The University of Akron

Capital Planning and Facilities Management

Design and Construction Guide

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THE UNIVERSITY OF AKRON
Capital Planning and
Facilities Management

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THE UNIVERSITY OF AKRON
Capital Planning and Facilities Management

Design and Construction Guide

TABLE OF CONTENTS

DIVISION

00

DEFINITIONS AND INSTRUCTIONS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 00 – DEFINITIONS AND INSTRUCTIONS

00100 APPLICATION AND AUTHORITY

00100.1 This document is provided by the University of Akron, Department of Capital Planning and Facilities Management to all Associates and Construction Managers for the administration of all capital construction for the University of Akron.

00100.2 This document is issued as a supplement to the Standard Requirements for Public Facility Construction, as provided by the University of Akron, for locally administered projects. This document is also issued for equal application of University standards, for state administered projects.

00100.3 Compliance with standards and procedures described in this document is mandatory, unless otherwise approved by the Department of Capital Planning and Facilities Management, University of Akron.

00100.4 The University of Akron, Department of Capital Planning and Facilities Management reserves the right to amend or revise, and re-issue sections of this document to the Associate during the course of the project.

00100.5 Specific duties of the Associate will be modified when a Construction Manager is involved with the project. The contracts of the Associate and the Construction Manager, as well as the Matrix of Responsibility, shall supersede the performance requirements of this document.

00110 DEFINITIONS

Associate:	Primary consultant (professional architect, engineer, or designer).
CM:	Construction Manager.
Consultant:	Design professional, employed by the Associate, in specific areas of expertise.
Contractor:	Prime contractor: general, plumbing, fire protection, mechanical, electrical, or other disciplines as defined for the project which holds a contract directly the University of Akron.
CPFM:	The University of Akron, Department of Capital Planning and Facilities Management, or their designated representative.
GC:	General Contractor (Multiple-Prime project) or general trades' contractor (Construction Manager project).
Institutional Designee:	The one principal contact designated by the University for all capital projects for which local administration has been granted.
Interim Chief	Planning & Facilities Officer, The University of Akron, Department of Capital Planning and Facilities Management
OBBC:	Ohio Basic Building Code.
ODAS:	State of Ohio, Department of Administrative Services.
OFCC:	Ohio Facilities Construction Commission
STC	Sound Transmission Class

State: State of Ohio, OFCC.
Trade: Prime Contractor or subcontractor.
University: University of Akron, as represented by CPFM.

00120 PROJECT ADMINISTRATION

00120.1 Locally Administered Projects are those in which all contracts for the project including design, construction management, and construction are held and directed by the University of Akron, CPFM.

00120.2 State Administered Projects are those in which all contracts for the project including design, construction management, and construction are held and directed by the OFCC, with the assistance of the University of Akron, CPFM.

00130 PROJECT DELIVERY METHODS

00130.1 **Limited Scope Projects** are intended for small, simple projects that do not require the formal contract and process language of the General Contracting Project version. The project contract is less than $1,000,000, has only one milestone date, disturbs less than one acre of land; renovates less than 5,000 square feet, with a single contractor and no allowances or unit prices.

00130.2 **General Contracting** is a linear design-bid-build process in which the University selects an A/E to fully document the project criteria and design prior to bidding. The lowest responsive and responsible single prime General Contractor is awarded the contract.

00130.3 **Design Build Contracting** is when a single entity is hired through a best value selection process to deliver a complete project. The University's criteria and design intent is documented by a separate criteria architect. The design is completed by the Design Build entity and a guaranteed maximum price is provided prior to bidding. The Design Build entity bids to prequalified subcontractors and holds all subcontracts for construction.

00131.4 **Multiple Prime Contracting** is the traditional approach in which the University hires an A/E to fully document the project criteria and design prior to bidding. Multiple packages are separately bid and awarded to the lowest responsive and responsible prime contractors. The University holds all prime contracts and is responsible for coordination during construction.

00130.5 **Multiple Prime / CM Advisor Contracting** is when the University hires an Construction Manager through a qualifications based selection process during the design phase. The University's design criteria and full design is documented by a separate A/E. The Construction Manger provides estimates during design, assists with bidding and coordinates prime contractors during construction. The University bids and holds all contracts for construction.

00140 APPROVALS

00140.1 **All work** is subject to approval by the following departments:

1. University of Akron, Department of Capital Planning and Facilities Management.
2. The current insurance carrier of the University;
3. State of Ohio, Board of Regents;
4. State of Ohio, Ohio Facilities Construction Commission
5. State of Ohio Department of Commerce, Division of Industrial Compliance
7. State of Ohio, Department of Health;
8. City of Akron, Ohio;
9. Other governing agencies as may be required for the project.

00140.2 **All submittals and approvals** are the responsibility of the Associate, unless otherwise indicated by the Interim Chief.

00200 ASSOCIATE'S RESPONSIBILITIES TO CPFM

00200.1 **The Associate**, as the agent for the University of Akron or the State of Ohio, Ohio Facilities Construction Commission, is required to work with the Interim Chief during all phases of the project from programming through completion. An agent who is authorized to make decisions for the Associate will represent the Associate at all meetings.

00200.2 **The Interim Chief** will provide authoritative answers affecting all design issues and coordination with the University.

00250 PROGRAMMING, SCHEMATIC DESIGN, AND SCHEDULE

00250.1 **The program of requirements** is developed by CPFM in cooperation with the using department and other pertinent support units of the University before the Associate is hired. Upon receipt of all University approvals, the program is submitted to the Ohio Controlling Board for review and approval. This approval normally includes authorization to proceed with selection of the Associate for the project.

00250.2 **The Associate will verify** the compatibility of the program of requirements, University energy conservation goals, the schematic design and the proposed budget, through meetings with the University, including all departments who are scheduled to occupy the project.

1. **If discrepancies are observed**, the Associate shall obtain clarification from the Interim Chief, and rectify the discrepancies.
2. **Priority values** of 1 through 3 are assigned to features of the program of requirements in order to accommodate budget variations and design flexibility.
3. **Priority 1 items**: spaces or facilities, which are absolutely required to achieve the program of requirements.
4. **Priority 2 items**: highly desirable and directly support the program of requirements.
5. **Priority 3 items**: program related facilities, which will be included as the

budget permits.

6. **All priority 1 and 2 items** are considered to be achievable within the established construction budget.
7. **Inclusion of priority 3** items will probably be contingent upon favorable bids and design efficiencies. The inclusion of all prioritized spaces or facilities is preferred in lieu of extravagant design or material selections.

00250.3 **A schematic design** for the building may be provided by CPFM to assist the Associate in their understanding of the program of requirements.

1. **The Associate** will create a schematic design (or modify the schematic design which is provided by the University) which includes site selection and features; building location and orientation; internal circulation and public facilities; department location(s); preliminary elevations and specific design features as determined by CPFM.
2. **The Associate** will provide a space tabulation, which compares areas of each individual space in the schematic design to those listed in the Program of Requirements.
3. **The Associate** will confirm compliance with the project budget.
4. **All modifications** to the program of requirements or the schematic design require the approval of the Interim Chief.

00250.4 **The project schedule** will be determined by the Interim Chief. Landmark dates for University approvals, construction start, and construction completion will be established.

1. **Phasing of specific areas** of the work may be required with subsequent interim completion dates.
2. **The Associate must execute his own work** to comply with the schedule. The Associate will be required to increase production if the Interim Chief determines that the Associate is not complying with the schedule.

00250.5 **The initial planning conference** will be scheduled by the Interim Chief immediately after confirmation of the Associate's appointment by the University.

1. **General requirements**; procedures for expediting the Associate's work and project schedule will be the focus of this meeting.
2. **The schematic design and program of requirements** will be presented to the Associate for discussion.
3. **All of the Associate's consultants** must attend this conference.

00250.6 **Interim conferences** during the planning period will be scheduled by the Associate with the Interim Chief to discuss the following:

1. **Correlation** of the program of requirements with schematic design, including critical review of schematic design.
2. **Correlation** of priorities with budget, including definition of alternates.
3. **The Associate's performance** in relation to the project schedule will be assessed in relation to the project schedule at each meeting. If delays are determined to be the Associate's responsibility, the Associate will expedite the work to comply with the original schedule.
4. **Document review** prior to bidding submittal, including Schematic Design Document Stage, Design Development Document Stage, and Construction

Document Stage. Submit documents to CPFM prior to review meetings for each project stage.

00250.7 **Project Team** shall be described on the cover sheet of the Construction Documents.

1. **The words "approved by"** preceding signatures of University officials only signify that the project generally conforms to the program of requirements, the schematic design, and the established construction budget.
2. **Technical sufficiency** and accuracy of information shown are solely the responsibility of the Associate.

00250.8 **Minutes of all meetings** will be recorded and distributed to all conferees by the Associate. The minutes will include a complete summary of all decisions and actions, which affect the various facets of the project.

00300 DESIGN AND BUDGET

00300.1 **All elements** of the building shall be institutional grade, heavy-duty products, which will provide maximum life cycle utility, unless otherwise stated in the program of requirements.

00300.2 **The budget**, as established by the University, indicates the maximum amount available for construction. The Associate is responsible for incorporating all priority 1 and 2 items, utility connections, site work, general construction, plumbing systems, heating, ventilating and air conditioning, fire protection, electrical systems, communications wiring, fixed equipment, movable equipment, furnishings and other work as can be accommodated within the budget.

1. **Cost estimates** shall be projected to the proposed bid date. If the Associate cannot rectify the program of requirements with the project budget, he must notify the Interim Chief as soon as the discrepancy is noted.
2. **Add alternates** are included in the project to assure the maximum number of priority 3 items and to fully utilize project funds.
3. **Deduct alternates** are prohibited unless approved by the Interim Chief for special conditions which justify their use.

00350 EQUIPMENT

00350.1 **Fixed equipment** is provided and installed through one or more of the prime contracts for construction and is funded within the construction budget.

00350.2 **Movable equipment** and furnishings are acquired by the University via an allocation from the total project funds.

00350.3 **Both categories** of equipment needs are defined in the program of requirements.

1. **Utility requirements** for both fixed and movable equipment are to be included in the Associate's construction estimate.
2. **Space planning** including furniture layouts, coordinated with utility requirements, will be coordinated and shown in the Associate's construction documents.

00400 SITE SELECTION

00400.1 **Site selection and orientation** is included in the program of requirements and in the schematic design provided by CPFM.

1. **The Associate** shall visit the site(s) and evaluate the proposed elements of the project.
2. **The Associate** may suggest changes in the site plan if the re-evaluation of any program element is recommended.

00400.2 **Topographic surveys and soils analysis** will be provided by the Associate for new construction or for renovations where specific soil data is required.

1. **Record drawings** are available and will be provided by CPFM. The Associate must field verify all record information received. The accuracy of all record information shown on the contract documents remains the responsibility of the Associate.
2. **All surveys and analysis** will be released to the University for Archival Storage.

00450 PROFESSIONAL CONSULTANTS

00450.1 **The services** of licensed professional Architects and Engineers are required for building design, structural design, interior design, plumbing and fire protection systems, HVAC, electrical systems, and communication systems (telephone, data, WiFi and security) on architectural projects for which enclosed structures are designed, unless specifically qualified by the University.

00450.2 **If additional consultants** are required, compensation for those consultants shall be included in the Associate's contract. Additional consultants may be required for acoustics, food service, Landscape Design, hazardous material abatement, etc.

00500 DESIGN FOR ENERGY CONSERVATION

00500.1 **Energy conserving** systems and construction must be utilized while providing occupant health and comfort in the project to the extent permitted by the budget but not less than the following:

1. **At minimum**, all new buildings shall achieve energy efficiency that is 20% more efficient than ASHRAE 90.1. 2013 standards.
2. **At minimum,** all renovations with construction costs in excess of $100,000 shall achieve energy efficiency that is 15% more efficient than ASHRAE 90.1.-2013 standards.
3. **Designs that** surpass the performance required above and make meaningful reductions in the energy consumed by campus facilities are encouraged.

00500.2 **The Associate** must design new construction and renovations to balance initial cost, energy use, and long range operating costs to the satisfaction of CPFM. The Interim Chief will review alternative solutions, which may be presented by the Associate.

00500.3 **Life Cycle Cost Analysis** shall be prepared by the Associate and his consultants in

accordance with standards established by Ohio House Bill 251 and applicable state guidelines. Energy modeling shall be provided as required.

00500.4 **Sustainability** of materials & resources, water conservation, waste management, and indoor environmental controls shall be reported to CPFM as outlined in 00250.2 above.

1. **Simple payback** analysis of sustainability features proposed will be required of the Associate.

00550 DESIGN OF HVAC AND ELECTRICAL SYSTEMS

00550.1 **Building utilization** must be considered by planning for energy conservation during periods of minimum occupancy (i.e. winter and summer breaks). If the program of requirements identifies 24-hour occupancy or more critical performance for limited areas of the building, separate systems must be considered for these areas.

00550.2 **Noise control** including sound and vibration isolation, must be included to provide maximum usefulness of the spaces. Noise control, as required by OSHA, for the health and safety of the building occupants, is considered to be the minimum performance requirement for the project.

00600 DESIGN OF SERVICE AREAS

00600.1 **Circulation artery service areas** include public and campus courtesy and/or emergency phones, drinking fountains, and public trash and recycling container areas. Recesses in public corridors are preferred to isolate these activities from circulation.

00600.2 **Custodial service areas** including equipment and supply storage and service sinks are required for all projects unless specifically deleted by the program of requirements.

1. **At least one** custodial storage room with adjustable shelving and one custodial closet with floor sink and mop hanger (over sink), will be provided on each floor.
2. **Custodial service** areas will not contain electrical panels, communication panels, or other similar equipment.
3. **Custodial supply storage areas** are required in each project and may include a battery charging station (with exhaust fan) for large equipment.

00600.3 **Electrical and mechanical equipment rooms** must include sufficient access space to all equipment (including valves) for operation, servicing, and equipment removal.

1. **Access to and within** equipment rooms shall be specifically approved by CPFM.
2. **4" high housekeeping pad** is required for all equipment including electrical switchgear, panels, substations, chillers, pumps, tanks, compressors, elevator controllers, and similar items.

3. **Surround all equipment** with exposed moving parts with a lockable chain link fence enclosure.

00600.4 **Telephone and data communication equipment rooms** are required to be separated from all other service equipment including electrical panels, pipe chases and mechanical equipment.

1. **Minimum depth** for telephone and data rooms is 4' for installation of equipment.
2. **Provide ventilation** to all telephone and data communication rooms to maintain temperature within operational limits of equipment.

00600.5 **AVS rooms** are required to be separated from all other service equipment including electrical panels, pipe chases and mechanical equipment.

1. **Each** room shall have a minimum of 3 duplex receptacles at 120 v 20 amp.

00600.6 **Pipe chases** shall be a minimum of 2'-0" in depth (clear inside dimension) with full height access door. Piping shall be designed to permit full access by maintenance staff.

00600.7 **Exterior trash disposal area** will be designed for each project unless specifically deleted by the program of requirements.

1. **Enclosure** for the trash disposal area and recycling containers will be constructed of materials to match the building enclosure walls, substantial landscaping, or other methods as approved by the Interim Chief.
2. **Access from the building** to the trash disposal area will be direct from within the building (via the loading dock if required).

00650 MISCELLANEOUS DESIGN REQUIREMENTS

00650.1 **Site development** including lighting, landscaping, furnishings and common spaces shall be designed to enhance the safety and security of the University Community.

00650.2 **Sidewalks** shall be 8' wide (min) x 5" thick with 6 x 6 x 10/10 welded wire mesh or equivalent; cross slope; and textured finish. Provide tooled control joints at 8'-0" o.c. and expansion joints as recommended by ACI standards.

1. Sidewalks adjacent to planting beds shall include a rolled curb.
2. A 1” high curb and gutter similar to the design of the Buchtel Commons shall contain brick paving areas.
3. All work shall comply with the City of Akron specifications.

00650.3 **Temporary entrance and egress** for adjacent occupied areas must be maintained for the duration of the project.

00650.4 **Handicapped access** shall be provided in all areas. Requirements of the OBBC and American Disabilities Act (ADA) are considered the minimum standards for accessibility.

00650.5 **Doors** on opposite sides of corridors shall be offset to obstruct view from one room to another. Whenever possible, doors opening into corridors shall be recessed the width of the door to eliminate corridor obstructions.

00650.6 **Pairs of doors** requiring center mullions will be equipped with removable mullions. Pairs of doors in corridors will be equipped with vision panels.

00650.7 **Exterior doors** will be recessed or provided with other shelter to protect the

assembly.

00650.8 **Toilet room sight lines** shall be broken by design. The Associate shall verify locations of mirrors and reflected images.

00650.9 **Floor loads** shall be designed to accommodate all live and dead loads including concentrated loads from fixed and movable equipment. Live loads for all University projects shall be a minimum of 100 pounds per square foot, unless otherwise increased by OBBC.

00650.10 **HVAC equipment** shall not be located in ceiling interstices unless adequate service clearance and noise control can be achieved. Mechanical design in dormitory renovations is critical because of limited heights above ceilings.

00650.11 **Roof Access** shall be via a standard stair whenever possible.

1. If mechanical equipment is located on the roof, at least one stair tower shall be extended to provide maintenance access.
2. A means of hoisting motors, compressors, and other heavy assemblies must be provided within the stair.

00650.12 **Signage** is required for all projects unless otherwise directed. Signage shall include building signs, directional signs, room identification and building directions. All signage shall comply with latest ADA requirements.

00650.13 **Campus Building Equipment Monitoring System**

In addition to Campus clock, bell, fire alarm, exterior lighting, and communications systems, all equipment and programmed lighting control systems shall be tied into the existing monitoring system as indicated by the program or instructed by the Interim Chief. Fire Alarms must be equipped with speaker units to allow emergency notification from the panel and dispatch center.

00650.13 **Toilet rooms** shall have tile floors and walls and floor mounted, overhead braced partitions, unless otherwise approved by the Interim Chief.

00650.14 **Laboratories** shall comply with the Ohio Building Code, OSHA Standards, and NFPA 45.

00650.15 **Attic Stock** shall be a specified item to be provided to the University.

00650.16 **Emergency Showers and Eye Wash Stations** shall comply with ANSI Z358.1.

00650.17 **Maintenance access** to all appurtenances shall be included in the design of all systems.

00650.18 **Safety and Security** considerations for the elimination of blind corners and spaces.

00700 ASSOCIATE AND CONSULTANT COORDINATION

00700.1 **Coordination** between the Associate (Architect) and the consultants (Engineers) is a basic premise of the Associate's appointment. Changes in the work required because of poor coordination between the Associate and the consultants are considered errors or omissions.

00700.2 **Single line duct layouts** are not acceptable. The mechanical consultant must show the actual width and depth of all ducts and accessories.

00700.3 **Reflected ceiling plans** must show all penetrations and equipment by all disciplines including supply and return air diffusers, light fixtures, sprinkler heads, and miscellaneous equipment.

00700.4 **The architectural design** must provide sufficient space for all mechanical, electrical, and other systems. The architect will require proper installation of all systems in order to minimize the possibility of compromising the architectural design.

00700.5 **Projections through the roof** shall be aesthetically acceptable. All projections through the roof shall be shown on the building elevations. Visual screening of roof-mounted equipment is required.

00750 SUBMITTAL FOR REVIEW

00750.1 **Four (4) sets** of drawings and specifications shall be submitted to the Interim Chief for each stage of drawing review: schematic, design development, and construction document.

00750.2 **The Schematic Design Submittal** shall include:

1. **Site plan** showing adjacent buildings, existing and proposed contours, and existing and proposed utilities.
2. **Floor plans** showing each room or space, room names and numbers, and equipment layouts if applicable.
3. **Finishes and Ceiling heights.**
4. **Room numbers** will be assigned by CPFM. The Associate will provide the Department with floor plans for room number assignments. If the Associate assigns room numbers without the approval of the Department, the Associate will be required to change all plans.
5. **Exterior elevations**.
6. **MEP** selection and distribution concepts with main trunk sizes, preliminary Life Cycle Cost Analysis and controls identification.
7. **Cross section** through the entire building, selected to best show the relationships of architectural and engineering features.
8. **An isometric diagram** of the building showing all levels.
9. **Tabulations** of floor areas and volumes, with separate tabulations for new and renovated areas. The tabulation will include the programmed area for each room.
10. **Cost estimate** with square foot and cubic foot unit costs with separate tabulations for new construction and renovated areas.
11. **Outline specification** indicating materials, type of construction, plumbing, HVAC, fire protection, and electrical systems.

00750.3 **The Design Development** submittal shall include:

1. **Site plan** showing adjacent buildings, existing and proposed contours, and all existing and proposed utilities. Note the statutory requirements for separate site plans for each of the following trades: general, plumbing, HVAC, electrical, and major fire protection systems.
2. **Professional Surveyor's site survey.**
3. **Presentation boards** containing samples of all colors, materials and finishes proposed.
4. **Site development plan** by landscape architect, if included in project scope.

5. **Floor plans** showing all information from the Schematic Design Phase Submittal plus vertical pipe and duct spaces, structural columns, and other principle architectural and engineering features. Include all door schedule and room finish information and door numbers. Door numbers shall include the room number with a letter suffix.
6. **Millwork Designs** including counters, cabinets, and casework.
7. **Interior Wall Elevations** indicating appearance and arrangement of wall mounted accessories.
8. **Roof plan** showing all high and low points, drains, penetrations, walkways, exposed equipment and piping, roof structures, equipment screens, hatches, fall protection and ladders.
9. **Elevations of all exterior sides** of the building showing materials, openings, floor and rooflines, grade and foundation lines, and all items exposed to view above the parapet. Include the elevation of major utilities, which may affect foundation depth, and pavement elevations.
10. **Equipment and furniture layouts** for all floors, coordinated with power, voice and data outlets.
11. **Structural design** including analysis of loads. Live loads must be noted on all floor plans.
12. **Plumbing plans** and riser diagrams.
13. **HVAC plans** showing equipment rooms, equipment, and distribution systems.
14. **Electrical plans** showing fixtures, equipment, major distribution systems, and all communication outlets (telephone, data, and security).
15. **Life Cycle Cost Analysis** for the selected design concept and related economic analyses of sustainable design features.
16. **Catalog Sheets** of proposed equipment including hardware, mechanical equipment, lighting fixtures, and switchgear.
13. **Tabulations** of floor areas and volumes, with separate tabulations for new and renovated areas. The tabulation will include the programmed area for each room.
14. **Cost estimate** with square foot and cubic foot unit costs with separate tabulations for new construction and renovated areas.
15. **Outline specifications** including materials, manufacturers of elevator, HVAC, plumbing, fire protection, electrical and miscellaneous fixed equipment. Specification shall define the responsibilities of each trade.

00750.4 **The Construction Document Submittal** shall include:

1. **Complete sets** of drawings and specifications in the final form intended for distribution for bidding. During the review period, any changes required by the approving agencies will be made by the Associate.
2. **Drawings and specifications** must be produced to accurately reflect the requirements of each prime contract. The documents shall completely define each bid package in order that omissions and overlaps are avoided. Each prime contract as determined by the Associate, the CM and the Interim Chief would require separate, distinct documents.

3. **The Associate and his consultants** shall co-sign a letter to the Interim Chief certifying that they have reviewed, cross checked, and coordinated all documents to avoid errors, omissions, conflicts, and duplications. If the Interim Chief determines that this requirement has not been satisfied, the Interim Chief may reject the entire submittal.
4. **Prior to the issuance of the last addendum** during the bid period, the Associate shall certify by letter to the Interim Chief that all comments, changes, revisions, etc. resulting from document review by the University, insurance carrier, State of Ohio Industrial Compliance, the Ohio Facilities Construction Commission, or any other governing agencies have been incorporated into the contract documents. Items, which have been resolved and do not require inclusion in the contract documents, shall also be included in the letter of certification.

00800 CONSTRUCTION DOCUMENT SPECIFICATIONS

00800.1 **Specifications** shall state that all contract documents are based upon the first product named in the specification and the contractor who bids other approved products must include any changes required to accommodate his selected manufacturer.

00800.2 **The Associate** is required to insure that all named products are compatible with the basic building design in regard to size, weight, and service. Further, the Associate shall verify that all approved manufacturers provide products, which truly equal or exceed the requirements of the primary product.

00800.3 **Computerized specifications** must be edited to suit individual project requirements. The University of Akron will not accept the Associate's "office standard specification" in lieu of a properly edited document. All specifications will be letter size and left hand bound

00800.4 **Certain phrases** are prohibited in the specification:

1. "Owner" - use "the University".
2. "Using Agency" or "User" - use "Interim Chief Planning and Facilities Officer."
3. "Latest edition" - list publication name and number, date of publication and revisions thereto, in effect at the time of bid.

00800.5 **Certain materials** and methods of construction are prohibited in unless specifically approved by the Interim Chief:

1. Deduct alternates.
2. Materials, which are not "industry standard" size.
3. Use of explosives for any operation.
4. Powder-driven anchors where their use will damage adjacent or existing materials, equipment, or installations.
5. Unsealed penetrations of wall or floor assemblies.
6. "Or approved equal" is unacceptable in technical specifications. The Associate must specify a minimum of three manufacturers for each product.
7. Asbestos.

8. Barbed wire construction fences.
9. Wood foundation systems.
10. Grit backfill.
11. Tar and chip surfacing (except for temporary installation).
12. Metal nosings for exterior concrete stairs.
13. Surface applied finish and hardener treatment for concrete floors.
14. Masonry material allowances.
15. Stacked bond masonry.
16. Full strength acid or sand blast cleaning of masonry.
17. Split masonry coursing at door heads.
18. Exposed concrete block.
19. Contractor designed metal fabrications.
20. Hygroscopic roofing materials.
21. Dead level roofs.
22. Gypsum, tectum, or other wood fiber roof decks.
23. Pitch pans or pitch pockets.
24. Bi-fold or bi-passing doors.
25. Exterior wood doors.
26. Flush or protruding glazing.
27. Hardware allowances.
28. Floor mounted doorstops.
29. Concealed head and floor mounted door closers.
30. Concealed rod exit devices.
31. Lever type panic exit device.
32. Thresholds which exceed 1/2" in height.
33. Ceiling suspension systems, which are not independently supported from the building structural system.
34. Acoustic ceiling systems used for fire rated ceilings.
35. Acoustic ceilings less than 8'-0" above finish floor.
36. Pre-molded corners for resilient base.
37. Stucco.
38. Stair Treads with raised shapes.
39. Demountable wall systems.
40. Unit kitchens.
41. Elevator processors and equipment, which cannot be serviced by the University's elevator maintenance contractor.
42. Generic elevator wiring diagrams (wiring diagrams must reflect as-built conditions).
43. Utility suspension systems, which are not directly supported from the building structural system.
44. Wet piping systems installed over electrical switchgear, transformers, motor control centers, elevator equipment, and computer rooms.
45. Under slab or underground glass waste piping.
46. Return air plenums.
47. Utility suspension systems, which are not directly supported from the building

structural system.

48. Electrical grounding systems specified only by reference to National Electric Code requirements.
49. Direct burial electrical cable.
50. Hard Bakelite or ceramic electrical insulators.
51. Aluminum conduit.
52. Cast metal conduit fittings.
53. Plastic conduit for interior use.
54. Extra flexible non-labeled conduit.
55. Inaccessible junction boxes.
56. Conduit supported by wire ties.

End of Division 00

DIVISION

01

GENERAL REQUIREMENTS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 01 - GENERAL REQUIREMENTS

01000 PERFORMANCE

01000.1 **All work** is subject to the Standard Conditions of Contract for Construction, as provided by the University of Akron and "Special Conditions" as written by the Associate and approved by the Interim Chief.

01000.2 **Standard specifications** of the Associate's office are not acceptable unless in full compliance with this Design and Construction Guide.

01011 SUMMARY OF THE WORK

01011.1 **A general description** of each prime contract is required. This description should be brief, yet complete enough to indicate the full scope of work for each contract. The proposed use for the building should be explained. Concurrent occupancy of adjacent buildings, or parts of a renovated building should be noted.

01011.2 **List all separate contracts** that are required for the project. Separate specifications sections and drawings are absolutely required for each prime contract.

1. **Lead Contractor projects** typically include five prime contracts: General Contract (GC), Plumbing Contract (PC), HVAC Contract (HC), Fire Protection Contract (FPC), and Electrical Contract (EC).
2. **Construction Manager (CM) projects** require additional prime contracts as recommended by the Interim Chief.

01011.3 **If additional work** outside the scope of the prime contracts will be performed concurrently with the project, advise the contractors that coordination and cooperation with this work will be required.

01011.4 **University furnished** items and any related work required of the prime contractors must be identified to the bidders.

01011.5 **Project conditions** such as occupation of buildings, limited scheduling for utility connections, and special events of the University must be identified to the bidders.

01020 ALLOWANCES

01020.1 **The general provisions** of the contract apply to all work specified under allowances.

01020.2 **The net cost**, including applicable taxes, of all materials and equipment delivered and unloaded at the project site shall be included in the allowance.

01020.3 **The contractor's handling costs** on the site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowance shall be included in the contract sum, not the allowance.

01020.4 **Masonry materials** may not be specified by allowance. Provide fully detailed specifications in compliance with Division 4 requirements.

01020.5 **Finish hardware** may not be specified by allowance. Provide fully detailed specifications and schedules in compliance with Division 8 requirements.

01030 ALTERNATES

01030.1 **A limited number of alternates** may be used to insure that the base bid will be

within the construction cost estimate and to fully utilize project funds.

01030.2 **The designation** for alternates shall be:
G-1, G-2, etc. for the General contract.
P-1, P-2, etc. for the Plumbing contract.
H-1, H-2, etc. for the HVAC contract.
FP-1, FP-2, etc. for the Fire Protection contract.
E-1, E-2, etc. for the Electrical contract.
Alternates for other prime contracts should be listed in numerical order with the prefix used on the drawings for that contract.

01030.3 **Alternates** for each prime contract must be coordinated with alternates of other prime contracts. The Associate must determine the applicability of each alternate to all prime contracts, and provide a separate space on the bid form for each alternate.

01030.4 **Deduct alternates** are prohibited unless special project conditions exist.

01041 PROJECT COORDINATION

01041.1 **The Pre-Construction Meeting** will be scheduled by the University Representative through the Associate or CM after the award of contracts. All successful bidders, a representative of CPFM, the Construction Manager and the Associate will attend. The Associate or the CM will record the meeting and distribute minutes.

01041.2 **Weekly progress meetings** will be scheduled by the Associate, the CM and/or the Lead Contractor with a representative of CPFM, all other prime contractors, and major subcontractors. The time and day of the meeting will be established by the CM or Associate in cooperation with CPFM. The Associate or CM will record the meetings and distribute minutes within five (5) days of the meeting. The frequency of this meeting may be decreased or increased as project conditions determine.

01041.3 **Weekly coordination meetings** will be scheduled by the CM and/or the Lead Contractor with the Associate, CPFM, all other prime contractors, and major subcontractors. The GC will establish the time and day of the meeting. The CM or Lead Contractor will record the meetings and distribute minutes within 5 days off the meeting. Note: the recommended time for the coordination meeting is immediately prior to the progress meeting.

01045 CUTTING AND PATCHING

01045.1 **Each trade** is responsible for his own cutting and patching (If you make a hole, or use an existing hole, you patch the hole). In renovations, each contractor must seal his own work when it penetrates an existing assembly scheduled to remain. All openings that require structural framing shall be assigned to the General Trades Contractor.

01050 FLUORESCENT FIXTURE DEMOLITION

01050.1 The Contractor is responsible for the collection and disposal of lamps, ballast, and other materials which are considered hazardous and are regulated materials.

01340 SUBMITTALS

01340.1 **Construction progress schedule** is the ultimate responsibility of the Lead Contractor, or the CM. A preliminary schedule will be presented to all other prime contractors for their input. After approval by the Associate, and review by the CPFM, the schedule will be signed by all prime contractors.

01340.2 **Field reports** shall be on the form provided by the Ohio Facilities Construction Commission. The Associate shall prepare this report in triplicate and submit to the Project Manager twice monthly. The reports shall be submitted no later than the 14th and the 28th days of each month. If these dates fall on weekends or holidays, the report shall be submitted on the first working day thereafter. Each field report shall include:

1. **Individual prime contractor reports** with the percentage of work complete and a short description (i.e. "3rd floor concrete placed", "building under roof", etc.).
2. **Scheduled completion** date and weeks ahead or behind schedule.
3. **Total project report** including percentage of completion for the total project; scheduled completion date; and weeks ahead or behind schedule. Briefly describe the reasons for variation in the schedule. If the project is behind schedule, describe the methods that will be used to put the project back on schedule.

01340.3 **Shop drawings and samples** shall be submitted to the Associate as soon as possible after award of contract.

1. **The contractor shall submit one copy** of all initial shop drawing submittals to the University unless otherwise specified.
2. **The Associate** shall submit one copy of all approved shop drawings, equipment operating manuals, parts lists, etc. to the University, unless otherwise specified.
3. **Specifications for ornamental work** that requires models or patterns, will stipulate that the models or patterns become the property of the University after the work has been installed.

01340.4 **Layouts** for structure coordinates, site improvements, utilities, elevations, etc. shall be performed by a licensed engineer or surveyor employed by the contractor performing the work. This information shall be verified periodically as the work progresses.

01340.5 **The Lead Contractor or General Trades Contractor) will establish** all grade lines, levels, and benchmarks.

1. **Well-built batter boards** at all corners of the building will be maintained throughout the project.
2. **Bench marks** at each level will be established by this contractor.
3. **Exact partitions locations** on floors as guides to other trades will be established by this contractor.

01400 QUALITY CONTROL

01400.1 **Each contractor** will be required to include the cost of services by certain specialists in the bid. The Associate or CM shall supervise these services and will furnish reports to the University. Unless specifically approved by CPFM, no testing

will be the responsibility of the University.

01400.2 **Each respective specification** section will contain the details of the type service required; methods and frequency of investigations; number and type of reports required; and the method of payment for the specialist's services.

01400.3 **The following services** will be performed by qualified independent testing agencies, unless expressly exempted by the University (**note, no testing will be the responsibility of the University, unless specifically approved by CPFM**):

1. **General (or General Trades) Contract**
   Soil compaction.
   Piling and caisson inspection and tests.
   Concrete sampling and tests.
   Sound transmission tests.
   Radiation tests.
2. **Plumbing Contract**
   Supervision of gas piping purging.
   Water piping sterilization.
   Sound control tests.
3. **Heating, Ventilating, and Air Conditioning Contract**
   Air and water systems balancing.
   Soil corrosion analysis for cathodic protection.
   Sound control tests.
4. **Fire Protection Contract**
   Water flow tests at the source.
5. **Electrical Contract**
   Communications systems tests.
   Signaling systems tests.
   Sound control tests.

01506 TEMPORARY FACILITIES

01506.1 Utility Connections

1. **The University** will permit the contractors to connect to existing utilities when they are available and shall not charge for electricity, water, or high temperature hot water (HTHW) used. If HTHW is used as a temporary utility, all HTHW shall be returned to the system. When utilities are not available, the contractor responsible for the temporary utility shall arrange with the local utility company for installation of temporary utility service and shall pay all costs involved.
2. **Connections to University utilities** shall be arranged by the Associate or CM through CPFM. The Associate shall obtain drawings for existing utilities and include information concerning connections in the contract documents.
3. **Connections to City of Akron Water Distribution System** shall be arranged by the Contractor, through the Utilities Business Office at (330) 375-2554.
4. **Utility company installations** of temporary services shall be reviewed with CPFM.

01506.2 **Temporary utilities** on typical multiple prime contract projects will be provided as

follows:

1. **Heat**: Lead Contractor or General Trades contractor will provide all temporary heat until weather tight enclosure of the building as determined by the Associate and/or the CM. The HVAC contractor will provide all temporary heat after weather tight enclosure of the building. If the use of new equipment is permitted for temporary heat, the HVAC contractor will be required to provide a complete cleaning of the system and equipment, including new filters, at project completion. The specified warranty for the equipment will commence at that time.
2. **Temporary drainage** for the building excavation including trenches, sumps, pumps, or other items as required providing satisfactory working conditions for the execution, completion, and protection of all work shall be provided by the GC. Water shall be directed or pumped to existing sewage systems and shall not be permitted to run across the surface of the ground. Upon completion of basement slab, first level floor, and foundation backfill, temporary sanitary sewer shall be provided by the plumbing contractor.
3. **Temporary drainage** for trenches shall be provided by the respective contractor.
4. **Water service**: Plumbing contract.
5. **Sanitary sewer**: Plumbing contract (include pumps if required).
6. **Storm drainage**: By contract providing permanent storm drainage.
7. **Electric service**: Electrical contract.

01506.3 **Payment for temporary utilities**, if extended from non-University sources, will be the responsibility of the contractor providing the temporary service.

01506.4 **Hoisting facilities** for the project shall be provided by the GC. These facilities will be made available to other contractors and subcontractors. Other prime contractors may furnish hoisting facilities if suitable arrangements cannot be made with the GC.

1. **New elevators** may be specified for transportation of workers and materials prior to acceptance by the University. If required, the GC will pay for temporary operators. Any elevator that solely services a space, it should include hangers and pads for use as a freight.
2. **Existing elevators** may not be used for construction unless approved by the University.

01506.5 **Noise and dust control** shall be provided by the GC. Specific materials and methods shall be specified by the Associate. Other means of dust and noise control shall be provided by the GC as construction operations dictate. No emission of dust is permitted from the project.

01506.6 **Site access**

1. **Entrances and exits** for the public must be maintained during periods of joint occupancy.
2. **A 6-foot high construction fence** with gates and OSHA approved "No Trespassing" signs shall be erected at the perimeter of the project. The fence location shall be approved by the University and shall be shown on the site plan. Barbed wire is prohibited. The Construction Manager or the Lead Contractor

shall lock Gates after working hours. Keys to double locks will be furnished to CPFM.

3. **Keys** and locks for construction will be provided by the Lead Contractor or Construction Manager. If University doors are used for site security, the General Trades Contractor shall arrange and pay for a temporary cylinder. The Construction Manager or Lead Contractor shall be responsible for coordination of access by all trades, and shall restore the door to its original condition.
4. **Vehicular access** to the site shall be provided and maintained by the General Trades Contractor.
5. **Parking and loading areas** will be limited to the building site when space permits. Otherwise, all contractors are required to purchase parking permits for all vehicles for parking in University lots. (www.uakron.edu/parking)
6. **Traffic flow** shall be maintained at all times. If traffic flow must be interrupted, the contractor will notify the CM, the Associate and the University two weeks prior to the work. The contractor will be required to post the construction area with warning signs that comply with the State Highway Signage Manual. All temporary signs shall be removed after the pavement is fully restored.
7. **Street debris** including mud and spillage caused by the work shall be removed immediately by the Lead Contractor or General Trades Contractor. Failure to clean public and University rights of way may result in the University performing the work and back charging the contractor.
8. **Repair** of damaged streets, roads, or other facilities shall be the responsibility of the contractor causing the damage, at no expense to the University. Work shall be performed to the satisfaction of the University and/or the City of Akron.

01506.7 **Project identification sign** requirement of the General Conditions may be waived by the University for small projects or renovations. Otherwise, the Lead Contractor will provide the sign including shop-drawing submittal for approval.

1. **The location of the project sign**, if required, will be approved by the University and will be shown on the site plan.

01506.8 **Field office**

1. **The Lead Contractor is required** to furnish a job office trailer with sufficient space for all prime contractors, subcontractors, and the Associate's field representative.
2. **The Lead Contractor's or Construction Manager's representative** shall be present in the job office or on the building site, or otherwise readily available by phone at all times during the work.
3. **The office** facilities shall include: locks; telephone; facilities for all project meetings; and space for the Associate's field representative including desk, plan rack, file cabinet, and telephone.
4. **Each contractor** may provide its own field office trailer if site area permits.
5. **Offices within the building** may be established if the project size warrants, provided that this use does not adversely affect progress. The University must approve use of the building for temporary office use by the contractors.

01506.9 **Materials and equipment**

1. **The University** will not sign for, pay for, or otherwise accept materials for the contractors. All shipments are to be addressed to the contractor and delivered to the project site. Deliveries to The University of Akron, which arrive at the Administrative Services Building, will be returned to the sender.
2. **Transportation and handling** is the responsibility of the contractors. The Associate and CM, by visual observation and checking of the contractors' estimate for partial payment, shall control deliveries to the site to avoid congestion of storage areas with materials that cannot be installed in a reasonable time.
3. **Storage and protection** of building materials and equipment is required of each contractor and will include weather tight sheds of sufficient size to store all materials which might be damaged by the weather. All outdoor storage (when permitted by the specification) must be limited to the area within the construction fence. Small sheds shall be painted with one coat of paint (color to be selected by the University). Small identification signs are permitted.
4. **Storage of materials within the building** shall not obstruct any of the work, or entrances and exits of the building. Material storage within the building must be agreeable to all prime contractors.
5. **Storage of University equipment** will be required shortly before beneficial completion. The contractors shall make available large rooms at or near grade level for this use.
6. **Protection of University equipment** stored on site is required of all contractors; similar to the protection afforded other contractor's materials and equipment.

01631 MANUFACTURERS

01631.1 **Three manufacturers** are required to be specified for each product unless otherwise approved by CPFM (with the exception of door locks, cylinders, or other noted items).

01631.2 **Specified manufacturers** must be provided unless approved by the Associate in writing (addendum) prior to receipt of bids.

01631.3 **Single manufacturers**, when specified, are products that the University maintains with its existing parts inventory.

01631.4 **The following list of certifications** and other submittal is required, in addition to guarantees, to assure quality of materials and workmanship:

1. **General Contract**

Reinforcing steel	Mill certificate
Insulating concrete decks	Manufacturer's certificate
Face brick	Efflorescence test results
Masonry restoration	Subcontractor's record of experience
Steel joists	Manufacturer's certificate
Metal decking	Manufacturer's certificate
Caulking and sealants	Subcontractor's record of experience
Metal windows	Performance reports

Reflective insulating glass	Performance reports
Finish hardware	Submit samples to CPFM.
Fire rated ceilings	Installer's certificate
Resilient flooring	Manufacturer's certificate
Carpet and padding	Manufacturer's certificate
Painting	Manufacturer's and installer's certificate
Fire resistive coatings	Manufacturer's certificate
Laboratory equipment	Manufacturer's financial statement
Radiation protection	Installer's certificate
Elevators	Maintenance service

2. **Plumbing Contract**

Soil, waste, and vent piping	Inspection certificate
Underground services piping	Test reports
Interior piping	Test reports
Gas service and piping	Recording line charts
Fire lines	Test reports

3. **Heating, Ventilating, and Air Conditioning Contract**

Boilers	Safety and function tests
Refrigerant lines	Certificate of compliance with USA Standards
Fan ratings	Test performance seals

4. **Electrical Contract**

Primary cable installations	High voltage d-e proof tests
Cable splicing	Installer's certificate
Lightning protection	U.L. Master Label

01700 PROJECT CLOSEOUT

01700.1 **Final clean-up** of the project shall be assigned to the GC, and shall include cleaning of all horizontal surfaces, windows (inside and outside), light fixtures, convector cabinets, exposed piping and structure, equipment, HVAC grilles, and plumbing fixtures. Remove all manufacturers' labels that are not specified to remain.

1. **A competent janitorial subcontractor** experienced in construction site cleaning shall be employed to perform final clean up.
2. **Carpeting** shall be cleaned by vacuuming. Hard surface floors shall be wet mopped and sealed or waxed with materials that are currently used by the University (unless prohibited by the manufacturer).
3. **Final clean up shall be complete**, suitable for immediate occupancy by the University.

01700.2 **Affidavits, bonds, and guarantees** are required in addition to the standard forms required by the contract documents. These documents should be included in the Operating and Maintenance manuals that are to be submitted by each contractor. Include similar statements in each technical specification section, similar to the following:

1. **Affidavits**

Resilient flooring,	from manufacturer and installer
Carpet and padding	from manufacturer and installer

2. **Bonds**

Roofing	15 year guarantee
Steel metalwork	5-year guarantee
Membrane waterproofing	5-year guarantee

3. **Extended Guarantees**

Caulking and sealants	5-year guarantee
Metal windows	2-year guarantee for windows, 5-year guarantee for weather stripping
Wood doors	Lifetime guarantee
Tinted glass and Insulating glass	5-year guarantee
Chalk and marker boards	20 year guarantee
Water chillers and air Cooled condensers	5 year guarantee

01700.3 **Project record drawings** shall be provided by the Associate after final acceptance of the project.

1. **Revise tracings** to show as built conditions, including the revision date and the words "As Built". Deliver two sets of reproducible prints and one electronic copy, in a format approved by Capital Planning and Facilities Management, of the drawings to CPFM with a letter certifying that "As Built" conditions are shown.
2. **The contractors' responsibilities** regarding as built drawings are stipulated in Article 6 of the General Conditions of the specifications.

01700.4 **Equipment demonstrations** shall be scheduled by the respective contractors with the Associate, the CM and the University representative.

1. **The Associate** shall attend each demonstration with the engineer responsible for the design of the system. The University representative will invite interested University personnel.
2. **An explanation** of mechanical, electrical, and control system operations shall be composed by the engineer in layman's terminology. Multiple copies of this explanation shall be distributed to all persons at the demonstration.

01700.5 **Operation and Maintenance (O & M) Manuals** are required to be submitted in triplicate by each prime contractor. Submittal shall be 8 1/2" x 11" format in loose-leaf binders with label pockets on the front and the binding. Each applicable section of the specification shall direct the contractors to include data in the O & M manuals.

ITEM	DATA REQUIRED
Elevators	O & M instructions and project specific wiring diagrams
Piping systems	Printed diagrams showing tagged valves
HVAC controls	Printed diagrams and operating instructions
Valves	Type-written directory of tagged valves
Communications	Point-to-point wiring diagrams and operating instructions
Motor control centers	Overload heater charts

Equipment Operating instructions

01700.6 **Final inspection procedures** shall be as defined in the article entitled "Contract Completion" in the General Conditions of the specifications and in the article entitled "Acceptance of the Project" in the Ohio Facilities Construction Manual.

End of Division 01

DIVISION

02

EXISTING CONDITIONS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 02 –EXISTING CONDITIONS

02000 GENERAL REQUIREMENTS

02000.1 **The Associate** shall consult CPFM during the early planning stage of the project concerning existing utilities; alterations to existing campus drives, parking areas, and walkways; removal vs. relocation of trees and shrubs; and access to and from the site.

02000.2 **The Associate** shall be responsible to prepare a subsurface investigation report consisting of test borings, laboratory testing and engineering analysis.

02000.3 **Existing utility** locations shall be determined by the Associate in the preparation of plans for boring locations. Associate shall locate borings to avoid these utilities. Notify CPFM to schedule the work. Significant amounts of underground utility information is available at CPFM

02000.4 **Boring locations and sections** showing all soil conditions shall be shown on the drawings. The specifications shall state that the information is for the contractor's use and shall hold the University harmless for the accuracy of the information.

02000.5 **Historical items**, relics, and similar objects including, but not limited to, corner stones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the University, that may be encountered during demolition activities. Upon discovery of such items demolition shall be stopped to allow the University opportunity to investigate the site and determine if the discovery is important enough to interrupt work.

02060 SITE DEMOLITION

02060.1 **Remove existing foundations** in open areas to a minimum depth of 3' below finish grade, or below the lowest floor of a proposed building. If any portion of existing foundations remains, they must be shown on the "As Built" drawings.

02060.2 **Indicate extent** of demolition on drawings where new structures will replace existing.

02060.3 **Existing slabs** scheduled to remain under fill for new structures shall be broken to provide for drainage.

02200 ASSESSMENT

02200.1 **All Surveys** shall be created in AutoCAD based on the Ohio State Plane Coordinate System, North American Datum 1983 (feet) [OSPCS NAD83 (feet)].

02200.2 **The University** shall receive an electronic copy of the file containing the drawing and survey points.

02700 SITE DRAINAGE

02700.1 **Although normally part of the general contract**, site drainage may be better executed if included in the plumbing contract. Consult CPFM for individual project recommendations.

End of Division 02

DIVISION

03

CONCRETE

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 03 - CONCRETE

03000 GENERAL REQUIREMENTS

03000.1 **Specification format** shall follow the CSI specification format if design requires engineering by a structural engineer. Otherwise, a short-form specification suited to job conditions is acceptable.

03000.2 **Short-form specifications** for small projects limited to patching of, or filling holes in existing concrete, may include job mixing of Portland Cement concrete. Patented cementitious patching compounds may also be included. Floor underlayment compounds will be specified in finish floor specification sections.

03000.3 **Coordinate specifications** with the requirements of the Portland Cement Association, especially concerning patching.

03000.4 **Structural design** of slabs should include consideration of exposed construction which can be used for finished ceilings.

03000.5 **Tests** will be performed in accordance with ASTM C495 by a testing laboratory which has been approved by the Associate. A minimum of 4 test cylinders shall be taken during each day's pour and written reports of the tests shall be sent directly to the Associate. The laboratory shall perform tests for wet density, dry density, and compressive strength for each specimen. Costs of testing shall be the responsibility of the contractor.

03310 ARCHITECTURAL CAST IN PLACE CONCRETE

03310.1 **Architectural cast in place concrete** specifications shall include a 4' x 8' sample panel to be erected at the site. The sample panel shall be protected from construction operations, but shall be exposed to the elements. The sample panel shall remain on site until all architectural concrete has been approved by CPFM

03310.2 **On site supervision** by the Associate or his representative is required during placement of all concrete. Report any non-compliance with the specifications to CPFM

03310.3 **All concrete test reports** shall be copied to CPFM

03310.4 **Strength of concrete** shall not be less than 3,200 PSI at 28 days, except concrete specified for filling excavations over footings may be 2,500 PSI.

03310.5 **Air entrained concrete** is required for all concrete exposed to weather.

03310.6 **Water repellant admixture** shall be provided for walls below grade and floors on grade.

03310.7 **Concrete floors** shall be thermally isolated from exterior walls in compliance with the OBC. Slabs on grade shall be installed over an 8 mil polyethylene vapor barrier.

03310.8 **Exposed concrete floors** shall be specified with integral finish and hardener treatment. Separate topping is prohibited.

03310.9 **Protection for nosing** on interior concrete steps shall be provided.

03310.10 **Non-slip surfacing** aggregate shall be specified for exposed concrete ramps, steps, and landings.

03410 PRECAST CONCRETE

03410.1 **Precast concrete design** and specifications for structural concrete and concrete panels shall be based upon recommendations of the Pre-Stressed Concrete Institute.

03520 LIGHTWEIGHT INSULATING CONCRETE

03520.1 **Lightweight concrete** for roof fill shall be made with expanded shale aggregate. Any other materials for this use require approval of CPFM

03520.2 **Insulating concrete** roof decks shall have the following characteristics:

Wet density	40-60 pounds/cubic foot
Dry density	20-30 pounds/cubic foot
Compressive strength	125-225 PSI

03520.3 **Upon completion of the installation**, a certificate from the manufacturer of insulating materials must be provided to the Associate stating that materials were installed by an approved applicator in accordance with the requirements of the contract documents.

End of Division 03

DIVISION

04

MASONRY

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DESIGN AND CONSTRUCTION GUIDE

DIVISION 04 - MASONRY

04000 GENERAL REQUIREMENTS

04000.1 **Allowances** for masonry materials to match existing are not permitted. The Associate will determine the manufacturer, texture, and color of masonry units and mortar to match existing prior to bidding. Approval must be obtained from CPFM and this information will be provided to the bidders in the contract documents.

04000.2 **Enclosure wall** masonry materials shall be reinforced and insulated.

04000.3 **Match** existing coursing when present.

04000.4 **Waterproofing** shall be applied to all exterior materials, which are not inherently water resistant. Use water resistant mortar additive in walls, which will not receive applied waterproofing materials.

04000.5 **Dampproofing** shall be applied to all walls below grade, which are not otherwise sealed to prevent water entry.

04000.6 **Sample panels** are required to be built for inspection and approval prior to starting the work. Two panels, showing the full color range and texture of masonry units, bond, mortar joints, and workmanship, are required for each specified masonry unit.

04000.7 **Store all materials** in original shipment containers with Manufacturer's Packing Slip.

04000.8 **Cold weather construction** shall comply with NCMA TEK 16 "Cold Weather Concrete Masonry Construction".

04000.9 **Protect from damage** by cover or similar means all stockpiled materials and protect partially completed masonry from weather by covering top course with waterproof, non-staining membrane.

04100 MORTAR

04100.1 **Mortar** for laying masonry may be ready-mix or job-mix. Specify by types according to ASTM C270.

04100.2 **Face brick mortar** shall be tinted to match adjacent building joints, or as otherwise approved by CPFM

04100.3 **Tooled joints** shall be standard concave joints unless otherwise required to match adjacent existing joints.

04150 MASONRY ACCESSORIES

04150.1 **Joint reinforcement** shall be truss type with factory manufactured corner and tee intersection units. Joint reinforcing shall be installed in alternating block courses (16" o.c. vertical).

04150.2 **Weep holes** shall be 1/4" rope or 1/4" outside diameter clear plastic tubing. Do not use open tubing above 35' from grade.

04150.3 **Accessories for stone masonry** including anchors and dowels shall be stainless steel.

04210 BRICK MASONRY

04210.1 **Modular brick coursing**, three courses to 8 inches, is required unless otherwise required to match existing conditions.

04210.2 **Stack bond** is prohibited unless approved by CPFM for limited architectural effect.

04210.3 **Split coursing** is prohibited at the head of any opening.

04210.4 **Brick selection** shall be Belden Brick "Kingsport Velour" 4x4x12 for new construction; otherwise for renovations or additions to buildings bricks shall match the closest adjacent wall unless otherwise approved by CPFM

04210.5 **Efflorescence** test certificate must be submitted to CPFM prior to approval of selection indicating no efflorescence when tested in accordance with ASTM C67.

04210.6 **Clay facing tile** shall be select quality, ceramic glaze, and 8"x16" face. Unless otherwise approved by CPFM, clay brick masonry for all new construction will be "Kingsport" as manufactured by The Belden Brick Company of Canton, Ohio. Reinforce clay facing tile assemblies in alternating courses with approved truss type reinforcing.

04220 CONCRETE MASONRY UNITS (CMU)

04220.1 **Exposed** concrete block shall be used for wall surfaces as approved by the University. Base should be glazed structural facing tile or glazed CMU.

04220.2 **Cinder** block is prohibited.

04220.3 **Normal weight** CMU shall be used for load bearing assemblies.

04220.4 **Light weight** CMU such as Haydite or Kenlight may be used for non-load bearing assemblies.

04220.5 **Exposed exterior** CMU assemblies shall only use Grade -A washed crushed limestone aggregate and washed limestone sand.

04220.6 **Fire rated** CMU specifications shall include the following paragraph:

Assemblies, which require rated fire resistant construction, are noted on the drawings. Units for these assemblies shall be certified as the rated product of a manufacturer listed in the current edition of the Building Materials List as published by Underwriters' Laboratories, Inc. In lieu of this certification, units may be furnished on the basis of examination and certified test report from another recognized laboratory, indicating that the units are equivalent in fire resistance rating to those listed by UL. Examination shall include outside dimensions, web and shell thickness, minimum equivalent thickness, compressive strength, and type of aggregate.

04400 LIMESTONE

04400.1 **Limestone** shall be Buff Indiana Limestone except where other types may be required to match existing. Backs and bonding faces shall be damp proofed with a water barrier as approved by the Indiana Limestone Institute of America, Inc. Limestone shall not be installed lower than 4" above grade when adjacent to lawns or planted areas.

04400.2 **Non-staining sealant** such as Thiokol or acrylic based compounds shall be used for painting stonework. Silicon based compounds are prohibited for limestone.

04400.3 **Handling**, protection, and installation shall comply with the recommendations of

the Indiana Limestone Institute of America, Inc.

04455 MARBLE

04455.1 **Marble** shall be domestic. The edges of marble window stools shall be eased.

04465 GRANITE

04461.1 **Granite** shall be domestic, in thicknesses as recommended for specific applications by the manufacturer.

04500 MASONRY RESTORATION AND CLEANING

04500.1 **Five years** experience of the subcontractor must be certified by the general contractor prior to approval of the subcontractor. This certification will include the following:

1. **Experienced and skilled craftsmen** will perform the work.
2. **Subcontractor** has been in the business of masonry restoration for a minimum of five consecutive years immediately prior to the date of the specifications.
3. **A minimum of five projects** of comparable size and complexity with references and telephone numbers.
4. **Statement** that proper equipment is available and will be used for this project.
5. **Resume** of subcontractor's supervisor for this project.

04500.2 **Methods and materials** for masonry restoration and cleaning shall be the least drastic available to accomplish the work.

04500.3 **Responsibility** for protection of adjacent property and environmental containment of the work shall be maintained by the masonry restoration and cleaning subcontractor.

04500.4 **Sandblasting**, power washing with aggregate or other extreme methods are prohibited unless specifically approved for limited application by CPFM.

End of Division 04

DIVISION

05

METALS

DIVISION 05 - METALS

05120 METAL FRAMING

05120.1 **Specifications** shall be complete for this part of the work, in addition to the Structural Engineer's notes on the drawings. The Associate is responsible for complete coordination of statements in the specifications with notes on the drawings.

05120.2 **Comply** with American Institute of Steel Construction (AISC) for all structural steel.

05120.3 **Erect** structural steel within the tolerances stipulated in the A15C Code of standard practice for buildings designed with future vertical expansion provisions.

05120.4 **Specifications** will require the erection subcontractor to provide an affidavit at the completion of the job stating that the structural steel frame is plumb and level within normal tolerance specified in the code.

05210 METAL JOISTS

05210.1 **Manufacturer's certificate** of compliance with Steel Joist Institute Specifications is required.

05210.2 **Prime coat** and touch-up painting are adequate for joists, except where subject to moisture or exposed to view.

05300 METAL DECKING

05300.1 **Manufacturer's certificate** of compliance with Steel Deck Institute Specifications is required.

05400 LIGHT GAGE METAL FRAMING

05400.1 **Patented metal framing systems**, which are required for the support of plaster or gypsum board ceilings, should be specified in this section. Coordinate with Division 9 for additional direction.

05500 METAL FABRICATIONS

05500.1 **Drawings and specifications** shall be complete for all fabrications. Contractor designed metal fabrications are prohibited including stairs, ladders, and railings.

05500.2 **Specify** that the general contractor will provide lintels for all openings through walls shown on drawings for all other prime trades.

05500.3 **All exterior** or wet location ferrous metals shall be hot-dip galvanized after fabrication.

05500.4 **Metal stairs** for public access shall be exposed concrete with metal nosings.

05500.5 **Bilco** "Ladder Up" or approved equivalent safety device is required at all roof ladders through hatches.

05500.6 **Metal expansion joint covers** are required at all joints in traffic planes.

05500.7 **Gratings** shall be hot-dip galvanized after fabrication. Provide galvanized hardware cloth under all areaway gratings.

05500.8 **Dome type drain gates** shall be installed in all areaways.

End of Division 05

DIVISION

06

WOOD

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 06 - WOOD

06100 ROUGH FRAMING

06100.1 **Fire Treat** all lumber when required by code. Back up all wall and ceiling mounted accessories with wood blocking (especially wall mounted door stops, shelving standards, and window treatment hardware).

06100.2 **Solid blocking** is absolutely required behind all wall-mounted fixtures and accessories, including wall mounted doorstops.

06100.3 **Blocking** in contact with masonry, concrete, or roof termination details shall be pressure treated.

06100.4 **Truss shop drawings** shall include a complete design analysis of structural components. Data shall bear the seal and signature of a registered professional architect or engineer certifying that the design of the trusses complies with the requirements of the specifications and the OBBC (Ohio Basic Building Code).

06200 FINISH CARPENTRY

06200.1 **Conform** to Architectural Woodwork Institute Specifications (AWI) for custom quality work.

06200.2 **Back prime** all trim prior to installation. Spot prime ends.

06200.3 **Shelving** shall be stained adjustable veneered plywood shelves with hardwood edge on heavy-duty steel standards and brackets unless otherwise indicated. K.V. is normally used.

06400 CABINET WORK

06400.1 **Flush** door and drawer design preferred. Pre-manufactured cabinets are acceptable if construction will withstand use.

1. Drawers shall be installed with full extension, heavy duty, ball bearing extension hardware.
2. Flush doors shall be back laminated.

06400.2 **Counter** material for wet areas in descending order of preference is: synthetic marble; solid color plastic laminate; or horizontal grade plastic laminate.

1. **Provide auxiliary support** under counters to withstand sitting loads.
2. **Laminate underside** of all edges on plastic laminate counters to prevent clothing snags.

06400.3 **Counter tops** may be fabricated off site, but back and end splashes shall be shipped loose for field installation.

06400.4 **Cabinet hardware** specifications shall be included in this section for installation by the installer of the cabinetry.

06400.5 **Laboratory Casework** is specified in Division 10 sections.

End of Division 06

DIVISION

07

THERMAL AND MOISTURE CONTROL

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 07 – THERMAL AND MOISTURE CONTROL

07110 WATERPROOFING AND DAMP PROOFING

07110.1 **Membrane waterproofing** shall be a heavy-duty permanent waterproofing type capable of adjusting to building movements without breaking the membrane seal.

07110.2 **Preferred system** is tar or asphalt impregnated fiberglass fabric. If rubber or plastic membranes are specified, a ten (10) year experience clause is required in the specification.

07110.3 **Fully detail** all conditions on the drawings to prevent seepage from exterior sources. Concrete foundation walls around elevator pits and basements, from grade to footings, shall be treated with membrane waterproofing.

07110.4 **Compatibility** with waterstop materials, as may be required at joints shall be determined by the Associate.

07160 DAMP PROOFING

07160.1 **Bituminous damp proofing** shall be installed on all walls where interior surfaces are scheduled to receive applied finishes.

07160.2 **Install** damp proofing prior to installation of furring.

07175 WATER REPELLENTS

07175.1 **Exposed surfaces** of exterior brick, concrete block, cut stone, and precast concrete shall be coated with a penetrating, colorless, non-staining, mildew resistant water repellent. Refer to Division 4 sections for additional information.

07190 VAPOR BARRIERS

07190.1 **Under floors** use minimum 8-mil polyethylene sheet. If a crawl space occurs, protect the vapor barrier with a 3" (min.) thick concrete slab.

07190.2 **In exterior** walls and ceilings under roofs that are scheduled to be finished gypsum board, use 8-mil polyethylene sheet (preferred) or foil backed gypsum board.

07190.3 **In roof systems** use vapor retarders that are compatible with other system components.

07200 BUILDING INSULATION

07200.1 **Roof deck insulation** including cant strips, and tapered edge strips shall be non-hygroscopic. Hygroscopic materials are prohibited in any part of the roof system.

07200.2 **Maximum gap** between roof insulation boards shall be 1/4". Gaps exceeding 1/4" shall be filled with scribe cut pieces of the same insulation material. This requirement is especially important around roof penetrations and projections.

07200.3 **Daily installation** of roof insulation materials shall be limited to that amount which can be covered with the roofing membrane prior to the end of the day, or prior to the onset of inclement weather. Stockpiled materials shall be kept dry.

07200.4 **Anchor roof insulation** in accordance with manufacturer's recommendations for fastener type, size, placement, and density. Installation shall comply with Factory Mutual I-90 rating against uplift.

07200.5 **Under slabs-on grade, Foundation walls and floors** shall be insulated to a minimum total resistance as determined for Zone 5.

07310 SHINGLES AND ROOFING TILES

07310.1 **Overlapping unit roof systems** (shingles and tiles) shall not be used unless roof slope exceeds 3 1/2 units of rise to 12 units of run.

07310.2 **Asphalt or fiberglass shingles** shall be minimum fire resistive UL Class C, wind resistive type, 20 year guaranteed.

07310.3 **Clay roofing tiles** shall be installed in strict compliance with manufacturer's recommendations.

07310.4 **Waterproofing membrane** shall be detailed in at valleys, roof edges, and other areas where ice build-up may cause water to enter the roof system.

07400 Traffic coatings for Pedestrian and Vehicular Traffic shall be Elastomeric urethane, providing continuous, seamless, waterproofing for rooms with occupied spaces below and parking decks.

07530 MEMBRANE ROOFING

07530.1 **The Associate** shall submit the roof system design to Department of EOHS, the insurance carrier of the University, for their approval. Approval of the system shall be obtained prior to bid in order that their comments may be included in the contract documents.

07530.2 **Roof decks** shall be tapered concrete (preferred) or metal deck with a minimum slope of 1/4" per foot toward the drains. Dead level roofs are prohibited. Gypsum, tectum or other wood fiber decks are prohibited.

07530.3 **Single ply sheet roofing membrane** shall be EPDM (Ethylene Propylene Diene Terpolymer) not less than .60 mils (.060") thick in widths of not less than 72".

07530.4 **Liquid applied materials** including bonding adhesive, splicing cement, seam edge caulk, waterstop mastic, night sealer, and pourable sealer, shall be compatible with all materials with which they are used and shall be as recommended by the manufacturer of the sheet roofing membrane.

07530.5 **Flashing** shall be uncured neoprene sheet of not less than .60 mils (.060") thick of required shapes and sizes to suit project conditions. The manufacturer of the sheet roofing membrane shall furnish flashing materials.

1. **Pipe seals** shall be pre-manufactured neoprene boots.
2. **The roofing subcontractor to assure a complete waterproof installation shall install all flashings including pipe seals**. To achieve this requirement, flashing and sheetmetal work should be combined in one specification section.
3. **The roofing subcontractor shall install counterflashing or similar materials that are provided by other contractors**.

07530.6 **Metal bar anchor strips** and fasteners shall be specified and supplied as required by the installation conditions.

07530.7 **Wood members** used in conjunction with roof system shall be pressure treated with water-borne preservatives for above ground use in compliance with AWPB LP-2.

07530.8 **Ballast** for roofs that are exposed to view must be approved by the University.

07530.9 **Minimum term** for warranty shall be ten years unless standard manufacturer's warranty exceeds this term. The GC, the roofing subcontractor, and the manufacturer, shall furnish the written guarantee bearing their three signatures, for the complete roof installation (including installation of items supplied by other contractors).

1. **The manufacturer's standard** 15-year guarantee for elastomeric sheet membrane material shall be executed and submitted with the GC's guarantee. An authorized representative of the manufacturer shall sign this guarantee.
2. **The contractor will submit the guarantee(s) in triplicate** to the Associate, and the term shall begin when the University accepts the roof.
3. **The primary responsibility** for executing guarantee work shall lie with the general contractor.
4. **The guarantee shall include**, at no cost to the University, all labor and materials required repairing or replacing the entire roof system including insulation, membrane, flashing, sheet metal, coping, and roofing accessories as may be caused by faulty workmanship or materials.

07600 FLASHING AND SHEET METAL

07600.1 **All flashing** and sheet metal work shall be as recommended by the sheet roofing membrane manufacturer and shall be included in the roof guarantee.

07600.2 **All metal** shall be copper or soft temper stainless steel only.

07600.3 **Gutters and downspouts** shall be copper, stainless steel, or color coated metal.

07600.4 **Fascia and gravel stops** shall be extruded aluminum, copper, stainless steel, or color coated metal.

07600.5 **The top of flashing** (bottom of counterflashing) shall be a minimum of 8" above the plane of the roof (16" preferred).

07600.6 **Pitch pans are prohibited**. Items penetrating roof must be flashed with sheet metal, or preformed accessories, secured to the roof and penetrating items.

07600.7 **Relief vents** shall not be installed unless recommended by the manufacturer of the sheet roofing membrane.

07600.8 **Walkways** shall be provided to all major pieces of mechanical equipment. On ballasted roofs, use precast concrete pavers with smooth undersides. Otherwise, provide elastomeric roof treads as recommended by the manufacturer of the sheet roofing membrane.

07600.9 **Provide overflow scuppers** on each flat roof to minimize the depth of standing water in case of roof drain backup, in addition to primary roof drains.

07900 JOINT SEALANTS

07900.1 **The terms "Caulk" or "Caulking"** may be used in the documents to indicate joint sealants. The drawings, however, shall not indicate the specific type of sealant. Specifications shall define the types of sealants to be used for each specific condition and adjacent materials. Note: "caulking" is correctly used for interior applications only. The sealant specification shall include all accessories such as

seals, waterstops, backer rod, bond break tape, and primer.

07900.2 **Sealants** shall be specified for all exterior applications and those interior applications where caulking compounds are not suitable.

07900.3 **For high movement** joints, use polysulfide, 2 part polyurethane, or silicone base materials.

07900.4 **For horizontal construction joints** in concrete pavements or walks, use pourable urethane base sealant.

07900.5 **Five years experience** of applicator shall be certified to the Associate prior to the installation of any sealants.

07900.6 **Acceptance of conditions** for application of sealant materials shall be solely the responsibility of the sealant subcontractor.

1. **If substrata** is not ready, or cannot be made ready, for application of these materials, the subcontractor shall notify the GC and Associate.
2. **After sealant materials are installed**, this subcontractor assumes all responsibility for the satisfactory installation of sealants.

07900.7 **Installation** of sealant materials shall be as late in the project as possible, between cleaning operations and paint application. Do not install sealants when the temperature is below 40 degrees F. unless approved by the manufacturer and the Associate.

07900.8 **A written guarantee** for all joint sealants shall be provided by the GC and the sealant subcontractor agreeing to replace all materials that fail within 5 years after acceptance. Replacement shall be at no cost to the University. Guarantee shall be submitted to the Associate in triplicate and shall be signed by the GC and the sealant subcontractor.

End of Division 07

DIVISION

08

OPENINGS

THE UNIVERSITY OF AKRON

DIVISION 08 - OPENINGS

08000 DOORS - GENERAL PROVISIONS

08000.1 **The minimum size** of all doors shall be 3'-0" x 7'-0" x 1 3/4", except for chase access and other special doors.

08000.2 **Labeled** construction shall be specified where required by OBBC.

08000.3 **Disabled access** is required through the entire building except for mechanical rooms and maintenance areas. Provide 5" minimum high head frame for disabled door operators to run 110vac power through head to operator.

08000.4 **Exterior doors** shall be equipped complete with weather strip, threshold, automatic door bottom, and continuous cam action hinge similar to Roton. Doors subject to high winds shall have a door check. Install thresholds with stainless steel screws.

08000.5 **Multiple exterior doors** shall have fixed jamb separations except that at least one pair of doors shall have a removable mullion for large equipment access. Astragals with coordinators are not preferred. Install lock with cylinder on one door leaf only.

08000.6 **Fire Door Undercut** shall be 3/8” or less.

08110 HOLLOW METAL DOORS AND FRAMES

08110.1 **Exterior doors** shall not be less than 16 gauge metal with the top channel turned web down to eliminate dirt pockets.

08110.2 **Interior doors** shall not be less than 18 gauge metal.

08110.3 **Door frames** shall be one piece welded assemblies of not less than 16 gauge metal. Frames in interior walls of up to 8" thickness shall be full thickness of wall. Knock down frames may not be used unless otherwise approved by CPFM.

08110.4 **Frames in exterior walls** shall be back primed with asphaltic emulsion and recessed to inside face of wall.

08210 WOOD DOORS

08210.1 **Wood doors** shall be solid core (particle board core preferred) with hardwood veneer; prime or seal all hardware cutouts and top and bottom of door prior to hardware installation.

08210.2 **Bi-fold or Bi-passing** doors are prohibited.

08210.3 **Exterior wood doors** are prohibited.

08210.4 **Guarantee** shall be lifetime guarantee including re-hanging of the door at no cost to the University.

08210.5 **Judicious selection** of face veneers shall be exercised by the associate. Doors adjacent to wood paneling shall have veneers to match the paneling.

08310 FRP Doors

08310.1 Coordinate use of FRP Doors with CPFM.

08360 UPWARD ACTING SECTIONAL DOORS

08360.1 **Upward acting doors** shall be insulated metal or fiberglass, with heavy-duty track, electric operator, and weather stripping.

08360.2 **Multiple control** locations may be required for operator.

08410 ALUMINUM DOORS AND FRAMES

08410.1 **Aluminum doors** shall be wide stile, thermal break construction.

08410.2 **Heads of doors** designed for door operators shall be a minimum of 5" high.

08520 METAL WINDOWS

08520.1 **All habitable rooms** shall have at least one operable window, or section of window (awning type preferred), unless otherwise approved by CPFM

08520.2 **Prior to acceptance** by the University, proposed manufacturers must provide to the Associate copies of test reports by an independent laboratory which certify that the proposed window units meet or exceed the following performance standards:

1. **Air infiltration** of an assembled sash and frame shall not exceed .070 cubic feet of air/minute/foot of sash perimeter when subject to the static air pressure developed from a wind velocity of 50 miles per hour.
2. **No water leakage** to the interior side of the window shall be present when tested according to the Metal Curtain Wall Manual Test C1.

08520.3 **Written guarantee** shall state that all components of the installation will meet specified performance requirements for a period of 2 years following acceptance.

1. **Weather stripping** shall be guaranteed for a period of 5 years.
2. **Guarantee shall certify** that all work is in accordance with the specifications and that defects will be repaired during the term of the guarantee at no cost to the University.

08520.4 **Install windows** in wall to positively drain to the exterior. Flush or protruding glazing is prohibited.

08610 WOOD WINDOWS

08610.1 **Design of wood windows** is to be approved by CPFM. Sash to be a minimum thickness of 1 3/4", with aluminum or vinyl cladding.

08710 HARDWARE

08710.1 **Hardware allowances** are prohibited. The Associate shall specify all required hardware for each opening. All hardware shall be coordinated with the University and approved by CPFM

08710.2 **Hardware finishes** shall be BHMA 626 Satin Chromium Plated unless otherwise required to match existing hardware.

08710.3 **Locksets** shall be BEST 45H, 15H lever and sectional or full face trim, Best 93K, 15D lever and trim, or Best 48H7K mortise locks for chase doors. Note: **Do not** install plastic spacers in lock core hole and **do not** install the core retaining screw. **Do** install the cylinder retaining screw.

08710.4 **Cylinders** shall be BEST 7-pin I/C core system. Cores are provided by the project,

designed and installed by University Locking Systems.

08710.5 **Keying** shall be done at the factory. Key all cylinders to a building master and to the existing University Master Key System. Permanent keying shall be provided by the Project and installed by University Locking Systems.

1. **Cylinders for selected** custodial and maintenance doors will be keyed the same as existing similar areas.
2. **Construction master key**, which will be voided once change keys are inserted into cylinders, is absolutely required.
3. **Keying** shall be determined by CPFM.
4. **Office furniture** shall be keyed per office with one key per workstation.

08710.6 **Hinges** shall be full mortise 4 1/2" x 4 1/2" ball bearing for all doors except exterior doors. At exterior doors use continuous cam-action hinge similar to Roton. Pivot hinges are prohibited.

08710.7 **Door stops** shall be wall mounted with concealed wood blocking. Use floor-mounted stops where wall mount will not protect door and wall. Use door checks on exterior doors subject to wind loads.

08710.8 **Closers** shall be LCN 4040 RW/PA-TB, Parallel arm installation when possible. LCN 1461 RW/PA-TB, light use areas only. Floor mounted, concealed in head closers, or pivot style is prohibited.

08710.9 **Exit devices** shall be Von Duprin 99NL (Doors must be wide stile), Von Duprin 99L. Electric Exit Devices shall be Von Duprin RX QEL99L when required, or RX QEL99NL when required. Concealed vertical rod devices are prohibited.

08710.10 **Handicapped door operators** shall be Horton Auto Operators Series 4000 LE Extra Heavy Duty. Height of door head must be a minimum of 5". Provide wall button, surface mounted sensor mats, and all accessories including electric strike releases and related wiring for a complete installation. Mount transmitter (wall push button) adjacent to opening (for pairs of doors, mount on side opposite to controlled door). NOTE: At pairs of doors, only one leaf should operate by door operator.

08710.11 **Kick plates** shall be 16-gauge 10"h. x 3" less than door width.

08710.12 **Push/pull** sets shall be 4" x 16" plates with wire pull.

08710.13 **Coat hooks** shall be provided with the project for all office doors.

08710.14 **Access Control** shall be Continental CICP1800T Turbo Superterm eight Reader with Ethernet Adaptor. CICP1800RB DIDO Aux input/output panel when needed. Note: Related hardware specified by University Locking Systems**.** Access Control panels and readers provided by the project, installed by the contractor, permanent connections by University Locking Systems.

08710.15 **Power Transfers** shall be Securition C-EPT-10 power transfer. Command Access ETH6WH4545-626-CH-BB79 (2-18 AWG & 4-28AWG)

08710.16 **Power supplies** shall be Securitron BPS21-10 (for 45HW7DEU15HxIDHx626) Schlage PS906 W/option board 900-4R (for Von Duprin RXRX QEL99NL) and 900 BB battery backup, 900 FA fire alarm when needed.

08710.17 **Wire Specification** 6 cond 22 awg, Sheiled Plenum, with ground, 6 cond 18 awg Shielded Plenum, with ground. Typical wire run diagrams will be provided.

08710.18 **Removable Mullions** shall be Von Duprin keyed removable mullions 54 Series.

08710.19 **Hold open devices** shall be magnetic wall mounted type tied into the Fire Alarm System if necessary.

08710.20 **Stand Alone Keypad Locks** shall be Kaba E Plex E5200 B WL Series.

08710.21 **Mechanical/Electrical Rooms** shall have Videx Cyber Lock incorporated into the hardware schedule.

08800 GLAZING

08800.1 **Exterior glazing** shall be designed for energy conservation.

08800.2 **Interior** borrowed lights shall be polished wire glass (square grid) where required to be fire rated, or laminated glass.

08800.3 **Glaze all windows** and borrowed lights from side that will permit replacement without the use of multi-story scaffolding.

End of Division 08

DIVISION

09

FINISHES

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 09 - FINISHES

09000 GENERAL REQUIREMENTS

09000.1 **Minimum flame spread** ratings for interior finish material is Class B or as required by code.

09000.2 **All colors** must be approved by CPFM prior to release to the contractor.

09110 METAL FRAMING SYSTEMS

09110.1 **Patented systems** that are required for the support of plaster or gypsum board ceilings should be specified in separate sections.

09110.2 **All framing** shall be at a maximum spacing of 16" o.c.

09110.3 **All door and window jambs** shall be backed with a heavy gauge stud, full height from floor to structural deck or top of wall. Install standard gauge jack studs and head framing.

09110.4 **Powder driven anchors** may only be used for attachment of wall track to floors.

09110.5 **Ceiling suspension attachment** to structure above must be with toggle bolts or other approved fasteners.

09200 LATH AND PLASTER

09200.1 **Plaster** is permitted for ceilings, exterior soffits, and patch of existing plaster.

09200.2 **Stucco** is prohibited unless approved by CPFM

09250 GYPSUM BOARD

09250.1 **All material** to be minimum 5/8" fire resistance rated asbestos free gypsum board.

09250.2 **Gypsum sheathing** is required behind acrylic finish systems when installed over metal framing systems. Protect gypsum sheathing from the elements if exposed to weather prior to installation of finish system.

09250.3 **Moisture resistant** board (min.) or portland cement sheathing (preferred) is required behind all wall tile.

09250.4 **Installation** of all materials shall be as recommended by the United States Gypsum Company Gypsum Construction Handbook.

09250.5 **Horizontal** board installation is required for long walls.

09250.6 **All trim** to be metal (compound set type) unless identified for specific details.

09300 CERAMIC AND QUARRY TILE

09300.1 **Floors** shall be non-skid surface. Install floor tile flush with adjacent materials without the use of reducer strips.

09300.2 **Where tile** is mounted on walls above counters, use wall tile for back splash and end splash. Bullnose all exposed edges.

09300.3 **Ceramic and Quarry Tile** shall be from one of the following:

1. American Olean Tile Company
2. Daltile Corporation

09400 TERRAZZO

09400.1 Preferred installation for terrazzo is over a sand cushion, to isolate the finish from the structural slab. Approximately 2-3/4" is required from rough slab to finish floor.

09510 ACOUSTIC CEILINGS

09510.1 **Support systems** for acoustic ceilings shall be specified within the section for acoustic ceilings.

09510.2 **Mineral fiber** lay-in panels shall be 2 feet x 4 feet or 2 feet x 2 feet. Non-standard sizes are prohibited.

1. All panels shall be resistant to high humidity as manufactured by USG, Armstrong or third selected manufacturer.

09510.3 **All ceilings** shall be accessible systems. Metal ceiling systems (i.e. paraline) and concealed spline systems shall be limited to areas that will require minimal access.

09510.4 **Suspension systems** shall be supported directly from the building structural system and shall be supported at four corners of each lay-in fluorescent light fixture.

1. **Lay-in fluorescent** light fixtures are to be independently supported with auxiliary hangers at opposite corners of each fixture. The ceiling installer provides and installs auxiliary hangers to deck. The electrical contractor attaches hangers to fixtures.
2. Identify **this separation** of work in both the ceiling section and the electrical section of the specifications.
3. Suspension **system** shall be USG/Donn rigid x DXL fire rated or two additional selected manufacturers.

09510.5 **Ceiling panels** may only be installed when work of all other trades is complete. The Associate and all consultants must inspect the work of respective trades prior to ceiling panel installation.

09510.6 **Fire rated** ceiling finish materials shall be gypsum board. Do not specify acoustic ceiling systems for fire rated ceilings.

09510.7 **Ceiling heights** for public access areas shall not be lower than 9'. Acoustic ceilings may not be used in soffits or bulkheads lower than 8'.

09530 SOUND ATTENUATION

09530.1 **Walls** surrounding toilet rooms, conference rooms, and other user-defined areas shall be filled with sound attenuation blankets.

09530.2 **Ceilings** do not require additional sound attenuation if insulated walls are continuous to the roof deck. If sound insulated walls are not continuous to roof deck, install a 4 foot wide sound attenuation batt on both sides of insulated walls.

09650 RESILIENT FLOORING

09650.1 **Submittal** as required by the State of Ohio, Department of Industrial Relations, Division of Factory and Building Inspection must include the following:

1. **Manufacturer's certification** that all materials have been tested per ASTM Method E84 and met the requirements specified for flame spread, smoke

developed, and fuel contributed.

2. **Installer's affidavit** stating that materials installed are the same as those certified by the manufacturer.
3. **Specify triplicate submittal** with copies to the Associate, the Department of Industrial Relations, and CPFM.

09650.2 **Cleaning** and sealing of all resilient flooring material is required by the contractor prior to acceptance. Specify owner's preferred materials for cleaning and sealing floors.

09650.3 **Resilient floor tile** shall be 12" x 12" x 1/8" vinyl composition tile.

09650.4 **Resilient base** shall be 4" minimum height (rubber preferred) with cove for all installations including carpet. **Pre-molded corners** are prohibited. Score back of continuous base for outside corners.

09650.5 **Manufacturers: Tile**

4. Armstrong Commercial Flooring
5. Tarkett Incorporated
6. 3rd Selection

09650.6 **Manufacturers: Base**

1. Roppe Corporation
2. 2nd Selection
3. 3rd Selection

09680 CARPET

09680.1 **Carpet materials** will be specified as part of the General Contract unless otherwise determined by CPFM. Minimum requirements for broadloom goods shall be 100 % Nylon, type 6 or type 6.6, minimum Yarn Density of 6,100, Lifetime Static warranty: less than 3.0 kv as tested under AATCC-134, Lifetime Moisture Barrier: Passing the British Spill Test, Method E, Lifetime Edge Ravel, Lifetime Delamination, Must pass 25,000 cycles of the Roller Caster chair test (DIN 54324), 10 Year Limited Wear Warranty, dense Textured Loop carpet equal to J & J Commercial Carpet for direct glued down installation.

09680.2 **Carpet type** (broadloom or tile) will be determined by the Associate with the approval of Capital Planning and Facilities Management.

09680.3 **Carpet pad**, if required, will be synthetic hair type, with flame spread and smoke developed ratings the same as for carpet.

09680.4 **Submittal** required for approval by CPFM includes the following:

1. **Shop drawings** of seam layouts.
2. **Manufacturer's notarized statement** that carpet assembly meets the requirements of ASTM E-84 Tunnel Test for flame spread rating and smoke developed rating of 75 or less.
3. **Certified chemical analysis** of all toxic gases noted during the combustion test including relative quantities of each and degree of toxicity and irritability. Certification shall be countersigned by the installer who is responsible for compliance with the manufacturer's requirements.

09680.5 **Materials** and application equipment shall be as approved by the manufacturer.

09900 PAINT

09900.1 **The Associate** shall prepare a schedule of all surfaces to be painted and the number of coats with dry film thickness for each. Each coat shall be compatible as a system. Type and number of coats is variable, but the following systems are recommended.

09900.2 **Interior woodwork**: 1 coat filler (for open grained wood); 1 coat stain; 2 coats satin clear varnish (2.0 mil thickness minimum).

1. **Back prime** all trim.
2. **Seal tops, bottoms, and hardware cutouts** in wood doors.

09900.3 **Metal doors and frames**: 1 coat shop primer; 2 coats semi-gloss enamel. Paint tops and bottoms of doors.

09900.4 **Gypsum board**: 1 coat primer; 2 coats eggshell wall enamel.

09900.5 **Interior concrete or concrete block**: 1 coat self-sealing primer/filler; 2 coats semi-gloss enamel.

09900.6 **Elastomeric coatings** shall be used in laboratories and corridors where heavy traffic is anticipated.

09900.7 **Interior ferrous metal**: 1 coat shop primer; 2 coats semi-gloss enamel.

09900.8 **Exterior ferrous metal**: 1 coat shop primer; 2 coats gloss enamel.

09900.9 **Accent colors**, if anticipated to exceed 5% of the project, should be noted as an aid to the bidders. Instruct the bidders that the Associate's color selections are unrestricted.

9900.10 **Manufacturers shall be PPG, Sherwin Williams or 3rd selected.**

09950 WALL COVERINGS

09950.1 **Use** in public areas and upper echelon offices and at the Associate's discretion for durability and appearance. Scope of this item may be reduced if budget dictates.

09950.2 **All markings** on substrata from ink pens, markers, etc. shall be removed or sealed prior to wall covering installation.

End of Division 09

DIVISION

10

SPECIALTIES

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 10 - SPECIALTIES

10100 CHALKBOARDS, TACKBOARDS, AND MARKER BOARDS

10100.1 **Guarantee** shall be submitted to the University, signed by an officer of the manufacturer, stating that all chalkboards and marker boards which do not retain the original writing quality, erasing quality, and visual acuity for 20 years after acceptance, shall be replaced, including installation, at no cost to the University.

10100.2 **Chalkboards and marker boards** shall be porcelain enameled steel as follows: 2 coats of porcelain enamel; 18 gauge enameling steel; 1/4" exterior plywood or tempered hardboard core; 0.15" thick aluminum or rust resistant steel backing sheet.

1. **Marker boards** shall be suitable for any type of marker.

10100.3 **Tack boards** shall be vinyl-covered cork. Advise bidders that vinyl selection will match selections for vinyl wall covering.

10100.4 **Frames and trays** shall be aluminum or wood with concealed fastening devices. Mount boards to primed wood grounds.

10100.5 **Electrically** operated boards shall include access panels for servicing motors, drives, and controls. Switches shall be key operated on building master key system. Boards may require more than one control location.

10160 TOILET PARTITIONS

10160.1 **Construction shall** be baked enameled steel or solid plastic (other finishes are subject to vandalism and not as easily repaired).

10160.2 **Toilet compartments** shall be floor supported, overhead braced.

10160.3 **Urinal screens** (when required) shall be stainless steel with secure mounting to withstand lateral and vertical loads.

10160.4 **Specify curtains** for use in disabled stalls (in lieu of doors) of sufficient strength to support an adult's body weight.

10160.5 **Anchors** and fasteners shall be stainless steel, vandal-proof type.

10200 LOUVERS AND VENTS

10200.1 **Louvers and vents** shall be specified in Division 23. Where louvers or vents are an integral part of the building exterior, specify that the mechanical contractor purchase louvers and vents and deliver to general contractor for installation. Match adjacent surface finishes unless intended as accent.

10200.2 **Interior louvers** and vents shall be purchased and installed by the mechanical contractor.

10270 ACCESS FLOORING

10270.1 **Accessible flooring** systems shall be wood core, metal pan type with carpet surface and integral structural support system.

10270.2 **Install** system per manufacturer's recommendations including auxiliary structural support and accessories.

10270.3 **Coordinate** heights of all mechanical and electrical fixtures with floor.

10270.4 **Provide ramp** or other transition for disabled access if access floor cannot be

recessed to match adjacent finish floor elevations.

10440 SIGNAGE

10440.1 **All signage** is subject to the approval of CPFM.

10440.2 **Unless otherwise directed**, the project shall include: exterior building sign; building directory; floor directories; directional signs; floor identification; stairwell identification; and room identification signs/numbers. All signage must conform to ADA requirements.

10500 LOCKERS AND ACCESSORIES

10500.1 **Material** shall be enameled steel.

10500.2 **Size and quantity** will be shown on the drawings, as determined by the user program.

10500.3 **Install** lockers fully recessed into wall or with sloped top.

10500.4 **Doors** shall be vented with silencers, latch, and integral recessed hasp.

10500.5 **Base** shall be solid base with toe space and sanitary cove.

10500.6 **Accessories** shall include shelves, robe hooks and/or rods as defined by user.

10500.7 **Locking Preference** shall be confirmed.

10522 FIRE PROTECTION ACCESSORIES

10522.1 **Extinguishers** shall be at least 4:A 60B:C extinguishers. Unless otherwise required by code.

10522.2 **Fire extinguisher cabinets** shall be full recessed with flat door and trim to match adjacent wall or building hardware. Mounting height to top of the extinguisher shall be 42” or less. Interior dimensions shall be no less than 8” deep, 9” wide, and 23” high.

10605 DEMOUNTABLE PARTITIONS

10605.1 Demountable wall systems must be approved by CPFM

10650 OPERABLE PARTITIONS

10650.1 **Support** shall be overhead with no bottom track.

10650.2 **Operation** shall be motorized except for small installations.

10650.3 **Sound rating** shall be a minimum S.T.C. value of 50 unless otherwise specified.

10650.4 **Accessories** shall include automatic bottom seal and jamb seals and doors on storage pockets.

10650.5 **Passage doors** through operable partitions are not recommended. Design spaces so required exits do not occur through operable partitions.

10800 TOILET ACCESSORIES

10800.1 **Primary** material shall be stainless steel.

10800.2 **Solid wood** blocking shall be specified behind all items. Mount with concealed fasteners whenever available.

10800.3 **Disabled** accessible height is required for all accessories.

10800.4 **Console units** are not recommended. These are subject to vandalism as individual accessories and are more difficult to repair.

10800.5 **Soap dispenser** shall be shown on the drawings as provided by owner and installed by the contractor.

10800.6 **Toilet paper dispenser** shall be shown on the drawings as provided by owner and installed by the contractor.

10800.7 **Towel dispenser** shall be shown on the drawings as provided by owner and installed by the contractor.

10800.8 **Sanitary napkin** disposals shall be similar to Bobrick model B-270. Install 1 per stall in women's restrooms.

10800.9 **Robe hooks** shall be compartment manufacturer's standard. Provide 1 per stall with integral door bumper.

10800.10 **Grab bars** shall be 1 1/4" diameter with peened surface.

10800.11 **Mirrors** shall be 1/4" float/plate glass with wrap-around stainless steel frame. Provide tilt or full-length mirror for disabled access.

10800.12 **Parcel shelves** shall be built into the walls or an accessory. Provide one per toilet room.

10800.13 **Broom/mop holders** shall be installed over the janitor's sink in each custodial space.

10800.14 **Vending machines** for sanitary napkins and condoms are not required.

10800.15 **Waste receptacles** shall be provided by owner. Design sufficient floor space in toilet room for freestanding unit.

10800.16 **Toilet Seat Cover** dispensers shall be provided by owner and installed by the contractor.

End of Division 10

DIVISION

11

EQUIPMENT

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 11 - EQUIPMENT

11000 EQUIPMENT – GENERAL

11000.1 **The user program** will identify which equipment is to be specified and which equipment is to be provided by the University. Specify all electrical and mechanical connections for University provided equipment.

11000.2 **Specify** all fixed equipment as required to respond to the program. Where applicable, CPFM will advise the Associate of experience with specific types and manufacturers.

11000.3 **Moveable equipment** will be specified by the Associate unless specifically excluded from the Associate's scope of work.

11000.4 **Submittal** by Associate specified equipment suppliers shall include rough-in drawings for the other prime contractors.

11000.5 **The Associate** shall coordinate all aspects of equipment installation including coordination with sprinkler and HVAC location, receiving, unloading, distribution, and trade jurisdictions.

11050 LIBRARY EQUIPMENT

11050.1 **Library equipment**, if required, will be specified by the Associate as a separate prime contractor.

11060 THEATER, STAGE AND AUDIO VISUAL EQUIPMENT

11060.1 If any of these items are required for the project, representatives of the University will advise the Associate.

11131 PROJECTION SCREENS

11131.1 **Manually operated** ceiling or the University normally provides wall-mounted screens. Concealed blocking or reinforcing for mounting must be specified.

11131.2 **Electrically operated** screens for large lecture halls, auditoriums, classrooms and etc. are to be specified with fully automatic operation. Two control stations (front and rear of room) are required.

11400 VENDING EQUIPMENT

11400.1 **A separate franchisee** of the University will provide vending equipment, if required for the project.

11400.2 **The Associate** shall design space for vending equipment including all required utilities.

11460 UNIT KITCHENS

11460.1 **Unit kitchens are prohibited**. When serving kitchens are required, use base cabinets with drop-in appliances or with recesses for owner supplied appliances.

End of Division 11

DIVISION

12

FURNISHINGS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 12 - FURNISHINGS

12000 GENERAL REQUIREMENTS

12000.1 **Furniture** will be specified by the Associate unless specifically excluded from the Associate's scope of work.

12345 LABORATORY CASEWORK AND FIXTURES

12345.1 **Laboratory equipment**, if required, will be specified by the Associate as a separate prime contractor. A minimum of two (preferably three) manufacturers is required.

12345.2 **Utility fixtures** and fittings shall be at least of the quality specified for the plumbing, mechanical, and electrical prime contracts.

12345.3 **Water faucets** with hose connections shall be specified with vacuum breakers.

12345.4 **Ducts** for fume hoods shall be specified with non-corrosive lining.

12500 WINDOW TREATMENT

12500.1 **The Associate** will specify window treatments. Horizontal aluminum 1" slat blinds with jamb channels are preferred.

12500.2 **Vertical blinds** have shown a high failure rate.

12500.3 **Use "blackout"** treatment in audiovisual areas when required.

12500.4 **Specify all concealed blocking** or reinforcing as required for secure installation of the window treatment.

12500.5 **Window details** must include the location and type of all window treatment, including concealed blocking.

12690 ENTRANCE MATS

12690.1 **Surface mats** are usually provided by the University for Wet Areas. The inclusion of recessed entry mats does not guarantee that the University will not introduce surface mats to the project.

12690.2 **Recessed mats**, if specified, will be readily removable for cleaning.

12690.3 **Deep recesses** for mats supported on aluminum extrusions will include a floor drain.

12710 AUDITORIUM AND THEATER SEATING

12710.1 **Specify** that all seats are to have articulating tablet arms.

1. **Ten to twelve percent** of the seats shall have left hand tablet arms.
2. **Minimum size of tablet arm** shall be sufficient to completely support one sheet of 8 1/2" X 11" paper.

12710.2 **Pre-approval** of fixed seating by CPFM is absolutely required. A full size sample showing all features, materials, and finishes shall be delivered to the CPFM.

End of Division 12

DIVISION

13

SPECIAL CONSTRUCTION

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 13 – SPECIAL CONSTRUCTION

13100 ACCESS CONTROL

13100.01 **Coordination** is required between the Associate and the University for all Access Control Devices and the installation of these devices required for, but not limited to elevators; stair tower doors; and card readers.

13100.02 **Funding** shall include local funds to reimburse the University.

13100.03 **Elevators** with access control shall have an override key switch using Best 1W7B2 hardware.

13100.04 **Stair Tower Doors** secured from the stair side electromechanically requires specific code approval. Hardware shall be coordinated with the University standards.

13100.05 **Card Reader Equipment** will be purchased and installed by the University from "Local" Project Funds.

13100.06 **Wiring and Conduit** shall be provided and installed by the contractor from the backboard to each device location. All cables shall be shielded plenum with ground cable.

13100.07 **Power Transfer Devices** will be provided and installed by the contractor. The University will make permanent connections.

13100.08 **Electronic Hardware** will be purchased and installed by the contractor.

End of Division 13

DIVISION

14

CONVEYING SYSTEMS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 14 - CONVEYING SYSTEMS

14200 ELEVATORS

14200.1 **A planning conference** shall be scheduled by the Associate with CPFM to determine elevator requirements.

14200.2 **Specify maintenance** and callback service for 1 year from the date of acceptance to include the following: regular examinations and inspection; lubrication, cleaning, supplies and parts for proper operation.

1. **Competent and trained** employees of the manufacturer will perform all maintenance.
2. **Manufacturer must certify** that a service office is located within 100 miles of the University, and that a parts warehouse is located within 150 miles of the University.
3. **Elevator manufacturer** shall provide repair parts catalogs, instruction manuals, and written and verbal directions to University personnel.
4. **Notify the University** in advance of inspection or maintenance trips so employees of the University may be present.

14200.3 **Processors or other equipment** which can only be serviced by the manufacturer are prohibited. <u>The following paragraph must be included in the specification VERBATIM!</u>

> Components of the Microprocessor Logic Control shall be serviceable by the Owner's selected elevator maintenance contractor. If this is not possible without the purchase of specialized electronic diagnostic equipment, said equipment will be provided to the Owner at no additional cost.

14200.4 **Final payment for the elevator will not be made** until maintenance and instruction manuals are submitted and approved by the Associate. Specifically note that "project specific" wiring diagrams are required before release of final payment will be approved. Generic wiring diagrams will not be accepted.

14200.5 **All permits** including inspection and first operation permit are to be included in the contract.

14200.6 **Entrances** shall be fully automatic, center opening, except for "freight only" elevators. Avoid the use of double sided entrances whenever possible.

14200.7 **Full accessibility** is required for the disabled including features for the hearing and vision impaired, per A.D.A. requirements.

14200.8 **Elevator pit** shall be complete with ladder; light; sump; 1/4" steel sump cover; sump pump; oil interceptor (for hydraulic elevators); and all electrical and drainage connections.

14200.9 **Telephone** shall be purchased and installed by the elevator manufacturer in each elevator with complete cabling back to the controller for connection by telephone utility. The device shall be RATH Smartview 2, Elevator Communication Platform.

14200.10 **Hydraulic Elevators shall include an Oil Cooler** to maintain the oil temperature within operational parameters.

14200.11 **Any elevator** that solely services a space should include hangers and pads for use as a freight elevator.

End of Division 14

DIVISION

21

FIRE SUPPRESSION

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

21300 FIRE SUPPRESSION

21300.01 **General Requirements**: The Associate shall comply with all necessary building codes pertaining to the fire protection requirements.

21300.02 **UL and FM Compliance**: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated. Associate shall verify insurance requirements since their requirements may be stricter than the OBC and NFPA.

21300.03 **Systems**:

1. Fire suppression for kitchen hoods shall be a wet chemical system. Dry chemical systems will not be allowed.
2. Halon systems will not be permitted.
3. **Carbon Dioxide systems** shall be avoided. The CPFM and the Director of EOHS must grant special permission to the Associate.

21300.04 **Extra Materials**:

1. Valve Wrenches: Furnish to CPFM, 2 valve wrenches for each type of sprinkler head installed.
2. Sprinkler **Heads and Cabinets**: Furnish six extra sprinkler heads with cabinet of each style included in the project. Cabinets shall be mounted near the main fire entrance line & valves.
3. A copy of the as-built fire suppression plans shall be placed in a suitable plastic tube mounted near the fir main entrance and valves.
4. Fire Extinguisher Cabinet with a self-latching door shall not lock.

21300.05 **Piping**: Fire protection piping shall be of one of the following:

1. Copper Tubing - Drawn Temper: ASTM B 88, Type L.
2. Steel Pipe: ASTM A 120, Schedule 40, seamless, black steel pipe, plain ends.
3. Steel Pipe: ASTM A120, Schedule 10, seamless, black steel pipe, plain ends.
4. **Other piping types as approved** in writing by CPFM such as Victaulic Systems.

21300.06 **Fittings shall match the piping material** and meet NFPA requirements.

21300.07 **Sprinkler Heads**:

1. Sprinkler heads in occupied areas: Semi-recessed style head with white escutcheons are preferred in occupied areas due to the ease of installation.
2. **Sprinkler heads in mechanical rooms** shall be standard brass pendant or upright style.

21300.08 **Valves for Fire Protection Systems**: Consult CPFM, for specific requirements.

21300.09 **Miscellaneous Equipment and Specialties**: Backflow protection shall be provided with an approved double-check valve.

21300.10 **Test and Drain Valves** shall be installed on all long pipe runs to facilitate flushing of the pipe.

21300.11 **Inspector Test Connections** shall be directed outside whenever possible. When this is not possible, they should be piped into a drain suitable to handle the flow. Directing the test discharge to a slop sink or floor drain should be avoided due to damage of over-spray and/or overloading of the drain line. Test nozzles directed outside should be located such that the spray will not affect pedestrians or damage

lawns. Splash blocks shall be provided when location requires.

21300.12 **A pressure gage and check valve** shall be installed at all limited area sprinkler connections to the domestic water system.

21300.13 **Fire pumps** are not to be installed unless required. When required they shall have a reliable secondary power supply. Generators, which support fire pumps, shall start and transfer within 10 seconds. The location of Fire Pump test headers shall be approved by CPFM. The Fire Department connection shall be a five-inch storz fitting with a downward angle of 30° and located on the street side of the building, unless otherwise approved. All hose fitting shall be the AKRON THREAD.

21300.14 **Limited area sprinkler systems** shall be connected to the domestic water system as close to the building entrance as possible.

21300.15 **Limited area sprinkler system piping** shall be of a material matching the domestic water system to which it is connected.

21300.16 **Chemical Fume Hood**s shall be tested to the ASHRE 110 standard.

End of Division 21

DIVISION

22

PLUMBING

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

22350 STORM & SANITARY SEWER SERVICE (from five feet outside the building to the utility connection)

22350.01 **The site storm and sewer service piping** shall be installed by the plumbing contractor.

22350.02 **General Installation Requirements**:

1. Wherever possible, the water service connection shall be made to the University of Akron storm and sanitary sewer systems. When not possible or if project is located at one of the regional campuses, the Associate shall comply with the local codes and requirements.
2. Manholes and catch basins shall be constructed to the City of Akron's construction requirements.
3. Plans shall include a grade profile of the storm and sewer piping to ensure adequate coverage and slope.
4. City of Akron standard requirements shall be followed whenever possible. A meeting shall be arranged by the Associate, with the City's utility department and CPFM as soon as the preliminary plans are complete. The purpose of the meeting will be to familiarize the Associate with the city's requirements as well as informing the city of the project scope.

22350.03 **Plans and specifications shall be submitted** to the City of Akron for review. The submission to the City shall occur at the same time as final approvals are submitted to State Department of Commerce for permits.

22350.04 **The contractor shall pay for all tap-in fees** and contact the city for inspections of the storm water and sanitary lines.

22350.05 **Utilization fees, excavation permits, etc.**, Associated with the water service piping shall be paid for within the project budget.

22400 WATER SERVICE PIPING (from 5' outside the building to utility connection)

22400.01 **The building water service piping** shall be installed by the plumbing contractor.

22400.02 **General Installation Requirements**:

1. Wherever possible, the water service connection shall be made to the University of Akron master meter system. When not possible or if project is located at a regional campus, the Associate shall comply with the local codes and requirements.
2. No water meters are required on systems connected to the master meter system.
3. A standard clock-wise off curb cock shall be provided at the connection to the street main.
4. Plans shall include a grade profile of the water line to insure adequate coverage and sloping for air and water drainage.
5. City of Akron standard requirements shall be followed whenever possible. A meeting shall be arranged by the Associate, with the City's utility department and CPFM as soon as the preliminary plans are complete. The purpose of the meeting will be to familiarize the Associate with the city's requirements as well as informing the city of the project scope.

22400.03 **Plans and specifications** shall be submitted to the City of Akron utility department for review. The submission to the City shall occur at the same time as final approvals are submitted to the State Department of Commerce for permits.

22400.04 **The contractor shall pay for all tap-in fees** and contact the city for inspections of the water service line.

22400.05 **Utilization fees, excavation permits, etc.**, associated with the water service piping shall be paid for within the project budget.

22411 BUILDING WATER DISTRIBUTION PIPING

22411.01 **Regulatory Requirements**: comply with the provisions of the following:

1. ASME **B 31.9** "Building Services Piping" for, materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. ASME **"Boiler and Pressure Vessel Code"**, Section IX, "Welding and Brazing Qualification" for Qualifications for Welding Processes and Operators.
3. OBC Ohio Building Plumbing Code.
4. Isolation **valves** shall be provided for all applications.

22411.02 **Maintenance Stock**: Furnish one valve key for each key operated hydrant, hose bibb, or faucet installed.

22411.03 **Materials**: The following is a list of approved manufacturers for major components. The owner may submit other manufacturers for consideration during design. Where less than three manufacturers are listed, the manufacturers listed shall be used as minimum requirements and the Associate shall submit cut sheets for approval.

1. **Basket Strainers**: no specific requirements
2. **Balance Cocks**: Taco, Inc.
3. **Bibbs and Faucets**: Chicago Faucet Co.
4. **Hydrants**: Smith, (Jay R.) Mfg. Co.
   Zurn Industries Inc., Hydromechanics Div.
   Wade
5. **Backflow Preventers**: Febco.
   a. Reduced pressure backflow preventers shall be installed on the incoming water service of all new buildings and installed on existing buildings whenever there is substantial work in the area of the service entrance.
   b. A funnel and drain line shall be attached to the relief port of the backflow preventer and routed to the floor drain.
   c. A floor drain shall be installed near the water service entrance on all new installations or as directed by CPFM
   d. Reduced pressure backflow preventers shall be installed on all make-up water lines to mechanical equipment.
   e. The reduced pressure backflow assembly shall be tested and a certificate of approval inserted in a vinyl sleeve and supported from the device or mounted on the wall nearby.
6. **Pressure Regulating Valves**: Watts Regulator Co.

7. **Water Meters**: Hersey Products Inc.
   a. Water meters shall be required on the campus only where tie-in to the campus master meter system is not possible.
   b. Water "deduct" meters shall be installed on all cooling tower make-up service lines and irrigation lines. The Associate shall contact the local water department for list of approved meters.
8. **Relief Valves**: Watts Regulator Co.
   a. Relief valves shall be piped to discharge in a floor drain with only one elbow. If more than one elbow is required, a union shall be installed close to the valve to facilitate easy replacement.
   b. In no cases shall there be more than three elbows from valve to point of discharge.
9. **Water Hammer Arresters**: PPC
   a. Water hammer arrestors shall be installed in an accessible location.
   b. Water hammer arrestors shall be installed at all major fixture groupings and where ever there is a potential for water hammer.
10. **Dielectric Waterway Fittings**: Victaulic Company of America
    a. Dielectric fittings are preferred on domestic hot water systems in lieu of dielectric unions.
11. **Y-Pattern Strainers**: No specific requirements.

22411.04 **Pipe and Tube Materials**:

1. Install type L copper with wrought copper fittings on domestic water lines 3" and smaller. Piping 2" and smaller shall have wrought copper fittings with 95-5 tin antinomy solder. 2-1/2" and 3" copper piping shall use wrought copper fittings with silfos 7 silver solder.
2. Install type K copper pipe for all domestic water piping below grade. Where joints below grade are unavoidable, the joints shall be made with silver solder.
3. Install galvanized piping with threaded fittings for domestic water lines larger than 3".
4. Fittings: All brass.
5. Proprietary piping system such as Victaulic may be approved by Capital Planning and Facilities Management.

22411.05 **Drain valves** shall be installed at all low points in the system to facilitate drainage.

22411.06 **Consideration shall be given to future alteration and expansion** of the system i.e. over-sizing lines or providing capped branches for future connections.

22411.07 Whenever possible, **the domestic water piping** shall be installed in public areas such as over corridors.

22411.08 **Isolation valves** shall be installed on all fixture groups and main branch lines.

22411.09 **Isolation valves** shall be installed on all equipment.

22411.10 **All exterior wall hydrants** shall be non-freeze type and include anti-siphon device.

22420 DRAINAGE AND VENT SYSTEMS

22420.01 **Comply with the provisions of <u>OBC</u>** Ohio Building Plumbing Code.

22420.02 **Floor drains** installed in toilet rooms, laboratories, and mechanical rooms shall include trap primer tapping and trap primer. Floor drains shall not be installed within toilet compartments.

22420.03 **Roof and floor drains** shall be no smaller than 3" pipe size.

22420.04 **The following is a list of approved manufacturers** or specific requirements for major components. The owner may submit other manufacturers for consideration during design. Where less than three are listed, the manufacturer listed shall be used as the standard and the Associate shall submit cut sheets for approval.

1. Drainage Piping Specialties, including backwater valves, expansion joints, drains, trap primers, and vandal-proof vent caps:
   a. Smith (Jay R) Mfg. Co.
   b. Tyler Pipe; Subs. of Tyler Corp.
   c. Zurn Industries Inc; Hydromechanics Div.
   d. Wade Mfg. Co.
2. **PVC, Type DWV Pipe and Fittings**: ASTM D2665 pipe and fittings, with solvent cemented joints; DWV plastic fitting patterns shall conform to ASTM D3311. Solvent: ASTM D2564.
   a. PVC pipe and fittings shall not be utilized in return air spaces.
   b. PVC pipe and fittings shall not be used for above grade piping unless specifically approved by CPFM
   c. PVC piping, although not preferred, may be used below grade when approved by CPFM.
3. **Cast-**Iron Soil Pipe and fittings: ASTM A74, Service weight, hub-and-spigot soil pipe and fittings.
4. **Clamps** and compression gaskets: ASTM C564.
5. Hubless Cast-**Iron Soil Pipe and fittings**: CISPI Standard 301, Service weight, cast iron soil pipe and fittings, with neoprene gaskets conforming to CISPI Standard 310. Clamp-all brand no-hub couplings shall be used on all 4" & larger sanitary piping.
6. Proprietary piping system such as Victaulic may be approved by Capital Planning and Facilities Management.

22440 PLUMBING FIXTURES

22440.01 **Furnish special wrenches** and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt in a quantity of one device for each 10 fixtures.

22440.02 **Furnish faucet repair kits** complete with all necessary washers, springs, pins, retainers, packings, O-rings, sleeves, and seats in a quantity of 1 kit for each 40 faucets.

22440.03 **Fixtures:**

1. **Water Closets and Urinals**:
   a. Kohler Co. or American Standard
   b. Water closets shall be wall mounted whenever possible.
   c. Water closets and urinals shall be "wash-out" style.
   d. At least one floor mounted urinal shall be installed in each men’s toilet room (and delete floor drain).

2. **Lavatories**: Kohler Co.; American Standard; Elkay Mfg. Co.
3. **Stainless Steel Sinks**:
   a. Kohler Co.; American Standard or Elkay Mfg. Co
   b. Stainless steel sinks shall be self-centering and fully sound deadened.
4. **Mop Basins**:
   a. Fiat Products or equal.
   b. Sink shall be 24"x36"X10" high, and provided with mop hanger, hose and hose support.
5. **Faucets**: Kohler Co.; American Standard; Chicago Faucet Co.
6. **Flush Valves**: Sloan Valve Co. (Campus standard).
7. **Water Closet Seats**: Bemis Mfg. Co.; Beneke Corp.; Forbes-Wright Industries, Inc.; Church Products; Olsonite Corp.; Olsonite Seats.
8. **Water Coolers**:
   a. University standard bi-level drinking fountain is the Oasis PG8EBFSL, automatic run handicap accessible water cooler with optional bottle filler and wall mounting frame. For single level fountains, use Oasis PG8AC.
   b. Other manufacturers and styles are acceptable but shall be submitted to CPFM for review prior to incorporation into the project.
9. **Supplies and Stops for Lavatories and Sinks**: polished chrome-plated, loose-keyed angle stop having 1/2" inlet and 3/8" O.D. x 12" long flexible tubing outlet, and wall flange and escutcheon.
10. **Eyewash stations** shall be installed in all laboratories and shall include floor drains.
11. **Emergency** Eye Wash and Showers shall be installed per ANSI/ISEC Z358.1 (2014) standard.

22440.04 **Installation**: Faucets for mop sinks and similar faucets shall include an integral anti-siphon device.

End of Division 22

DIVISION

23

HEATING, VENTILATING AND AIR CONDITIONING

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

23010 BASIC MECHANICAL REQUIREMENTS

23010.01 **Format**: The standard CSI specification format has been used for the generation of the standard specifications. Sections 23010 thru 23250 are general mechanical items and apply to plumbing, fire suppression and heating ventilating and air conditioning (HVAC). Section 21300 applies to fire suppression systems; sections 22400 thru 22440 applies to plumbing systems and 23448 thru 23950 applies to HVAC.

23010.02 **Format**: Separate drawings and specifications are prepared for all Plumbing, HVAC, Fire Suppression and Electrical work.

23010.03 **Minimum Requirements:** This section does not cover all phases of mechanical work, but only those areas where special attention is needed. Compliance with all state, Federal and Local (Health Department approvals and site utilities connecting to the local utilities) and OSHA standards shall be minimum requirements.

23010.04 **Safety Requirements:**

1. **Safety requirements (general)**: The contractor shall be required to comply with OSHA requirements for physical hazards, safety equipment, fire fighting equipment and protective equipment.
2. **Safety Requirements**: Belt guards, coupling guards, rails, etc. shall be provided to meet OSHA requirements. Vent shafts, and vertical openings shall be enclosed and comply with all OSHA requirements.

23010.05 **Insurance Requirements:** All systems and equipment must be of a quality acceptable to the University's Insurance representatives. The Associate will be required to submit two copies of the design documents to the representative for review and comment prior to distribution.

23010.06 **Utility Connections:** Connections to the existing utilities must be prearranged for a time suitable to the University. The Associate shall contact the Interim Chief of CPFM or his designate, to schedule a planning meeting for this purpose.

23010.07 **Submittals:**

The Associate shall submit one file copy of the approved submittal information to the University. Each submittal shall be forwarded to the University at the time of approval and <u>not</u> held until the end of the project.

23010.08 **As-Built documents (Outside Utilities)**: The University shall be provided with as-built drawings on all outside utilities. The Associate or Construction Manager shall make notes for these drawings in the field during installation.

23010.09 **As-Built Documents (general)**: The University shall be provided with as-built documents as prepared by the Associate. The Associate shall prepare the as-built documents based on information provided by the contractor and verified by the Lead Contractor or Construction Manager. One set of prints shall be submitted to the owner's designate for review prior to submission of final sets and electronic copy.

23010.10 **Maintenance Manuals:**

1. One (1) preliminary review manual shall be submitted to the CPFM for review <u>after</u> the Associate has reviewed and approved. Upon approval by the

University, three (3) final sets shall be provided to the CPFM for distribution.

2. Maintenance manuals shall be bound in a hard covered, good quality, three-ring binder. The binder shall include a transparent vinyl sleeve on the front and the binder edge to protect labeling. The manual shall be labeled on the front as well as the binder with the project name, project number, and the trade covered (i.e. "plumbing", "HVAC", etc.)
3. Maintenance manuals shall include the following:
   a. Cover sheet with project name, number & contractor.
   b. Contractor and sub-contractor contact & phone list.
   c. Contractor warranty, indicating date of final acceptance.
   d. Equipment and material warranties and guarantees.
   e. Table of Contents.
   f. Tabbed sections for each topic included in the manual.
   g. Complete equipment list, with model numbers and serial numbers.

23010.11 **Prohibited Construction:** All plumbing and mechanical equipment, especially piping shall be at least three feet away horizontally from any electrical switchgear or transformers. No hydronic lines or steam lines shall pass thru telephone, transformer or switchgear rooms.

23010.12 **Design for Energy Conservation**: The University is committed to the principle of conserving natural resources and requires detailed examination of proposed construction in order to reduce initial costs and long range operating costs. The Associate shall comply with 00500, 00550, applicable Building & Energy Codes, and ASHRAE 90-75.

23010.13 **Design for Future Repair and Replacement**:

1. The Associate shall lay out equipment and mechanical rooms in such a way to facilitate the long-term maintenance of the equipment. Coil-pull clearances shall be shown on the drawings. Access to mechanical rooms shall be analyzed for future replacement of large equipment. Design safe service aisles.
2. Unless approved otherwise, all piping and ductwork shall be kept a minimum of 7'-0" above the floor in access ways and around equipment. The plans shall clearly indicate potential restrictions and detail the areas appropriately.
3. Equipment and mechanical rooms shall be located to accommodate easy access for workers, tools and replacement assemblies. If equipment or mechanical rooms are located at the roof level, at least one building stair shall be extended to the roof level and include a means to hoist motors, pumps or other large assemblies down to a level which is accessed by an elevator.

23030 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

23030.01 All electrical components shall be UL labeled.

23030.02 All electrical installations shall comply with the Division 26 specifications and with the National Electric Code.

23030.03 **Motors**:

1. **Noise rating**: All motors shall have a "Quiet" noise rating.
2. **Efficiency**: "Energy Efficient" motors shall have a minimum efficiency as

scheduled in accordance with IEEE Standard 112, test method "B".

3. All motors must be Totally-Enclosed Fan Cooled (TEFC) unless flammable gases or vapors are present; then the motors must be Totally-Enclosed Explosion Proof (TEXP).
4. The University is attempting to standardize and limit the types of motors used on campus. Therefore, motors shall be manufactured by one of the following:
   Baldor Gold
   Century E Plus
   Delco T Line
   Lincoln
   GE Energy Saver
   Louis Allis Sparten
   Marathon Blue Chip
   Relience XE
   Siemens PE21 Premium Efficiency

23030.04 **Variable Frequency Drives:**

1. Acceptable manufactures shall be Graham, Cutler-Hammer or Allen-Bradley.
2. VFD's shall not be co-located with pressurized water systems.

23050 BASIC MECHANICAL MATERIALS AND METHODS

23050.01 **Abandoned Systems**: Wherever possible, abandoned piping and ductwork shall be completely removed back to the main and capped. Underground utilities may be abandoned in-place but shall be disconnected and capped at the main. All remaining abandoned systems or components shall be accurately reflected on the "As-built" drawings.

23050.02 **Backfill and Fill Material**: Backfill requirements at road and parking lot crossings shall meet the City of Akron's standards for backfilling.

23050.03 **Joint Sealers**:

1. Elastomeric Joint Sealers shall be one-part, mildew resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, class 25 for all non-traffic areas.
2. Standard manufacturer colors shall be submitted to the Associate for selection.

23050.04 **Fire and Smoke Sealers**:

1. The contractor shall provide submittal data on each installation type for approval by the consultant.
2. Fire resistant joint sealers shall be tested in accordance with ASTM E 814 and by Underwriter's Laboratories.

23050.05 **Miscellaneous Metals:** All miscellaneous metal items such as tank or heat exchanger supports shall be primed ready for paint as a minimum, but two coats of finish paint are preferred.

23050.06 **Design Pressures and Temperatures:**

1. High Temperature Hot Water — 300 psig at 400 degrees F
2. Chilled Water — 125 psig at 43 degrees F

23050.07 **High Temperature Water System Design Considerations:**

1. Underground piping to be in conduit with a polymer outer jacket.

2. Shut off and control valves to be ball valves rated at the appropriate temperature and pressure.
3. Flange gaskets shall be spiral wound type.
4. All pipe 2 inches and smaller shall be schedule 80.
5. No brass or copper or alloys of copper can come in contact with HTW.
6. Shut off valves shall be installed outside of buildings.
7. All valves larger than 2 inches shall have a warm-up valve installed.

23050.08 **Chilled Water System Design Considerations:**

1. Underground piping shall be encased in a urethane jacket.
2. Shut off valves shall be ball valves rated at the appropriate temperature and pressure.
3. The Building chilled water loop is to be tied into the campus secondary loop as a tertiary loop.
4. The building discharge chilled water temperature is to be controlled through the campus automation system.

23100 VALVES

23100.01 **Submittal Data**: Information on each valve, including parts list, shall be submitted to the consultant for review. This information shall be included in the maintenance manuals.

23100.02 **Valves (General)**:

1. Valves shall be by one manufacturer whenever possible.
2. Hydronic systems shall utilize quarter-turn valves for isolation.
3. High Temperature Hot Water (HTHW), hot water (210^{o}F. and higher), shall utilize Butterfly Valves: CS, RF Double Flanged Ends per API #609 and F/F Dimensions per ISO 5752, Ansi/ASME B16.34 Class 300, A351 grade CF8M 316 SS discs, 316 SS/graphite laminate seats, graphite packing, Bi-directional, Bubble tight Shut-off per API #598/607, Gear Operated.
4. Drain valves shall be comprised of a 1/2" or 3/4" ball valve with a capped hose end connection. The cap shall be attached to the valve with a 12" long beaded chain.
5. Manual air vents shall be comprised of a ball valve with a capped hose end connection. The cap shall be attached to the valve with a 12" long beaded chain.
6. Proprietary valves for piping system such as Victaulic may be approved by Capital Planning and Facilities Management.

23100.03 **Valve end Connections**:

1. Potable water systems (2-1/2" & smaller): Valves shall have soldered connections where used for zone isolation or have threaded connections when used in conjunction with a union for equipment isolation.
2. Potable water systems (3" and larger): all valves shall have flanged connections.
3. Hydronic heating and cooling systems (2" & smaller): Valves shall have soldered connections where used for zone isolation or have threaded connections when used in conjunction with a union for equipment isolation.
4. Hydronic heating and cooling systems (2-1/2" and larger): Valves shall have

flanged connections.

5. HTHW valves shall have welded/flanged connections.
6. Proprietary valve connections for piping system such as Victaulic may be approved by Capital Planning and Facilities Management.

23115 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

23115.01 **Valves, 2-inch and smaller:**

SERVICE	GLOBE	BALL	CHECK	GATE
Heating Water	150	150	150	
Chilled Water	150	150	150	

23115.02 **Valves, 2½ inch and larger:**

SERVICE	GLOBE	BALL	CHECK	GATE
Domestic Hot and Cold Water	125	150	125	
Heating Water	125	200	125	
Chilled Water	125	150	12	5
Steam (15 psi or less)				
Steam Condensate (gravity, low pressure)				
Steam (15 to 80 psi)				
Steam Condensate (pumped)				

23118 VALVE SCHEDULE

23118.01 **Ball Valves - 1 Inch and Smaller:**

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	70-100	70-200

23118.02 **Ball Valves - 1¼ Inch to 2 Inch:**

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	82-100	82-200

23118.03 **Gate Valves - 2 Inch and Smaller (Class 125):**

MANUFACTURER	THREADED ENDS		SOLDER ENDS	
	NRS	RS	NRS	RS
Grinnell	3000	3010	3000SJ	3010SJ

23118.04 **Gate Valves - 2-1/2" and Larger:**

MANUFACTURER	THREADED ENDS		SOLDER ENDS	
	NRS	RS	NRS	RS
Grinnell	3050	3060	x	x

23118.06 **Swing Check Valves - 2 Inch and Smaller:**

	CLASS 125		CLASS 150
MANUFACTURER	THREADED ENDS	SOLDER ENDS	THREADED ENDS
Grinnell	3300	3300SJ	3320

23118.07 **HTHW Valves (all):**

MANUFACTURER
Zwick
Grinnell Corporation
Adams Valve USA (Type MAK)

X means not available.

23125 EXPANSION COMPENSATION

23125.01 Discuss preferred options with CPFM

23135 METERS AND GAGES

23135.01 **Thermometers**:

1. Thermometers shall be 9" long with glass front, spring secured with 180° adjustment in the vertical plane and 360° adjustment in the horizontal. Adjustment shall have locking device. Thermometers shall be well type whenever physically possible.
2. Dial thermometers will be acceptable when approved by CPFM
3. Dial thermometers shall be used in air ductwork.
4. Thermometers shall be located at the following locations (minimum):
   a. Discharge from heating hot water boilers.
   b. Discharge from domestic water heaters.
   c. Return to hydronic heating boilers.
   d. Supply and return to chillers and cooling towers (condensers).
   e. Supply and return into heat exchangers, both domestic and hydronic.
5. Manufacturers: Thermometers shall be equivalent to Trerice Company.

23135.02 **Pressure Gages**:

1. Pressure gages shall be 4-1/2" diameter.
2. Gages shall include isolation cock or Pete's plug.
3. Gages on steam systems shall include protective siphon.
4. Pressure gages shall be located at the following locations (minimum):
   a. Supply and discharge of pumps.
   b. Discharge of steam condensate pumps.
   c. Fire protection systems including limited area systems connected to potable water.
   d. At automatic fill valves.
5. Manufacturers: Pressure gages shall be equivalent to Trerice.

23140 SUPPORTS AND ANCHORS

23140.01 **Support length and location** shall be as specified in the Ohio Basic Building Code.

23140.02 **Hangers for copper pipe** shall be copper plated.

23140.03 **Hangers for refrigerant piping** shall be isolated from the hanger by a non-metallic material around the piping in such a manner as to protect the piping from damage due to vibration.

23140.04 **Chilled water piping of dual temperature** heating and cooling piping 2-1/2" and larger shall be mounted on roller hangers. The piping shall be supported on saddles of length and size as recommended by the manufacturer.

23190 MECHANICAL IDENTIFICATION

23190.01 **All piping and major equipment** shall be labeled.

23190.02 **All site utility piping** shall be labeled with underground type plastic line markers.

The tape shall be multi-ply tape consisting of solid aluminum foil core between two layers of plastic tape. Line markers shall be located 6" - 8" below finished grade.

23190.03 **Identification** shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification.

23190.04 **Label location**:

1. Equipment labels shall be located where easily seen from the front of the equipment. When the equipment itself is not able to accept the label (i.e. pressure sensitive tape does not stick to the surface) the tag shall be mounted in an appropriate location on the wall.
2. Equipment located concealed above ceilings or access doors shall be labeled utilizing an engraved tag mounted on the ceiling grid or on the access door. The tag shall have a background color matching the surface to which it is attached and the lettering shall be 1/4" high and of a contrasting color.

23190.05 **Piping** shall be labeled utilizing one of the following:

1. Standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying with ANSI A13.1.
2. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.

23190.06 **Arrows and color banding**: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic. Piping shall also be marked with color band codes; color codes shall be as developed and specified by the CPFM.

23190.07 **Valves** shall be tagged utilizing one of the following:

1. 1-1/2" diameter, 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. The tag engraving shall be filled with black enamel.
2. 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener.

23190.08 **Valve tags** shall include an abbreviation for the type of service. The abbreviations shall be as follows or as directed by CPFM:

1. Plumbing systems: CW=potable cold water; HW=potable hot water; RHW=re-circulated hot water; GAS=natural gas;
2. Fire Protection Systems: LSP=Limited sprinkler;
3. HVAC systems: CH=chilled water; HHW=hot water heating; ST=steam; SC=steam condensate; HTHW=high temp hot water.

23190.09 **Valve tags** shall be attached to the valve with brass or stainless steel chain.

23190.10 **Valve chart**: A typewritten directory of all valves shall be framed under glass and turned over the owner for mounting. The valve list shall include the valve number, type of service, and approximate location. A copy of the valve chart shall be included in the maintenance manual.

23250 MECHANICAL INSULATION

23250.01 **The following plumbing piping systems** shall be insulated (minimum):

1. Potable hot, cold and re-circulated water;
2. Horizontal storm piping inside building;
3. Roof drain sumps inside the building;
4. Horizontal piping carrying chilled water from air conditioning systems;
5. Other piping systems as directed by CPFM.

23250.02 **The following mechanical piping systems** shall be insulated (minimum):

1. Chilled water piping;
2. Heating water piping;
3. Dual temperature heating and cooling piping;
4. Steam piping;
5. Steam condensate piping;
6. Refrigerant piping (hot gas and suction);
7. System make-up water piping;
8. Horizontal condensation drain piping located in areas where surfaces could be damaged due to dripping;
9. Other piping systems as directed by CPFM

23250.03 **The following duct systems** shall be insulated:

1. Outside air intake ductwork and plenums;
2. Supply air ductwork;
3. Return air ductwork when located in un-conditioned areas;
4. Boiler breaching as required by NFPA and state codes;
5. Other duct systems as directed by CPFM.

23250.04 **The following equipment** shall be insulated:

1. Chiller components to prevent sweating;
2. Chilled water pumps.

23250.05 **All steam valves 2-1/2" and larger** shall be insulated with removable/replaceable insulation covers as manufactured by Flexpack, Multicover or Advanced Thermal.

23250.06 **Insulation Smoke & Flame Spread**

1. Mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) shall have a flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
2. Outdoor mechanical insulation may have flame-spread index of 75 and smoke developed index of 150.

23250.07 **Fiberglass Pipe Insulation:**

1. **Fiberglass Piping Insulation**: ASTM C 547, Class 1 unless otherwise indicated.
2. **Jackets for Piping Insulation**: ASTM C 921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient.
3. **Encase pipefittings insulation** with one-piece premolded PVC fitting covers.
4. **Encase exterior fiberglass piping insulation** with aluminum jacket with

weather-proof construction.

5. **Pipe insulation exposed within reach of the public** or in food service areas shall be covered with PVC covers (Cealco).

23250.08 **Flexible Unicellular Pipe Insulation (ARMAFLEX)**:

1. Flexible unicellular insulation may be used on refrigerant piping. Other piping systems may utilize flexible unicellular insulation if approved by CPFM.
2. Exterior piping shall be protected with two (2) coats of the manufacturer's recommended protective paint.

23250.09 **Cellular Glass Pipe Insulation**

1. Cellular glass pipe insulation shall be used to insulate steam and steam condensate piping in areas subject to moisture or water damage such as pits and vaults.
2. Cellular glass piping insulation may be used for direct buried steam piping provided the proper wrap is used to protect the piping and insulation.

23250.10 **Calcium Silicate Pipe Insulation**: Consult with University of Akron, CPFM, for special requirements.

23250.11 **Vermiculite Buried Pipe Insulation**: Consult with University of Akron, CPFM, for special requirements.

23250.12 **Fiberglass Duct Insulation**:

1. Rigid Fiberglass Ductwork Insulation: ASTM C 612, Class 1.
2. Flexible Fiberglass Ductwork Insulation: ASTM C 553, Type I, Class B-4.
3. Jackets for Ductwork Insulation: ASTM C 921, Type I for ductwork with temperatures below ambient and Type II for ductwork with temperatures above ambient.
4. Rigid insulation shall be used in all exposed locations, unless otherwise approved by the University.
5. Duct insulation thickness shall be increased in areas of above normal ambient temperature such as attics or near major steam reducing stations.
6. **Duct insulation shall be external** to the ductwork unless specifically authorized to the contrary by CPFM.

23448 NATURAL GAS SYSTEMS

23448.01 **Codes and Standards**:

1. **NFPA 54** - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems.
2. **OBBC** Ohio Basic Building Mechanical Code.
3. **University Insurance Carrier** requirements.

23448.02 **Gas Valves**

1. **Manufacturers:** DeZurik; Jenkins Bros.; Lunkenheimer Co.; NIBCO, Inc.; Stockham.
2. **Gas Cocks 2 Inch and Smaller**: 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.
3. **Gas Cocks 2-1/2 Inch and Larger**: MSS SP-78; 175 psi, lubricated plug

type, semi-steel body, single gland, wrench operated, flanged ends.

23448.03 **Pipe and Fittings**

1. **Steel Pipe**: ASTM A 120, Schedule 40, seamless, black steel pipe, beveled ends.
2. **Malleable-Iron Threaded Fittings**: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
3. **Steel Fittings**: ASTM A 234, seamless or welded, for welded joints.

23448.04 **All exterior piping and fittings** shall be painted with one coat of primer and two coats of protective paint.

23453 PLUMBING PUMPS

23453.01 **Codes and Standards**:

1. **Hydraulic Institute Compliance**: Design, manufacture, and install plumbing pumps in accordance with "Hydraulic Institute Standards."
2. **National Electrical Code Compliance**: Components shall comply with NFPA 70 "National Electrical Code."
3. **UL Compliance**: Plumbing pumps shall be listed and labeled by UL and comply UL Standard 778 "Motor Operated Water Pumps."
4. **NEMA Compliance**: Electric motors and components shall be listed and labeled NEMA.
5. **SSPMA Compliance**: Test and rate sump and sewage pumps in accordance with the Sump and Sewage Pump Manufacturers Association (SSPMA) Standards.

23453.02 **Pump manufacturers**:

1. **In-line circulators**: Taco; Weil Pumps.
2. **Sump pumps**: Weil Pumps

23453.03 **Sump pumps installation:**

1. **Install** in a manner to facilitate easy removal for maintenance.
2. **Sump** pumps installed in pits subject to debris and trash accumulation shall be installed in a manner to minimize clogging.
3.

23458 DOMESTIC WATER HEATERS & HEAT EXCHANGERS

23458.01 **All domestic water heating equipment** shall have a high level efficiency. This shall include insulation values, flue dampers, special controls, etc. Details of available options shall be evaluated by the Associate and presented to CPFM for discussion.

23458.02 **Codes and Standards**:

1. **Provide water** heater components, which are UL-listed and labeled.
2. **Construct** and install water heaters located in food service establishments in accordance with NSF 5, "Standard for Hot Water Generating Equipment for Food Service Establishments using Spray Type Dishwashing Machines".
3. **Install** electric water heaters in accordance with requirements of NFPA 70, "National Electrical Code".
4. **Install** gas-fired water heaters in accordance with requirements of NFPA 54, "National Fuel Gas Code".

5. **Provide** water heaters with Performance Efficiencies not less than prescribed in ASHRAE 90A, "Energy Conservation in New Building Design".
6. **The** campus insurance carrier shall approve heaters.

23458.03 **Warranty on Coil, Heat Exchanger, and Burner**: 5 years from Date of Substantial Completion.

23458.04 **Domestic Water Heater Manufacturers**:

1. **Gas or Electric Water Heater Manufacturers**: AerCo; Smith Corp. (A.O.); Lochinvar
2. **Steam or HTHW Heat Exchanger Manufacturers**: Taco.

23458.05 **Steam or HTHW heat exchangers used for domestic hot water production** shall have straight thru tube design to facilitate cleaning. (Shall have 304 stainless steel 16 gauge “U” type bundles. The shell is to be extended approximately 12 inches beyond the end of the tube bundle.)

23458.06 **Domestic hot water heat exchangers** shall be installed in pairs when possible to maintain hot water production during cleaning. This is especially critical in laboratory buildings and residence halls. Each heat exchanger shall be sized to handle at least two thirds of the total peak load.

23458.07 **Piping to the exchangers** shall be installed in a manner to have clear access for tube repairs and cleaning. Valving shall allow cleaning of one exchanger while the other remains active.

23458.08 **Capped threaded connections** shall be installed between the exchanger isolation valves and the exchanger for the addition of chemical cleaning solutions thru the exchanger. A drain valve shall be located at the lowest level.

23458.09 **Domestic Hot Water Storage Tanks**: Tanks shall be glass lined and include a ten-year warranty on the tank.

23458.10 **A bladder type expansion tank** shall be installed on all domestic hot water systems.

23510 HYDRONIC PIPING

23510.01 **The first choice for piping material** for heating water and dual temperature water is copper. The Associate shall review the maximum size of piping and maintain all copper if the largest pipe size is 2-1/2" or possibly even 3".

23510.02 **All black steel piping over 2"** in size shall have welded fittings.

23510.03 **Non-ferrous piping** is preferred for all condenser water piping and other piping, which is drained annually.

23510.04 **Drain valves** (see section on valves) shall be installed on all low points in the piping and manual air vents shall be installed on all high points of the system.

23510.05 **Automatic fill valves** shall be installed on all closed systems. Fill systems shall include reduced pressure backflow devices.

23510.06 **Hydronic Piping Specialties**:

1. **Expansion Tanks** approved manufacturers: Amtrol, Inc., Bell & Gossett ITT, or Fluid Handling Div., Taco, Inc.
2. **Multipurpose** pump discharge valves are acceptable in some cases. The Associate shall review with the University Consultant.

3. **Flexible** connectors shall be braided style; neoprene isolators are not acceptable.

23520 STEAM AND CONDENSATE PIPING

23520.01 **Copper piping** shall be kept to a minimum in steam and condensate piping systems.

23520.02 **Quarter turn valves** shall not be used in steam and condensate piping systems.

23520.03 **All major steam valves** shall be insulated with removable insulation covers. See insulation section.

23520.04 **Safety relief valves** shall be discharged outside and in an area clear of public access.

23520.05 **Steam and Condensate Piping Specialties**

1. **Safety Pressure Relief Valve manufacturers**: Armstrong Machine Works, A-Y Division; Kunkle Valve Co., Inc.; Lunkenheimer Co.; Spirax Sarco; Watts Regulator Co.
2. **Pressure Regulating Valves**: Armstrong Machine Works, A-Y Division; Fisher Controls International, Inc.; Hoffman Specialty ITT; Fluid Handling Div.; Spirax Sarco; Spence Consultanting Co., Inc.
3. **Steam Traps**: Armstrong Machine Works; Dunham-Bush, Inc.; ITT Hoffman; Spirax Sarco.
4. **Air Vents**: Armstrong Machine Works; Eaton Corp.; Controls Div.; Hoffman Specialty ITT; Fluid Handling Div.; Spirax Sarco.

23530 REFRIGERANT PIPING

23530.01 **Refrigerant piping** shall be type ACR copper with long radius fittings and silver solder joints. Pre-charged tubing will not be allowed unless specifically approved by CPFM.

23530.02 **Refrigerant piping** shall be isolated from all hangers with an approved pipe wrap, gasket or isolator.

23530.03 **The Contractor shall provide and pay for** pressure piping permits associated with refrigerant systems and provide a copy to the University of Akron.

23540 HVAC PUMPS

23540.01 **Quality Assurance**

1. **Provide components** complying with NFPA 70 "National Electrical Code."
2. **Provide** HVAC pumps which are listed and labeled by UL, and comply with UL Standard 778 "Motor Operated Water Pumps."
3. **Pump motors** shall meet the efficiency requirements specified in Section 23030.

23540.02 **Pump Manufacturers**

1. **Inline** Circulators: "Series 60," Bell & Gossett, ITT; "1600 Series," Taco, Inc.
2. **Vertical Inline Pumps**: "Series 4360," Armstrong Pumps, Inc.; "380 Series, APCO-LIGN," Aurora Pumps; "Series 80," Bell & Gossett, ITT; "Type PV," Peerless Pump; "VL Series," Taco, Inc.

3. **Base-Mounted, Close-Coupled, End-Suction Pumps**: "360 Series," Aurora Pumps; "Series 1531," Bell & Gossett ITT; "Series C," Peerless Pump; "CM Series," Taco, Inc.
4. **Base-Mounted, Separately-Coupled, End-Suction Pumps**: "360 Series," Aurora Pumps; "Series 1510," Bell & Gossett, ITT; "Type CCB, CGB, and CKB," Federal Pump Corp.; "Series F," Peerless Pump; "FM Series," Taco, Inc.
5. **Base-Mounted, Separately-Coupled, Double-Suction Pumps**: "410 Series, Model 411," Aurora Pumps; "VSC & VSCS," Bell & Gossett, ITT; "Type SC," Federal Pump Corp.; "Series 5100, Type AD," Peerless Pump; "TA Series," Taco, Inc.; "Series 3500, Type A," Weil Pump Company.

23540.03 **All base mounted pumps** shall be mounted on a 4" high house keeping pad as a minimum.

23540.04 **All pumps** shall be provided with Chesterton mechanical sleeves when size of pump permits.

23550 BOILERS

23550.01 **Campus HTHW** shall be utilized for heating and domestic water whenever feasible.

23550.02 **Where boilers** are required, natural gas is the preferred fuel.

23550.03 **All boilers** shall be high efficiency and include all accessories and controls necessary to maximize efficiency within the constraints of the project budget.

23550.04 **Equipment** shall have electronic ignition in lieu of standing pilots.

23550.05 **Equipment manufacturers**:

1. **Gas** fired hot water boilers: Lochinvar Powerfin, A.O. Smith shell & tube; other options as approved by CPFM.
2. **Electric** water boilers: Consult University of Akron and CPFM for specific requirements.

23570 BOILER ACCESSORIES

23570.01 **All boiler accessories** shall be discussed with the University, describing benefits, disadvantages, efficiencies, etc.

23575 BREACHINGS, CHIMNEYS AND STACKS

23575.01 **Codes and Standards**:

1. **Comply** with NFPA 211 "Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances."
2. **Comply** with applicable portions of UL safety standards; provide products, which have been UL, listed and labeled.
3. **Comply** with SMACNA Low Pressure Duct Standards for fabricated breaching and smoke pipe.
4. Comply with requirements of University's insurance carrier.

23670 CONDENSING UNITS

23670.01 **Codes and Standards**:

1. Capacity ratings for condensing units shall be in accordance with ARI Standard 360 "Standard for Commercial and Industrial Unitary Air-Conditioning Equipment".
2. Refrigeration system of condensing units shall be constructed in accordance with ASHRAE Standard ASHRAE 15 "Safety Code for Mechanical Refrigeration".
3. Condensing units shall meet or exceed the minimum COP/Efficiency levels as prescribed in ASHRAE 90A "Energy Conservation in New Building Design".
4. Condensing units shall be listed by UL and have UL label affixed.

23670.02 **Provide written warranty (five year)**, signed by manufacturer, agreeing to replace/repair, within warranty period, motors/compressors with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement (including refrigerant) only, and does not include labor for removal and reinstallation.

23670.03 **Equipment manufacturers:** Carrier Air Conditioning; Div of Carrier Corp.; McQuay Air Conditioning Group; McQuay Inc.; Trane (The) Co (preferred); Div American Standard Inc.; York; Div of York International.

23670.04 All condensing units shall include low and high-pressure cutout controls.

23670.05 All condensing units shall include controls necessary to prohibiting short cycling.

23680 CHILLERS

23680.01 Targeted HCFCs shall not be allowed in any new chillers.

23680.02 Due to the availability of district HTHW on the University of Akron Campus, absorption chillers shall be the chiller of choice whenever possible.

23680.03 The university is continually searching for methods to reduce energy costs on the campus, therefore, the consultant shall consider thermal energy storage systems on all projects with chillers 100 tons or larger.

23680.04 **Codes and Standards**

1. Test and rate reciprocating chillers in accordance with ARI STD 590, "Standard for Reciprocating Water-Chilling Packages."
2. Fabricate and install chillers in accordance with ASHRAE STD 15, "Safety Code for Mechanical Refrigeration". Provide Energy Efficiency Ratio (EER) for reciprocating chillers not less than prescribed by ASHRAE STD 90A, "Energy Conservation in New Building Design".
3. Provide high-efficiency motors for reciprocating chillers which comply with NEMA Studs Pub/No.'s MG 1, 2, 3, 10, and 11.

23680.05 **All reciprocating compressors** shall carry a minimum of a five (5) year parts warranty.

23680.06 **Equipment manufacturers:**

1. Centrifugal and reciprocating chillers: Trane (preferred); Carrier; York; McQuay.

2. Screw type chillers: Trane (preferred); Dunham Bush; Carrier;
3. Absorption chillers: Trane (preferred); Carrier; York.

23680.07 **Access** shall be maintained for unrestricted removal of the tubes.

23680.08 **The consultant** shall plan for future removal of the chiller by providing removable access panels, adequately sized equipment wells, aisles, etc.

23680.09 **Piping** shall be designed and installed in a manner to enable the annual cleaning of the tubes.

23680.10 **The chiller controls** shall enable chilled water reset by the energy management system.

23680.11 **Chillers** shall be mounted on a 4" high (minimum) reinforced concrete housekeeping pad.

23700 COOLING TOWERS

23700.01 **Codes and Standards**

1. Provide electric motors and electrical components required as part of factory-fabricated cooling towers, which have been listed and labeled by UL and comply with NEMA Standards.
2. Provide cooling towers approved by the University Insurance carrier.

23700.02 **Preferred equipment manufacturers:** Marley; Baltimore Air Coil; Evapco.

23700.03 **The consultant** shall review each of the manufacturers to confirm size and weight compatibility when developing the design documents.

23700.04 **If budget allows, an indoor sump tank** is preferred in order to conserve water, electricity and chemical treatment.

23700.05 **The towers** shall be mounted on structural steel, primed, and painted with two coats of quality exterior grade paint. If budget allows, the towers shall be mounted on galvanized support steel.

23700.06 **Roof mounted cooling towers** shall be mounted a minimum of 24" above the roof (24" to lowest portion of support steel) to facilitate future roof maintenance.

23700.07 **Cooling towers shall be provided** with distribution basin covers.

23700.08 **Tower make-up lines** shall have a winter shut-off valve located such that the tower lines can easily be drained to avoid freezing (min. 1-1/4" make-up float valve).

23700.09 **Open tower system piping** shall be a non-ferrous pipe such as fiberglass, PVC, or ABS. This eliminates the continual cleaning problems associated with rust flaking in steel piping.

23700.10 **Cooling tower fan** shall be controlled by a frequency drive whenever possible. Two speed fans shall have a soft start on the low speed as a minimum.

23700.11 **Cooling towers for absorption chillers** shall include a tower by-pass for control of condenser water temperature at initial start-up. Water must be bypassed to the tower cold basin.

23700.12 **Cooling tower sump outlet** shall be a minimum of 48" higher than the suction inlet of the tower water pump.

23700.13 **Cooling tower design and construction** shall include an access ladder to the hot basin and fans. The ladder shall include guards to prevent falling.

23740 AIR COOLED CONDENSERS

23740.01 **Codes and Standards**

1. Air cooled Condensers shall meet or exceed the minimum COP/Efficiency levels as prescribed in ASHRAE 90A "Energy Conservation in New Building Design".
2. Air cooled Condensers shall be listed by UL and have UL label affixed.

23740.02 **Equipment manufacturers:** Roof top condensers shall be of the same manufacture as the compressor equipment.

23740.03 **Roof mounted equipment** shall be mounted such that the roof may be maintained below the unit. For larger equipment, the unit shall be mounted 18" minimum, 24" preferred, above the roof.

23740.04 **Equipment shall be mounted** such that there is a minimum of ten feet to the edge of any drop-off or roof edge (unless otherwise approved by CPFM).

23740.05 **Ground mounted equipment** shall be mounted on a reinforced concrete pad designed to support the weight of the unit.

23740.06 **Ground mounted equipment** shall be located to minimize public access by location or by installation of a security barrier or screen.

23740.07 **Ground-level installations** shall be selected and designed to prevent the accumulation of grass clippings or other debris, which can block airflow.

23755 HEAT EXCHANGERS

23755.01 **Codes and Standards**: Construct and install heat exchangers in accordance with "Standards of the Tubular Exchanger Manufacturers Association" (TEMA).

23755.02 **Equipment manufacturers:** Bell & Gossett ITT; Fluid Handling Div.; Taco, Inc.

23755.03 **Heat exchangers shall be mounted** with adequate access for tube cleaning and tube replacement.

23755.04 **Heat exchanger supports** shall be painted with primer and two coats of enamel paint.

23755.05 **Heat exchangers for building heat** shall be installed in pairs whenever possible. Each exchanger shall be sized for a minimum of one half of the total heat requirement. Valves shall be installed to facilitate concurrent cleaning of one unit while the other is in operation.

23755.06 **Taps with ball valve and capped hose connection** shall be installed on the equipment side of the isolation valves for the purpose of circulating chemical cleaners thru individual exchangers.

23755.07 **Thermometers and gages** shall be installed on the inlets and outlets of water piping and gages on inlet of steam piping.

23755.08 **Heat exchangers for heating domestic hot water** shall have a straight through tube arrangement to allow for tube cleaning from both ends.

23755.09 **Heat exchangers for hydronic heating** also will have straight tubes as the preferred arrangement.

23800 TERMINAL HEATING EQUIPMENT

23800.01 **Codes and Standards**

Test and rate baseboard and finned tube radiation in accordance with I=B=R, provide published ratings bearing emblem of I=B=R.

23800.02 **Equipment; Preferred Manufacturers and types**:

1. Finned Tube Radiation: No preferred manufacturer. Radiation covers shall include manual dampers with occupant accessible operators.
2. Electric Baseboard Radiation: No preferred manufacturer. Electric Baseboard in occupied areas shall include accessible temperature modulation.
3. Radiant Ceiling Panels: Aerotec, Airtex, Sun-el
4. Convectors: No preferred manufacturer.
5. Unit Heaters: Trane.
6. Cabinet Heaters: No preferred manufacturer.
7. Mixing Boxes: Krueger or Titus with factory installed and set pneumatic controls. Reheat valves shall be installed with unions for easy replacement.
8. Coils shall be 18 gauge copper tubing.

23850 AIR HANDLING UNITS

23850.01 **Air Handling units** shall be located in a completely enclosed mechanical room whenever possible. Roof and ground mounted equipment is unacceptable unless otherwise approved by CPFM.

15850.02 **All air-handling units** shall include outside air economizer unless other wise approved.

15850.03 **Air Handling units** shall include humidifying systems when ever economically feasible.

15850.04 **Codes and Standards**

1. Test and rate air handling units in accordance with AMCA standards.
2. Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", display certification symbol on units of certified models.
3. Provide air handling unit internal insulation having flame spread rating not over 25 and smoke developed rating no higher than 50 and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
4. Construction should be double wall aluminum; chilled water coils shall be copper coils with stainless steel supports, casing and drip pan. Dampers are to be seal tight style with pneumatic motors. Preheat coils are to be a Wing style coil.

23850.05 **Preferred Manufacturers (pre-built):** Trane (preferred); Carrier; York; McQuay.

23850.07 **Preferred Manufacturers (custom built)**: Air Enterprise.

23850.08 **Units shall be mounted on appropriate equipment bases** or house keeping pads.

23850.09 **Adequate space shall be provided** for coil replacements. Coil pull space shall be indicated on the construction documents.

23850.10 **The consultant shall design installation** with future replacement of the unit in

mind.

23850.11 **Variable Frequency Drives** shall be Fincor, Graham, or Allen Bradley with manual bypasses.

23870 EXHAUST FANS

23870.01 **Codes and Standards**

1. Provide power ventilators, which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Ratings Seal.
2. Provide power ventilators, which are designed, manufactured, and tested in accordance with UL 705 "Power Ventilators".

23870.02 **Preferred Manufacturers (roof mounted and inline)**: Penn; Cook; Greenheck other equivalents as approved

23870.03 **All exhausters shall have means of disconnecting power** to drive unit at or close to the unit.

23870.04 **Roof mounted fans with dampers, gravity or motorized**, shall be installed with access to the damper via a hinged mounting or with access doors.

23885 AIR CLEANING

23885.01 **Access to the filters** shall be made with out the use of tools.

23885.02 **Larger air handling units (greater than 10,000 CFM)** shall include a prefilter section and a bag filter section. Do not use roll pre-filters

23885.03 **Larger air handling systems (greater than 10,000 CFM)** shall include a port on the up stream and the down stream sides of the filters for installation of a portable magnahelic pressure-measuring device. One measuring device shall be turned over to CPFM at the close of the project.

23885.04 **The contractor shall replace all filters** upon final completion of the project. Coils shall also be cleaned if dirt build-up due to lack of maintenance is apparent.

23885.05 **The contractor shall be responsible for filter maintenance** when the unit is used for temporary ventilation purposes while construction continues.

23885.06 **Extra Stock**: The contractor shall supply one complete set of filters at the close of the project. Where the unit has prefilters and final filters, the contractor shall provide only the prefilter spare set.

23885.07 **All filters** shall be replaced prior to balancing.

23891 METAL DUCTWORK

23891.01 **Quality Control**: The contractor fabricating and installing the sheetmetal work shall be a firm regularly engaged in such work and shall have a minimum of three years of experience.

23891.02 **Codes and Standards**:

1. Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
2. Comply with ASHRAE Handbook, Equipment Volume, Chapter 1" Duct Construction", for fabrication and installation of metal ductwork.

23891.03 **Field Reference Manual**: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

23891.04 **Shop Drawings**: The sheetmetal contractor shall be responsible for the coordination drawings associated with large projects. The sheetmetal contractor shall be responsible for ultimate coordination between the other trades with utilities in the ceiling spaces (electric, sprinkler, lighting, plumbing, etc.)

23891.05 **Fiberglass ductwork** shall not be allowed.

23891.06 **Due to lower installed costs, round ductwork** shall be utilized wherever space allows.

23891.07 **Flexible Ductwork**

1. Flexible ductwork shall be used for the connection to distribution diffusers where feasible. The use of the flexible duct allows for minor adjustment to the location of the diffuser during future space modifications as well as lowers initial installation costs.

2. Flexible ductwork shall be no longer than five feet in length and include no more than 180^{o} (two elbows) of direction change.

23891.08 **Duct liner**

1. Duct liner must be approved by CPFM. When used it shall be kept to a minimum on distribution duct supplying terminal control boxes but may be used down stream of the boxes for sound control and insulation.
2. Ductliner shall be of a non-friable type to prevent entrainment of fiberglass particles in the air stream.

23891.09 **All duct joints** shall be sealed with an approved joint compound.

23891.10 **The distribution ductwork on larger systems (10,000 CFM or higher)** shall be leak tested by an approved testing agency to guarantee duct leakage is kept below 1% of the design air flow.

23891.11 **Chemical exhaust ductwork** shall be tested by an approved testing agency to guarantee duct leakage is below 1% of the design airflow.

23891.12 **Large ductwork** shall not be supported from the roof deck unless approved by the structural consultant. Consult with University of Akron CPFM for further information.

23891.13 **Prohibited Installations**:

1. Ductwork shall not be installed below grade or under floor slabs unless otherwise approved by University of Akron, CPFM.
2. Ductwork shall not pass thru electric vaults or rooms.

23891.14 **Equipment Connections**: Connections to equipment shall be made with a flexible duct connection 3" to 4" wide.

23910 DUCTWORK ACCESSORIES

23910.01 **This section describes requirements for dampers (manual, control, fire and smoke); turning vanes, duct access doors, etc.**

23910.02 **Ductwork accessories** shall be provided by the sheetmetal contractor and therefore all quality assurance and standards listed under that section shall apply to this section.

23910.03 **Balance or volume dampers** shall be provided at all branches for balancing purposes. These dampers should be shown on the drawings.

23910.04 **Manual dampers** shall be installed over public areas whenever possible.

23910.05 **Outside air dampers** shall be low leakage type and have a maximum air leakage

of 2% of the air quantity calculated at 2,000 fpm face velocity through the damper and 4.0 inches w.g. pressure differential. If the installation is questionable, the contractor shall be required to test the leakage rate of the damper to verify specified maximums.

23910.06 **Fire & Smoke Dampers**

1. Fire dampers shall be out-of-the-airstream type wherever possible.
2. Access shall be provided to all fire dampers. If damper cannot be reached via a distribution opening, an access door shall be provided.
3. Access door shall be large enough to access and reset the fire damper but no less than 12"x12".
4. Access doors (on the duct, not chase access doors) shall be labeled indicating the access for the fire damper.
5. Motorized smoke and fire dampers shall be labeled as such at the operator so as not to be confused with temperature control dampers.

23910.07 **Turning Vanes** shall be installed at all bends in the supply air ductwork unless recommended otherwise by the consultant. Discuss with University of Akron, CPFM.

23910.08 **Test holes** shall be provided at each section of air handlers for testing purposes. The test slots shall include a cover to minimize duct leakage.

23910.09 **Quadrant locks** shall be provided at all dampers. Insulated ductwork shall have the bearing plates extended so that the insulation does not interfere with the damper operation.

23910.10 **Duct access doors** shall be provided wherever required to maintain equipment in the ductwork including the following:

1. Fire and smoke dampers.
2. Control dampers in order to verify operation.
3. On the inlet side of coils (including air handler coils) for cleaning purposes.
4. At the inlet of in-line fans for cleaning and operation verification.

23932 AIR OUTLETS AND INLETS

23932.01 **This section describes requirements for diffusers, grilles, registers and louvers.**

23932.02 **Air outlets and inlets** shall be provided by the sheetmetal contractor and therefore all quality assurance and standards listed under that section shall apply to this section.

23932.03 **Codes and Standards**:

1. Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
3. Provide air outlets and inlets bearing ABC Certified Rating Seal.
4. Provide louvers bearing AMCA Certified Rating Seal.

23932.04 **Ceiling diffusers and registers** shall be lay-in type whenever possible. This reduces initial installation as well as future renovation costs.

23932.05 **Air outlets** should be balanced by a manual damper in the ductwork instead of a

damper at the diffuser. This minimizes tampering of the balanced system by room occupants.

23932.06 **Return air** shall be via a return air ceiling whenever possible. Consult with CPFM if the return air system will be otherwise. The use of return air ceilings will save both installation and future renovation costs. Coordinate all items within the plenum as plenum-rated.

23932.07 **The University prefers a supply diffuser, which the throw directions** may be changed in the field such as the Titus PAS perforated diffuser.

23932.08 **Diffuser throw directions and grill/register louvers** shall be adjusted to the proper position by the balance contractor. A note should be included in the specifications and on diffuser schedule directing the contractor to perform this final setting since it is often not done.

23932.09 **Egg crate type grills** shall not be used due the difficulty in cleaning.

23932.10 **System powered variable volume diffusers** shall be used only if approved by University of Akron, CPFM.

23950 BUILDING AUTOMATION

23950.01 All energy management controls must be Ethernet-based Direct Digital Controls and must be compatible with the campus Siemens Apogee System.

1. Fiber optic communication is required.
2. Heating, cooling and ventilation systems are expected to be fully controlled through the automation system from the Energy Center.

End of Division 23

DIVISION

26

ELECTRICAL

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 26 - ELECTRICAL

26010 BASIC ELECTRICAL REQUIREMENTS

26010.01 Specifications shall contain a statement of Qualifications for Cable Splicers.

26010.02 Consult with CPFM regarding the choice of primary service voltage; its location, and the capacity available.

26010.03 Design for removal and replacement of electrical equipment.

26010.04 All electrical panels shall be equipped with Best Access cylinders. Refer to Division 8.

26010.05 Coordinate submittals at close out to include schematic and point to point wiring diagrams with service manuals for each electrical and communication system.

26010.06 Power shall be from the University's grid.

26010.07 Prohibited Materials and Construction Practices:

1. Aluminum wiring shall not be used.
2. Direct burial cable.
3. Duct within 5 feet of buried high temperature utilities.
4. Metal clad cable. Cable shall only be used for lighting whips. No MC Cable is to be used inside of walls. No MC Cable shall be used for receptacles.
5. Flat conductor cable, under carpet, etc.

26010.08 Medium Voltage cable shall be warranted for 40 years

1. Cables shall be numbered in coordination with the University.

26010.09 Fire Alarms must be compatible with the Simplex system or Edwards EST-3 Fiber Network.

1. Fire alarms shall be equipped with broadcast speaker system and include pull stations red in color.

26010.10 All Concrete Duct Banks shall be bright red concrete throughout.

26020 BASIC MATERIALS AND METHODS

26020.01 Specify only Underwriter's Laboratories listed equipment, assemblies, and materials.

26020.02 Minimum conduit size for power circuit shall be 3/4-inch.

26020.03 Minimum conduit size for control wiring shall be 1/2-inch.

26020.04 Conduit, conduit fittings, boxes and accessories shall be specification items.

26020.05 Flexible conduit shall not exceed 6 feet and shall be a minimum of 1/2 inch for lighting whips and 3/4 inch for motor connections.

26020.06 Conduit crossing building expansion joints shall have expansion provision with grounding continuity.

26030 WIRES AND CABLES

26030.01 Material shall be copper of 98 percent conductivity.

1. Color Coding for 480/277V and 208/120V shall be as follows:

Phase	Voltage 208/120	Voltage 480/277
Neutral	White	Gray

A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Equipment Ground	Green	Green w/ Yellow stripe

26030.02 Primary Voltage Cables: Cable construction and installation shall be specified in detail.

26030.03 Secondary Conductors: Solid and Stranded wire No. 12 AWG and smaller may be solid. No. 10 and larger shall be stranded.

1. Minimum size for lighting and branch circuit shall be No. 12 AWG.
2. Minimum size for control wiring and auxiliary system circuits shall be No. 14 AWG.
3. General use insulation: NEC, 600-volt type THHN/THWN or XHHW.
4. Connections in No. 10 and smaller shall be made with wire nuts.
5. Connections in No. 8 and larger shall be made with pressure type mechanical connectors insulated with plastic electrical tape.

26040 WIRING DEVICES

26040.01 Design: All devices shall be specification grade.

1. Placement of Receptacles:
   a. Classrooms shall be provided with a Double duplex receptacle centered on front wall and two duplex receptacles equally spaced on all remaining walls unless otherwise noted.
   b. Corridors shall be provided with duplex receptacles at 35 feet on center and a maximum of 15 feet from the end of corridor.
   c. Lecture Halls shall have two additional double duplex receptacles equally spaced between center double duplex and the corners. Provide duplex receptacles in floor for podium. Provide additional receptacles for cleaning, spaced a maximum of 25 feet on center.
   d. Computer Labs shall be provided with at least two general-purpose receptacles equally spaced per wall in addition to all receptacles for computers. Labs will include surge suppression receptacles where required.
   e. Mechanical rooms shall be provided with at least four double duplex receptacles (one per wall) and additional duplex receptacle where walls are 25 feet and longer.
2. Switches
   a. Provide switches of specification grade.
   b. Switches provided outside of the spaces they are serving shall be provided with pilot lights.
   c. Security switches shall operate with a standard type key with carbon lock.
3. Cover Plates
   a. For interior applications match with device color.
   b. For exterior applications provide weatherproof covers.

26040.02 No occupancy sensors or other lighting controls shall be battery operated.

26100 MEDIUM VOLTAGE DISTRIBUTION

26200 SERVICE AND DISTRIBUTION

26300 LIGHTING

26301 General:

1. All bulbs shall be “Eco” type, low mercury.

26302 Exterior Lighting: light head shall be LED type with individual photocell control

1. "Architype” by Kim Lighting on either 14 foot or 16 foot tapered poles.

26303 Interior Lighting

1. Classroom Lighting:
    a. Classrooms shall have fixtures on switches to control the level of lighting for viewing the projection screen. Additional zone control for the front 10 feet; the middle and the rear of each shall be required. Coordinate the location of emergency lighting that may interfere with viewing the projection screen.
    b. **To match existing use:** Standard 24”x48” 4-lamp Fluorescent Fixtures with Acrylic Prismatic Diffuser (0.125’ K12) with minimum weight of 8 oz. per square foot, or equal. Flush white steel frame with spring-loaded latches. Four T-8 lamps and two 277 volt Electronic Ballast. Electronic Ballast THD shall be less than 15% on two lamps and 10% on four lamps. Ballast shall have less than 2% flicker, shall have no audible noise (“A” sound rating or better).
    c. Classroom Lighting: Standard 24”x 48” Lithonia Lighting VT Series Volumetric LED Troffer with ADP Acrylic linear prismatic diffuser and 40L lumen package. Include Drivers for dimming or step level dimming with an LP850 Color temperature. Flush white steel frame with spring-loaded latches.
2. Storage/ Mechanical Room Lighting: Standard 24” x 48” Lithonia Lighting TLED with #12 patter acrylic 48L lumens and Flush aluminum door. Driver to be EZ1 and Color temperature LP850.

End of Division 26

DIVISION

27

COMMUNICATIONS

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 27 - COMMUNICATIONS

27710 BASIC COMMUNICATION REQUIREMENTS

27710.01 Design to achieve and maintain a "state-of –the-art" communication system. Compliant with codes and standards set forth by standard-making bodies, including, but not limited to, current editions of the ANSI/TIA/EIA Telecommunications Infrastructure Standards, NEC, NESC, NFPA, FCC, IEEE and BICSI's design and Installation Manuals. The contractor shall purchase, install, test, and document all communications cabling, connectivity and support hardware as specified herein. Active Telecommunications network equipment (electronics, riser cabling, campus cabling, etc.) shall be specified on a project by project basis.

1. Design for easy building access to campus distribution system.
2. Design for coordination of vertical and horizontal feeder systems.
3. Design for future growth.
4. Design for adequate space for cable entrances, equipment rooms, and feeder closets.
5. Design so that cable points are located in reference to the distribution routes connecting other buildings on campus.
6. Environmental Requirements to consider are areas that emit excessive EMI interference and maintenance of temperatures between 62^0F and 74^0F with relative humidity at 30% to 55%. The University will supply the amount of heat generated by the installed electronics, after the number of end users is known.
7. Two duplex communication jacks per 100 square feet of office space and one additional per 100 square feet.
8. In Classrooms, Lecture Halls and Auditoriums one duplex communication jack shall be installed per wall and coordination for additional specific needs for Audio/Visual Equipment shall be considered.
9. Laboratories shall have one wall phone jack and one duplex communication jack.
10. Residence rooms should have one network connection per occupant, one cable TV outlet and one voice outlet per room.
11. Libraries shall be designed with direction from CPFM.
12. Each MDF and IDF will require two voltages, one 208vac 30 amp twist lock single outlet located near the tele/data rack, and one 120vac 20 amp four-plex at 6-8 ft. intervals on each wall except that containing the door. Wrap wall faces in ¾" fire-retardant plywood painted silver gray #20-20AC02-86012 by Flame Control Products. Provide 50 fc illumination within these spaces.
13. Tele/data room shall be provided with emergency generator power where available. The system shall automatically transfer to standby source upon power failure. All battery charging and recharging operations shall be automatic.
14. Power in Closets
    a. Power for UPS should always be on generated power.
        i. One single twist-lock receptacle located near the rear of the data

switch rack or cabinet.
   ii. Nema L 14-30R (Hubble part #HBL2710 or equal)
   iii. Voltage can range from 208 to 240 volts AC.
   iv. For 208V line-to-line-2P, 3W-grounding. (Does not encompass 208V AC line-to-neutral).
   v. For 250V – 2P, 3W – grounding.
b. Convenience Power must be on Generator Power
   i. Two, duplex 110V AC receptacles in a 4" square box, near the back of each equipment rack or cabinet.
   ii. One, duplex 110V AC receptacle every 12 linear feet on every wall, so that a standard 6 foot corded device can be used (without an extension cord) at any of the 110V AC outlets.
   iii. Outlets are on dedicated circuits.

15. Provide 84" high opencabinet or racks as required to receive equipment.
16. Provide standard black overhead ladder tray system, minimum size 12 inch width.
17. Install Telecom central bonding system.
18.

If the serving area is	Then the interior dimension of the room must be at least
(5000 sq ft) or less	(10 ft) x (8 ft)
(>5000 sq ft to 8000 ft)	(10 ft) x (9 ft)
(8000 sq ft to 10,000 ft)	(10 ft) x (11 ft)

19. Tele/data rooms shall be located so that no 4-pair (6e) data drop exceeds 295 feet in length.
20. Provide 6" of slack at the workstation end of all cable runs and 10 ft. in the TR
    a. Category 6e cable runs must be a minimum of 30 feet in length.
21. All floors shall be sealed and painted with light grey deck paint.
22. All data communication equipment shall be determined by the Department of Network and Communication Services and shall be funded by the Project, to include network switches, wireless access points.

27720 COMMUNICATIONS MATERIALS AND METHODS

27720.01 Cable Distribution between buildings is buried conduit and conduit in tunnels.

1. Conduit between buildings shall be 4 inch PVC in a quantity and from a source to be determined by the UA Telecommunications Department on a per-project basis. Cabling between buildings will be installed by UA Telecommunications Dept, projects provide the conduit & path.
2. Conduit to communication outlets shall be one-inch minimum.
3. Conduit shall have a maximum fill of 40%.
4. Limit conduit runs without a pull box to 100 linear feet and two 90^0 turns.
5. Install spare conduit for future growth.
6. Stack closets vertically.
7. Sufficient space will be determined by equipment and service requirements.

27730 COMMUNICATION WIRES, CABLES AND DEVICES

27730.01 Horizontal Cabling

1. All horizontal cabling shall be plenum rated.
2. All horizontal cabling for voice and data shall be green Cat 6e, Mohawk part #M57197 or Siemons part # 9C6P4-E3-07-RXA.
3. This cable is rated 2.5 Gbps.
4. All horizontal cabling for wireless shall be yellow Cat 6e Mohawk part #M57195 or Siemons part # 9C6P4-E3-05-RXA.
5. This cable is rated 2.5 Gbps.
6. All jacks shall be Siemons UltraMAX part # U6-H02NS.
7. All outlet plates shall be Siemons part # MX-FP-S-02-02 for 2 ports.
8. All outlet plates shall be Siemons part # MX-FP-S-04-02 for 4 ports.
9. All surface mount boxes shall be Siemons part # MX-SMZ2-02 for 2 ports.
10. All surface mount boxes shall be Siemons part # MX-SMZ4-02 for 4 ports.
11. All wall phones shall use Siemons MX-WP-K6-SS plate w/ jack Siemons MX6-K02.
12. All patch panels shall be Siemons flat UltraMAX 24 or 48 part # UP6-F1-24L-RS (24 port) or UP6-F2-48L-RS (48 port) or Siemons angled UltraMAX part # UP6-A1-24K-RS or UP6-A2-48K-RS. The patch panel label ID holder will be Siemons part # Z-PNL-PS.

27730.02 Riser Cabling

1. Provide Paired copper cable for voice, facsimile, special circuits, etc.
2. Provide Single mode fiber for data, video, CCTV.
3. Provide Coaxial trunk cable for Zip TV.
4. The size of the riser cabling used to feed each Tele/Data room shall be sized by the UA Telecommunication Department on a per project basis. Each Tele/Data room will have the appropriately sized cables run directly from the Main Closet to each Tele/Data room, and properly terminated and tested.
5. A coaxial trunk cable and associated: splitters, taps, amplifiers, etc.. will be designed to feed each Tele/Data room, from the Main Closet.

27730.03 Splicing Devices (not used)

27730.04 Cable TV Cable

1. System Description: Extension of service entrance from the Zip TV campus cable television system. Provide premises wiring for broadband distribution of television signal, including individual outlets
2. Performance Requirements: Television Channels: 2 thru 99. Install cable distribution system to provide a useable television signal at each user outlet: +1 dBmV across 75 ohms, minimum; +5 dBmV across 75 ohms maximum.
3. Installed by authorized installers of specified equipment with minimum 5 years documented experience.
4. Cable System Amplifier

a. Blonder Tongue # BIDA 86B-43 for a coaxial design pre-approved by US Telecom and/or Blonder Tongue FRDA-S4A-860-43 PA for a fiber design pre-approved by UA Telecom.
b. Substitutions Not Permitted.

5. Directional Line Coupler (for example)
   a. Blonder Tongue DMT-1000-2
   b. Substitutions Not Permitted.
6. Splitter (4-Way for example)
   a. Blonder Tongue SCVS-4
   b. Substitutions Not Permitted
7. Splitter (16-way for example)
   a. Blonder Tongue SDS-16
   b. Substitutions Not Permitted.
   b. Product Description: All channel, back-matched splitter with grounding block.
   c. Insertion Loss: 15.5 dB, 10-1000 MHZ.
   d. Return Loss: 20dB, 20-1000 MHZ.
   e. Isolation: 22dB, minimum.
   f. Dimensions: 3-15/16”W, 9-5/8”L x 1-3/8”H.
   g. Frequency Range: 1 GHZ
   h. Impedance: 75 Ohms.
   i. Connections: “F” type.
8. Riser Cabling
   a. Comscope Model #2312Plenum ½ inch if design is pre-approved by Telecom. Terminations use: 3 piece stinger fittings.
   b. Comscope Model #2285K Plenum RG11 if design is pre-approved by Telecom. Terminations use: Thomas and Betts #SNS-11-AS.
   c. Substitutions Not Permitted
9. Horizontal Cabling
   a. Comscope Model Number: 2227V (plenum RG-6).
   b. Termination Fittings: Thomas and Betts #SnS1P6.
   c. No Substitutions Permitted.

27730.05 Fiber Optic Cable and Apparatus

1. Single Mode Fiber shall be Siemon #9F8LB2-12D or Corning #012E88-3313112; 12 strand single-mode plenum.
2. Fiber enclosure shall be Siemon LightVerse part # LVE-1U-MD-P01Afor 1-96 strands.
3. Fiber enclosure shall be Siemon LightVerse part # LVE-2U-MD-P01Afor up to 192 strands.
4. Adaptor plate shall be Siemon LightVerse part #LVA12-SCA-BC-A.
5. Accepted Fiber Terminations:
   a. Fusion Splice-On Ultra Polish SC Type connectors
   b. Fusion spliced pigtail Ultra Polished SC Type connectors

c. A separate enclosure must be provided to house the splice trays or the termination enclosure must be designed to house splice trays when pigtail connectors are used

27730.06 Fire Alarm Cabling: Consider the following as applicable to the fire alarm system requirements:

1. Need for dial tone and quantity.
2. Need for dry pairs to the digitizer in PFOC and how many.
3. Fire alarm vendor design for insertion to existing system loop.
4. Number of fiber strands required.
5. The University requirements for two separate paths within the building (in and out of the alarm panel), separated by at least 15 feet where possible, and sharing a conduit for 10 feet maximum.
6. The minimum size conduit leaving the panel is 1 ½ inches.
7. The Fire Alarm Vendor will test the system with the University of Akron Telecom and EOHS Department.

27730.07 Area of Rescue Assistance: where required by code, the area of rescue unit shall be Code Blue Interact 500-S.

27730.08 Distribution Frames

1. Main Distribution Frames
    a. Chatsworth Part Numbers
        i. 30026-701 Horizontal 1RU Filler Panel (Black)
        ii. 30026-702 Horizontal 2RU Filler Panel (Black)
        iii. 30330-719 Horizontal 2RU Cable Manager (Black)
        iv. 55053-703 Rack 19” x 7’ (Black)
        v. 30162-703 Vertical Cable Manager 6”w x 7’h (Black)
        vi. 30163-703 Vertical Cable Manager 10”w x 7’h (Black)
        vii. 10610-019 Horizontal Rack Busbar (Grounding)
2. Intermediate Distribution Frames
    a. Chatsworth Part Numbers
        i. 30026-701 Horizontal 1RU Filler Panel (Black)
        ii. 30026-702 Horizontal 2RU Filler Panel (Black)
        iii. 30330-719 Horizontal 2RU Cable Manager (Black)
        iv. 55053-703 Rack 19” x 7’ (Black)
        v. 30162-703 Vertical Cable Manager 6”w x 7’h (Black)
        vi. 30163-703 Vertical Cable Manager 10”w x 7’h (Black)
        vii. 10610-019 Horizontal Rack Busbar (Grounding)

27730.09 CCTV Security Cameras

1. CCTV cabling system shall be IP based.
    a. Blue Cat 6e cabling: Mohawk # M57193 or Siemon # 9C6P4-E3-06-RXA.
    b. Maximum length 295 feet.
2. Acceptable manufacturer for cameras and housings shall be determined by UA
3. Camera locations shall be determined by UA personnel.

27730.10 Grounding shall be completed from the building service entrance ground to all

MDFs, IDFs, relay racks, and cable trays. Telecommunications grounding shall follow ANSI J-STD-607-A and the Grounding section of these standards. A Harger (minimum)12 inches long by 4 inches wide by ½ inch thick Telecommunications main grounding busbar (TMGB) shall be provided in the communications rooms and shall be labeled (TMGB). The TMGB shall be pre-drilled copper with holes for use with standard size lugs. The TMGB shall be located 18 inches above finished floor.

27730.11 Security to all rooms containing voice, video, or data equipment shall be coordinated with the University Best Locking System

27740 COMMUNICATIONS INSTALLATION & QUALITY CONTROL

27740.01 Cable and Wire Identification

1. Label each cable within 4 inches of each termination, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
   a. Label each unit and field within distribution racks and frames.
2. Identification within connector fields in equipment rooms and wiring closets: label each connector and each unit of cable-terminating and connecting hardware. Where similar jacks are used for both voice and data communication cabling, use a different color icon for jacks of each service.
3. Labels shall be preprinted or computer-printed type with printing areas and font color contrast with cable jacket color but still complies with requirements in TIA/EIA-606-A.
4. Labels must use flexible vinyl or polyester that flex as cables are bent.
5. Outlet labeling scheme to be provided by UA Network and Communication Services Department.

27740.02 Cabling shall not exceed a 40% fill ratio in any raceway (conduit, moulding, J-hook, tray, etc..).

27740.03 All cabling shall have an independent means of support at least every 5 feet.

27740.04 Cabling penetrations shall be fire-stopped.

27740.05 Cabling shall not be spliced, must be homerun from the user location to the Tele/Data closet, and must not exceed 295 feet including the required 10 foot service loop which is required at the closet ends of every cable.

27740.06 Cabling shall run through the appropriate sized conduit sleeves when penetrating any wall or floor.

27740.07 Cabling shall be run at least, 40 inches away from transformers, capacitors motors, and 12 inches from florescent lighting.

27740.08 Test and Inspections:

1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6 and Category 6e, marking of outlets, cover plates, outlet/connectors, and patch labeling of all components.

3. Visually confirm cable placement, cable termination, grounding, and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination prior to cross-connection.
    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
5. UTP Performance Test:
    a. Test for each outlet. Perform the following tests according to TIA/EIA-568B.1 and TIA/EIA 568-B.2:
        i. Wire map
        ii. Length (Physical vs. electrical, and length requirements).
        iii. Insertion Loss.
        iv. Near-end crosstalk (NEXT) loss.
        v. Power sum near-end crosstalk (PSNEXT) loss.
        vi. Equal-level far-end crosstalk (ELFNEXT).
        vii. Power sum equal-level far-end crosstalk (PSELFEXT).
        viii. Return loss.
        ix. Propagation delay.
        x. Delay skew.
        xi. Attenuation to crosstalk ratio near-end (ACR-N)
        xii. Power sum attenuation to crosstalk ratio near-end (PS ACR-N)
        xiii. Attenuation to crosstalk ratio far-end (ACR-F)
        xiv. Power sum attenuation to crosstalk ratio far-end (PS ACR-F)
6. Test results: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
    a. Test results shall be submitted to UA Network and Communication Services Department in electronic PDF (portable document format).

27800 WIRELESS

27800.01 Wireless design considerations:

1. Dimensional drawings of the building
2. Building materials
3. Occupancy density
4. Design and Hardware shall be approved by UA Network and Communication Services Department prior to installation.

27900 FIRE ALARMS

27900.02 Fire alarm systems shall be a complete, supervised, non-coded, addressable micro-

processor based fire alarm system with initiating devices, notification appliances (audio & visual), monitoring and control devices as manufactured by either of the following:

1. Edwards EST-3 (EST-3 Fiber Network).
2. SimplexGrinnel 4100U (4120 Campus Network). (Preferred)

27900.03 Class B networked installation interfaced with existing campus system including secondary communications with dispatch through central campus digitizer.

27900.04 Mass notification capability as initiated locally or selectively from UAPD Dispatch.

27900.05 2000 addressable point capacity capable of loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

27900.06 NFPA and ADAAG compliant system and operations. Each and all components the product of a single manufacturer, UL Listed and UL labeled.

27900.07 Hard-wired signal transmission. All fire alarm wiring enclosed in conduit.

27900.08 Adjustable audible alarms with voice paging configuration.

27900.09 General Alarm: A system general alarm shall include:

1. Indication of alarm condition at the FACP and the remote VCC annunciator.
2. Identification of the device that is the source of the alarm at the FACP and the annunciator.
3. Operation of audible and visible notification devices throughout the building until silenced at FACP.
4. Closing doors normally held open by magnetic door holders.
5. Unlocking designated doors.
6. Shutting down supply and return fans serving zone where alarm is initiated.
7. Closing smoke dampers on system serving zone where alarm is initiated.
8. Initiate smoke control sequence through the building temperature control system. (As detailed under division 23)
9. Fire pump start-up or running.
10. Notifying UAPD Dispatch.
11. Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified sensors are activated.

27900.10 Supervisory Operations: Upon activation of a supervisory device such as low air pressure switch, and tamper switch, or fire pump power failure the system shall operate as follows:

1. Activate the system supervisory service audible signal and illuminate the LED at the control unit.
2. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.

3. Record the event in the FACP historical log.
4. Transmission of supervisory signal to remote central station.

27900.11 The system shall be provided with emergency generator power or sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to standby source upon power failure. All battery charging and recharging operations shall be automatic.

27900.12 Extra stock equivalent to 10% of each device type – detection and notification.

27900.13 The graphics package for fire alarms shall be provided by the Fire Alarm contractor.

End of Division 27

DIVISION

31

EARTHWORK

THE UNIVERSITY OF AKRON
DESIGN AND CONSTRUCTION GUIDE

DIVISION 31 - EARTHWORK

31110 CLEARING AND GRUBBING

31110.1 **Strip** all objectionable growth. Remove from the site all debris resulting from the stripping operations at frequent intervals to prevent accumulation of material. On-campus disposal is prohibited unless otherwise approved by CPFM

31110.2 **Strip topsoil** to its full depth from entire area to be graded. Stockpile where directed and where it will not interfere with construction activities. Topsoil to be reused shall be free from roots, brush and debris. Excess topsoil shall be deposited and/or spread on University property as directed unless otherwise approved by CPFM

31110.3 **Grub trees and shrubs** completely including removal of stumps and roots to the extent that no root greater than 3" in diameter remains within 5' of a site improvement or structure (existing or new).

31110.4 **Protection of trees and shrubs** scheduled to remain shall be assigned to the appropriate contractor and shall include tops, trunks, and roots. The Associate shall indicate on the drawings boxes, fences, or other protection required because of proximity to the work. Do not permit heavy equipment or material stockpiles within drip line. Any pruning required shall be with the approval and direction of CPFM

31110.5 All site areas to be covered by the building shall be treated against termite infestation.

31200 EXCAVATING AND BACKFILLING

31200.1 **Removal of excavated materials** from the site is prohibited unless approved by CPFM

31200.2 **Backfill** only with materials that can be compacted, without containment, to the densities specified herein. Grits are unacceptable as backfill material.

31200.3 **Waste materials** shall be disposed of off site in a legal manner.

31200.4 **Compaction control** shall be specified for all fill, backfill, and embankments.

31200.5 **Field compaction tests** and related laboratory (ASTM member) analysis shall be performed by a registered Professional Engineer specializing in soils engineering. All soil used shall be analyzed and approved by this engineer for each application prior to placement. A testing laboratory representative shall "spot check" during placement and compaction operations. Tests shall be made in sufficient quantity to assure uniform compaction and density of each course of fill.

31200.6 **Payment** for the testing services shall be assigned to the general contractor. The testing laboratory will be under the direction of the Associate and will provide written reports to the Associate. The Associate shall provide copies to the respective contractor and to CPFM

31200.7 **Compaction requirements**, as determined by the Standard Proctor Tests, shall be to the following densities:

1. **Road beds** - compaction for the entire subgrade area including the full width and depth of the embankment supporting the berm and pavement shall be per the latest edition of the Ohio Department of Transportation

Construction and Material Specifications, Item 203.

2. **Parking areas** - the top 1' of subgrade shall be compacted to 100% of maximum dry density; balance as follows:

Maximum Laboratory Dry Weight (lbs/cu. ft.)	Minimum % of Compaction (Laboratory Minimum)
90.0 - 104.9	100%
105.0 - 119.9	98%
120.0 and greater	96%

3. **Paved** pedestrian walks and courts: 95%
4. **Backfill at manholes** and other underground structures:
   95% if depth is less than 10'
   100% if depth is more than 10'
5. **Foundation backfill** under pavements: 100%
6. **Special foundations**, isolated pads, and footings: 100%
7. **Trench backfill**: equal to densities for all other fill and backfill.
8. **Planting beds and sod** adjacent to building:
   Upper 2' of soil below finish grade - 90% maximum
   Remainder - 95% to 10' of depth, 100% beyond 10' depth
9. **Planting beds and sod** in open areas:
   Upper 1' of soil below finish grade - 90% maximum
   Remainder - 95%
10. **Interior**, normally loaded, non-structural slabs on grade: 95%

31200.8 **Site utilities excavation** shall be performed by each contractor including excavation, trenching, and backfill associated with the respective work. All work is subject to all requirements of Division 31 of the specifications including: earthwork, excavating, backfilling, compaction, testing and payment for testing. Include references to Division 31 in all other prime contractors' specification divisions when applicable. Refer also to Division 02 for additional direction.

31200.9 **Rough grade** lawn area to a maximum of 1' vertical to 4' horizontal. Steeper grades will require ground cover planting. Provide roundings at top and bottom of banks and at breaks in grade.

31200.10 **Scarify subgrade** to a minimum depth of 5" before placement of topsoil. Remove all waste material.

31200.11 **Minimum depth** for topsoil shall be 4" for grass and adequate depth for other planting materials.

31200.12 **Protect new grade** areas from the elements. Repair all settlement and erosion, and re-establish grades to the required elevations prior to acceptance.

31350 FOUNDATIONS

31350.1 **Types of foundations** shall be determined by the Associate in consultation with his structural engineer, based upon the types of soil encountered and other conditions. If pile foundations are desirable, the Associate must thoroughly examine adjacent structures and determine the effects of vibratory forces on structural systems and interior features and installations. At the Associate's option, foundations may be a system of precast or cast-in-place concrete piles,

concrete caissons, steel piles, or a combination of piles and caissons.

31350.2 **Wood foundation** systems are prohibited.

31351.3 **Design of foundation** systems shall be by an Ohio registered Professional Engineer. All structural drawings shall bear the seal and signature of this engineer.

31351.4 **Testing** of piles and continuous inspection of pile and caisson installation shall be performed by an independent laboratory in cooperation with the Associate's engineer to assure compliance with the contract documents.

31351.5 **Payment** for testing laboratory services shall be as specified for soil compaction control above.

02351.6 **Test piles** will be located and paid for by the laboratory in cooperation with the Associate's engineer. The laboratory will employ the contractor to drive a minimum of 3 test piles prior to any other pile driving. The laboratory will locate the test piles such that if the test piles meet the project requirements, they may be used in the building foundation system.

02351.7 **Test reports for the test piles** shall include: Date of driving; locations; grade designation and dimensions of piles; pile joint reinforcement description (if required); total penetration; start and finish times; duration of driving; number of blows required for each foot of penetration; total number of blows; and resistance in blows per inch for the last 6 inches of driving. Include in the report the description of the driving equipment used, including: hammer make and model number; weight of ram, stroke, and rated driving energy; driving cap weight and description; actual rate of operation of hammer during driving.

02351.8 **Test reports for permanent piles** shall be made for each pile and shall include the **same** information as for test piles. Record of driving equipment shall not be required.

02351.9 **Drilled caissons** shall be continuously inspected by the testing laboratory and the Associate's engineer during excavation, casing installation, and concrete placement.

02351.10 **Data reports for caissons** shall include: identification mark and location; date, weather and time; shaft and bell diameters; length of permanent casing; top and bottom elevations; nature and depth of obstructions; bearing strata description; and water conditions during drilling and concrete placement.

02351.11 **Basis of payment** for base bid price shall be noted in the specifications as the depths and quantities of piles and caissons shown on the working drawings and on soil boring data. The Form of Proposal shall include separate lines for the unit price per lineal foot to be added to or deducted from the base bid for depths differing from those indicated. State that payment will not be made for extra pilings, which may be driven for the execution of his work. The Associate must certify the depths of piles or caissons upon which the contractor's price is based.

31361 TERMITE CONTROL

31361.1 **Apply** soil treatment at the following locations

1. Under slabs on grade.
2. Along inside perimeter of foundation walls.

3. Along outside perimeter of foundations.

31480 LANDSCAPING

31480.1 **Topsoil** shall be provided in all areas to receive seeding and planting in the amounts indicated.

31480.2 **Trees and shrubs** shall be delivered to the site balled and bagged, bearing the producer's name. Obtain all plants from one source when possible. The University will provide the preferred plant pallet to the associate.

31480.3 **Ground cover** shall be delivered to the site in flats bearing the producer's name.

31480.4 **Mulch for planting areas** shall be shredded hardwood bark free of obnoxious weeds. Specify a minimum thickness of 3" in all beds including those with ground cover.

31480.5 **Erosion control** for slopes greater than 1 vertical to 4 horizontal will be by a commercial mulching cloth.

31480.6 **Water** all landscaping material using a fine mist. Avoid devices, which will pack soil surfaces. Lawn areas must be kept moist for a period of 3 weeks.

31480.7 **Seeded lawns** are the base specification for all areas not covered by paving or building. Unless otherwise indicated, all areas are to be seeded.

1. **Seed all permanent lawn** areas between February 15 and May 20 or between August 15 and October 1 under favorable climactic conditions.
2. **Seed** shall be a clean, weed free mix delivered to the site in sealed containers bearing the producer's name and the required formula. Seed shall be fresh stock, labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act, and with the State of Ohio Department of Agriculture and are available from The Olinger Seed Company, Akron Ohio.
3. **Athletic Field** seed mix shall be as follows:
   20% Revenge GLX Perennial Ryegrass
   20% Liberator or Jackpot Kentucky Bluegrass
   15% Amazing A+ or Fiesta 4 Perennial Ryegrass
   15% Grand Slam GLD Perennial Ryegrass
   15% Brooklawn Kentucky Bluegrass
   15% Rugby II Kentucky Bluegrass

31480.8 **Mulch** for seeded lawns shall be threshed straw, free from matured seed and obnoxious weeds. If used, asphaltic emulsion shall conform to O.D.H.S. Type SS-1, 70204. Mulch shall be chemically inert, and non-toxic to plants, humans, and animals.

31480.9 **Sod** shall be well rooted Kentucky Bluegrass, Poa Pratensis, containing a growth of not more than 10% of other grasses and clovers, free of obnoxious weeds, cut below the root line.

1. Deliver to the site within 24 hours after cutting and install within 36 hours after cutting.
2. Specify that areas to receive sod shall not be fertilized more than 48 hours prior to installation.
3. Sod damaged by storage or placement shall be rejected.
4. Place sod smoothly, edge to edge, with staggered end joints. Lay sod on

slopes with long dimension parallel to contour lines, starting at the bottom. Stake in alternating rows with stakes staggered. Water sod and tamp to eliminate air pockets.

31480.9 **Fertilize** all seeded or sodded areas with a balanced fertilizer 8-8-8 or 12-12-12 at a rate 31 1 lb. of nitrogen per 1,000 square feet.

31480.10 **Maintenance** of lawn areas shall include watering, mowing, weed control, protection from damage, and repair of damage.

1. Repair of damage includes re-establishment of grade and soil condition prior to seeding or sodding.
2. A uniform stand of grass, 2 1/2" high must be produced prior to acceptance.

31480.11 **Guarantee** shall be a minimum of one year or one growing season for all landscaping materials.

31513 BITUMINOUS PAVING AND SURFACING

31513.1 **Construction** of all roads, drives, and parking areas including subgrade preparation and all related work must be constructed by a road building firm fully qualified and equipped to perform the work.

31513.2 **Types of paving materials** shall be approved by CPFM. Chip and seal pavement is prohibited for any type of permanent construction.

31513.3 **Bituminous paving for vehicular** installations shall have a minimum load factor of 15.25. Load factors shall be determined by multiplying thicknesses (in inches for each course of material) by the following constants:

1.	**Asphaltic concrete**	**2.00**
2.	**Bituminous aggregate**	**2.00**
3.	**Uncoated aggregate**	**1.00**
4.	**Subbase aggregate**	**0.75**

31513.4 **Bituminous paving for pedestrian walkways** shall have a minimum load factor of 9.00 with a minimum thickness of 2" compacted ODOT Item 404. Where no curbs or other lateral containment exists, base shall extend 3" minimum beyond edge of walk.

31513.5 **Materials for bituminous paving** must be specified by reference to the latest edition of the State of Ohio, Department of Transportation, Construction and Materials Specifications (ODOT Specs) with the exception that only limestone aggregate be used in asphaltic concrete.

1.	Asphaltic concrete wearing course	ODOT Spec Item 404
2.	Asphaltic concrete intermediate course	ODOT Spec Item 402
3.	Bituminous aggregate base	ODOT Spec Item 301
4.	Uncoated aggregate base	ODOT Spec Item 304

31513.6 **Base drainage** must be designed over impervious sub-bases. Drainage trenches filled with stone shall be provided through the earth berm perpendicular to the edge of the pavement at low points and at intervals of 100 feet or less.

31513.7 **Protect the surface course** from vehicular traffic and parking until fully cured.

31513.8 **Repair depressions** by cutting out the surfacing with vertical cuts to a minimum depth of 1", filling and rolling. Feathered patches are prohibited.

31513.9 **Parking lots** shall be as follows:

1. Standard space 8'-6" wide x 19'-0" long.
2. Disabled space Same as standard space with adjacent 5' wide aisle (cross striping required).
3. Aisles 22' - 24' wide.
4. Striping Parking spaces and directional graphics to be white. Restricted curbs shall be painted red.
5. Seal coat Asphalt paved areas will be seal coated by the University approximately one year after installation. Seal coat is not required within the scope of the project.

31514 PORTLAND CEMENT CONCRETE PAVING

31514.1 **Sidewalks** shall be 8 feet wide and will be a minimum 5" thick concrete with 6"x 6" wwm (or equivalent fiber reinforcement) and non-skid finish over a minimum thickness of 3" of gravel. Concrete shall be Class C air-entrained (3%-6%), 4,000-PSI compressive strength at 28 days.

31514.2 **Metal nosings** on exterior stairs are prohibited.

31514.3 **All sidewalks** must be designed to withstand vehicular loading.

31514.4 **Radiused intersections** shall be poured monolithic and should extend to the outer limits of the curves.

31514.5 **Scoring** type and locations for sidewalks shall be shown on the drawings.

31514.6 **Cross slope** of all walks shall be 1/4" per foot.

31514.7 **Walks** abutting buildings shall bear on the foundation or be dowelled.

31514.8 **The full width of sidewalks** adjacent to curbs shall be 1/4" above the curb.

31514.9 **Temperature steel in stair nosings** must have a minimum 1-1/2" concrete cover.

31514.10 **Curbs** shall be poured concrete with #4 top and bottom reinforcing. Integral gutters may be required for specific projects. Provide expansion joints with asphalt-impregnated filler strips at 30' intervals. Filler strips must be specified.

31514.11 **Dropped curbs** for drive and handicapped access shall be formed for all new work.

31514.12 **Remove existing curb** back to nearest existing joint, when new curbs extend into existing curb lines.

31514.13 **Paving base** should extend a minimum of 12" beyond the edge of the surface, if curbs are not provided.

31515 STONE AND BRICK PAVING

31515.1 **Flagstone** shall be a minimum thickness of 2", set on a compacted, porous drainage layer.

31515.2 **Brick paving** shall be a minimum thickness of 4" nom. Brick shall be dry laid over a 4" thick layer of compacted limestone screenings and shall be vibrated into place with sand. Concrete curbs and borders are required at all perimeters and intervals to limit the movement of the pavers. All concrete borders adjacent to limestone screenings shall extend a minimum of 8" below the bottom of the limestone in order to facilitate proper compaction.

31813 SITE SPRINKLER (IRRIGATION) SYSTEMS

31813.1 The Associate shall include in the project a sprinkler system, which will irrigate all lawn, as manufactured by the University's preferred suppliers.

31813.2 The system shall consist of recessed "pop-up" sprinkler heads, distribution piping, water regulators, valve boxes, controllers and associated wiring.

31813.3 Show all heads on the site plan and coordinate location with other underground utilities; above ground improvements such as signs and light standards; and plantings.

31830 FENCES

31830.1 **Construction fence** location must be approved by CPFM and must be shown on the drawings. The construction fence shall be of substantial construction with driven posts, and top and bottom reinforcing wires or struts. The spacing of the posts shall be as is necessary to support the fence material vertically for the duration of the project. Reinforcing bars are not acceptable fence supports.

31830.2 **Permanent fencing** may be required by the program. Specify chain link fence for perimeter protection and as guards around equipment.

31870 SITE AND STREET AMENITIES

312870.1 **Bike Racks** shall be CORA W Series, black powder coated-glossy; sized for 4 (# 2704), 6 (#3606), 8 (#4508), or 10 (#7510) bicycles.

31870.2 **Benches** shall be by Recycle Design, Victoria Series, 60-inch seat (#9875) with center arm (#9879) (Black Frame/Grey Slats); 60-inch bench with out back (#9870), Black Frame/Grey Slats)

31870.3 **Trash Receptacles** shall be from Recycle Design, Victoria Series, 32 gallon with Dome Lid, black frame/grey slats, # 9873; 32 gallon plastic liner, black, # 9932; ordered in pairs.

31870.5 **Emergency Phone** units shall be CODE BLUE, CB 1-s, pedestal unit, mid-night blue.

End of Division 31