UA Board Policy 750.1. These are set forth in the Arkansas Sustainable Energy-Efficient Buildings Act.

01 91 00 Commissioning

Commissioning is determined on a project basis and the consultants and contractors will abide by the Commissioning Guidelines and coordinate with the Commissioning Agent.

END OF DIVISION 01

02

DIVISION 02

EXISTING CONDITIONS

DIVISION 02 – EXISTING CONDITIONS

02 00 01 Owner General Requirements and Design Intent

A. UAMS endeavors to maintain records of existing conditions. However, it is the Contractor and A/E Consultant's responsibility to verify all existing conditions that may affect the work of the project.
B. If unknown hazardous material is discovered during construction, e.g. asbestos, mold, or lead, stop work, secure the affected areas(s), take all necessary precautions to prevent damage and release of Asbestos Containing Materials (ACM) fibers into the air, and notify the Project Planner/Manager.
C. A/E shall verify adequate capacity for all utility tie-ins
D. Infrastructure data collected during construction including utility locations, storm drains, topography, etc. shall be captured for inclusion in the owner's Geospatial Information System (GIS).
E. Room names and numbers shall be approved by UAMS and done so early enough to allow for the following systems to be programmed consistently: Building Automation System, nurse call, security access, fire panel, signage (electronic scheduling software), IT and COMM systems. Wayfinding standards will be taken into consideration when room numbering conventions are developed.

02 21 00 Surveys

Utility locating is the responsibility of the contractors. Any located utilities will be documented on the as-built drawings.

02 84 16 Handling of Lighting Ballast and Lamps Containing PCBs and Mercury

A. If light fixtures and lamps contain PCB or mercury, notify the Project Planner/Manager

END OF DIVISION 02

03

DIVISION 03

CONCRETE

DIVISION 03 - CONCRETE

03 00 01 Owner General Requirements and Design Intent

A. All slabs-on-grade and structural slabs at ground level of enclosed building spaces shall be underlain with a vapor retarder complying with ASTM E 1745, Class A (minimum 15 mils). Installation shall comply with ASTM E 1643.
B. Fly ash shall not be used in concrete mixes. Concrete mixes will be provided for submittals.
C. Maximum Water to Cement (w/c) ratio shall be 0.40 for concrete mixes for interior slabs.
D. Curing compounds shall not be used at slabs scheduled to receive adhesive-applied flooring or other moisture sensitive flooring. These slabs shall be cured by covering them with moisture retaining sheets.
E. Exposed concrete floors shall be treated with a hardener and dustproofing agent.
F. All concrete placing and finishing shall be performed by a crew led by an American Concrete Institute (ACI) certified Flatwork Finisher or ACI certified Technician.
G. All concrete slabs to receive flooring finishes shall be tested for moisture and alkalinity per flooring manufacturers' instructions as well as ASTM F2170.
H. Testing shall be performed by an approved testing agency and an International Concrete Repair Institute (ICRI) concrete slab testing technician.

   All test results should be sent to the architect and owner's representative.

END OF DIVISION 03

04

DIVISION 04

MASONRY

DIVISION 04 - MASONRY

04 00 01 Owner General Requirements and Design Intent

A. All exposed masonry (brick or block) shall have a water-repellent treatment applied after cleaning with a non-staining, gum resin solution. Silicone coatings are not acceptable.
B. Masonry subject to graffiti shall be treated with a graffiti protective coating.
C. **Efflorescence:** Care must be taken in the selection of materials and in design and detailing of exterior walls to prevent efflorescence in brickwork. Certification of ASTM testing shall be provided to owner.
D. Weep Holes will be included and installed according to industry standards.
E. **UAMS standard brick color**:
    1. Existing building repair/renovation at Little Rock campus: Acme Denton Blend 100 Burnt Pumpkin with standard gray mortar *(See Appendix B)*.
    2. New construction buildings: Brick colors/blends shall be complimentary to adjacent buildings and shall be approved by UAMS.
    3. As part of quality assurance, all projects with exterior masonry shall be required to have an on-site mockup which shall remain in place until final masonry installation is complete.

END OF DIVISION 04

05

DIVISION 05

METALS

DIVISION 05 - METALS

05 00 01 Owner General Requirements and Design Intent

A. Ornamental Metal Work (Architectural) and exterior handrails shall be constructed of anodized aluminum.
B. All steel exposed to the weather or moist environments shall be galvanized.

END OF DIVISION 05

06

DIVISION 06

WOOD, PLASTICS AND COMPOSITES

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

06 20 23 Interior Finish Carpentry

A. Millwork shall comply with standards of the Architectural Woodwork Institute (AWI) “Quality Standards,” Custom grade for materials and installation.
B. Exposed face veneer matching panels shall be book matched, Grade A.
C. Wood products shall be free of any added urea formaldehyde and all adhesives/sealants shall meet the VOC content limits outlined in the most current version of South Coast Air Quality Management District Rule 1168.

06 41 00 Architectural Wood Casework

A. Millwork shall comply with standards of the Architectural Woodwork Institute (AWI) “Premium Grade” for materials and installation.
B. Provide only 7-ply veneer core plywood or MDF boards with Type II water resistant glue for laminates. No particle board or chip board shall be used. Wood products shall be free of any added urea formaldehyde and all adhesives/sealants shall meet the VOC content limits outlined in the most current version of the South Coast Air Quality Management District 1168.
C. All exposed surfaces to be high pressure decorative laminate. Laminate pattern with “grain” to be matched along series of doors/drawer fronts.
D. Interior surfaces to receive white melamine.
E. Door and drawer fronts to receive square edge with PVC edge banding, flat shaped, smooth finish and self-locking serrated tongue.
F. Cabinet door and drawer style to be flush panel/flush overlay.
G. Accessories listed below shall require UAMS representative approval.
    a. Adjustable Shelf supports.
    b. Fixed brackets
    c. Locks (required in Exam rooms and Nurse Stations)
    d. Cabinet catches
    e. Drawer slides
    f. Hinges (no exposed hinges are allowed)

END OF DIVISION 06

07

DIVISION 07

THERMAL AND MOISTURE PROTECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 00 01 Owner General Requirements and Design Intent for Low-Slope Roofs

A. Wind Load: Provide roofing assemblies, including anchorage, capable of withstanding wind pressures acting inward and outward normal to the plane of the roof. The complete roof system assembly shall be rated and installed to resist wind loads including corner and perimeter enhancements in accordance with ASCE 7, ICC IBC Building Code, Factory Mutual and Local Code. Roofing system uplift pressures to be validated by uplift resistance testing in accordance with Factory Mutual (FM) test procedures for that assembly.

B. Fire resistance for roofing systems shall have a class "A" rating as listed by *Underwriters Laboratory, Inc.*

C. Provide roofing membrane, base flashings, and component materials that comply with requirements of ICC IBC Building Code and Factory Mutual for resistance to hail damage.

D. The minimum slope for construction of new buildings is 1/2" per foot slope. In existing construction, provide a minimum 1/4" per foot slope for new roof system. Provide required positive drainage. **Flat roofs are prohibited.**

E. Allowable low-slope roof membrane material systems are selected based on roof structure type:

   a. 2-Ply SBS Modified Bitumen Roofing Membrane System
      a. Base ply SBS Modified Bitumen Membrane, applied in cold adhesive.
         1) ASTM D6163 Type I or Type II, Grade S or ASTM D6162 Type I, Grade S; styrene-butadiene-styrene (SBS) modified, glass fiber reinforced or glass fiber / polyester composite reinforced.
         2) Minimum Thickness: 90 mils, test method ASTM D5147
      b. Finish ply SBS Modified Bitumen Membrane, granulated coated, applied by torched.
         1) ASTM D6163 Type I, Grade G or ASTM D6162 Type I, Grade G or ASTM D6164 Type II, Grade G (ceramic granules, specifically treated for cool roof application, manufacturer's standard white color); styrene-butadiene-styrene (SBS) modified, glass fiber reinforced.
         2) Minimum Thickness: 138 mils, test method ASTM D5147.
         3) Maximum 1.5 grams of granular loss (average result) and 2.0 grams loss per individual sample when tested in accordance with ASTM D5147.
      c. Cyclic Fatigue: Base Ply and Finish Ply, when bonded together shall pass ASTM D5849 as manufactured and after heat conditioning according to ASTM D5147/D5147M. The roof system shall pass 500 cycles of ASTM D5849 Resistance to Cyclic Joint Displacement (fatigue) at 14 oF. Passing results shall show no signs of membrane cracking or delamination after 500 cycles. The roof system shall pass 200 cycles of ASTM D5849 after heat conditioning performed in accordance with ASTM D5147/D5147M.
      d. Flashing ply Aluminum Foil Cladded SBS Modified Bitumen Membrane, applied by torch.
      e. Flashing system for penetrations, roofing membrane manufacturer's liquid applied PMMA monolithic, reinforced roof membrane flashing system.
   b. Ethylene-Propylene-Diene-Monomer (EPDM) Single-Ply Roofing Membrane
      a. ASTM D 4637, Type 1
      b. Thickness – 90 mil, nominal
      c. Fully Adhered
      d. All lap seams to be fabricated with 6" wide seam tape.
      e. Exposed Face Color: White
   c. Polyvinyl-Chloride (PVC) Single-Ply w/ Ketone Ethylene Ester (KEE) Roofing Membrane
      a. Provide reinforced polyvinyl chloride (PVC) membrane with Ketone Ethylene Ester (KEE), containing non-wicking polyester scrim reinforcement, and complying with ASTM D4434/D4434M, Type III.
      b. Thickness – 80 mil, Minimum; minimum thickness over scrim 0.038 inches per ASTM D7635.
      c. Fully Adhered
      d. Exposed Face Color: White or Gray

d. Thermoplastic Polyolefin (TPO) Single-Ply Roofing Membrane
    a. ASTM D6878, reinforced.
    b. Thickness – 80 mil, nominal; minimum thickness over scrim 0.033 inches per ASTM D7635.
    c. Fully Adhered.
    d. Exposed Face Color: White or Gray

F. Warranties shall consist of Roofing Manufacturer's total system form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
    a. Warranty Period: 20-year (from date of project's substantial completion) manufacturer's standard total system warranty including labor and materials for watertightness of the roofing system.
    b. Warranty shall include roofing damage resulting from wind speeds up to and including 90 mph (3-second gust speed at 33 feet above ground for exposure category indicated for project).
    c. All materials in roofing system, such as, but not limited to roofing membrane, roofing flashings, cover board, insulation, adhesive, fasteners, perimeter metal, etc., shall be approved and supplied by roofing membrane manufacturer and included in roofing manufacturer's system warranty.
G. Roof Installer must warrant for a period of not less than one (1) year (from date of project's substantial completion) that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, cover board, insulation board, accessories, attachments, perimeter metal, and sheet metal installation integral to a complete watertight roof system assembly. Correction of defective workmanship and replacement of damaged or affected materials are the responsibility of the roof system installer. All costs associated with the repair or replacement work are the responsibility of the Roof Installer
H. Contractor shall provide walk-mats to access for equipment maintenance and protection of steam vents onto the roofing system.
I. Provide factory fabricated perimeter metal flashing system to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement. The roof perimeter fascia systems shall meet performance design criteria according to the most recent edition of ANSI/SPRI/FM 4435/ES-1: Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
J. Field Quality Control of Roofing System: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation and submit report to the Owner.
    a. Manufacturer's technical representative must visit the site a minimum of four times, at ¼ points, of the installation for purposes of reviewing materials installation practices and adequacy of work in place.
        a. Inspections must occur during the first 20 squares of membrane installation, midpoint, three quarter point of completion, and at substantial completion, at a minimum. Additional inspections of previously noted deficiencies or application errors must be performed. After each inspection, submit a report, signed by the manufacturer's technical representative then submit to the Owner.

07 10 00 Damp Proofing and Waterproofing

A. Below-grade foundation walls and all masonry work shall have a minimum warranty of 5 years from substantial completion for complete replacement of failed materials.
B. Exterior slabs and/or deck areas which allow weather exposure to building interior shall be waterproofed by positive water stops.

07 24 00 Exterior Insulation and Finish Systems

A. EIFS shall be a water drainage or pressure equalized system.

07 60 00 Flashing and Sheet Metal

A. All flashing shall have a minimum height of eight inches (8") above finished roof membrane.

07 70 00 Roof Penetrations and Wall Specialties and Accessories

A. Pitch pockets are not allowed.
B. All roof penetrations shall have a minimum 24” clearance between penetrations and perimeter of roof
C. Mechanical equipment curbs:
    a. Curbs shall be minimum 12” at top of slope.

07 80 00 Fire and Smoke Protection

A. Comply with *UAMS’ Maintenance of Smoke/Fire Barriers - Policy Number 11.1.08; Refer to Appendix E*.
B. Firestopping shall be limited to one manufacturer per building; acceptable manufacturers are 3M, Hilti, or STI. Manufacturer for each building shall be designated by UAMS.
C. Sprayed on fire-resistant materials for structural elements shall be a non-friable cementitious type and not flake off.
D. Contractor must schedule with the UAMS Project Manager and commissioning authority 2 weeks before the ceiling tile is installed that the area is ready for inspection.

END OF DIVISION 07

08

DIVISION 08

OPENINGS

DIVISION 08 – OPENINGS

08 00 01 Owner General Requirements and Design Intent

A. Provide minimum of 42” wide door leaf on all in-patient pathways.
B. Doors and Frames shall be from a single supplier.
C. Secure door access, alarming, and motion detection shall be coordinated with UAMS Technical Security- see Division 28 for additional info.

08 12 13 Hollow Metal Frames

A. All hollow metal frames shall be welded construction.

08 13 13 Hollow Metal Doors

K. A. Hollow metal doors should be welded construction and applied based on project specifications and needs.

08 14 16 Flush Wood Doors

A. Doors shall be the following:
    a. Solid core
    b. Book match when paired.
    c. Minimum Grade ‘A’ 5-ply veneers with vertical edge of same species as face, Grade A.
    d. Rated and non-rated doors shall have same veneer.
    e. White Maple or birch wood, with factory finish.
    f. Products shall have no added urea formaldehyde.
    g. Adhesives and sealers shall conform to the VOC limits of the latest edition of the South Coast Air Quality Management District rule 1168.
    h. In health care occupancy spaces must be finished, sealed and cleanable door surfaces to infection prevention standards.

08 33 00 Coiling Doors and Grilles

A. All coiling doors, grilles and trim in public view shall be stainless steel finish.

08 40 00 Entrances, Storefronts and Curtain Walls

A. Finish shall be the following:
    a. New construction: Brushed/clear anodized aluminum.
    b. Renovation/remodel: Match adjacent
B. Finish shall be guaranteed for 20 years.
C. Approved manufacturers are Kawneer, Efco, US Aluminum, and Vistawall.
D. At all spandrel panel locations, the panel and framing shall be fully insulated and have a non-permeable vapor barrier to prevent condensation.
E. Aluminum entrances and storefronts shall be installed complete by a single manufacturer.
F. System shall meet or exceed standard testing methods for the following: air/water infiltration, thermal transmittance, wind load, wind-driven rain, solar heat gain, and acoustics.
G. Exterior storefront systems shall not be used above the first floor.

08 42 29 Automatic Entrances

A. Automatic entrances shall be designed for heavy traffic applications.
    a. A disconnect switch shall be provided above ceiling.
B. Low energy, barrier-free operators are required.
C. Automatic entrances shall be coordinated and interface with fire alarm and security requirements.
D. Door control shall allow for manual or automatic operation - *see section 28 10 00*.
E. Specify Stanley when applicable, or equal and compatible with existing.
F. Vestibules shall be designed to limit intrusion of outside air into the lobby entrance areas; provide minimum 14' perpendicular between doors.
G. Revolving doors are not the preferred solution.

08 71 00 Door Hardware

A. Hardware shall be full 45 series mortise or 9K series cylindrical, Best locksets based on the owner's preference for the project. Finish 626.
B. Hardware shall be coordinated with the Security and Fire Alarm system requirements.
    a. Keyways shall be a ~~5~~ 7 pin Best key system, integrated into the campus master system.
    b. Permanent keys shall be delivered to the UAMS Project Planner/Manager.
C. Slim line door panic hardware shall be used.
    a. Acceptable manufacture or equal: Von Duprin
D. All corridor doors shall have kick/armor plates.
    a. 36" tall armor plates shall be used on cross-corridor openings.
E. Provide magnetic hold opens on all cross-corridor doors.
F. Wall-mounted doorstops shall be used; floor stops where necessary shall be placed in a location that does not cause a tripping hazard.
G. All doors in patient areas shall be positive latched.
H. Provide astragals and coordinators for double pair of doors requiring rating or security; astragal shall be constructed on active leaf of door pairs with latching hardware.
I. Door closers shall be LCN, Corbin Russwin or equal, match area.
J. *See division 28 for information on secure door access, alarming, etc*.

08 81 00 Exterior Glass Glazing (part of wall assembly)

A. Glazing products assembly shall be designed to perform at or above minimum requirements including but not limited to the following:
    a. Positive/negative wind pressure - ability to withstand air/water infiltration.
    b. Thermal performance
    c. Optical performance

08 91 00 Louvers

A. Shall be extruded aluminum fixed louvers.
B. Louver shall include an insect screen on the interior.
C. Louver shall have an anodized 20-year finish in a color approved by UAMS.
D. Preference is to have standard sized louvers instead of custom.

09

DIVISION 09

FINISHES

DIVISION 09 – FINISHES

09 00 01 Owner General Requirements and Design Intent

A. Design shall maximize UAMS's ability to maintain and operate the facility with limited staff resources and operating budget. Maintainability shall be a prerequisite to all design decisions.
B. All materials and finishes shall be selected with UAMS's environmental services habits in mind. All products shall be commercial grade with commercial product warranties suited to healthcare environments.
C. Maintenance and replacement costs shall be considered over the life of the facility during project design to give UAMS the best materials while minimizing life cycle cost.
D. All materials, adhesives, and accessories shall be asbestos free and shall comply with the most recent version of South Coast Air Quality Management District rule 1168.
E. Color palette will be provided by UAMS's Interior Planners.
F. To the extent possible, contractors and subcontractors shall use the Vizient GPO Contracts available at time of construction for best pricing.
G. See Appendix C for typical materials by room type.

09 21 00 Plaster and Gypsum Board Assemblies

A. Acute Care and Ambulatory Care:
    a. Wall surfaces shall have a level 5 finish.
B. Business Occupancies:
    a. Wall surfaces receiving paint shall have a level 4 finish with a light texture coating.
    b. Surfaces exposed to grazing light (corridors, etc.) shall have Level 5 finish.
C. Provide access panels in ceilings and walls where mechanical and electrical access is required for maintenance.
D. Special units, such as behavioral health, shall be considered for high impact gypsum wallboard.
E. Areas where there is high moisture content should have a mold resistant application.

09 30 13 Ceramic Tiling

A. Ceramic and porcelain tile are not a preferred material and must be approved by a UAMS representative before being specified.
B. Ceramic tile flooring is prohibited.
C. When used, all tiles to be installed following the guidelines from the latest edition of the Tile Council of North America (TCNA) handbook.
D. Large and heavy tile (tile that is greater than 15" on one side) shall use mortar specific for this function. A tile leveling clip system shall also be used during installation to ensure against lipping.
E. Tiles shall be 12" minimum and grout lines 3/16" or less with true straight lines (for ease of cleaning).
F. If required, grout shall be sealed prior to acceptance, sealer must be acceptable to grout manufacturer.
G. Movement joints shall be included in tile installation per the latest TCNA handbook EJ171 and an uncoupling membrane shall be used for all floor tiles.
H. Attic stock: Specify a minimum of 50 SF or maximum of 500 SF of each type and of each color of ceramic tile used . Tile shall be labeled by the contractor with the following information: Building name, date, tile manufacturer, style, color, and corresponding grout color.

09 51 00 Acoustical Ceilings

A. Acoustical panels shall be limited to Armstrong (color: white) with the following styles:

a. Armstrong 1772 (square lay-in) and 1774 (angled tegular) Dune, exposed 15/16” grid, 24” x 24” x 5/8”
b. Armstrong 3250 Optima (Square Tegular) with exposed 15/16” grid, 24” x 24” x 1”- to be used for areas with high sound-absorption needs.
c. Armstrong 770 Cortega (Square Lay-in), exposed 15/16” grid, 24” x 24” x 5/8”
d. Armstrong 868 Clean Room VL Fireguard Non-perforated, 24” x 24” x5/8”- to be used in areas where high cleanability is required, grid type to be determined by room function.

B. Deviation from standard 24” x 24” ceiling size and/or style listed above shall be approved by UAMS on a per-project basis.
C. Systems shall receive Armstrong standard 30-year warranty.
D. Attic stock: Provide two unopened cartons of each type of ceiling tile if different from the campus standard.
E. Installation shall be in accordance with the building seismic design category.

09 53 00 Acoustical Ceiling Suspension Assemblies

A. Ceiling Grid shall be 15/16”; 9/16” or other slim line and vector grids require approval from UAMS representative before specification.
B. Installation shall be in accordance with the building seismic design category.

09 65 00 Resilient Flooring

A. All flooring shall be installed using the manufacturer’s recommended adhesive based on concrete moisture and PH testing. All concrete slabs are to be tested per manufacturer’s instructions. AND/OR ASTM F2170/ ASTMF1869
B. Vinyl Tile/Plank:
    a. Acceptable manufacturers are Armstrong, Mannington, Tarkett, Johnsonite, Shaw Contract, or equal.
    b. Patterns shall be approved by the UAMS Interior Planner.
    c. All flooring shall be Class I per ASTM E648.
    d. Minimum 20 mil wear layer.
    e. Attic stock: Provide one unopened carton of each color and type.
C. Sheet Vinyl Flooring:
    a. Homogeneous type preferred.
    b. Seams shall be heat welded with a color to match the flooring.
    c. Cap strips sealed against the wall shall be used at wall terminations.

09 65 13 Resilient Base and Accessories

A. Typical resilient base to be type “TS” Thermoset rubber and are to have pre-molded internal/external corners. Toeless base shall not be used.
B. Resilient base to be installed with manufacturer’s recommended adhesive.
C. Attic Stock:
    a. Rubber Base: Provide one unopened carton of each type and color.
    b. Rubber Accessories: Provide 50 LF
    c. Rubber Stair Treads: Provide 10 of each color or type.

09 67 23 Resinous Flooring

A. Install seamless resinous flooring with integral base in all toilet rooms, animal holding areas, and kitchens; chemical resistant flooring may be required and should be discussed on a per project basis.
B. Preferred manufacturer or equal: Desco Coatings Inc, Tnemec

C. Floors shall be seamless, and trowel applied only, broadcast is not allowed. Aggregate to be ceramic coated colored quartz.
D. Provide warranty for minimum 5 years.
E. Bases shall be of the same material as the floor.
F. Bases shall have an edge strip at the top sealed against the wall.
G. A pre-installation meeting shall be conducted prior to installation. Shall include owner's representative, Architect/Designer, Flooring installation sub, general contractor.
H. A mock-up shall be required in all projects using resinous flooring. Mock-up to be approved prior to remainder of resinous flooring being installed.

09 68 00 Carpeting

Where deemed appropriate, carpet tile shall be used in pre-approved areas; broadloom carpet is not permitted.

A. UAMS Interior Planner shall approve or provide manufacturer and pattern.
B. Wear warranty shall be minimum 15 years limited; backing warranty shall be lifetime limited.
C. Carpet padding shall not be permitted; specify impermeable backing.
D. Manufacturer recommended full spread and pressure sensitive adhesives shall be used. Specific type shall be determined by concrete moisture and PH test results.
E. Flooring transitions shall be placed in the center of the threshold and appropriate for commercial spaces and shall be the minimum height required -to minimize disturbance for wheeled traffic.
F. Walk-off carpet tile shall be used at building entry vestibules.
G. Attic Stock: Provide a minimum of 50 SF and maximum of 500 SF for each carpet type in unopened carton and matching dye lot

09 69 00 Access Flooring

A. When used, access flooring requirements should be discussed on an individual project basis.

09 72 16 Flexible Vinyl Wall Covering

Vinyl wallcovering is not a preferred product and should be used for specialty purposes

09 91 13 Exterior Painting

A. Provide Sherwin-Williams products only. Ferrous Metals apply three coats:
    a. 1st Coat: Rust primer
    b. 2nd and 3rd Coats: Exterior alkyd semi-gloss paint
B. Galvanized Metal apply three coats unless using DTM paint:
    a. Pretreatment: Chemical wash
    b. 1st coat: Galvanized iron primer
    c. 2nd and 3rd coats: Exterior alkyd semi-gloss paint
C. Structural Steel – Semi Gloss Finish:
    a. 1st Coat: Acrylic primer
    b. 2nd Coat and 3rd Coat: acrylic urethane.

09 91 23 Interior Painting

A. Provide Sherwin-Williams products only.In supply rooms shall use accent color 18" from ceiling for fire code compliance.
B. Provide minimum 2 finish coats per the following:

LOCATION	TYPE	FINISH
Walls	For Acute Care, high impact, or wet/humid areas: Water-based epoxy	
	Other: Water based acrylic latex	Eggshell
Doors, Frames and Metal Surfaces	Water based acrylic latex	Direct to Metal (DTM)
Ceilings	Water based acrylic latex	Flat
Wood Finishes		Stained with polyurethane varnish, or Satin alkyd enamel

END OF DIVISION 09

10

DIVISION 10

SPECIALTIES

DIVISION 10 – SPECIALTIES

10 14 00 Signage

A. Interior ADA room signage, as well as directional signage, shall be included in all renovation and new construction projects. Whether owner or contractor provided, signage shall be determined based on the project.

B. Room numbers and names shall be determined by UAMS and used in all project signage. Room names will be coordinated early in design.

C. Signage manufacturer, font, type, and style must be UAMS approved; Adhere to UAMS Pathway System Signage Standards as well as marketing guidelines. Consult with PDC for guidelines, APCO's Full View series is current standard. Y. Coordinate with UAMS Radiation Safety and OH&S hazardous materials for requirements in applicable areas. -Z. Specialty signage is required at areas such as fire extinguishers, AED, and eyewash stations.

10 14 16 Plaques

A. All new buildings shall have a building plaque placed in a public area.
B. Plaque materials, layout and verbiage shall be coordinated by project and shall be approved by UAMS.
C. Mounting – tamper proof manual system

10 14 23 Panel/Exterior Signage

A. Exterior signage shall be contractor furnished; contractor installed.
B. All exterior signs shall meet UAMS guidelines for verbiage, size, color and branding and need approval by Marketing.
C. Illuminated signs shall be LED.

10 21 23 Cubicle Track and Hardware

A. Curtain track and curtain material shall be contractor furnished, contractor installed and will be chosen based on project requirements and budget.
B. All non-disposable cubicle curtains shall pass NFPA 701 and must be manufactured in such a way that all curtains within one department are the same width. This will aid in the rehanging of curtains after they have been laundered. Department labels inside each curtain seam is preferred.
C. Extra count of non-disposable cubicle curtains to be coordinated with user staff on a per project basis.
D. During design, the project team will make the determination between disposable and non-disposable curtains.

10 25 00 Service Walls (13 is Patient Bed)

A. Laminate is preferred surface material. Construction should not have exposed edges.

10 26 00 Wall and Door Protection

A. Acute and Ambulatory Care:
    a. Areas subject to impact shall have impact resistant gypsum board to 4' above finish floor. Consider full height to ceiling grid when appropriate.
        i. In high traffic public areas: Provide rigid vinyl corner guards/rails with non-corrosive mounting metal. Height to vary per project and area.
        ii. Rigid vinyl sheet protection to be .060 thickness. Height to be per project and area.
        iii. Handrails, bed locators, door kickplates and bumper guards to be used on a per project basis.

iv. In staff and work area: Provide wall and corner guards that are stainless steel- height to vary per project and area.
v. Acceptable manufacturers are Acrovyn or Inpro Corporation.

B. Business Occupancies:
   a. In public spaces: Provide rigid vinyl corner guards with non-corrosive mounting metal- 4'-0" minimum height.
   b. In Office areas: Provide 4'-0" minimum height corner guards that are stainless steel or rigid vinyl.
   c. Acceptable manufacturers or equal: Acrovyn, Inpro Corporation

10 28 00 Toilet, Bath, and Laundry Accessories

A. Partitions:
   a. Partitions shall be solid plastic, high density polymer resin (HDPE), minimum ¾" thick, overhead braced and anchored at wall and floor.
      i. Install in restrooms with two or more water closets or urinals.
   b. Partitions at urinals shall be wall mounted between urinals to provide privacy.

B. Accessories:
   a. Mirrors:
      i. Restrooms with 1 (one) mirror - flat mirror
      ii. Restrooms with 2 (two) or more mirrors - 1 (one) ADA mirror, and the remaining mirrors shall be flat.
   b. Design for baby changing stations in all public restrooms: Men's and Women's
   c. Provide coat hook on inside of each toilet partition stall door.
   d. Provide blocking for all specialty items such as: sharp containers, glove boxes, emesis, alcohol, paper towels, toilet paper, soap, hand sanitizer,

10 40 00 Safety Specialties

A. Coordinate OFCI installation such as: sharp containers, glove boxes, emesis, alcohol.

10 44 13 Fire Extinguisher Cabinets

A. All fire extinguishers shall be installed in a semi-recessed cabinet.
B. Fire extinguisher cabinets shall be sized appropriately for fire extinguisher.

10 51 00 Lockers

A. Standard lockers shall be high pressure laminate. All lockers should be secured to the walls.
B. Padlocks are the preferred locking mechanism. PDC must approve alternate solutions.

10 81 13 Bird Control Devices

A. Bird roosting deterrent measures shall be used for elevated horizontal exterior surfaces.

END OF DIVISION 10

11

DIVISION 11

EQUIPMENT

DIVISION 11 – EQUIPMENT

11 12 00 Parking Control Equipment

A. Equipment and devices must be fully compatible and programmable with current PARCS supplier and must be approved by UAMS Parking Operations for use.
B. Provide separate 1-inch (minimum) conduits for electrical power and telecom/data connections between parking equipment items.
C. All cabling must be Cat 6a.
D. Provide surge and lightning suppression system for all electrical and communication lines for parking equipment.
E. Uninterruptable Power Supply (UPS) is required on all revenue equipment.
F. Install heavy-duty pipe bollards to protect surface mounted equipment and paint to match bollards campus wide.
G. Vehicle Sensor Loops must be installed according to manufacturer requirements- sub-surface saw cuts- flush with the pavement. Surface mounted sensors are not preferred.
H. Cameras must be installed on all revenue equipment. Two positions are required:
    a. Directly on credit card readers
    b. Directly at license plate of vehicle in lane.

11 13 00 Loading Docks

Dock Bumpers: Vertical, non-corrosive unit 18” x 18” x6” thick. Heavy molded rubber compound reinforced with nylon, rayon, or tyrex cord. Space as necessary to protect the dock from damage.

A. Acceptable manufacturers Pawling, Kelley, Durable Corp, Chalfant, McGuire
B. Loading dock dimensions shall clearly be called out on both site plans and architectural plans. Confirmation of truck size, approach, and turn-around shall be confirmed with the following: UAMS Supply Chain representative, Engineering and Operations, Shipping/Receiving, Environmental Services.
C. Overhangs/ “Eyebrows” shall be a minimum of 13’-6” high.
D. All dock levelers to be flush mounted, automatic, and able to be used as a storage area when not in use (i.e. Blue Giant)
E. Heaters and fans with air curtains are preferred at all docks to establish a more comfortable work environment. Coordinate with UAMS on project-by-project basis.
F. Coordinate with UAMS on locations for wall mounted insect catcher at all docks.
G. Coordinate with UAMS to establish if a trash compactor and/or cardboard balers are needed. Cardboard recycling as well as cardboard gaylords should be taken into account if needed.

11 15 00 Security Equipment??

A. Access control and security surveillance to be approved by UAMS Security Team (CFCI).

11 40 00 Food Service Equipment/Planning

A. All food service areas to be coordinated and approved by UAMS Nutrition Services (Patient Food and/or Retail).
    a. Equipment planning for food service areas should be done early in the design process to allow for equipment requirement considerations to be included in overall building/system loads.
    b. Electrical/IT considerations should be discussed with UAMS Nutrition Services as well as IT Services, and E&O.

B. Food service areas should include a small, lockable back office to be used as a safe space for employees to count till money and close out their daily receipt log. These areas (office, cashier, entry, storage, delivery etc.) shall have access control, space for a safe, and video surveillance.
C. Equipment types and layouts are typically chosen in conjunction with an outside vendor (i.e. Aimco). All must be UL and National Sanitation Foundation Standards (NSF) certified. Energy Star rating is also preferred.
D. Preferred manufacturers for the following equipment types are listed below.
    a. Refrigeration units: Tru, Continental, Taulsen, Turbo Air
    b. Ice Maker: Follett
    c. Speed Ovens: Turbo Chef
    d. Storage: Olympic
    e. Combi-oven: Blodgett
    f. Rotating Ovens: Baxter
    g. Disposals: Insinkerator
E. Point of Sale (POS) software system in both patient food and retail areas is Computrition Hospitality Suite
F. Menu Board system is Epicure Digital Central Menu System.

11 52 00 Audio-Visual Equipment

Coordinate with UAMS IT on A/V system type requirements and location on a per-project basis during the design phase. A/V supplier, whether UAMS or project contractor shall also be determined at this time.

A. Blocking, raceways with string pull and trim shall be Contractor Furnished, Contractor Installed
B. Cabling to be Cat6a.

END OF DIVISION 11

12

DIVISION 12

FURNISHINGS

DIVISION 12 – FURNISHINGS

12 10 00 Art

A. Any installation requiring structural support or lighting must be considered early in planning.

12 20 00 Window Treatments

B. Window treatments shall be selected based on exposure and room function.
    a. Acceptable manufacturer: MechoShade Systems, or approved alternate
    b. Window treatments that are prohibited: Vertical blinds and spring roller shades.

12 35 53 Laboratory Casework

A. At a minimum, casework shall have the following features:
    a. Doors with glass inserts shall have removable 6mm laminated safety glass.
    b. Drawers shall be full extension and interchangeable without the need for special tools.
    c. Location of lockable cabinetry as well as number of locks shall be determined by project end user.

12 36 23 Plastic-Laminate-Clad Countertops

A. Plastic laminate countertops are prohibited on horizontal surfaces with sinks.
B. 3mm PVC shall be the preferred edgebanding - self edge shall not be used.
C. Minimum backsplash height to be 4”.

12 36 53 Laboratory Countertops

A. Countertops shall be either:
    a. Solid surface with continuous backsplash and sides permanently sealed.
    b. 316 stainless steel with a continuous backsplash and sides with welded seams.
    c. Epoxy Resin

12 36 61 Solid Surfacing Countertops

A. Solid surface tops shall be used in all wet areas.
B. Provide back and side splashes that are sealed with epoxy to provide greater water resistance. Minimum height - 4”.
C. Integral sinks are preferred for solid surface countertops- because these sinks are limited in the sizes available, this should be carefully coordinated between architectural designer and plumbing engineer.
D. Acrylic splash guards to be included at all sink locations. Dimensions to be the full depth of the countertop and 10” high.
E. Porous counter tops (natural materials such as granite) must be approved by UAMS on an individual project basis.

12 50 00 Commercial Furniture

A. The selection of furniture style and finish shall be determined on a per project basis and shall be coordinated with the UAMS Interior Planner.
B. All materials and finishes shall be selected with UAMS’s environmental service habits in mind.

C. All fabrics used in patient care spaces shall be healthcare grade, bleach cleanable with a minimum of 100,000 double rubs using the Wyzenbeek testing method. Silicone fabric content is preferred.
D. All foam and fabric components used shall meet CAL 117-2013 and all electrical components shall be tested and certified per UL Solutions, Environment Testing Laboratories (ETL) or other nationally recognized testing laboratory. Add note for powered furniture.
E. All seating shall meet or exceed current Business + Institutional Furniture Manufacturers Association (BIFMA) standards. Bariatric seating in patient care spaces- minimum of 10%.
F. All items shall meet current procurement and contract requirements (i.e. Vizient or Arkansas state contract)

END OF DIVISION 12

13

DIVISION 13

SPECIAL CONSTRUCTION

DIVISION 13 – SPECIAL CONSTRUCTION

13 05 00 Architectural

A. Clinical Imaging shall be placed on the ground floor for vibration control.
B. All mechanical equipment rooms shall have concrete floors and curbs.
C. Vestibules to be designed to minimize draft and energy transfer.
D. Roof access will be adequate to allow maintenance personnel to access and maintain all equipment easily without disruption to patients and other building occupants.
E. All SPD, Isolation and Surgical Suites shall have hard ceilings and/or walls that extend up to the deck above for air pressure control (both are preferred, at least one is mandatory).

13 21 26 Cold Storage Rooms

A. Cold storage rooms shall:
    a. Have condensing units located in an accessible area and not on top of the cold room.
    b. All evaporators shall be coated with a rust inhibitor due to corrosive agents used by research.

B. Control Panel:
    a. Recording dial thermometers
    b. Alarms shall be wired to UAMS Campus Operations Call Center/BAS.
    c. Located at front door of each room.
C. Condensers should be air-cooled, not water cooled with electric defrost.

13 31 00 Sterile Processing Rooms

A. Sterile Processing rooms shall:
    1. Operating Rooms, all SPD rooms (dirty/clean/sterile storage) and Isolation rooms shall follow NFPA, FGI, ADH, Ark. Fire Prevention Code, ASHRAE 170, and AAMI Guidelines (the most stringent from each AHJ shall be applied) for room pressure testing. These rooms will require digital pressure monitoring systems to insure either positive or negative pressure relationships are being kept in a normal working environment, and to verify that the space envelop is properly sealed. Pressure monitor with digital display shall be placed at the door and connect back to BAS in accordance with ASHRAE 170.

B. HVAC: The following TDS standards are based on OPR owner project requirements (preference) that meet or exceed the various codes.

    1. SPD Suites to maintain a min. of:

        a. Decontamination Room
            i. UAMS requires a Min. 10 ACH (Code min. is 6 ACH with min. 2 OACH)
            ii. Negative pressure min. -.0125
            iii. Temp. 60-65 degrees (code is 60-73 degrees max.)
            iv. Relative Humidity – 30-60% (No Requirement by code)

        b. Clean Assembly Room and BI/Sterrad Rooms
            i. UAMS Min. 10 ACH (Code is 4 ACH with Min. 2 OACH)
            ii. Positive pressure min. +.0125
            iii. Temp. 68-73 degrees (code 68-73 degrees max.)
            iv. Relative Humidity 30-55% (code 30-55% (Max. 55%)

        c. Sterilization

            v. UAMS Min. 10 ACH (Code is 4 ACH with Min. 2 OACH)
            vi. Positive pressure min. +.0125
            vii. Temp. 75-85 degrees (85 degree max)
            viii. Relative Humidity 30-60% (code 30-60% (Max. 60%)

        d. Sterile Storage Room

            ix. UAMS requires 10 ACH min. (Min. 4 Outdoor ACH)
            x. Positive pressure min. +.0125
            xi. Temp. Max. 75 degrees or lower
            xii. Relative Humidity 30-60% (Max. 70%)

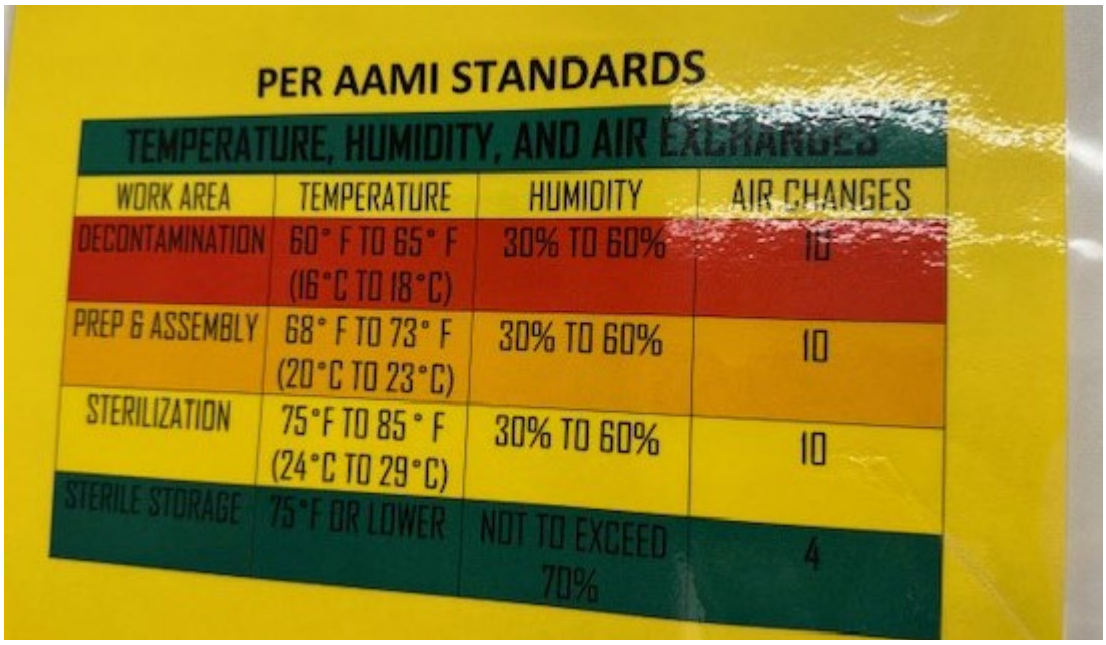


Figure 1

13 35 00 Operating Rooms

A. Operating Rooms, all SPD rooms (dirty/clean/sterile storage) and Isolation rooms shall follow AORN, NFPA, FGI, ADH, ASHRAE 170 Guidelines (the most stringent from each AHJ shall be applied) for room pressure testing. These rooms will require digital pressure monitoring systems to insure either positive or negative pressure relationships are being kept in a normal working environment, and to verify that the space envelop is properly sealed. Pressure monitor with digital display shall be placed at the door and connect to BAS in accordance with ASHRAE 170.
    a. ORs will utilize Unoccupied control to save energy, but should remain positive at a min. of +.01
    b. OR design should incorporate the latest guidelines for infection control.

B. Operating Room Air Handling Unit
    a. ORs will have two dedicated AHU's to serve the suite that will split the OR service into two blocks with an N+1 fan redundancy on each.
    b. AHU will be desiccant type which is better for low temperatures and humidity control.
    c. UAMS requires that a fan wall system be used in the AHU for redundancy. ECM motors are not allowed.

C. Operating Rooms shall maintain a min:
    a. 20 ACH (with min. 4 outside air ACH)
    b. Positive pressure min. +.0125
    c. Design temperature 63-65F (code:16-24 Celsius/ 60F – 73F degrees max).
    d. Design Relative Humidity 50% (code is: 20-60%)

D. Procedure Rooms - TBD

13 49 00 Radiation Protection

A. Lead Sheet for Equipment
    a. After the make/model of radiation emitting equipment has been determined, the UAMS Radiation Safety department will require a physicist's report. The shielding report signed by the physicist-of-record shall show a layout of the room and the calculations in determining the shielding.
    b. Provide lead lining, leaded glass and lead blocks to meet design requirements:
        i. Verify the weight of lead products do not exceed the structural capacity of the building.
    c. Exhaust of radioactive materials:
        i. Provide alarms wired to UAMS' Central Call Center to monitor radioactive fallout in the ductwork.
    d. A pre-installation meeting shall be conducted prior to the beginning of any radiation shielding.
    e. All shielding partitions shall be clearly labeled above ceiling.
B. Integrated RFI/EMI Shielding Assemblies:
    a. Shall be Contractor Furnished, Contractor Installed

END OF DIVISION 13

14

DIVISION 14

CONVEYING EQUIPMENT

DIVISION 14 – CONVEYING EQUIPMENT

14 20 00 Elevators

A. Designer/Contractor shall coordinate all elevator requirements and obtain elevator certification with the state elevator inspector prior to final submission to UAMS.
B. Requirements for the type of elevator depends on floor-to-floor height and floor number:
    a. Designer should consider doing an elevator study along with the proposed manufacturer to determine elevator sizes and quantities - UAMS participation to include Engineering & Operations, Environmental Services, Patient transport, Radiology, Occupational Health and Safety.
C. Minimum patient transport elevator size - 6'-9" x 11'-0". Minimum weight capacity and speed to be determined on a per project basis.
D. Typical finishes:
    a. Steel sheet decking is preferred for elevators that are to receive heavy load equipment. This will provide more support and a smoother finished floor.
    b. Sheet vinyl is the preferred finished floor in all elevators as opposed to porcelain/ceramic tile and/or terrazzo which are not preferred.
    c. Stainless steel wall panels are preferred for patient transport and freight elevators for cleanability.
E. For emergency power - Elevator drives shall be capable of operating with total harmonic distortion up to and including 7.5%.
F. Minimum of one elevator in business occupancy and all elevators in healthcare occupancy to be on emergency power.
G. Machine room preferred - to aid in the ease of maintenance and speed of repairs. This also allows better temperature control for elevator equipment. Elevator room to have access control- see division 28. Machine room less elevators shall have an air-conditioned shaft.
H. The elevator control system shall include the following:
    a. Any specialized service equipment needs (i.e. hydraulic fluid holding tank, pully belt covers-manufactured by elevator vendor, tension monitors) to be provided with the project.
    b. All elevator manufacturers must be Schindler, Otis, TK Elevator or equivalent.
    c. The system shall be serviceable and maintainable by a trained elevator mechanic of the owner's choice. The original equipment manufacturer shall guarantee to sell and deliver, on a timely basis, proprietary component repair services, replacement and stock parts, and software updates to the Owner and/or to a third-party elevator maintenance company of the Owner's choice at a fair market price and provide same with whatever technical notices or bulletins as would be provided to the OEM organization in order to keep the equipment current. Service- 24/7. Software shall be commercially available.
    d. Technical and engineering support and assistance for control adjustment, maintenance or troubleshooting shall be provided by the original equipment manufacturer to any maintaining contractor designated by the Owner.
    e. Coordinate with UAMS to ensure elevators will support all building systems including telephone, access control, security, fire protection, and surveillance. And any other code-driven items. Occupancy sensors to be used in buildings where appropriate.
    f. Coordinate with UAMS IT services on equipment capability infrastructure to cabs.
    g. An extended warranty for a minimum of 3 years from substantial completion to be included in project cost.

14 92 00 Pneumatic Tube Systems

A. Any material handling system must be fully compatible with existing Swisslog pneumatic tube delivery system at UAMS. Suppliers shall certify in writing their full compliance with all features and meet the reliability of the existing Swisslog Translogic system.
B. Provide sound attenuation when transport tubes and equipment are located over occupied space.
C. New location installations shall receive a minimum of two drops Cat6A cables for each controller.

D. New locations or renovation of existing locations to be added on to the equipment branch of the emergency power system.
E. Designer shall coordinate location of conduit, tubes, etc. with all other building systems.
F. Transfer units in ceilings to be in readily accessible areas such as corridors or back of house areas.

END OF DIVISION 14

21

DIVISION 21

FIRE SUPPRESSION

DIVISION 21 – FIRE SUPPRESSION

21 00 00 Owner General Requirements and Design Intent

A. Provide concealed/flush sprinkler heads in occupied areas with drop-in ceiling.
B. Coordinate with fire department connections with Authority Having Jurisdiction and UAMS.
C. Dry sprinkler systems are required in all non-heated rooms and building vestibules. The use of dry sprinkler systems shall also be discussed on a per project basis for any large/ major electrical and data rooms.
D. Provide thrust resistance on all sprinkler systems per insurance carrier requirements. Pre-installation meetings shall be held at least one week prior to fire suppression system being installed. At a minimum, attendees shall include architect and owner's operations representative.
E. Glass in building atriums shall be fire rated per IBC.
F. Tamper resistant fixtures shall be used in areas where sprinklers, speakers, and/or strobes are especially prone to damage.
G. All fixtures to be installed based on seismic zone requirements for project site.
H. UAMS has IDIQ award for Fire Alarms that should be utilized for all subcontracting.
I. *See Division 28 for Fire Detection and Alarm requirements*.
J. Fire pump and automatic sprinkler system riser rooms shall be designed with adequate space for all equipment necessary for the installation, as defined by the manufacturer, with sufficient working room around the stationary equipment. Clearances around equipment to elements of permanent construction, including other installed equipment and appliances, shall be sufficient to allow inspection, service, repair or replacement without removing such elements of permanent construction or disabling the function of a required fire-resistance-rated assembly. Fire pump and automatic sprinkler system riser rooms shall be provided with a door(s) and unobstructed passageway large enough to allow removal of the largest piece of equipment.

21 07 00 Fire Suppression System Insulation –

A. If the sprinkler is not in a temperature-controlled environment, a dry pipe system should be considered.

21 05 53 Identification for Fire-Suppression Piping and Equipment

A. Identify Fire Suppression systems in accordance with UAMS Equipment Schedule and room numbers.
B. Indicate valve location with tags on the valves.
C. Indicate valve number on the drawings.

END OF DIVISION 21

22

DIVISION 22

PLUMBING

DIVISION 22 – PLUMBING

22 00 01 Owner General Requirements and Design Intent

A. *Refer to appendix F for tagging requirements.*
B. *Freeze protection should be a primary consideration in plumbing design.*
C. Provide directional labeling to identify piping contents approximately every 15 ft.
D. All devices that have the potential of discharging water, such as RPZ backflow preventer, relief valves, etc., shall be piped and gravity drained back to an approved waste receptor with a code compliant gap.
E. All valves shall be installed with proper clearance and accessibility for maintenance or replacement.
F. Meter all water and gas lines at building entrance recording the flow and usage. These measurements will be returned to the Building Management system for monitoring.
G. Isolate piping from building where required to prevent transmission of noise and vibration; where piping noise is audible, provide acoustical wrap on piping.
H. Sleeve all penetrations through concrete or block with a compatible heavy-duty sleeve that will prevent electrolysis.
I. Zone isolation valves for each plumbing system shall be installed at no less than one per floor and shall not interfere with other zones; means shall be provided to drain the system and the isolated zone.
J. Bradey Label the locations of shut off valves, RPZ, etc. on ceiling grid.

22 05 29 Hangers and Supports for Plumbing Piping and Equipment

A. Indoor equipment in mechanical rooms shall be mounted on minimum 4” reinforced concrete pad with chamfered edges.
B. Supports for pipes or equipment shall be fastened to the building structure; supports being attached to other utilities or fire suppression systems are not acceptable.
C. Piping on roof shall be mounted on pedestal type stands that require no penetrations through the roof; Piping shall be a minimum of 1’-0” above the roof.
D. Exterior equipment shall be supported on galvanized structural steel supports designed by a Registered Arkansas Structural Engineer
E. Piping and equipment shall be installed per appropriate seismic zone meeting ASCE/SEI 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

22 07 00 Plumbing Insulation

A. All domestic water, hot and cold, shall be insulated.
B. The use of electrical heat tape for the purpose of domestic water temperature maintenance is not permitted on UAMS campus. Exceptions: Remodeling of the Patient Bed Tower or exterior wall pipes that are prone to freezing.
C. In mechanical rooms, domestic water piping shall be insulated and covered with a 20 mil PVC jacket. Insulate all piping including elbows, fittings, and valves. (No diaper type insulation in elbows.)
D. Roof drain piping (storm drain system) shall be insulated to prevent condensation. Insulate drain bodies and all horizontal piping at the roof level for the first 50 feet or to a point where the piping goes vertical.
E. Seal all longitudinal and lateral insulation seams and joints.

22 11 00 Facility Water Distribution

A. All domestic cold and hot water piping within a building:
    a. Acute/Ambulatory/Research
        i. Shall be Type “L” hard drawn copper tubing. Fittings shall be wrought copper, solder joint type. Press type fittings shall not be used unless pre-approved by UAMS.

b. Educational and Business
    i. As an alternative to copper piping, PEX (cross-linked polyethylene) piping systems with PEX brass crimp fittings may be used with pre-approval from UAMS.

B. High points of all water piping and where flow in pipe turns down shall be properly vented and/or arrested to prevent water hammer.
C. Copper piping below grade shall be sleeved with a 4-mil thickness polyethylene sleeve. Hot water lines shall have a red sleeve and cold water lines shall have a blue sleeve
D. Butterfly valves shall not be lever actuated. Install valve with hand wheel and gear box to observe indicator from standing position on the floor.
E. Isolation valves shall be installed on all fixture zones or on remote individual fixtures.
F. Dielectric fittings shall be installed to prevent electrolysis.
G. Expansion loops and/or fittings shall be installed to provide expansion control.
H. Route domestic hot water loop piping close enough to each handwash lavatory to provide hot water within 10 seconds.

22 11 19 Domestic Water Piping Specialties

A. Exterior hose bib
    a. Exterior hose bibs shall be freeze proof, ¾" size, with chrome finish brass casting face
    b. Provide with vacuum type backflow prevention.

22 13 00 Facility Sanitary Sewerage

A. Waste arms for lavatories and sinks shall be drain, waste and vent (DWV) copper with cast brass adaptors and wrought copper fittings.
B. Above grade all interior sanitary sewer, vent, and storm drain piping shall be:
    a. Standard weight cast iron soil pipe and no-hub fittings
C. Below grade sanitary sewer, vent, and storm piping shall be:
    a. Standard weight cast iron soil pipe with hub and spigot fittings
        i. Hub gaskets shall be equal to Tyler Pipes "Ty-seal"
D. Equip mechanical rooms with adequate floor drains. minimum one drain per 500 square feet Dimple floor at floor drains. All mechanical room floor drains shall have a minimum of a 3" trap and shall be properly vented per Arkansas State Plumbing Code.
E. Do not install drains or cleanouts in "clean/sterile areas".
F. Install water sensors at appropriate low points of floor and/or adjacent to water sources and connect back to the Control Center in all mechanical rooms over occupied spaces with a water source to notify UAMS of overflowing drains
G. Elevator drainage drum is to have an alarm tied back to the Control Center through the BAS system to notify Control when the tank is about full and the line shall have a shut off valve to stop flow while the drum is being replaced. A minimum of two drums are required, one in service and one spare while the tank is properly being disposed; Provide a curb to contain the spill if the drum fails as required by EPA

22 14 00 Facility Storm Drainage

A. Acceptable manufacturers for floor and roof drains should be equal to Wade, and Zurn.

22 14 29 Sump Pumps

A. Elevator sump pump shall:
    a. Be submersible

b. Have the following items constructed of stainless steel: suction, discharge, intermediate chambers, impeller and terminal box cover
c. Have high water level detection connected to BAS
    i. Program BAS to reduce elevator cab movement to a level above until water level is reduced

22 42 13 Commercial Water Closets and Urinals

A. Water Closets
    a. Wall mounted fixtures are preferred with 1.6 gpf
    b. Specifications should be equal to American Standard, Kohler, or Eljer
B. Urinals
    a. Specifications equal to American Standard, Kohler, or Eljer

22 42 16 Commercial Lavatories and Sinks

A. Lavatories/Sinks
    a. Lavatories incorporated into millwork shall be self-rimming vitreous with 8” faucet centera. Specifications equal to American Standard, Kohler, or Eljer
    b. Areas where solid surface integral sinks are to be used shall be coordinated with architectural designer for size and depth.
B. Janitor Sinks
    a. Service sinks shall be floor models
    b. Use separate spigots, hot and cold water supply to be independent
    c. Install vacuum breakers on all spigots
    d. Install check valves on both water supply lines

22 42 39 Commercial Faucets

A. Faucets shall be electronic with gooseneck spout a minimum of 10” above the bottom of the lavatory/sink bowl. Splash proof circuit control module, vandal proof adjustment for operation of activation and time-out settings. Integral LED trouble shooting indicator. Battery operated faucets will not be permitted.
B.
C. Design for hard-wired sensor type infrared; transformers shall be hidden, but accessible. Design to minimize the number of transformers by having multiple sensors on a transformer.
D. Specifications equal to Delta, Chicago, or T&S Brass.
E. Laminar flow faucets are required in patient care areas regardless of building occupancy type.

22 42 43 Flushometers

A. Flush valves shall have an 11-1/2” high inlet rough-in, chrome-plated brass,sensor-operated. “No-hands operation” but with manual override button.
B. Design for hard-wired, infrared sensor type. Transformers shall be hidden, but accessible. Design to minimize the number of transformers by having multiple sensors on a single transformer. Battery operated flush valves will not be permitted.
C. Flush valves shall be equal to Sloan Royal or Zurn AquaSense AV.

22 45 13 Emergency Plumbing Fixtures

A. Emergency Showers (All shall be ADA compliant)

a. In rooms with 8’ ceilings: Shower head shall be flush with ceiling, stainless steel, with stainless steel face plate. Stainless steel actuating arm and pull rod with guide plate. Install with mixing valve to provide Tepid water. Set delivery temperature at 95 degrees. Install Strobe light and alarm horn on adjacent wall. Install floor drain under shower head.
b. In rooms with 9’ to 10’ ceilings: Shower head shall be semi concealed, stainless steel, with vertical supply pipe and ceiling escutcheon for mounting shower head at 8’ AFF. Stainless steel actuating arm and 63 ½” pull rod with guide plate. Install with mixing valve to provide Tepid water. Set delivery temperature at 95 degrees. Install Strobe light and alarm horn on adjacent wall. Install floor drain under shower head.

B. Emergency Eyewash shall be located wherever required by code or requlation and shall be ADA compliant.
a. Wall mount: Stainless steel bowl, two flip top “dust cover” heads with internal flow control and filtration. Cast aluminum wall bracket. Install with mixing valve to provide Tepid water. Set delivery temperature at 95 degrees. Hard pipe drain to sanitary sewer system with trap and vent.
b. Deck mount: Mount to rear of sink ledge with pull down Arm actuated, two flip top “dust cover” heads with internal flow control and filtration. Install with mixing valve to provide Tepid water. Set delivery temperature at 95 degrees.

C. Combination Emergency Eyewash/Shower (All shall be ADA compliant)
a. Free standing unit with stainless steel shower head, actuating arm and pull rod. Stainless steel eyewash bowl, two flip top “dust cover” heads with internal flow control and filtration. Install with mixing valve to provide Tepid water. Set delivery temperature at 95 degrees. Install Strobe light and alarm horn on adjacent wall. Install floor drain under shower head.

22 47 19 Water-Station Water Coolers

A. All Water Coolers shall be ADA compliant.
B. All water coolers shall include a bottle filler.
C. All units shall have a limited 5-year warranty on the seal refrigeration system and component parts.
D. Basis of design shall be equal to Elkay, Halsey Taylor or Oasis manufacturers.

22 63 00 Gas Systems for Laboratory and Healthcare Facilities

A. Alarm panel locations will be established by Owner.

a. All healthcare medical gas systems shall be designed and installed per NFPA 99 guidelines.

b. All laboratory gas systems shall be designed and installed per NFPA 45 guidelines.

c. Source equipment for laboratory and medical gas systems shall be installed separate of one another.

d. Medical gas area alarm panels shall be located per NFPA 99 with UAMS being informed and given final approval of such locations and shall carefully match the current system.

e. Careful consideration shall be given for location of medical vacuum pumps and medical air compressors too

f. Medical gas outlet/inlets shall be pre-approved by UAMS and shall carefully match the “type” of outlets that are existing on campus. Wall outlets shall be latch key type (aka Chemetron and Ohio Medical compatible). All ceiling outlets shall be Diameter Index Safety System (D.I.S.S.) type with retractable hose reels attached to place outlet at 6’ AFF. Rooms with Nitrogen outlets shall be provided with a nitrogen regulator in addition to the high-pressure outlet. Nitrogen regulators shall be coordinated with UAMS staff to determine if regulators will be wall mounted or boom mounted.

g. All anesthetizing locations shall be piped with Nitrous Oxide and a Waste Anesthesia Gas Disposal (WAGD) outlet.

h. Medical gas Zone Valve Boxes shall not be installed in line of sight of the outlets they serve.

i. Service valves shall be installed prior to all Zone Valve Boxes, in addition to base of all risers and branch lines of all mains.

22 67 13 Deionized-Water Piping

A. All supply and return piping shall be equal to Orion Scheduled 80 Whiteline pipe, no CPVC will be allowed.
B. Fittings shall be Schedule 80 PVDF mechanical joint with electrometric face seal, PVDF snap ring and nut.
C. All fixtures shall have one gate valve per line at each fixture.

END OF DIVISION 22

23

DIVISION 23

HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

DIVISION 23 – HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

23 00 01 Owner General Requirements and Design Intent

A. The following mechanical technical design standards are provided as a supplement to applicable code requirements, guidelines, industry standards, and best practices.
B. UAMS awards IDIQ contracts, this contract should be utilized when subcontracting.
C. Adhere to the current edition of the following minimum guidelines. Where discrepancies between guidelines are found, the most stringent requirements shall take precedence.
    a. *Arkansas Mechanical Code*
    b. *Arkansas Department of Health: Rules and Regulations for Hospitals and Related Institutions in Arkansas*
    c. *The Facility Guidelines Institute: Guidelines for Design and Construction of Hospital and Health Care Facilities*
    d. *ASHRAE Standard 170: Ventilation of Health Care Facilities*. Refer to Appendix G "Table 6.1 – Space Ventilation", for quick reference of air pressure, air change rates, temperature, and humidity requirements.
D. The design team shall provide a list of applicable codes pertaining to the project on the cover sheet of the drawing set and ensure approval by the Arkansas Health Department. Additional review by the Arkansas State Legislature and University of Arkansas Board of Trustees may be required depending upon project's cost.
E. Energy Efficiency
    a. For new facilities, the recommended Energy Star Target score is 75. This is the minimum required to earn the Energy Star label.
    b. New buildings must comply with the *State of Arkansas Act 674* for conservation of energy in state owned buildings. Utilize the "checklist for design professional compliance", provided on the Arkansas Department of Energy and Environment website. If the actual rating does not meet or exceed the target rating, the project team shall identify the cause of the disparity and implement corrective action.
    c. All projects shall use the current *United States Green Building Council (USGBC)* LEED checklist as a method to document the project's sustainability. Submittal to USGBC for certification will be determined on a per project basis, coordinate requirements with owner.

23 01 30 Operation and Maintenance of Mechanical Systems

A. Locate fresh air intakes where they are inaccessible to the public. Maintain a minimum of 25 feet from exhaust fans, combustion stacks, medical vacuum outlets, plumbing vents, and areas with noxious fumes. Consider carbon filters for fresh air intakes located adjacent to or down wind of objectionable odors including dumpsters, fuel storage tanks, parking areas, etc.
B. Preferred general exhaust fan location is on the roof in an accessible location. Sidewall, in-line, and ceiling mounted fans will be considered where project requirements dictate.
C. Maintain minimum OSHA setback distance from edge of roof for roof mounted equipment. Provide required fall protection where minimum setback distances can't be provided.
D. Return air plenums are prohibited as dictated by the *Arkansas Department of Health Rules and Regulations for Hospitals and Related Institutions in Arkansas*.
E. Mechanical equipment and system components requiring regular service or scheduled maintenance shall be installed in easily accessible locations without removing other utilities. Locate to minimize disruptions to the occupants or space function. Avoid locations above any equipment, transformers, panels, or telephone gear.
F. Design shall maximize the owner's ability to maintain and operate the facility with limited staff resources and operating budget. Maintainability shall be a prerequisite to all design decisions. Design elements which require difficult and time-consuming maintenance or costly contract services shall be avoided. The project will be designed with the ease of operation and maintenance as a primary consideration. To ensure that maintenance can be easily performed, and the facility's operation will not be compromised because of de-construction due to maintenance activities, the maintenance criteria shall adhere to the following:

a. Existing equipment and associated infrastructure shall be decommissioned and removed.
b. Ensure that sufficient access and clearance is provided to perform routine maintenance tasks. Indicate manufacturer recommended service clearances on plans.
c. Coordinate the installation of building materials and components to allow sufficient space for maintenance and service without obstructing or impeding space function.

G. System reliability shall be enhanced through equipment redundancy to reduce downtime from equipment failure and to lengthen equipment life by alternating run times.
   a. Provide N+1 reliability for major heating and cooling system components. Major equipment includes chillers, cooling towers, boilers, pumps, and large fans.
   b. N+1 redundancy means the required components (N) to meet the system demand are provided along with a stand-by component (+1) to ensure system demand is met in the event of component failure or scheduled maintenance.
   c. Examples of N+1 redundancy are as follows:
      i. One 50-ton chiller is required to meet system demand. Provide two 50-ton chillers.
      ii. Three 50 HP pumps are required to meet system demand. Provide four 50 HP pumps.

H. New construction and major renovation work on the main Little Rock campus shall be served by the central utility plant systems as directed by the owner.
   a. Design shall calculate mechanical utility demands compared to current plant capacity. Obtain current plant capacity from owner. Where new construction reduces the central plant's chilled water, tower water, or steam loop capacity below 80% capacity, the project shall provide additional central plant equipment to maintain capacity.
   b. Written notice shall be submitted to the owner at least two weeks prior to any scheduled utility connection or shutdown.

I. Owner uses the TMA Enterprise Management platform to manage work orders and preventive maintenance. Provide all equipment maintenance information to owner's maintenance staff to enter into the system.
   a. Provide electronic Installation and Operation Manuals and Repair Parts Manuals for all equipment and systems. Include all information required to operate and maintain the facility. Equipment manufacturers shall provide recommended maintenance procedures and frequency, along with recommended calibration of temperature, pressure, and other sensors critical to efficient system performance.

J. Maintenance and replacement costs must be considered over the life of the facility and selections of systems, equipment, and materials shall be based on minimizing life cycle costs. Design of mechanical systems shall allow required maintenance and replacement of key system components to be performed without de-construction. All systems and their components shall be easily accessible for adjustments to the respective system components.
   a. The maintenance cost goal is typically determined using the ASHE benchmarking tool. This tool identifies anticipated maintenance costs for health care facilities, including staffing, service contracts, tools, materials, utilities, and training.
   b. Owner training is required for all new building systems and controls to ensure the building is operated safely and efficiently. Identify the systems and equipment for which training is required, including the preferred training format (classroom, field, etc.). These requirements shall be reviewed by owner to ensure expectations are meet.

K. Utility Management Plan shall be provided as required by the *Joint Commission's Comprehensive Accreditation Manual for Hospitals* and shall include the following sections:
   a. Written inventories of the operating components of utility systems considered critical to patient care based on risks of infection and occupant needs.
   b. Written descriptions of inspection, testing, and maintenance activities for operating components of critical utility systems.
   c. Detailed diagrams of utility distribution systems.
   d. Written procedures for responding to utility system disruptions.
   e. Written procedures for shutting off malfunctioning utility systems and notifying staff in affected areas.
   f. Written procedures for obtaining emergency repair services.
   g. Written identification of alternative means of providing electricity, water, and fuel.
   h. Written identification of alternative means for providing medical air, medical vacuum, oxygen, nitrous oxide, nitrogen, and other medical gases.

i. Written identification of alternative means of providing other critical utilities, such as vertical transport, steam for sterilization, heating, cooling, and ventilation.
j. Written procedures for responding to events that curtail or disrupt utility service to the health care facility for up to 96 hours.
k. Project team will assist owner with any information required to update the Utility Management Plan to include new construction.

23 05 29 Hangers and Supports for HVAC Piping and Equipment

A. Indoor equipment in mechanical rooms shall be mounted on a minimum 4-inch-thick reinforced concrete pad with chamfered edges. Pad footprint shall exceed equipment footprint by a minimum of 6 inches on all sides.
B. Supports for pipes or equipment shall be fastened to the building structure. Do not support or attach to other utilities.
C. Ductwork and piping on roofs shall be mounted on pedestal type stands that require no penetrations through the roof. Piping shall be a minimum of 1'-0" above the roof to allow roof maintenance. Ductwork minimum height above roof shall be equal to half of the duct width or 1'-0", whichever is greater.
D. Roof mounted equipment shall be mounted on a minimum 12-inch-tall roof curb, attached to the equipment and to the roof deck. Equipment roof curbs shall be provided by the equipment manufacturer or a manufacturer who specializes in roof curb construction. Provide seismic curbs where required.
    a. In renovation projects, or new construction with prior approval from owner, non-penetrating equipment stands may be provided to avoid impacting existing roof warranties. Mounting height above roof shall be equal to half of the stand width or 1'-0", whichever is greater. Ensure wind and seismic loads are considered prior to utilizing free-standing equipment supports.
E. Exterior equipment elevated above grade or large roof mounted equipment, shall be mounted on galvanized steel supports connected to the building structural system and designed by a registered Arkansas structural engineer.
F. Exterior equipment located at grade shall be mounted on a minimum 5-inch-thick reinforced concrete pad with chamfered edges and reinforced concrete footings extending a minimum 8 inches below grade. Pad footprint shall exceed equipment footprint by a minimum of 12 inches on all sides.

23 05 48 Vibration Isolation

A. All isolators and isolation materials shall be provided by the same manufacturer and shall be certified by the manufacturer.
B. Provide mechanical equipment with higher rotation or reciprocating rates for sound and vibration considerations. Disturbing frequencies are easier to vibration isolate at higher speeds, e.g., 3500 rpm vs 1750 rpm (60 Hz). If other selection parameters are satisfied, smaller higher speed fans are preferred to larger slower speed fans.
C. Provide flexible ductwork, piping, and conduit connections to mechanical equipment to prevent vibration transmission to the building structure.
D. Motorized equipment supported from above shall include vibration isolation supports.
E. For vibration sensitive areas, consider providing elastomer vibration isolator pads, static deflection 0.10"-0.15", under large AHU casings to reduce the transmission of aerodynamically induced vibrations. AHU isolator pads are supplementary to internal fan/motor assembly spring isolators.

23 05 49 Seismic Controls

A. Seismic design conditions shall be evaluated in accordance with ASCE 7-05 per project site class and building occupancy category to determine if seismic restraints are required.
    a. Identify Seismic Design Category and Importance Factor on cover sheet and indicate if seismic restraints ARE or ARE NOT required.

b. Where restraints are required, provide seismic controls for equipment, piping, and ductwork in accordance with seismic codes, component manufacturer requirements, and building construction standards to keep components in place during a seismic event.

23 05 53 Identification for HVAC Piping and Equipment

A. All valves shall be accessible and tagged according to Appendix F. Identify utility service at manifolded valve connections for isolation during emergency shutoff.
B. Manufacturer name plates shall be engraved non-corrosive metal including model and serial numbers, date of manufacture, and performance information. Provide additional equipment identification corresponding with the construction documents. Equipment labels shall be comprised of laminated three-layer plastic with engraved white letters on a black background.
C. Identify ductwork and piping indicating contents and direction of flow. Comply with ASME requirements for lettering sizes and colors.
D. Locate ductwork and piping identification at equipment connections, both sides of wall penetrations and obstructions, at least once in every room, and at intervals not to exceed 15 feet. Install in clear view and align with direction of flow.
E. Ensure all equipment is identified in a manner consistent with facility standards. For renovation and expansion projects, equipment numbers shall continue with the next available number, in lieu of starting at “1”. Coordinate with owner.

23 05 93 Testing, Adjusting, And Balancing for HVAC

A. Pre-Approved TAB agencies:
    a. Airtech Corporation, Powers of Arkansas, Wade Company
    b. Alternate manufacturers will require owner approval prior to consideration.
B. TAB agencies, supervisors, and technicians shall be certified by one or more of the following associations. Certifications must be current and provided by the same associate.
    a. AABC: Associated Air Balance Council
    b. NEBB: National Environmental Balancing Bureau
    c. TABB: Testing Adjusting and Balancing Bureau
C. Provide testing, adjustment, and balancing of all mechanical systems identified on mechanical equipment schedules and as required to provide a fully functional mechanical system to the following tolerances.
    a. Air handling supply equipment: Plus, or minus 5 percent of design airflow, temperature, and pressure.
    b. Air handling return or exhaust equipment: Plus, or minus 10 percent of design airflow, temperature, and pressure.
    c. Air devices: Plus, 10 percent or minus 5 percent of design airflow.
    d. Hydronic equipment: Plus, or minus 10 percent of design water flow, temperature, and pressure.
D. Duct air leakage testing shall be performed after ductwork installation, and witnessed by owner’s representative, prior to installing ductwork insulation. Leakage test procedure shall follow the outlines and classifications in the current edition of the *SMACNA HVAC Air Duct Leakage Test Manual*.
    a. Medium pressure supply ductwork shall be tested at 3.0” WC.
    b. Return and exhaust ductwork shall be tested at 2.0” WC.
    c. Any air leaks shall be repaired and retested until pressure requirements are met.

23 07 13 HVAC Duct Insulation

A. Insulate supply air, return air, and outside air ductwork and fittings with minimum 2 inch thick, R-6.0, external fiberglass duct wrap (0.75 pcf) or rigid board (3.0 pcf). Insulation shall include factory applied foil skrim kraft vapor barrier jacket. Seal all joints and seams with 3-inch-wide mastic tape.
B. Insulate exhaust air ductwork within 10 feet of exterior openings.

C. Kitchen hood exhaust ductwork shall be wrapped with minimum 2-hour fire rated duct insulation certified for zero clearance to combustible materials.
D. Air device back pans and plenum boxes shall be externally field insulated to match connected ductwork or provided with air device manufacturers insulation blankets meeting the associated ductwork insulation valve.
E. Condensate drip pans and exterior louver plenums shall be externally insulated.
F. Internal duct insulation (where allowed) shall be elastomeric foam. Glass fiber liner is not allowed.
G. In mechanical rooms and finished spaces, all duct insulation within 10 feet of the floor, shall be finished with a minimum 0.016-inch-thick embossed aluminum jacket.
H. Exterior duct insulation shall be covered with multi-ply embossed UV-resistant aluminum polymer laminate with a layer of rubberized asphalt specially formulated for use on insulated duct. The jacket will include a metalized polyester film coated with a high-quality low temperature acrylic adhesive that allows for a peel and stick functionality.

23 07 16 HVAC Equipment Insulation

A. Insulate cooling equipment, including but not limited to pump bodies, air separators, buffer tanks, heat exchangers, and cold surfaces that are not factory insulated with minimum 1-inch-thick closed cell elastomeric foam insulation. Seal all joints and seams with contact adhesive compatible with the insulation.
B. Insulate hot water and steam heating equipment, including but not limited to pump bodies, air separators, storage tanks, steam convertors, and steam condensate receivers with high temperature closed cell elastomeric foam insulation or glass fiber insulation with FSK.
    a. Provide removable and reusable insulation jackets where equipment or components require regular access for maintenance, cleaning, or repair.
    b. Bevel and seal insulation at piping connections, around equipment manufacturer nameplates, and ASME stamps.
C. In mechanical rooms and finished spaces, all equipment insulation within 10 feet of the floor, shall be finished with a minimum 0.016-inch-thick embossed aluminum jacket.

23 07 19 HVAC Piping Insulation

A. Insulate all heating hot water, chilled water, and condenser water piping system components with rigid molded glass fiber insulation with a minimum K-value of 0.24 at 75 degrees F. Insulation shall include factory applied white kraft paper with glass fiber yarn, bonded to aluminized film. Seal all joints and seams with vapor barrier mastic cement compatible with the insulation.
B. Insulate all steam and steam condensate piping system components with rigid molded calcium silicate insulation with a minimum K-value of 0.40 at 300 degrees F, 15 pcf density. Insulation shall include factory applied white kraft paper with glass fiber yarn, bonded to aluminized film. Seal all joints and seams with vapor barrier mastic cement compatible with the insulation.
C. Insulate refrigerant suction and hot gas piping with minimum 1 inch thick, preformed flexible elastomeric cellular rubber insulation. Seal all joints and seams with contact adhesive compatible with the insulation.
D. Minimum piping insulation thickness shall comply with current ASHRAE 90.1, table 6.8.3.
E. Bevel and seal ends of insulation at heating hot water, steam, and steam condensate pipe unions and flanges.
F. Exterior pipe insulation shall be covered with aluminum jackets.
G. In mechanical rooms and finished spaces, all piping insulation within 10 feet of the floor, shall be finished with a minimum 10 mil PVC jacket.
H. Buried piping shall be insulated with polyurethane insulation with high density polyethylene (HDPE) jacket and heat shrink sleeves.

23 08 00 Commissioning of HVAC

A. Mechanical equipment and control sequences shall be tested to ensure that performance and control elements are calibrated, adjusted, and in proper working condition. Detailed instructions for commissioning activities shall be identified on the plans or specifications.
B. Measure and verify actual building energy performance for the first year of occupancy using the *Energy Star* rating system. If the actual Energy Star rating does not meet or exceed the target rating, the project team shall work to identify the cause and implement corrective action until the target rating is achieved.
C. Commissioning tools shall be made available to owner's operations and maintenance staff. At minimum, these tools shall include:
    a. Open protocol interface to the energy management system
    b. Open protocol interface to major equipment control panels
    c. Automatic data archiving system
    d. Query-and-response program
D. Ease of use for the operators must be maintained when new buildings are brought online. Trending of key parameters in the system shall be provided to allow operators to analyze and diagnose issues within the system. These tools shall match what is in place for other buildings on campus and should be reviewed with owner to ensure expectations are met.
E. Owner utilizes utility usage trending and data analytics software. This software provides the ability to implement fault detection strategies and monitor energy efficiency. New construction and major renovation equipment and systems shall be integrated into the trending and analytics software.
F. Acceptance of the construction phase of the commissioning process requires owner acceptance of the commissioning report, verified test reports, and training reports, consistent with recommendations of the design team and other appropriate commissioning team members. At a minimum, the commissioning final report will include the following:
    a. Executive Summary
    b. Final Commissioning Plan
    c. Final version of the Owner's Project Requirements
    d. Final version of the Construction Documents
    e. Project Observations
    f. Final Commissioning Issues Log
    g. Completed Pre-Functional Checklist
    h. Completed Functional Performance Tests
    i. Supporting Documentation

23 09 23 Direct-Digital Control System for HVAC

A. Controls instrumentation and software shall be the most recent technology released by the manufacturer. Controls manufacturer shall be Siemens. Ensure all controls are identified in a manner consistent with facility standards. For renovation and expansion projects, controls numbers shall continue with the next available number, in lieu of starting at "1". Coordinate with owner.
B. Control systems for new construction and major renovation work shall integrate into the existing campus control system. The control system shall not require an additional workstation or any additional software or program by which the system operator has to interface to access the system. The control system shall have the same authentication interface and password protected access as the existing system. The system should not have any additional authentication or login process.
C. Provide a complete new networked DDC system capable of stand-alone control with web-based operator interface in compliance with the current edition of the ASHRAE 135 BACnet standard. The new DDC system shall be a single, complete, non-proprietary DDC system and shall be based on an open implementation of the BACnet protocol per ASHRAE standard 135.
D. Control systems shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface. System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a web browser over the control system network, the owner's local area network, and over the internet. The intent of the thin-client architecture is to provide operators complete access to the control system via a web browser. No special software other than a web browser shall be required to access graphics, point displays, alarms, and

trends as well as configure trends, scheduling, points, and controllers, or to download programming into the controllers.

E. The system shall use the BACnet protocol for communication to the web server and for communication between control modules. I/o points, schedules, setpoints, trends and alarms shall be BACnet objects. Include all programming, objects, and services required to meet the sequence of control.
F. Provide BACnet communications between the DDC system and native BACnet devices furnished with all mechanical equipment including but not limited to air handling units, VAV terminals, boilers, chillers, and variable frequency drives. Provide all new actuators, sensors, control wiring, and any other components necessary to provide a complete and operational DDC system.
G. Provide owner training to demonstrate how to navigate and manipulate control points, equipment set points, and systems.
H. Provide all necessary control power wiring, conduit, valves, actuators, controllers, sensors, interface, switches, circuit boards, thermostats, labor, etc. for a complete and operational system.
I. Display all points indicated on control diagram schematics.
J. Furnish and install building automation system data harvesting device to reside on BAS subnet capable of external / public communication. Coordinate installation and network configuration with owner.
K. Owner has an IDIQ (indefinite delivery, indefinite quantity) contract to provide mechanical controls. This includes control drawings, sequences of operation, and alarm standards for typical systems. Controls for all projects shall follow these drawings and sequences, edited appropriately for the project. Refer to Appendix H.
L. Control points and monitor points for all systems shall be coordinated with owner. Coordinate with other disciplines to obtain complete list of building systems and control points to be interfaced with BAS.
M. Control panels shall be provided with the appropriate NEMA rated enclosures for a mechanical room environment.
N. Panels shall have a minimum of 20% spare point capacity.
O. Controller shall:
    a. Provide a minimum of two communication ports.
    b. Continuously perform self-diagnostics for its communication system and components
    c. Provide local and remote annunciation of any detected failures.
    d. Have battery backup for a minimum of 72 hours.
P. Operations and maintenance dashboards for new construction shall match existing campus standards. These shall include dashboards for building energy demands and costs, major systems, and major equipment. Dashboard requirements will be indicated on the control drawings. In addition to the dashboard, all building automation system alarms shall be wired to the owner's Campus Operations Call Center.
Q. Hydronic flow meters, temperature probes, and pressure sensors shall monitor utility usage for all buildings. The following flow characteristics shall be monitored by the owner's Campus Operations Call Center.
    a. Steam capacity (lb./hr.), Steam pressure (psig)
    b. Steam condensate flowrate (gpm), Steam condensate return temperature (°F).
    c. Chilled water flow rate (gpm), Chilled water supply and return temperatures (°F).
    d. Heating water flowrate (gpm), Heating water supply and return temperatures (°F).
R. Any room requiring a positive or negative differential pressure relationships shall have a digital manometer interfaced with the building automation system to monitor and alarm. Wall mounted digital device shall actively display differential pressure relationship.

23 10 00 Facility Fuel Systems

A. Onsite standby fuel storage for dual fuel boilers shall be provided with a minimum of 96-hour capacity. Refer to Boiler sections for when dual fuel storage is required.
    a. Acceptable standby fuels include but are not limited to the following.
        i. #2 fuel oil (diesel gasoline)
        ii. Liquified Petroleum gas (propane)
        iii. Electricity
B. Provide fuel polishing systems for bulk storage systems. Short term storage systems such as belly tanks or day tanks are exempt. Design systems for fuel types and anticipated storage times.

23 21 13 Hydronic Piping, Valves, and Specialties

A. Chilled Water Supply, Chilled Water Return, Heating Water Supply, and Heating Water Return piping:
    a. Piping 2-1/2 inches or less shall be Type “L” hard drawn copper tubing.
    b. Piping 4 3 inches or more shall be Schedule 40 black steel with standard weight fittings.
    c. When more than one piping system material is selected use non-conducting dielectric unions to ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings.
B. Fan coils shall not be utilized unless discussed with Owner.
C. In accordance with Little Rock Wastewater Utility requirements, condensate drains from cooling coils shall discharge outdoors or to storm sewer drains. Do not discharge into sanitary sewer drains such as but not limited to, floor drains and janitors sinks.
D. All equipment shall have one shut-off valve per line.
E. For butterfly valves, provide isolation valves with gear operators in lieu of lever handles.
F. Piping connections to control valves and equipment shall include flanges or unions to allow disconnection of components for servicing. Do not use direct welded, soldered, or threaded connections.
G. Provide gate or ball isolation valves in heating water piping at each group of air terminals.
H. All two-way valves less than 1” on reheat coils shall have stainless stem and seats.
I. Design 2-way valves for all chilled water coils. No 3-way valves shall be used unless it is at the end of a run.
J. Control valves above 1” shall be actuated with electronic controls.
K. Buried piping shall be schedule 40 black steel with polyethylene jacket, or double layer, half-lapped polyethylene tape. Refer to HVAC Piping Insulation section for insulation and jacketing requirements.
L. Press sealed fittings and grooved mechanical joints may only be used in accessible locations. Accessible locations include those exposed on interior of building, in pipe chases, in mechanical rooms, and above ground outdoors.

23 21 23 Hydronic Pumps

A. Pre-Approved Manufacturers:
    a. Armstrong, Bell & Gossett, Grundfos
    b. Alternate manufacturers will require owner approval prior to consideration.
B. All pumps above 1 hp shall be vertically mounted direct coupled.
C. All pumps above 25 hp shall have insulated boxes surrounding but not contacting the pump.
D. Sound attenuation shall be provided where operations dictate.
E. Provide variable frequency drive with bypass for each pump.

23 22 13 Steam and Condensate Piping, Valves, and Specialties

A. Boiler steam systems shall not be used for heating or domestic hot water systems. Boiler steam may only be used for process equipment such as sterilizers and autoclaves. Where required, HVAC humidification shall utilize point of use electric humidifiers. Coordinate with owner for prior approval of alternate uses of boiler steam.
B. Low-pressure steam piping (maximum 15 psig) shall be Schedule 40 black steel.
C. Medium and high-pressure steam piping (maximum 150 psig) shall be Schedule 80 black steel.
D. Steam condensate piping shall be Schedule 80 black steel.
E. Steam and steam condensate fittings shall be minimum Class 150 with welded joints.
F. Gate valves, globe valves, and check valves shall be minimum Class 600 cast steel full port valves with raised flange connections and bolted bonnet.
G. Gaskets for unions, flanges, and couplings shall be spiral wound stainless steel and graphite, equal to Garlock or Flexitallic.

H. Steam and steam condensate piping branch connections shall be made from top of main and include isolation valve.
I. Steam and steam condensate valves shall be rising stem gate type.
J. Slope steam piping one inch in 40 feet (0.25 percent) in direction of flow. Use eccentric reducers to maintain bottom of pipe level.
K. Slope steam condensate piping one inch in 40 feet (0.25 percent) in direction of flow. Provide drip trap assembly at low points and before control valves. Run condensate lines from trap to nearest condensate receiver.
L. Steam traps
    a. Use Float and Thermostatic steam traps for heating equipment.
    b. Use Inverted Bucket steam traps for main header and branch line drains.
    c. Provide unions or flanged connections. Provide gate valve and strainer at inlet, gate valve and check valve at discharge. Provide minimum 10 inch long, line size scale pocket between apparatus and trap.

23 23 00 Refrigerant Piping

A. Type L Copper tubing. Brazed or press fittings.
B. Provide isolation valves, with flanges or unions at all serviceable equipment.
C. Provide dielectric unions at connections to dissimilar materials.

23 31 00 HVAC Ducts and Casings

A. Ductwork shall be UL Class 1 galvanized steel unless otherwise indicated. Fibrous glass ductwork is not permitted. All ductworks shall meet NFPA 90A and SMACNA standards.
B. Seal all sheet metal ductwork joints and seams with fluid applied mastic sealant.
C. Flex duct is prohibited at penetrations through any walls, ceilings, or floors.
D. Laboratory fume hood exhaust ductwork shall be welded stainless steel except where corrosive chemicals are used. Coordinate with users to determine fume hood contents and provide ductwork materials (PVC, CPVC, FRP, etc) or coatings (phenolics) suitable for use.
E. Kitchen hood and dishwasher hood exhaust ductwork shall be welded stainless steel, sloped toward equipment, or drain pockets piped to sanitary sewer. Install cleanout access doors at drain pockets, changes in direction, and a maximum of every 20 feet.
F. Ductwork, fittings, and air devices installed inside an MRI RF cabin shall be constructed of non-ferrous materials,
G. Connect VAV terminal units to medium pressure ductwork directly or with 1-foot maximum length of medium pressure flexible duct. Do not use flexible duct to change direction.
H. Connect diffusers to low pressure ductwork directly or with 5 feet maximum length of low-pressure flexible duct. Do not use flexible duct to change direction.

23 33 00 Air Duct Accessories

A. Install accessories in accordance with manufacturer’s instructions, NFPA 90A, and follow SMACNA standards.
B. Provide duct access doors for inspection and cleaning before and after duct mounted filters, coils, fans, control dampers, fire dampers, smoke dampers, and combination dampers.
C. Conduct operational testing, documentation, and training for owner’s representative for all fire, smoke, and combination dampers.
D. Motorized smoke/fire dampers shall have:
    a. Location and position status monitored by the BAS (whether open/close)
    b. Direct coupling actuator
    c. Two position actuators: 15 second run time and 15 second spring return.
    d. Metal housing with position indicators and auxiliary switches.

    e. Manual switch to allow service technician to disconnect hot lead to the motor for repair.
    f. Reset accessible.
E. When remodeling an existing building, verify existing fire dampers are serviceable and report inaccessible devices to owner's Project Coordinator. When existing walls are de-rated, remove associated fire and/or smoke dampers.
F. Each branch shall have volume balancing dampers as close to the main duct as possible.
G. Install 24"x24" ceiling access panels in hard ceilings to service above ceiling equipment including but not limited to VAV terminals, volume control dampers, fire and smoke dampers, and pipe valves.
H. Provide manual volume balancing dampers for duct branches to and from air devices, regardless of if air device incorporates integral damper.
I. Provide remote damper operators for balancing dampers located above hard ceilings.

23 34 00 HVAC Fans

A. Pre-Approved Manufacturers:
    a. Greenheck, Loren-Cook
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Fans shall be direct drive. Coordinate with owner for prior approval of belt drive fans.
C. Variable pitched drives shall be sized for 150% of motor horsepower capabilities.
D. Furnish units with weather tight roof and end panels to protect motor, shaft, bearings, and drives from the elements.
E. Motor horsepower (HP):
    a. One-quarter HP and larger: shall be continuous duty, permanently lubricated, open drip proof type with thermal overload protection.
    b. Less than one-quarter HP: shall be shade pole type.
    c. 1-1/2 HP and larger: shall have full load efficiencies not less than the values scheduled by the engineer-of-record.
F. Motor bearings shall be double sealed type with 200,000 hour's average bearing life (L-50)
G. Unit shall have re-lubricating oversized pillow block ball bearings resiliently mounted in neoprene rings.
H. Design for 10% extra capacity for air flow and static pressure.
I. Fan wheels and blades shall be constructed of corrosion resistant materials or provided with a corrosion resistant coating.
J. Provide gravity backdraft dampers on exhaust fans or exhaust ducts nearest to outside.
K. Avoid use of inline vane axial fans due to maintenance concerns. Coordinate with owner for prior approval.

23 36 00 Air Terminal Units

A. Pre-Approved Manufacturers:
    a. Price, Titus, Tuttle & Bailey
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Single-duct variable air volume units shall be provided with integral heating coils, damper motor operators, and airflow sensors.
C. Controller, supply air temperature sensor, hot water re-heat coil control valve actuator, and wall mounted thermostat shall be provided by ATC contractor.
D. Where applied, fan powered terminals shall be series flow type. Limit use of fan powered terminals due to increased maintenance requirements and additional fan noise. Provide bypass air filter, fan speed controls, and fan motor vibration isolators.
E. Heating coils shall be attached to terminal outlet.
    a. Electric coils shall be provided with SCR controller, airflow switch and thermal cutoff.
    b. Hot water coils shall be copper tube with aluminum fins. Heating water supply temperature provided by the main Little Rock campus central utility plant is 140°F.
F. VAV boxes shall not serve more than 3 rooms unless approved by Owner. Provide reheats on all VAV excluding electrical and telecom.

G. All VAV hot water coils shall have flushing capabilities.
H. Provide lead-free brass test port plugs in lieu of rubber for airflow sensor differential pressure test ports for VAV terminals and elsewhere where applied, with. Nonmetallic components are susceptible to deterioration and leakage.
I. Install a minimum of 3 duct diameters of straight ductwork upstream of VAV terminal airflow sensors to ensure proper airflow measurability.
J. Casing shall be a minimum of 22 gage galvanized steel.
K. Casing lining shall be a minimum of 0.5-inch-thick neoprene with an anti-microbial coating. Fiberglass lining is not acceptable inside the airstream.

23 37 00 Air Outlets and Inlets

A. Pre-Approved Manufacturers:
    a. Price, Titus, Tuttle & Bailey
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Coordinate air device sizes and types with architectural ceilings. Provide manufacturers mounting frames are in gypsum board ceilings. Coordinate ceiling mounted device locations with lighting layout, fire protection devices, and any other ceiling mounted device to ensure airflow patterns are installed as designed.
C. Noise criteria (NC) for air devices installed in occupied areas shall not exceed 30 dB.
D. Ensure air devices with adjustable airflow pattern vanes are set to deliver airflow where intended.
    a. Perimeter devices intended to wash exterior surfaces shall be adjusted from manufacturers' default vertical discharge position.
E. Construction materials shall be steel or aluminum. Plastic components are prohibited.
F. Device finish color shall match color of (ceiling/wall/floor/duct) surface in which they are installed. Ductwork visible behind air devices shall be matte black.
G. For renovation and expansion projects, new air devices shall match existing devices to remain, or existing devices shall be replaced to provide a consistent appearance and performance throughout the project.
H. Size outside air intake louvers with adequate free area to avoid water penetration (<0.01oz/sq. ft). Consider sightline and noise criteria when locating louvers. Coordinate finish and materials with adjacent construction.
I. Operating Room air devices shall be designed in accordance with the current edition of ASHRAE Standard 170
    a. Uni-directional (laminar) downward airflow shall be provided above surgical fields.
    b. Laminar airflow devices shall maintain an average velocity between 25 and 35 fpm while room is in use.
    c. Supply diffuser array shall extend a minimum of 12 inches beyond the footprint of the surgical table on all sides. Ceiling mounted obstructions (booms, lights, etc.) within the diffuser array shall not exceed 30 percent of the total diffuser array area.
    d. Low sidewall return grilles shall be installed 6 inches above finished floor at opposite corners (or sides) of the room to ensure single pass airflow and limit air turbulence.

23 52 16 Condensing Boilers

A. Pre-Approved Manufacturers:
    a. Aerco, Cleaver-Brooks, Fulton, Lochinvar
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Condensing boilers shall utilize waste heat from combustion flue gases to preheat boiler feedwater. Thermal efficiency shall exceed 90%.
C. Factory assembled; factory fire-tested, self-contained, readily transported unit ready for automatic operation except for utility connections.
D. Construction shall include metal membrane wall, water or fire tube, stainless steel heat exchanger, integral structural steel base with integral fuel burning system, firing controls, boiler trim, and insulation, suitable for indoor application.
E. Provide forced draft automatic burner or pulse combustion, integral to boiler, designed to burn natural gas, and maintain fuel-air ratios automatically.

F. Pipe cooled condensate produced by the combustion process from the boiler condensate connection and/or flue stack with suitable piping material to neutralizer prior to discharging to drain.
G. *Arkansas Department of Health: Rules and Regulations for Hospitals and Related Institutions in Arkansas* identifies patient spaces where self-preservation abilities are potentially diminished. Provide the following when designing for these spaces.
    a. Fully redundant quantity and arrangement of heating hot water boilers and pumps.
    b. Dual fuel capabilities with automatic change over upon loss of primary fuel source. Refer to Facility Fuel Systems section for sizing stand-by fuel tanks.

23 52 39 Scotch Marine Boilers

A. Pre-Approved Manufacturers:
    a. Cleaver-Brooks, Hurst
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Factory assembled; factory fire-tested, self-contained, readily transported unit ready for automatic operation except for utility connections.
C. Mount unit on integral structural steel frame and include integral forced draft burner, burner controls, boiler trim, refractory, insulation, and jacket.
D. Insulate casing with readily removable, 2-inch-thick glass fiber blanket insulation covered by sectional preformed sheet metal jacket. Boiler casing temperature not to exceed ambient room temperature by 18 degrees F maximum.
E. Provide boiler exhaust stack economizer.
F. Ensure service clearance is provided for boiler service and disassembly, including tube pull.
G. *Arkansas Department of Health: Rules and Regulations for Hospitals and Related Institutions in Arkansas* identifies patient spaces where self-preservation abilities are potentially diminished. Provide the following when designing for these spaces.
    a. Fully redundant quantity and arrangement of heating hot water boilers and pumps.
    b. Dual fuel capabilities with automatic change over upon loss of primary fuel source. Refer to Facility Fuel Systems section for sizing stand-by fuel tanks.

23 64 16 Chillers

A. Pre-Approved Manufacturers:
    a. Carrier, Daiken, Trane, York
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Chillers shall be factory assembled and tested, packaged machines complete with compressors, compressor motors, condenser, evaporator, refrigeration accessories, instrument and control panels including gauges and indicating lights, auxiliary components and accessories, and motor starters.
    a. Water-Cooled chillers shall be provided with centrifugal compressors and located indoors.
    b. Air-Cooled chillers below 100 tons cooling capacity shall be provided with fully hermetic scroll type compressors and located outdoors.
    c. Air-Cooled chillers above 100 tons cooling capacity shall be provided with screw type compressors and located outdoors.
C. Units shall have Energy Efficiency Rating (EER)/Coefficient of Performance (COP) in excess of the minimum requirements of ASHRAE 90.1.
D. Ensure service clearance is provided for chiller service and disassembly, including separable shells, compressor doweling, and tube pull.
E. On or near chiller, mount steel control panel containing solid state, fully automatic operating, and safety controls.

23 65 10 Cooling Towers

A. Pre-Approved Manufacturers:
    a. BAC, Evapco, SPX Marley
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Cooling towers shall be manufactured units for outdoor use, factory assembled, sectional, cross flow design with vertical discharge.
C. Induced draft type with adjustable pitch axial fan blades.
D. Welded stainless-steel cold-water basin with electric immersion heaters and makeup water controls.
E. Framework and casing shall be constructed of galvanized steel. Plastic towers are prohibited.
F. Louvers shall be corrugated glass reinforced polyester with drift eliminators.
G. Provide fan guard, safety railings around full perimeter of fan deck, ladder with safety cage from grade to fan deck. When elevated, provide service platforms and safety railings for all serviceable components.

23 73 00 Air Handling Units

A. Pre-Approved Manufacturers:
    a. Carrier, Daiken, Semco, Trane, and York.
    b. Alternate manufacturers will require owner approval prior to consideration.
B. Units shall be furnished with:
    a. Full perimeter integral base frame. Ensure frame height and housekeeping pad thickness are sufficiently sized to account for condensate drain trapping height requirements.
    b. Double wall foam injected insulated galvanized steel casing.
        i. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) based on cooling coil discharge air temperature:
            1) Standard Unit: 52°F or higher, 13 Hr*Ft2*°F/BTU.
            2) Low temperature Unit: Below 52°F, 25 Hr*Ft2*°F/BTU.
        ii. Standard unit casing air leakage shall not exceed leak class 6 per ASHRAE 111 at specified casing pressure. Air leakage shall be determined at 1.50 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk.
        iii. Low temperature unit casing air leakage shall not exceed 0.5 percent of design airflow at +10.0 inches w.g. in all positive pressure sections and -10.0 inches w.g. in all negative pressure sections. Casing deflection shall not exceed L/250.
        iv. Manufacturer shall provide a written guarantee against condensation forming on the unit exterior at the design conditions.
C. Access doors in coil and fan sections shall be equipped with view ports with wire glass.
D. Fans:
    a. Provide fan wall type systems for system redundancy. Provide motorized impeller type fans when system static pressure requirements allow. When motorized impeller capabilities are exceeded, provide direct drive plenum fans.
    b. Provide gravity backdraft dampers at each fan outlet where more than one fan is provided.
    c. Refer to 23 34 00 HVAC Fans section for further information.
E. Water Coils:
    a. Coil casings shall be constructed of continuous galvanized steel. Coils shall be copper tube with aluminum fins. Maximum of 8 rows and 12 fins per inch.
    b. Heating water supply temperature is 140°F.
    c. Chilled water supply temperature is 45°F.
    d. UVGI lights shall be installed inside units downstream of wetted cooling coils to shine upon the leaving face of cooling coils and into cooling coil drain pans.
    e. Install magnahelic gauges on unit across filters and cooling coils.
F. Air Filtration:
    a. Filters racks shall be generic to accept any manufacturer’s filters.
    b. Utilize standard size cassettes and frames.
    c. Refer to current edition of ASHRAE Standard 170 for filtration requirements according space usage.
    d. Provide roughing filters for all filters beyond MERV-11.
G. Humidifiers:

a. Electrode steam humidifiers shall be provided where required to maintain space relative humidity levels.

H. Desiccant Dehumidification Wheels
   a. Where space temperature and humidity requirements cannot be achieved through a single cooling coil, utilize desiccant wheels and coil arrangements to lower the supply air humidity ratio as required.

I. Heat Recovery Unit shall have:
   a. Enthalpy recovery wheel or cube core plate frame
   b. Provide pre-filters in all airstreams upstream of heat recovery devices.

J. Variable Frequency Drives:
   a. Provide for fan balancing and variable speed applications on all motors greater than 1 HP.
   b. Shall be installed with bypass.
   c. Interlock in ATC to open VAV terminal units when placed in bypass.
   d. Variable Frequency Drives (VFD's) shall be kept in a conditioned environment not to exceed 85 deg. F.

23 74 00 Packaged Air Handler

A. Pre-Approved Manufacturers:
   a. Carrier, Daiken, Semco, Trane, and York.
   b. Alternate manufacturers will require owner approval prior to consideration.

B. Roof mounted units having gas burner or electric heating elements and DX refrigeration.

C. Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heating components, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.
   a. Supply (and return) fan shall be forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor.
   b. Gas burner heat exchanger shall be welded stainless steel with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, spark ignition, flame sensing device, and safety controls.
   c. Electric heating coil shall be resistance wire coil heating elements with refractory ceramic supports, automatic reset thermal cut-out, built-in magnetic contactors, galvanized steel frame, control circuit transformer and fuse, manual reset thermal cut-out, and airflow switch.
   d. Evaporator cooling coil shall be copper tube aluminum fin with stainless steel drain pan.
   e. Compressors shall be hermetic digital scroll type, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high- and low-pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.
   f. Condenser coil shall be copper tube aluminum fin with subcooling rows and coil guard.
   g. Condenser fans shall be direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

23 81 26 Split-System Air Conditioners

A. Pre-Approved Manufacturers:
   a. Carrier, Daiken, Trane, and York
   b. Alternate manufacturers will require owner approval prior to consideration.

B. Indoor units: Air handling unit for ducted or free discharge
   a. Cabinet: Galvanized steel with baked enamel finish for exposed units. Coordinate color with adjacent finishes. Concealed units shall be unpainted. Fiber free insulated cabinet, hinged access doors.
   b. Fan: Centrifugal type, direct or belt drive with vibration isolation.
   c. Filter: Minimum 1" panel filter. Bottom access for overhead units.
   d. Evaporator Coil: Copper tube with mechanically bonded aluminum fins. Galvanized or polymer drain pan.
   e. Natural gas or electric resistance forced air furnace with vent connections as required.

C. Outdoor units: Air cooled condensing units, air source heat pumps, or water source heat pumps
   a. Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser coil.
   b. Cabinet: Galvanized steel with baked enamel finish.

c. Refrigerant: Use only refrigerants with an ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50. Coordinate with owner for refrigerant preference.
d. Compressor: Digital scroll or variable speed to allow for full range of capacity modulation. Resilient mounted integral with condenser. Provide thermostatic expansion valves and low ambient kit to 0 degrees F. Minimum SEER: 10.0. Minimum EER: 12.0
e. Condenser: Copper tube with mechanically bonded aluminum fins. Direct drive propeller fan with guard.

23 81 29 Variable Refrigerant Flow Systems

A. Pre-Approved Manufacturers:
   a. Daiken, LG, Mitsubishi
   b. Alternate manufacturers will require owner approval prior to consideration.
B. Refrigerant piping: Piping design shall be provided by the equipment manufacturer. Design shall include piping layout with all pipe routing, sizes, and piping appurtenances based on the manufacturer's specific product requirements.
   a. Provide 3-pipe refrigerant system, including high/low pressure dedicated hot gas, liquid, and suction lines. 2-pipe systems utilizing lower temperature mixed liquid/gas refrigerant to perform heat recovery are not permitted due to reduced heating capabilities.
   b. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.
   c. Insulate each refrigerant line individually between the condensing and indoor units.
C. Indoor units: Ductless Mini-Splits with ceiling or wall mounted cassettes, Air handling unit for ducted discharge
   a. Exposed Housing: High impact polymer for exposed units. Standard white finish. Concealed units shall be unpainted galvanized steel. Fiber free insulated cabinet. All electrical components accessible through exposed face of housing.
   b. Fan: Manufacturer's standard type.
   c. Filter: Manufacturer's standard type.
   d. Evaporator Coil: Copper tube with aluminum fins. Galvanized or polymer drain pan with condensate pump.
D. Outdoor units: Air cooled condensing units, air source heat pumps, air source heat recovery units
   a. Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser coil.
   b. Cabinet: Galvanized steel with baked enamel finish.
   c. Refrigerant: Use only refrigerants with an ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50. Coordinate with owner for refrigerant preference.
   d. Compressor: Digital scroll or variable speed to allow for full range of capacity modulation. Resilient mounted integral with condenser. Provide thermostatic expansion valves and low ambient kit to 0 degrees F.
   e. Condenser: Copper tube with aluminum fins. Direct drive propeller fan with guard.

23 83 13 Radiant-Heating Cables

A. Exposed outdoor piping freeze protection shall be provided by electric heat trace cables to maintain water temperature above 40 degrees F. Connect heat trace electrical circuit(s) to emergency power. BAS shall monitor heat trace and alarm upon failure.
B. Glycol solutions are not permitted due to heat transfer efficiency de-rating, increased pump energy requirements, added chemical treatment maintenance, and glycol disposal costs.

END OF DIVISION 23

26

DIVISION 26

ELECTRICAL

DIVISION 26 – ELECTRICAL

26 00 01 Owner General Requirements and Design Intent

A. The following electrical design standards are provided as a supplement to applicable code requirements, industry standards, and best practices. Coordinate with UAMS during the design phase on systems details and space requirements.
B. Square D is the preferred manufacturer for all electrical switchboards, panelboards, safety switches, switchgear, and transformers. Eaton, iGE/ABB and Siemens are allowed with UAMS approval.
C. Post One-Line & Riser Diagrams (in frame) visibly in the main electrical room near the main distribution gear.
D. Any work done on new and existing electrical equipment, panelboards, or switchboards shall have an Arc Flash Study performed on that equipment. Labels shall be provided on the equipment after the study is completed.
E. Multiwire branch circuits are prohibited. All circuits requiring a neutral shall have a dedicated neutral.
F. Design consultant will provide seismic design as required by the Seismic Design Category of the project.
G. Safety switches shall be heavy-duty type.
H. Motor control centers are prohibited.
I. Night/weekend work is likely required for most projects. Contractor shall coordinate schedule with UAMS.
J. Contractor shall notify UAMS a minimum of two weeks prior to an outage.

26 05 19 Low-Voltage Electrical Conductors and Cable

A. All electrical wire shall be soft drawn copper.
B. Minimum conductor size for power circuits shall be #12 AWG.
C. Conductors sized #10 American Wire Gauge (AWG) and larger shall be stranded.
    a. Motor connections shall be stranded wire.
D. Use stranded conductors for control circuits 24V and below.
    a. Minimum size shall be #16 AWG.
E. Label all neutral conductors to indicate the circuit that it serves.
F. All wiring shall be color coded by phase and voltage level.
    a. Conductors smaller than #6 AWG shall have colored insulation.
    b. Conductors #6 AWG and larger may be color coded with tape.
    c. Colors shall be as follows:

Phase	120/208	277/480 and medium voltage
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

B. Use full neutral conductors in all circuits requiring a neutral.
C. The preferred largest wire size to be used on campus is 500 kcmil. All larger than 500 kcmil to be reviewed by owner.
D. Isolated power panel wiring (installed in operating rooms, typically):
    a. Branch circuit conductors shall be type XHHW or XHHW-2.
    b. Use of a pulling compound on branch circuit conductors is prohibited.

26 05 33 Raceway and Boxes for Electrical Systems

A. Minimum conduit size shall be ¾ inch.
E. Conduits above grade shall comply with the following:
    a. All 90-degree conduit bends 1-1/4” or larger shall be factory made 90s.

b. Conduits shall be concealed except in electrical and mechanical rooms.
c. Healthcare:
    a. Galvanized rigid metal conduit (GRC) or electrical metallic tube (EMT) shall be used for all primary runs, except at equipment connections or special conditions.
    b. Hospital-grade metal clad cable (MC Cable) may be used for light fixtures and small equipment connections only as allowed by code and shall not be concealed within walls.
    c. PVC conduit shall not be used.
d. Ambulatory:
    a. Galvanized rigid metal conduit (GRC) or electrical metallic tube (EMT) shall be used for all primary runs, except at equipment connections or special conditions.
    b. Hospital-grade metal clad cable (MC cable) may be used for light fixtures and small equipment connections only as allowed by code and shall not be concealed within walls.
    c. PVC conduit shall not be used.
e. Business:
    a. GRC or EMT shall be used for all primary runs, except at equipment connections or special conditions.
    b. MC Cable may be used for light fixtures and small equipment connections. Health-care grade MC cable may be used in patient care spaces for light fixtures and small equipment connections. These cables may be used only as allowed by code and shall not be concealed within walls.
    c. PVC conduit shall not be used.
f. Provide flexible conduit (or MC cable as described above) for light fixtures.
g. Provide flexible metal conduit for motor connections (6’ maximum length).
    a. Liquid-tight flexible non-metallic conduit shall be used when subject to moist or corrosive conditions.
h. All fire alarm wiring shall be in conduit with the junction boxes painted red.

F. Corridor receptacles shall be on dedicated circuits separate from other spaces.
G. Electrical Metallic Tubing (EMT) conduit shall be color coded as follows:
    a. Blue for Building Automation System use only.
    b. Red for all Fire Alarm/Signal installations.
    c. Purple, or labeling, for standby/emergency circuit installations (any generator powered circuit).
    d. Other conduit colors (green, gray, yellow) to be determined by project.
H. Provide pull strings in empty conduits.
I. Plastic or insulated throat box connectorsshall be provided for all conduit ends.
J. Installation of electrical conduit:
    a. May be run horizontally in walls.
    b. Horizontal runs installed over other equipment shall be installed close to the structure above.
    c. Vertical runs shall be installed close to the adjacent wall.
    d. In all cases installation shall avoid conflicts with mechanical ductwork, piping, and cable trays.
    e. All penetrations of fire-rated partitions shall be fire-caulked.

26 05 53 Identification for Electrical Systems

A. Provide operational identification and warning signs to ensure safe and efficient operation and maintenance of electrical systems, electrical equipment, and electrically connected mechanical systems.
B. Provide plasticized tags with clearly type-written messages adequate to describe its intended purpose or operation.
C. In addition to danger signs required by governing regulations and authorities, install appropriate danger signs at locations subsequently identified as constituting similar dangers for persons in or about the following locations:
    a. High Voltage (600V and higher)
    b. Critical switches and control devices
    c. Panelboards or switchboard electrical shock hazard (Available Arc Fault, Arc Flash)

D. Nametags:
    a. Install engraved plastic-laminated nametag for major unit of equipment, including but not limited to the following: Panelboards, electrical cabinets/enclosures, switchboards, switchgear, power transfer equipment, transformers, motor starters, disconnect switches, junction boxes larger than 8” x 8”, circuit breaker enclosures, and power generating units.
    b. Provide double line of text 3/8” high on minimum 1-1/2” high nametag.
    c. Nametags shall contain the following at a minimum:
        i. Name of equipment type of system
        ii. Equipment number assigned by UAMS.
        iii. Voltage, amperage, and the circuit from which the equipment is fed or the equipment it feeds, as appropriate.
        iv. Manufacturing date and serial number (all equipment, gear, and major switches) unless provided by the manufacturer.
        v. Essential electrical system branch (life safety, critical, or equipment), where applicable
    d. Color coding:
        i. Non-emergency/standby 120/208V: black with white lettering.
        ii. Non-emergency/standby 277/480V: brown with white lettering.
        iii. Standby/emergency/life safety/critical 120/208 and 277/480V: red with white lettering.
E. Receptacles:
    a. Type-written label on the cover plate identifying the panel and circuit.
    b. Non-emergency/standby: receptacle and cover plate color shall be selected by UAMS or architect. Labels shall be clear, white, or beige with black lettering.
    c. Emergency/standby/life safety/critical branch: receptacles and cover plates shall be red. Labels shall be clear, white, or beige with black lettering.

26 12 00 Transformers

A. Substation transformers shall be cast resin type, primary and secondary.
B. Wall or ceiling mounted dry-type transformers are prohibited unless approved by UAMS.
C. K-rated dry-type transformers shall be used in data or electronic equipment areas.
D. Load shall be less than 80% of the transformers rating.
E. *See division 26 05 53 for labeling requirements*.

26 24 13 Switchboards

A. Switchboards shall be rated a minimum of 600 VAC for a 480 VAC system and 250VAC for a 208 VAC or 240 VAC system.
B. Enclosures shall comply with the following:
    a. General-purpose National Electrical Manufacturers Association (NEMA) Type 1, unless otherwise required by the environment in which it is installed.
    b. Dead front construction with removable steel channels (1.5-inch floor sills) bolted to the frame.
    c. Open bottom and individually removable top plate for installation and termination of conduit
C. Bus
    a. Bus bars shall be tinned or silver-plated copper.
    b. For 4-wire systems, the neutral shall be fully-rated (ampacity equivalent to the phase bus bar). Tapered buses are not acceptable.
    c. Bussing shall include all necessary hardware to accommodate splicing for future additions.
D. Circuit breakers shall have the following:
    a. Electronic trip, where appropriate
        i. Time/current response adjustments: Each adjustment shall have discrete settings (fully adjustable) and shall be independent of all other adjustments.
        ii. Microprocessor-based true RMS sensing designed with sensing accuracy through the thirteenth harmonic.

iii. Local visual trip indication for overload, short circuit, and ground fault occurrences
iv. Long Time Pickup indication to signal when loading approaches or exceeds the adjustable ampere rating of the circuit breaker.
v. Zone selective interlocking (ZSI) communications capabilities on the short-time and ground fault functions

E. Metering shall comply with the following:
   a. Digital multi-function meter with minimum kWh accuracy of 0.2% (revenue grade) with the following features: A, V, kW, kVAR, kVA, PF, F, THD, kWh RS-485 communication port, BACNet/IP data logging (memory for minimum 6 parameters at 15-minute intervals for 90 days) with display, date/time stamping, onboard alarms, min/max log, data log, event log, maintenance log, minimum 1MB memory
   b. Waveform capture and transient event recording are optional. If included, provide an integral UPS to serve as the power supply to the meter to support this function.
   c. CTs shall be solid core with revenue grade accuracy for new switchboards.
   d. Vendor shall commission the meter and settings and submit list of settings, IP addresses, BACnet port settings, usernames, and passwords.
   e. Basis of Design: Square D #PM5560 or Eaton #PXM-2260 with gateway card
F. Provide surge-protective device.
G. *See division 26 05 53 for labeling requirements*.

26 24 16 Panelboards

A. Power distribution type and lighting and appliance type panel boards shall comply with the following:
   a. Dead-front safety type
   b. Copper bus bars
   c. Uninsulated grounding bar bolted to enclosure.
   d. Enclosure fabricated by same manufacturer as internal components.
   e. Main feed connection at top of panel
   f. Fully rated neutral bus (ampacity equivalent to the phase bus bar)
B. Sub-feed breakers are allowed to feed additional panelboards, but only when it is the best option (renovation for example).
C. When multiple-pole breakers are required, provide with internal common trip so overload on one pole will trip all poles simultaneously.
D. The branch circuit breaker sub-assembly shall be in continuous contact and bolted to the bus bar. Subassemblies mounted on “Z” brackets are not allowed. The circuit breaker sub-assembly shall utilize thermo-plastic mounting straps to properly align breakers.
E. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges and door swings allowing full access.
F. New panels are to be filled by breaker count and by amp capacity shall not exceed 75% of the rating.
G. In addition to code-required surge protection of emergency power distribution (NEC 700) and the life-safety branch of essential electrical system, provide surge protection for the critical branch and equipment branch of essential electrical system, legally required standby systems, and optional standby systems.
H. *See division 26 05 53 for labeling requirements*.

26 27 26 Wiring Devices

A. General receptacles shall be (NEMA) 5-20R (20 amp)
B. “Plug & play” receptacles are prohibited. Wire shall be wrapped around screw terminals.
C. Receptacles shall be tamper-resistant where required by code.
D. For clinical areas, receptacles shall be hospital-grade.
E. For non-clinical areas, receptacles shall be commercial grade, minimum.
F. Switches shall be commercial grade, quiet toggle.
G. *See division 26 05 53 for identification requirements*.

26 41 00 Lightning Protection System

A. Lightning protection is required for all UAMS-owned buildings on campus. Perform NFPA 780 risk assessment for other facilities. Obtain approval for lightning protection on leased facilities when risk assessment recommends it.

26 51 00 Interior Lighting

A. All fixtures shall be LED, 4000K color temp, and minimum 80 CRI.
    a. Consider 90 CRI in patient care spaces.
B. Conference/presentation rooms, exam rooms, offices, and similar spaces shall be designed with dimmable fixtures.
C. In a building with emergency power or a life safety branch, these sources shall provide backup power for emergency egress lighting. Battery-backed ballasts and drivers are not allowed to provide the backup source unless otherwise required by code (operating room and general anesthesia area, for example).
D. Exit signs shall be LED type and shall match existing exit signs within the building, where applicable.
E. Interior lighting design shall meet current IES footcandle recommendations and comply with the Arkansas Energy Code.

26 56 00 Exterior Lighting

A. All fixtures shall be LED, 4000K color temp, and minimum 70 CRI.
B. Lights shall be controlled by photocell and/or astronomical time switch.
C. Exterior lighting to have cutoff style light distribution, except where up light is required (American flags, landscape, sculpture)
D. In-grade lighting is prohibited. Stanchion-mounted floodlights and similar are acceptable.
E. Exterior lighting design shall meet current IES footcandle recommendations and comply with the Arkansas Energy Code.

END OF DIVISION 26

27

DIVISION 27

COMMUNICATIONS

DIVISION 27 – COMMUNICATIONS

27 00 01 Owner General Requirements and Design Intent

A. The following communication design standards are provided as a supplement to applicable code requirements, industry standards, and best practices. Coordinate with UAMS IT during the design phase on systems details and space requirements.
B. All installers must be Building Industry Consulting Service International (BICSI) or Siemon certified.
C. Low voltage cables shall be plenum rated.
D. General Contractor to provide and install rough-in for a standard UAMS phone/data outlet (consists of a 5" square deep junction box with a single gang mud ring), conduit with protective bushing on ends, pull string, cable tray, etc. Wire pulls, jack faceplates, patch panels, racks and terminations are by Owner.
E. All tele/data jacks are to be Siemon Cat 6A F/UTP products and therefore all contractor rough-in requirements should provide openings for installation of UAMS Standard Siemon product use.
F. Television locations shall be provided with separate power and communications rough-in.
G. Tele/data rooms shall be a minimum of 120 square feet (if nothing else is in the space), centrally located on each floor and stacked between floors.
H. Tele/data rooms shall have card access and be monitored by video surveillance - see Division 28.

27 05 28 Pathways and Cabling for Communication Systems

A. Cable trays for primary pathways shall be equal to Cooper B-Line Series 1 steel tray 18" wide (166P12-18-144) or Cooper B-Line Flextray 18" wide (FT4x18x10).
    a. Tray shall allow for 200% of initial calculated cable requirements. Calculations to include network, nurse call, security, and known building feeders.
    b. All efforts to reduce bends and offsets to primary pathways shall be made. Coordination with all major utilities should be completed.
    c. Provide appropriate hardware for splices and elevation changes per manufacturer's installation guidelines.
    d. Cable tray should be installed within 6-8" above ceiling grid and include 10-12" clearance above tray for accessibility.
B. Cable tray within Tele/Data rooms shall be CPI Runway 15" wide minimum (CPI 10250-215).
    a. Install cable runway above all racks at a minimum height of 90" above finished floor. Include all required splices, joints, and supports per room designed.
    b. Cable runway size to account for all network, nurse call, security, and known building feeders.
C. General Contractor shall ground and bond cable tray and UAMS-installed data racks.
D. Maximum of 4 feet between j-hooks, minimum width of j-hooks to be 1" wide for flat portion of hook, sizing and quantity of hooks to accommodate 200% of initial calculated cable requirements with a maximum of 100 Cat 6 or 75 Cat 6A per row of 4" j-hooks.
E. All main wall penetrations should include STI EZ-Path, or equal, that allows for 200% of initial cable requirements.
F. Cables:
    a. All new network infrastructure shall be Category 6A F/UTP. Verify color of each system prior to installation.
        i. Network – White
        ii. Security – Purple
        iii. Nurse Call - Orange
        iv. Automation – Yellow
        v. For building automation system (BAS) cabling of VAV controls, the link from the IT rack to the first VAV shall be white. Links between downstream VAVs shall be yellow.
    b. Additions to all existing network infrastructure should be minimum Category 6 and be verified by UAMS IT Enterprise Comm & Tech Services.
    c. Use appropriate cable for outside plant (OSP) (wet) and indoor/outdoor locations. Follow grounding requirements.

i. Cat 6A F/UTP Shielded OSP Cable - Siemon 9A6O4-A5-01-R1B or equal.
ii. Cat 6A UTP Indoor/Outdoor Cable - Siemon 9U6W4-AF-12-R1A or equal.

d. Backbone cable shall be verified with UAMS IT.
    i. Fiber optic cable shall be minimum 24-strand armored jacketed single-mode with LC connectors.
    ii. Copper shall be maximum 25-pair type CMP (plenum-rated) terminated on patch panels within IT rack.
e. For installation in existing buildings, network cable shall match existing cabling but be at least CAT 6. For example, if existing cabling is CAT 6A, all new cabling shall be CAT 6A, including security upgrades and other upgrades.

G. Conduit
    a. Provide minimum 1” diameter conduit with pull string; 1-¼” conduit to be used where 4-6 cables are noted.
    b. Conduit, connectors, and whips shall be sized to accommodate the number of cables the area could receive with 40% free space.
    c. Provide protective bushings at conduit ends with open end within 2 feet of cable tray or j-hooks.
    d. Flexible conduit is not preferred. If required, increase size to accommodate loss of internal diameter caused by conduit connector.
H. General contractor to provide and install conduits for all tele/data cabling in mechanical rooms. Use industrial covers for all surface mounted or open wall areas.
I. Rough-in for wireless LAN access points (APs) shall include a suitable cable path from cable tray to proposed wireless AP locations via ¾” conduit or cable hooks to within 2 feet of wireless AP locations. Solid ceiling areas are required to have 4” square box and single gang mud ring. Wireless AP locations shall be determined by UAMS Network Engineering.

27 11 00 Communications Equipment Room Fittings

A. Provide Siemon VersaPOD 4-post rack for each floor and patch panels for both LAN & telephone needs with vertical and horizontal wire management to be determined by UAMS Technology Support Services.
B. Contractor shall ground and bond UAMS-installed data racks and bus bar.
C. Provide ¾” fire retardant plywood backboard. This board shall remain unpainted to allow the fire-retardant label to remain visible. Installed at 20” AFF to 116” AFF on all walls, circumference the room.
D. Provide emergency/standby and normal power quadraplex receptacles on every wall and 8" AFF at each rack location.
E. Provide wall mount phone near entry door as approved by UAMS IT. Provide 7” clearance on each side of the center line of the phone outlet box. Note as a “network” phone (VOIP, not analog).
F. Provide 4’-0” minimum clearance on three sides of every rack.
G. Uninterruptible power supply (UPS) receptacle shall be determined by UAMS IT Enterprise Comm & Tech Services.

27 30 00 Voice Communications

A. Voice communication systems shall be determined/designed on a per-project basis with careful collaboration/coordination with UAMS IT during the design phase.
B. Contractors shall install and provide Valcom VE9811 or VIP-9895 for exterior emergency telephones and their associated conduit and blue light on pole for all new parking lots. Equipment to be approved by UAMS Unified Communications. Equipment must be compatible with service provider at time of installation.
C. For network wall-mount phones, provide 7” clearance on each side of the outlet box to any surrounding surface or device (thermostat, switch, door frame, etc.). Location to be verified by UAMS IT.

27 51 16 Public Address/Overhead Paging

A. All overhead paging systems shall be determined/designed on a per-project basis with careful collaboration/coordination with UAMS IT during the design phase.
B. Contractor shall provide ¾" conduit from a minimum of 2 feet from cable tray or j-hook route in accessible ceiling to within 6" to 18" of solid ceiling opening for speaker location. Contractor to provide 10" diameter cut-in opening with minimum of 13" clearance in all directions from center.
C. All overhead speakers shall be Valcom Clarity S-522B-2 unless in solid ceilings. Use 18-2 shielded for cabling.
D. Coordinate zoning with UAMS Unified Communications
E. Headend equipment shall include the following and shall be installed in each IT room:
    a. Valcom VE8004BR Gateway (quantity varies depending on zones)
    b. Valcom SM-120 Amplifier
    c. Valcom VMT-2 Transformer

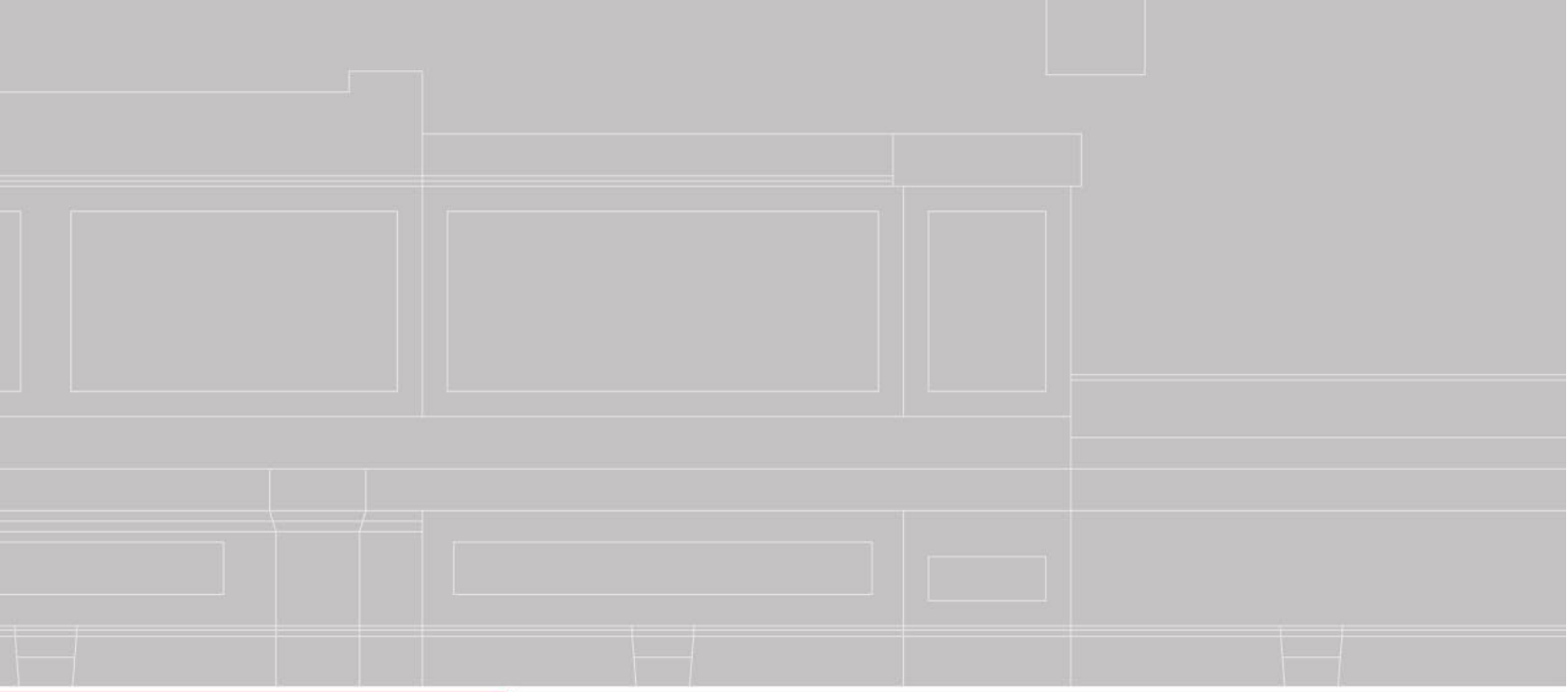
27 52 23 Nurse Call/Code Blue System

A. Install West-Com nurse call system in all areas as required by Arkansas Department of Health Regulations. These are sole source items to match existing.
B. Dome lights shall be mounted on wall above the corresponding door.
C. Coordinate nurse call locations with UAMS IT.
D. Pull stations shall be waterproof.
E. Provide 4-gang outlet box for headwall rough-in.
F. Nurse call system will be located within UAMS IT racks.

27 53 13 Clock Systems

A. Kronos Employee Clocking System? UAMS uses Kronos employee clocking systems, Owner will furnish equipment, location, and installation to be determined on a project basis.

END OF DIVISION 27



28

DIVISION 28

ELECTRONIC SAFETY AND SECURITY

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 00 01 Owner General Requirements and Design Intent

A. For the safety and security of UAMS personnel and property, all buildings shall have security equipment installed.
B. Areas involving cash transactions/storage, patient files, medical/drug storage, infants, and research shall have access control and video surveillance.
C. All cash transaction/storage areas shall have panic/robbery alarms.
D. All high-risk areas (determined by UAMS Technical Security) shall have access control, video surveillance, and panic alarms.
E. All safety and security systems shall be on emergency/standby power. High-risk areas (determined by UAMS Technical Security on a per project basis) shall have battery backup (UAMS to determine).

28 05 13 Conductors and Cables for Electronic Safety and Security

A. All cable for security systems shall be plenum rated.
B. Composite cables for access control doors shall be BELDEN B658AFS or approved equivalent.
C. Individual cable for door status, motion detection, pushbuttons shall be 22 AWG stranded shielded twisted pair. Belden 6500FC or approved equivalent.
D. Individual cable for card readers shall be 3 pair 22AWG stranded shielded twisted pair, BELDEN 5504FE or approved equivalent.
E. Individual cable to electric locking devices shall be a minimum of 18 AWG stranded twisted pair. BELDEN 6300FE (or equivalent) or BELDEN 6302FE (or equivalent), or as required by the device.
F. Networking cables shall be CAT 6 or CAT 6A. Refer to Division 27.
G. Unless authorized, all network cable and connections between security equipment shall be provided and installed by UAMS Technology Support Services (TSS)/Cabling team.

28 10 00 Electronic Access Control and Intrusion Detection

A. For all buildings (including Research), common entry/exit exterior doors shall be secured by card access doors with closure. All interior doors (except Research) shall have BEST hardware with passage or locksets depending on usage.
B. Elevator machine rooms, electrical rooms, mechanical rooms, and tele/data rooms shall be equipped with BEST lockset storeroom function with closure as well as card access.
C. Door controllers and power supplies.
    a. Equipment shall be in a secure environment (telecom/data room).
    b. Equipment cabinets shall have key locks.
    c. Door lock power supply shall have a power distribution board containing individual circuit breakers for each point.
    d. Provide dedicated 20-amp emergency/standby circuit.
D. Door controllers shall be SoftwareHouse iSTAR controllers. UAMS Technical Security will specify which model is required to meet location needs.
E. Include one network cable per door controller and power supply.
F. All inputs on the door controller must be wired with supervision resistors in accordance with the equipment manufacturer.
G. All access control doors shall be equipped with a card reader, locking device, motion sensor, and door status switch. Door status devices shall be supervised normally closed contacts. Request-to-exit devices shall be supervised normally open contacts.
H. Locking devices shall be electro-mechanical fail-secure models (electrified panic hardware, electric strikes) EXCEPT for doors that would prohibit free egress to emergency exits. Maglocks may be used if authorized by UAMS Technical Security and will require all other locking hardware removed.

I. All locking devices shall be 24vdc.
J. Access control doors where a maglock has been authorized, shall have an emergency release button that removes lock power from the maglock for 30 seconds. The pushbutton must state “Push to Exit”.
K. Card readers are limited to within 500 feet from the controller. Locking devices are limited to 1000 feet of the controller.
L. Card readers shall be HID iCLASS SE models operating on 12vdc.
M. One fire alarm relay shall be located within 3 feet of the door controller and in all exit stairwells to be coordinated with OH&S. The relay must be wired in accordance with the door controller manufacturer specifications.
N. Exterior non-access control doors:
    a. Doors shall have a status sensor monitored by the security system. Door status device shall be supervised normally closed contacts.
    b. Ground floor stair access shall be equipped with a door closure and interior panic storeroom function and no exterior entry.
    c. Roof access (greater than two floors) doors shall be equipped with a door closure and storeroom function on the interior side and unlocked exterior side.
    d. Roof access (less than three floors) doors shall be alarmed through the security system with a door status sensor.
O. Exterior access control doors:
    a. Manually operated doors shall have electronic latching panic hardware with request-to-exit switch and shall be fail-secure locking.
    b. Powered doors (auto-openers) must lock in fail-secure state and must have break-out option. The door operator shall be interfaced to the access control system to allow control of the door functions (determined during planning)
    c. Doors shall have a card reader, door status sensor, and a request-to-exit motion sensor or touch bar that connects to the security system.
    d. Doors shall be monitored by a video camera connected to the campus surveillance system.
P. Interior access control doors:
    a. Interior door access control, surveillance (audio/video), and alarm requirements will be determined by UAMS Technical Security during planning.
    b. Powered Doors (auto-openers) must have either a fail-safe electric strike OR maglocks (if approved).
    c. Nursery areas shall be equipped with card-in/card-out access, video surveillance, and may require interfacing with the infant protection system.
    d. Telecom/data rooms, medication rooms, soiled utilities, biohazard, and rooms/closets that house data networking and/or security equipment shall have card access and be monitored by video surveillance.
    e. All research interior doors to labs and animal storage areas shall have card access control with closure and video surveillance.
Q. Panic/Duress Devices
    a. Under-desk panic devices shall be United Security Products HUB2SA or equivalent.
    b. Wall-Mounted panic devices shall be STI SS2425EM-EN or equivalent.
    c. Panic devices shall be located at the following locations:
        a. Check-in/Reception Desks
        b. Nurse Stations
        c. Cash Exchange Locations
        d. Others determined by UAMS Technical Security
R. Lockdown Devices
    a. Wall-mounted lockdown devices shall be STI SS2429LD-EN or equivalent.
    b. Lockdown Devices may be located at the following:
        a. Check-in/Reception Desks
        b. Nurse Stations
        c. Other locations as determined by UAMS Technical Security
S. Intrusion Detection Devices
    a. Some UAMS site may require intrusion motion sensor or glass break detection devices. These locations shall be determined by UAMS security.
    b. Motion Sensors may be one of the following:

a. DSC BV-500
b. DSC BV-300

c. Glass Break sensors shall be DSC DG-50 or equivalent.

28 23 00 Video Surveillance

A. All video surveillance needs, including camera locations, shall be established on a per project basis by UAMS Technical Security.
B. Network-based IP storage systems shall be utilized.
C. Each location having a network recorder must have a properly sized UPS with supervision software to safely power down equipment.
D. Cameras shall be tamper-resistant, high resolution, color, and IP communication with Power Over Ethernet (POE).
E. Devices must be compatible with the current video surveillance system and must be approved by UAMS Technical Security for use.
F. All patient visiting/waiting areas as well as cash transaction/safe areas shall have video surveillance cameras.
G. Entry and Exit points shall be monitored by video surveillance.

28 31 00 Fire Detection and Alarm

A. Preferred fire alarm systems/ shall be Edwards or Computrols with the capacity to coordinate with existing systems.
B. Provide most current version of software for use by UAMS.
C. Provide control panel manufacturer's warranty that system components shall remain free from defects for a minimum of one year after date of substantial completion of project.
D. A sequence of operation shall be provided with every system.
E. The system shall include, but not limited to:
    a. LED annunciators,
    b. one-way multi-channel voice communication system,
    c. color graphic workstation (unless compatible with existing system),
    d. Discreet system control switch provided for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch, and details switch.
    e. Discreet system disable switch for speakers, strobes, elevator recall and shunt trip, doors, smoke dampers, atrium purge fans, AHU shutdown, stairwell pressurization fans, security, and a separate switch for all the above at one time.
    f. All cabling to be run inside of conduit.
    g. Wiring to be plenum rated
F. The control panel(s) shall:
    a. Be a multi-processor based networked system designed especially for fire and smoke control
    b. Provide one-way and two-way emergency audio communications.
    c. Allow interactions between any applications to be configured and modified using software provided by a single supplier.
    d. Be addressable points.
    e. Support multiple digital dialers and modems, support multiple communication ports and protocols.
    f. Panels network capable through TCIP addressing.
G. The network control panels shall include all software and ability to download the following features to UAMS:
    a. All network applications and firmware from the configuration computer from a single location on the computer.
    b. Electronic addressing of analog/addressable devices.
    c. Operator interface control/display that shall annunciate, command and control system functions.
    d. Internal audio signal with different programmable patterns to distinguish between alarms, supervisory, trouble, and monitor conditions.

H. Systems reports that provide detailed description of the status of the system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer. Reports shall be capable to generate smoke sensitivity percentage.
I. Authorized UAMS operator shall be able to operate to modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file and perform test functions.
J. Annunciation shall have the capability to be put into “private mode” in patient sleeping rooms.
K. For high rises, a Firefighter Smoke Control Station (FSCS) shall provide a graphic representation of the facility HVAC system and Stairwell Pressurization system. Fan override and control switches and fan/damper status LEDs shall be provided. The following minimum system controls and indicators shall be provided on the FSCS: Power ON, Trouble, and Signal Silenced LEDs; System Reset, Silence, Trouble Silence, and Drill push buttons. It shall be possible to annunciate text messages via LCD display mounted in the FSCS enclosure.
L. Training and required competencies shall be determined at the beginning of project and shall be observed by observed by the commissioning agent.
    a. Specific training shall be on-site and be videotaped.
M. Provide a minimum of 2% extra replacement devices for each type of fire alarm devices.
N. Include a minimum of 3 keys to access the system.

28 40 00 Life Safety Alarms

A. All required alarms shall be connected to UAMS Little Rock Campus Central Call Center.

END OF DIVISION 28

32

DIVISION 32

EXTERIOR IMPROVEMENTS

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 12 16 Asphalt Paving

A. Perform work in accordance with the latest edition of the Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction.
B. Mixing plant and mix design shall be certified by ArDOT.
C. Aggregate Base Course: Class 7 aggregate base course in accordance with ArDOT Standard Specifications for materials and workmanship.
D. Asphalt Concrete Hot Mix Surface Course: Type II or III asphalt surface course in accordance with ArDOT Standard Specifications for materials and workmanship.
E. Light Duty Pavement (Standard Parking Lots and Drives – Cars and Light Trucks)
    a. 3” Asphalt Concrete Hotmix Surface Course
    b. 6” Aggregate Base Course (95% Modified Proctor Density)
    c. 8” Minimum Compact Existing Subgrade (98% Standard Density ASTM D-698)
F. Heavy Duty Pavement (Delivery Areas, Drives for Deliveries, Truck or Fire Access Lanes, etc.)
    a. 2” Asphalt Concrete Hotmix Surface Course
    b. 2” Asphalt Concrete Hotmix Binder Course
    c. 8” Aggregate Base Course (95% Modified Proctor Density)
    d. 8” Minimum Compact Existing Subgrade (98% Standard Density ASTM D-698)
G. Tack Coat: Apply tack coat in accordance with manufacturer's instructions.
    a. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.
    b. Apply tack coat to contact surfaces of curbs, gutters, and pavements.
    c. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.
H. Finished Surface:
    a. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.
    b. Finished surface, when checked with a 10-foot straight edge placed perpendicular to the direction of slope, shall show no variation more than 1/8 inch. Unacceptable areas shall be removed and replaced at no expense to the owner.
    c. Final pavement exhibiting surface defects such as poor texture, roller marks, honeycomb, cracking, rich marks, brown spots, bleeding, or waving shall be removed and replaced at no expense to the owner.

32 13 13 Concrete Paving

A. Perform work in accordance with the latest edition of the Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction.
B. Mixing plant and mix design shall be certified by ArDOT.
C. Sidewalk construction shall be:
    a. 6” compacted Subgrade, min 90% Standard Proctor Density
    b. 4” concrete
    c. Broom Finish
D. Concrete Pavement shall be:
    a. 8” Compacted Subgrade minimum 98% Standard Proctor Density ASTM D-698
    b. 8” Crushed Aggregate Base Course 95% minimum Modified Proctor Density
    c. Broom Finish
E. Aggregate Base Course: Class 7 aggregate base course in accordance with ArDOT Standard Specifications for materials and workmanship.
F. Concrete Materials:
    a. Obtain cementitious materials from same source throughout.
    b. Cement: ASTM C150/C150M, Normal - Type I Portland cement, gray color.
    c. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
    d. Fly Ash: ASTM C618, Class C or F.
    e. Water: Clean, and not detrimental to concrete.

f. Air-Entraining Admixtures: ASTM C260/C260M.

G. Concrete Properties:
   a. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4000 psi- Testing agency shall report test results in writing within 24 hours of test.
   b. Total Air Content: 6 percent plus or minus 1 percent, determined in accordance with ASTM C 173/C 173M.
   c. Maximum Slump: 3 inches.
   d. Maximum Aggregate Size: 3/4 inch.

H. Follow recommendations of the American Concrete Institute's ACI 305R/ACI306R when concreting during hot/cold weather.

I. Concrete Finishing:
   a. Area Paving: Light broom, texture perpendicular to pavement direction.
   b. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4-inch radius.
   c. Curbs and Gutters: Light broom, texture perpendicular to pavement direction.
   d. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

J. Defective Concrete:
   a. Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.
   b. Repair or replacement of defective concrete will be determined by the Architect/Engineer. The cost of additional testing shall be borne by the Contractor when defective concrete is identified.
   c. Do not patch, fill, touch-up, repair, or replace defective, exposed concrete except upon express direction for each individual area.

K. Dumpsters shall be situated on a concrete pad.

32 90 00 Planting

A. General:
   a. Anti-germination weed control agent shall be applied to finished topsoil in flower and shrub beds.
   b. A minimum of 4" of good quality topsoil shall be installed before any sod is installed.
   c. A minimum of 12" good quality topsoil shall be installed at planting beds.
   d. Weed barrier is to be used in non-planted beds of rock mulch. Weed barrier shall be spun bonded, non-woven landscape fabric.
   e. Spray irrigation is preferred to drip irrigation.
   f. Any plantings shall be guaranteed, by contractor, healthy and alive for one year from date of planting.

B. Plant Materials:
   a. Plant material shall be inspected by the UAMS Grounds Landscape Tech or Coordinator prior to installation; UAMS shall approve plant material placement.
   b. Plant materials not listed in the approved plant listing must be approved by UAMS.
   c. All plant materials should meet the standards of the American Association of Nurserymen, Inc.
   d. Plants listed on the U of A List of Invasive Species (App. D) shall not be planted unless specifically approved by UAMS.
   e. Plantings shall be designed and planted so as not to be a monoculture of one variety. Having a diversity of plants ensures pest and disease resistance.

C. Sod:
   a. Sod is preferred in most applications to seeding.
   b. Appropriate varieties should be installed to minimize irrigation maximize ground coverage and match any adjacent turf.
   c. Sod shall be staggered with joints filled with topsoil. Sod shall be installed perpendicular to the gradient of the slope and rolled smooth with appropriate tool.

D. Trees:
   a. Topsoil dressing within tree drip lines shall not exceed 4 inches; No soil is permitted on the root flare of any tree.

b. In areas of unprotected root zones (under drip lines), those areas should be covered with 4 inches of organic mulch to minimize soil compaction. Mulch shall not be in contact with the trunks of trees and shall be kept a minimum of 6” clear of trunk.
c. Landscape irrigation shall be placed outside of existing tree drip line.
d. Trees Near New Construction
    i. Before any trenching or excavation near trees, there shall be a consultation with UAMS. Any trenching required for installation of landscape irrigation shall be placed as far from the existing tree trunks as possible.
e. All grading within protected root zone shall be done by hand or hydro-excavated to minimize root damage.
f. Any roots exposed by construction activity shall be pruned flush with the soil. Backfill root areas with good quality topsoil as soon as possible. If exposed root areas are not backfilled within 2 days, cover with organic material in a manner, which reduces soil temperature and minimizes water loss to evaporation.
g. Trees most heavily impacted by construction activities should be watered deeply once a week during periods of hot, dry weather. Tree crowns should be sprayed with water periodically to reduce dust accumulation on leaves.
h. All finished pruning shall be done according to the National Arborist Association Pruning Standards for Shade Trees

END DIVISION 32

33

DIVISION 33

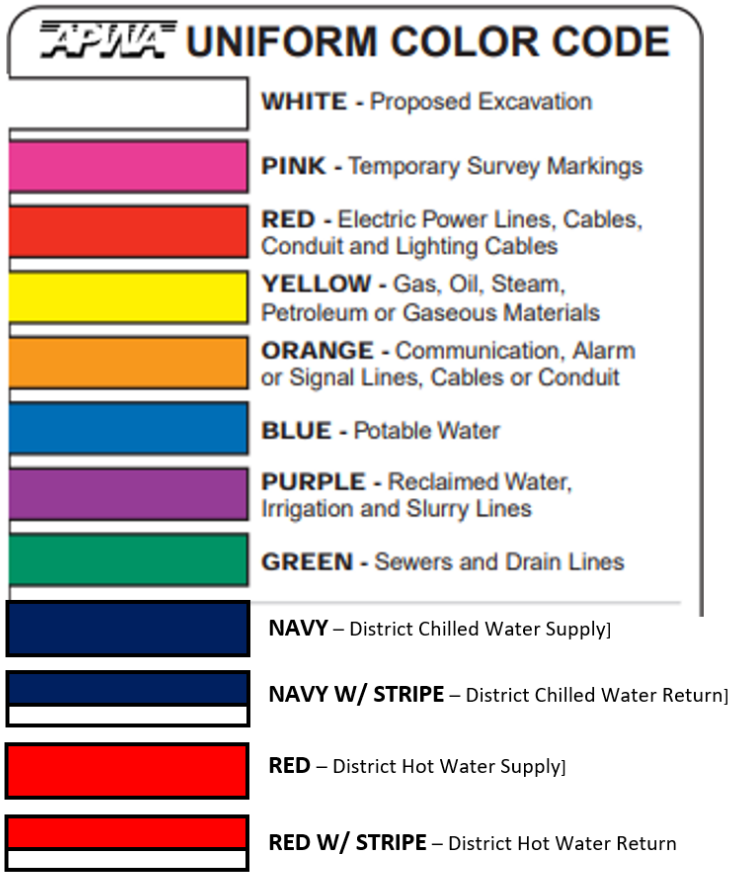
UTILITIES

DIVISION 33 – UTILITIES

33 00 01 Owner General Requirements and Design Intent

A. All underground piping shall be welded.
B. All underground valves shall be in an accessible vault of adequate size to allow valve replacement.
C. Underground Piping shall be buried a minimum of 4 feet on main branches (exception will be sanitary and storm systems which are gravity fed).
D. All underground piping shall have a means to trace down the pipe after concealment, including tracer wire for plastic pipe and tape identifying the system or “caution, underground line” placed 1 foot below grade above the pipe systems which could disrupt the services of the building, with the exception of sprinkler piping.
E. Provide inspection wells at appropriate spacing and locations.
F. The contractor shall be responsible for utility connection fees and other costs associated with turning on new utilities.
G. The ground marking of utility lines, valve boxes and other underground elements shall follow the American Public Works Association standard colors with specific additions for UAMS. See the illustration below at the end of this section.

UAMS Uniform Color Code in Accordance with ONE-CALL



33 05 13 Manholes and Structures

A. Perform Work in accordance with utility company requirements.
B. Local codes and utility company requirements take precedence over the Construction Documents.

C. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).
D. Lid and Frame: ASTM A48/A48M, Class 30, Cast iron construction, machined flat bearing surface, removable lid, closed lid design; traffic weight; lid molded with identifying name. Meet local authority's requirements.

33 10 00 Water Utilities

A. Perform Work in accordance with utility company requirements.
B. Comply with applicable requirements of locally adopted plumbing codes.
C. Local codes and utility company requirements take precedence over the Construction Documents.
D. Fire protection work shall also comply with NFPA requirements.
E. Verify with local water utility company the meter size required to allow sufficient discharge flow pressure for proper sanitary operation of all fixtures in the project, and fire protection if required.
F. The contractor shall furnish the meter if the utility company does not.
G. Obtain all necessary permits and approvals.
H. The operating routine shall include necessary protective measures to detect and remove or destroy any contaminant of concern or regulation that might enter the distribution system. Every precaution must be taken against the possibility of sewage contamination of the water in the distribution system. Water mains and sanitary sewers shall be constructed as far apart as practicable and shall be separated by undisturbed and compacted earth. A minimum horizontal distance of ten feet shall be maintained between water lines and sewer lines or other sources of contamination. Water lines and sewers shall not be laid in the same trench, except on the written approval of the Arkansas Department of Health. Water mains necessarily in close proximity to sewers shall be placed so that the bottom of the water line is at least 18 inches above the top of the sewer line at its highest point. If this distance must unavoidably be reduced, the water line or the sewer line shall be encased in watertight pipe with sealed watertight ends extending at least ten feet either side of the crossing. Any joint in the encasement pipe shall be mechanically restrained. The encasement pipe may be vented to the surface if carrying water or sewer under pressure. Where a water line must unavoidably pass beneath the sewer line, at least 18 inches of separation shall be maintained between the outside of the two pipes in addition to the preceding encasement requirement. Exceptions to this shall be approved in writing by the Arkansas Department of Health.
I. A minimum horizontal distance of three feet shall be maintained between water lines and other underground utilities of a non-sanitary nature (gas, electric, etc.). Exceptions to this shall be approved in writing by the Arkansas Department of Health.
J. Separation Of Water and Sewer Lines:
    a. Water and sewer lines shall have a 10'0" horizontal separation.
    b. Where water and sewer lines cross, an 18-inch vertical separation shall be made between the top of the lower pipe and the bottom of the upper pipe.
    c. The water line shall be above the sewer line if possible.
K. Establish elevations of buried piping to ensure not less than 3 ft of cover.

33 30 00 Sanitary Sewerage

A. Provide products that comply with applicable code(s) and local authorities having jurisdiction.
B. Perform work in accordance with applicable code(s) and local utilities requirements.
C. Bottom Of Trenches: Remove and replace all unstable soil or rubble fill encountered at bottom of trench with thoroughly consolidated bedding material. Keep trench clear of water at all times. Allow 6 inches over-excavation for bedding under pipe.
D. Backfill around sides and to 6 inches over top of pipe with bedding for plastic pipes or cover fill for metallic pipe in 6" maximum lifts, tamp fill under pipe haunches and compact, then complete backfilling.
E. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to owner.
F. Pressure Test: Test in accordance with ASTM F1417 and local utility requirements.

G. Deflection Test: After the sewer line has been laid and backfilled, the contractor shall pull a mandrell through the line without a mechanical pulling device. The maximum deflection allowable shall not exceed 5 percent of the internal pipe diameter.

33 40 00 Stormwater Utilities

A. Provide products that comply with applicable code(s) and local jurisdiction requirements.

33 52 16 Site Natural-Gas Distribution

A. Contractor shall pay all cost required by utility company pertaining to construction and tie in. Deposits required for permanent service will be paid by the owner.
B. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
C. Perform Work in accordance with utility company requirements.
D. Conform to ASME B31.8.
E. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to owner.

END OF DIVISION 33

48

DIVISION 48

ELECTRICAL POWER GENERATION

DIVISION 48 – ELECTRICAL POWER GENERATION

48 01 00 Operation and Maintenance for Electrical Power Generation

A. Emergency Service & Distribution
    a. Emergency/standby generators shall be designed with minimum 20% extra capacity.
    b. Automatic transfer switches (ATSs) shall be alarmed through the Siemens Building Automation System (BAS). The minimal alarms for the ATS shall be as follows:
        i. Normal Power Available
        ii. Emergency Power Available
        iii. Contactor in Normal Position
        iv. Contactor in Emergency Position
        v. Test Switch Activated

B. Uninterruptible Power Supply
    a. For BAS provide the following:
        i. Install for all critical equipment that cannot tolerate a down time longer than 1 minute in the event of a power failure (regardless of emergency/standby power). Consider computer reboot time requirements.
        ii. Battery replacement shall not be needed sooner than 4 years. Battery discharge shall be gradient with unit calculation accurate within 2 minutes.
        iii. Provide redundancy with a parallel battery compartment.
        iv. UPS remote monitoring capacity shall be able to communicate and coordinate with Siemens BAS.
        v. Emergency shut off button of UPS and HVAC systems shall be protected by a non-locking clear cover so that two steps are required before unit can be shut down.
        vi. UPS shall have a bypass to disengage the UPS and return to emergency/standby power separate from the UPS in event of a change out or system failure.

END OF DIVISION 48

APPENDICES

APPENDIX A - H

APPENDIX A - ROOM SPACE PROGRAM

SPACE PROGRAM	
Title	**Approximate SF**
Chancellor	300 (Private)
Vice Chancellor Dean Executive Director	170 – 250 (Private)
Associate Vice Chancellor Associate Dean Chairman Professor Assist. Professor Instructor Director	120 – 160 (Private)
Associate Director Department Manager Department Administrator Program/Project Manager Nurse Manager Associate Administrator Administrator	100 – 120 Private or Open Workstation (depends upon privacy needs)
Visiting Faculty Fellow Executive Assistant Support Staff Clerical Student/Graduate Assistant Technician Nurse	50 - 80 Open Workstation Not to exceed 100
Non-Full Time Employee/Faculty	Shared space only

APPENDIX B - EXTERIOR ELEMENTS

APPENDIX C - TYPICAL ROOM MATERIALS

ROOM TYPE	WALL FINISH	FLOORING/BASE	CEILING
Offices, Administration Areas, Break Rooms, Work Rooms	Gypsum wallboard with paint, eggshell finish	Carpet tile or LVT; 4" Resilient base	2 x 2 Lay-in acoustical tile and/or suspended gypsum wallboard painted, flat finish
Public Lobbies/ Dining	Gypsum wallboard with paint, eggshell finish; Wall protection and corner guards as appropriate Reception Desk/Millwork: Solid Surface and/or laminate as appropriate	Terrazzo or LVT; Resilient base	2 x 2 Lay-in acoustical tile and/or suspended gypsum wallboard painted, flat finish
Public Restrooms	Gypsum wallboard with water-based epoxy paint	Terrazzo or Seamless resinous flooring; integral base	2 x 2 Lay-in acoustical tile
Mechanical/Electrical Equipment Rooms, Maintenance/Building Services, IT Rooms, EVS	Gypsum wallboard with paint	Sealed concrete; 4" Resilient base	Exposed structure, painted if appropriate (No finish at exposed steel with fire- proof ing)
Food Preparation	Seamless Resinous walls	Seamless resinous non-slip flooring; integral base	2x2 Cleanable acoustical tile with gasketed grid
Dock Receiving, Material Movement Corridor	Gypsum wallboard with paint; Wall protection and corner guards as appropriate	Sealed concrete, LVT, or sheet flooring; 4" resilient base	Exposed structure, painted if appropriate (No finish at exposed steel with fire- proofing) and/or 2x2 Acoustical Ceiling tile
Patient Rooms, Nurse Stations, Locker Rooms, Pre-Op, PACU, Exam Rooms	Gypsum wallboard with paint, eggshell finish; Wall protection and corner guards as appropriate	Seamless sheet flooring with heat welded seams/ LVT/ Rubber tile; 4" Resilient base	2 x 2 Lay in acoustical tile and/or painted gypsum wallboard

Clean Workroom/Supply, Soiled Workrooms/Holding, Pharmacy	Gypsum wallboard with water-based epoxy paint; Wall protection and corner guards as appropriate	Seamless sheet flooring with heat welded seams	Gypsum wallboard with epoxy paint or 2 x 2 Cleanable acoustical tile and gasketed grid
Stairs	Gypsum wallboard with paint	Sealed concrete	Exposed structure, painted if appropriate (No finish at exposed steel with fire- proofing)
Patient Room Toilets/Showers	Moisture resistant gypsum wallboard with water-based epoxy paint	Seamless resinous flooring with 4" high integral base	Gypsum wallboard with water-based epoxy paint
Staff Restrooms	Moisture resistant gypsum wallboard with water-based epoxy paint	Seamless resinous flooring with 4" high integral base	2x2 Cleanable lay-in acoustical tile
Vivarium and Vivarium Support Functions	Concrete masonry units or seamless resinous walls or moisture/impact resistant gypsum wallboard with water-based epoxy paint	Seamless resinous flooring with 4" high integral base	Gypsum wallboard with epoxy paint
Waiting Rooms/ Family Lounges	Gypsum wallboard with paint, eggshell finish; Wall protection/ corner guards as appropriate	Carpet tile or LVT; 4" Resilient base	2 x 2 Acoustical tile or Gypsum wallboard with paint
Large conference rooms, auditoriums, lecture halls	Gypsum wallboard with paint, eggshell finish; Fabric-wrapped acoustical panels as appropriate	Carpet tile; 4" resilient base	2 x 2 Lay-in acoustical tile- consider high NRC tile
Classrooms	Gypsum wallboard with paint, eggshell finish	Carpet tile or LVT; 4" resilient base	2 x 2 Lay-in acoustical tile
OR's	Gypsum wallboard with water-based epoxy paint; Wall protection and corner guards as appropriate	Sheet flooring with heat welding seams or rubber tile with heat welded seams	Gypsum wallboard with water-based epoxy paint or cleanable acoustic tile with gasketed grid
Procedure Rooms	Gypsum wallboard with water-based epoxy paint; Wall protection and corner guards as appropriate	Sheet flooring with heat welding seams	2 x 2 Cleanable lay-in acoustical tile with gasketed grid

NOTE: Materials in the above table are typical, however each individual project could require alternates to the items shown. All materials to be reviewed and approved by UAMS Planner.

APPENDIX D - INVASIVE PLANT SPECIES LIST

Before any of these plants are introduced on campus, written approval from Grounds is required:

a. Bamboo – Phyllostachys species
b. Bradford Pears – Pyrus calleryana „Bradford"
c. English Ivy – Hedera helix
d. Japanese Honeysuckle – Lonicera japonica
e. Kudza – Pueraria Montana
f. Mimosa – Albizia jullbrissin
g. Privet – Ligustrium sinense
h. Running Money Grass – Liriope spicata
i. Large leaf vinca – Vinca major
j. Wisteria – Wisteria floribunda
k. Bishop"s Weed – Aegopodium podagraria
l. Ajuga – Ajuga reptans
m. Garlic Chives – Allium tuberosum
n. Devils Walking Stick – Aralia spinosa
o. Ardisia – Ardisia japonica
p. Artemesia – Artemisia absinthium & Artemisia vulgaris „Oriental Limelight"
q. Trumpet Creeper – Campsis radicans
r. Sweet Autumn Clematis – Clematis terniflora
s. Mexican Hydrangea – Clereodendron
t. Wild Ageratum – Conoclinium coelestinum
u. Queen Ann's Lace – Daucus carota
v. Russian Olive – Elaegnus angustifolia
w. Horsetail – Scouring Rush – Equisetum hyemale
x. Wintercreeper Euonymus – Euonymus fortune
y. Carolina Jessamine – Gelsemium sempervirens
z. Ground Ivy – Glechoma hederacea
aa. Chameleon Plant – Houttuynia cordata
bb. Morning Glory – Ipomoea violacea
cc. Cypress Vine – Ipomoea quamoclit
dd. Creeping Jenny – Lysimachia nummuluaria
ee. Yellow Rose of Texas – Kerria japonica
ff. Deadnettle – Lamium species
gg. Purple Loosestrife – Lythrum salicaria
hh. Nandina – Nandina domestica
ii. ii. Mint – Mentha species
jj. Bee Balm – Monarda didyma
kk. Showy Evening Primrose – Oenothera speciosa
ll. Pricky Pear Cactus – Opuntia sp
mm. Star of Bethlehem – Ornithogalum umbellatium
nn. Woodsorrel – Oxalis species
oo. Passionflower – Passiflora incarnate
pp. Obedient Plant – Physostegia virginiana
qq. Cherry Laurel – Prunus caroliniana
rr. Pickerel Weed – Pontederia cordata
ss. Mexican Petunia – Ruellia brittoniana
tt. Sumac – Rhus glabra
uu. Bouncing Bet – Solidago species
vv. Goldenrod – Solidago species
ww. Spiderwart – Tradescantia virginia

APPENDIX E - MAINTENANCE OF SMOKE/FIRE BARRIERS-POLICY NUMBER 11.1.08

See attachment E:

UAMS
University of Arkansas for Medical Sciences

UAMS ADMINISTRATIVE GUIDE

NUMBER: 11.1.08 **DATE:** 02/11/1999
REVISION: 9/1/05; 4/6/09; 9/24/09; 7/10/13; 8/18/16; 09/26/19 **PAGE:** 1 of 3

SECTION: CAMPUS OPERATIONS
AREA: GENERAL
SUBJECT: MAINTENANCE OF SMOKE/FIRE BARRIERS

PURPOSE

To enable Engineering & Operations (E&O) and Occupational Health & Safety (OH&S) to account for, track, and confirm that all Smoke/Fire Barrier penetrations have been appropriately resealed to ensure Arkansas Department of Health and Joint Commission compliance with 2000 Life Safety Code 8.2.3.2.3 as adopted March 1, 2003, "Opening Protective's".

SCOPE

All UAMS staff who has authorization to cause Smoke/Fire barrier penetrations, such as, E&O, Telecommunications, Information Technology, Clinical Engineering and approved outside contractors/vendors.

POLICY

Penetrations through smoke/ fire barriers must be properly sealed by approved individuals.

PROCEDURES

All craftsperson's from E&O, Telecommunications, Information Technology, and outside contractors/vendors shall first submit an E&O work order and get approval prior to making any penetrations. The UAMS *Above Ceiling and Fire/Smoke Barrier Permit* will be used for this purpose. This permit is available in OH&S.

All craftsmen, technicians, and/or contractors must be properly trained and approved to reseal each smoke/fire barrier penetration using approved fire assemblies and materials. They will complete the repairs before leaving the work location and proceeding to the next work site.

1. Prior to any Smoke/Fire Barrier penetration, an E&O work order must be completed and submitted to the Campus Operation Call Center. The requestor shall then proceed to OH & S to obtain the permit.

2. The Campus Operations Call Center will assign a job control number to the work order for tracking and the submitter will receive a copy for his or her records and display.
3. An E&O or OH&S representative will inspect and monitor all penetrations until they have been correctly resealed. Once all penetrations have been confirmed as having been appropriately resealed, the work order can then be signed off by the E&O representative as complete and closed.

4. The Foremen /work supervisor is responsible for selecting the appropriate resealing material and providing it to the worker. Contractors will be responsible for providing their own sealant, approved by E&O.

5. The E&O Materials Management section will maintain a stock of Intumescent Firestop sealant, which is expected to meet most resealing requirements. Other products may be procured through E&O Materials Management upon request.

6. UAMS Employees and Contractors may also be required to have an Infection Control Risk Assessment/Interim Life Safety Measure permit approved depending on the area and type of maintenance/construction being performed.

7. Failure to comply with this policy and procedures may result in disciplinary action for UAMS employees, or termination of contractors.

IMPORTANT NOTES REGARDING FIRESTOP SEALANTS

- Due to the variety of construction materials used in smoke/fire barrier construction at UAMS (e.g. reinforced concrete floor/ceiling slabs, cement block, drywall, tile block, reinforced concrete vertical walls) various products may be required to reestablish appropriate smoke/fire barrier integrity in different locations.
- Most sealants labeled firestop are actually "smoke" sealants, for use only as a part of a multicomponent firestop system. When in doubt, check the listed system design to ensure that proper materials are being used.
- Firestop sealants are NOT GENERIC. Each manufacturer has a proprietary formula that has undergone third party testing; meaning one sealant cannot be substituted for another sealant!
- Ensure chemical compatibility with different substrates and penetrating items.
- Ensure adhesion capability with different substrates and penetrating items.
- Ensure adhesion capability to "actual" job site conditions of damp, dirty surfaces.
- Ensure elasticity to withstand building settling and penetrating item movement.

REFERENCES

NFPA 101 Chapter 8
AFPC-Fire Chapters 7 & 10
TJC HAS LS.01.01.01, LS.02.01.10, LS.02.01.20, & LS.02.01.34

Signature:  **Date: September 26, 2019**

APPENDIX F - EQUIPMENT AND ACCESSORIES ABBREVIATIONS

Tagging

All equipment and accessories shall be tagged with a permanent system and brass valve tags permanently color coded on the back to know if valve is to be normally left open (green), closed (red), or adjustable to seasons (yellow). Numbers for rooms and equipment can be obtained at UAMS. Equipment classification shall be as follows:

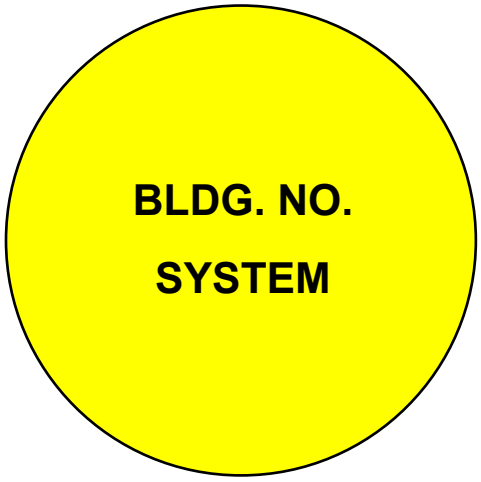
SHORT FORM	EQUIPMENT	COLOR
ACF	Air Curtain Fan	
ACP	Air Compressor	
AHU	Air Handler Unit	
ATS	Automatic Transfer Switch	
BHH	Bio Hazard Hood	
BLR	Boiler	
CH	Chiller	
CDU	Condensing Unit	
CEM	Chemical Treatment	
CWT	Cooling Tower	
CTR	Controls	
DEA	Deaerator	
DKF	Drinking Fountain	
DRS	Door	
EXH	Fan Exhaust	
FCU	Fan Coil Unit	
FMH	Fume Hood	
FRN	Furnace	
FRZ	Refrigerator/Freezer	
FPD	Fire Protection Devices	
FPS	Fan, Smoke Purge	
FXT	Fire Extinguishers	
GEN	Generator	
HEX	Heat Exchanger	

SHORT FORM	EQUIPMENT	COLOR
HOD	Hood, Standard	
HRU	Heat Recovery Unit	
HYL	Hydraulic Lift	
ICE	Ice Machine	
LHT	Lighting	
MAU	Make-Up Air Unit	
PAC	Package Unit	
PAN	Electrical Panel	
PHX	Plate Heat Exchanger	
PLT	Plaster Trap	
PMP	Pump	
PRV	Pressure Reducing Valve/Station	
RAF	Return Air Fan	
RHT	Reheat Terminal	
RPZ	Back Flow Preventers	
SAF	Supply Air Fan	
SBD	Switch Board	
SFE	Safety Equipment	
STL	Still, H2o	
STP	Steam Trap	
SWT	Incoming Line Switch	
SWG	Switchgear	
TNK	Tank	
TRN	Transformer	
UH	Unit Heater	
VAV	Air Volume Box (Variable or Constant)	
VFD	Variable Frequency Drive	
WAC	Window Units	
WEM	Weather Makers	
WSH	Washer	

SHORT FORM	EQUIPMENT	COLOR
WH	Water Heater	
ACH	Air Conditioning and Heating Architecture	
ART	Architecture	
BFW	Boiler Feed Water	
CAS	Control Air	
CDS	Condensate	
CHS	Chilled Water Supply	Blue
CHR	Chilled Water Return	Light Blue
TWS	Tower Water Supply	
TWR	Tower Water Return	
CT	Chemical Treatment	
DSW	Distilled Water	
DWS	Drinking Chilled Water	
DCW	Domestic Cold Water	Light Green
EGS	Ethylene Glycol	
EMG	Emergency Power	
FOS	Fuel Oil	Light Red
FP	Fire Protection	
GAS	Natural Gas	Yellow
HEX	Hood Exhaust	
HPS	High Pressure Steam	
HWS	Heating Water Supply	Red
HWR	Heating Water Return	Orange
DHW	Domestic Hot Water	Dark Green
LPS	Low Pressure Steam	
MAS	Medical Air	
MPS	Medium Pressure Steam	
NEP	Normal Electric Power	
NIS	Nitrogen	
NOS	Nitrous Oxide	

SHORT FORM	EQUIPMENT	COLOR
OXY	Oxygen	
PNE	Pneumatic	
RFG	Refrigeration	
SAF	Safety Equipment	
STR	Storm Drain	
SWR	Sewer	
VAC	Vacuum	

The tag should look as follows but color coded to the position of the valve:



APPENDIX G - ASHRAE 170-2017 VENTILATION TABLE

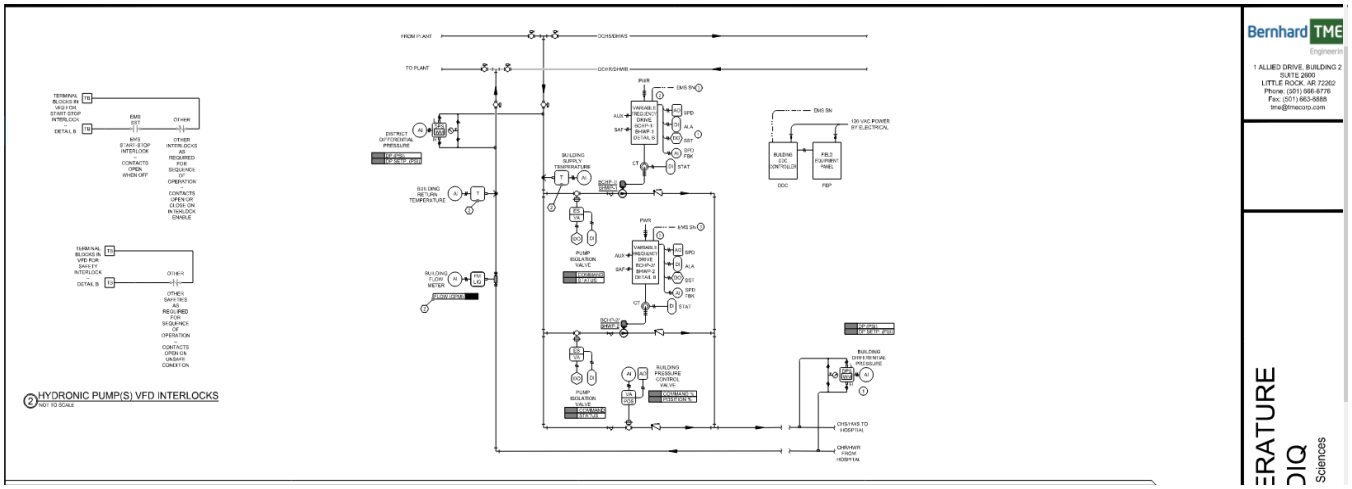
See attachment G: This full document is available through UAMS Planning Design and Construction Department

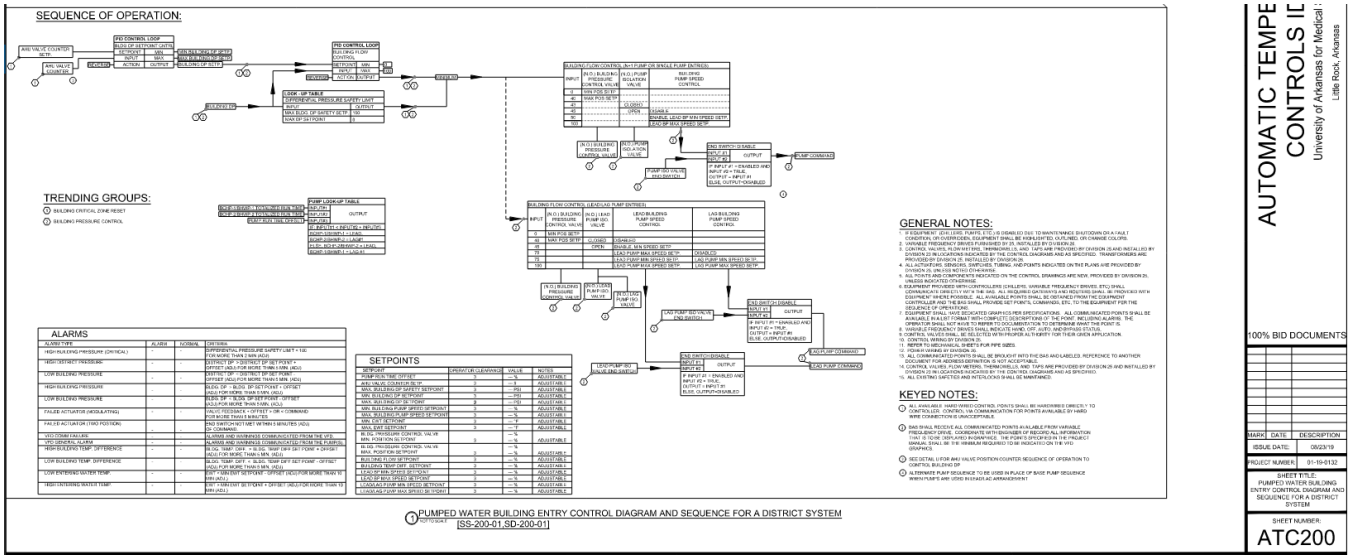
APPENDIX H - UAMS ATC IDIQ

See attachment H: This full document is available through UAMS Planning Design and Construction Department

ATC 200 UAMS IDIQ sheet.pdf

UAMS IDIQ 8-28-2019.pdf





APPENDIX I - EQUIPMENT TEMPLATE IMPORT TO TMA

https://app.box.com/s/00qv3l4fs61d46cu29a88pb2mmib06av

UAMS®

4301 WEST MARKHAM STREET
LITTLE ROCK, AR 72205
501.686.7000 | UAMS.EDU