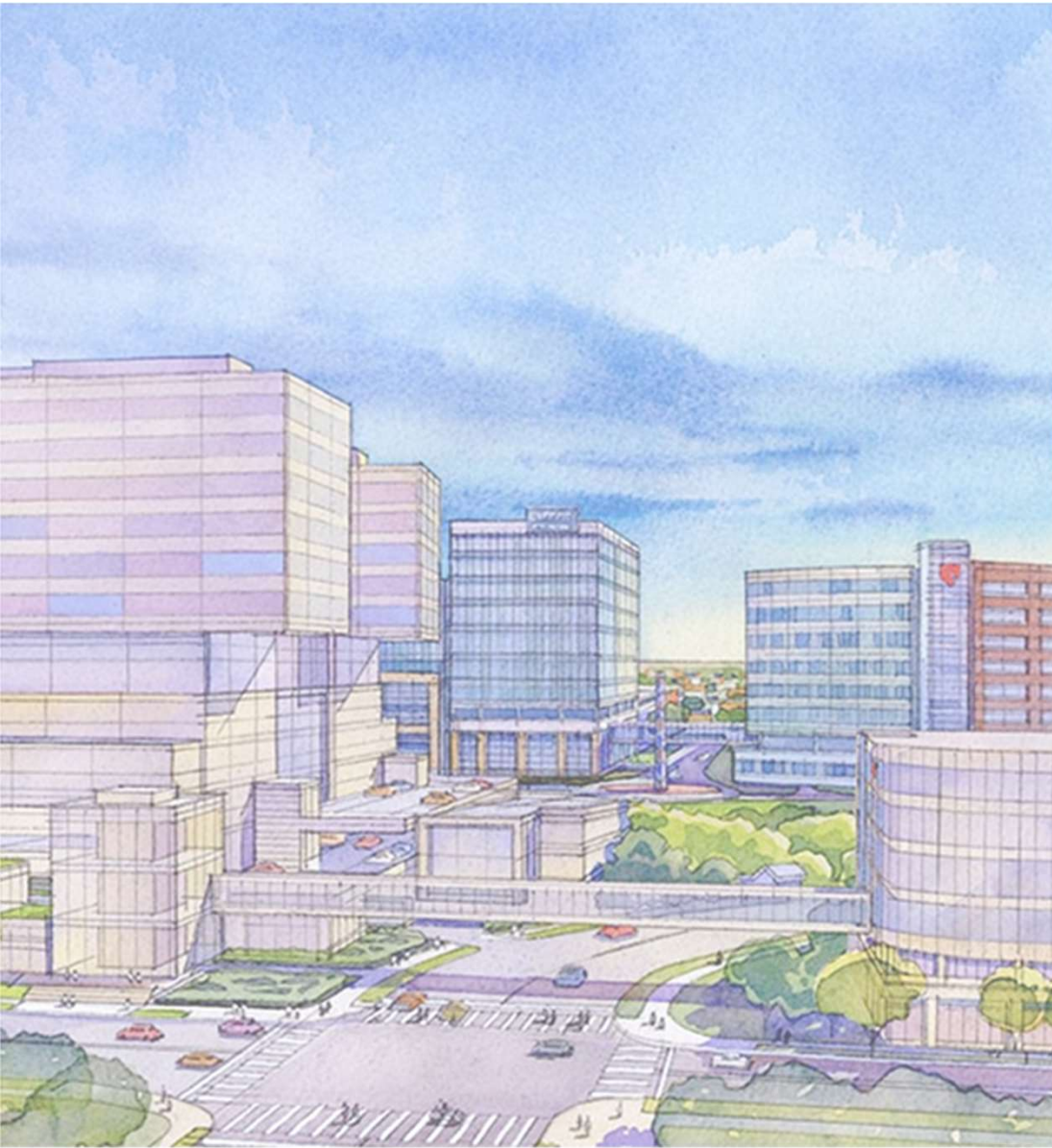


# Design Guidelines

2024 Edition



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## Introduction

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The Design Guidelines set forth the standards for renovations and new construction on properties owned or leased by the University of Nebraska Medical Center (UNMC) and Nebraska Medicine (NM).

In addition to the information found within the guideline, the following information is available to design professionals throughout the Design Process.

1. **Clarifications and Additional Information:** The Owner will provide project-specific criteria and further details as required.
2. **Exceptions and Substitutions:** Requests for exceptions or substitutions to these guidelines must be submitted to the Owner via email at [fmpguidelines@unmc.edu](mailto:fmpguidelines@unmc.edu) for review and approval. Approval must be provided in writing back to the design professional.
3. **Supplemental Documents:** Design Professionals should consult with the Owner to obtain the latest versions of guideline supplemental documents, which include, but are not limited to:
  - **BIM Standards & Guidelines:** Outlines deliverables, model requirements, naming conventions, etc., for Construction Documents.
  - **Wayfinding and Signage:** Guidelines for navigational aids and signage.
  - **Specification-Specific Requirements:** The Owner at its discretion may provide project specific specification sections to be utilized by the design professional.
4. **Compliance and Deviation:** During the process of design, if any existing condition, local code requirements, or other existing conditions impede compliance, the design professional is required to submit a Notice of Deviation for review and approval by the Owner. The standards outlined in this document do not supersede the prevailing regulations of the local jurisdiction or any nationally adopted codes or requirements.

These guidelines aim to ensure consistency, compliance, and quality in construction and renovation projects under the Owner's purview.

Facilities Management and Planning department (FMP) is the representative for both University of Nebraska Medical Center (UNMC) and Nebraska Medicine (NM) for the purpose of executing design and construction on behalf of these institutions and will collectively be referred to as the "Owner".

Generally, a designated FMP Project Planner will be responsible for the overall process of design. Once the project has completed design and moves into construction the FMP Project Manager will then be responsible for the project execution. Occasionally based on project size, a project manager may represent both the planning and the management of the project execution.

The Owner will also engage a variety of internal stakeholders that will be involved throughout the design process as needed. These stakeholders from other business units throughout the

organization will provide key input into their area of the business. These stakeholders include but are not limited to:

- Building Code Official
- Zone Facility Managers
- Engineering, Mechanical
- Engineering, Electrical
- Engineering, Controls and Lighting
- Engineering, Fire Protection
- Campus Utilities
- Telecommunications
- Biomedical Equipment
- Infection Control
- Access Control / Door Hardware
- Security & Safety

The design team will be asked to incorporate strategic specialty consultants of the Owner's choosing for design or consultation on specific areas of expertise for the Owner. The design professional should inquire with the Owner as to which specialty consultants will be required for their project before finalizing pricing and contracts for design. Some examples of specialty consultants that the Owner typically uses but are not limited to, include:

- Multi-disciplinary engineers
- Process Equipment
- Interiors and furniture
- Kitchen equipment
- Sustainability
- Building Automation Systems
- Energy Modeling

Document sharing shall be conducted through the Autodesk Construction Cloud with access provided to all stakeholders by the Owner.

## **Owner's Design Principles**

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### **Design Quality Process**

Projects will be broken up into 5 phases of work:

1. Conceptual Design/Programming
2. Schematic Design
3. Design Development
4. Construction Documents
5. Construction Execution

The following are the requirements for each stage of design. Refer to the Agreement for Design Services for additional requirements and detail. (This process applies to capital projects of \$5M and over or as determined by Owner).

At each stage of the process, a review meeting will be held as described herein. Design team is responsible for documenting and responding to review comments and incorporating changes into the next phase of design.

Note: Projects that incorporate high profile design features, or dramatic lighting may be required to be rendered in 3-dimensions graphically modeling actual interior elements during design and presented and approved by stakeholders. Design team should recommend areas that could have additional rendering at each step of the design phase.

1. **Conceptual design / Programming:**

- a) Scoping document which outlines the goals for the project, functional requirements, and operational strategy.
- b) Space program (UNMC Projects requiring BOR approval shall use provided template for space program)
- c) Adjacency diagram(s)
- d) Baseline project budget (by Owner)
- e) Major process load equipment list (excluding MEP)
- f) Initial project design and construction schedule
- g) Preliminary site layout showing circulation, services, and occupiable outdoor spaces
- h) Engineering specific programming:
  - i. Baseline/concepting energy model - work with owners energy modeling consultant and Director of Engineering to perform initial box model to establish baseline/code EUI (minimum EUI required by energy code)
  - ii. Energy code compliance pathway (prescriptive, performance, or other additional option)
  - iii. Three MEP system options decided with the Director of Engineering to explore with impacts of each system on required mechanical spaces, acoustics, and operation of the building. See Energy and Systems Selection section for more information.
  - iv. Sustainability scope organized based on Section 01 81 13 of this document which outlines what strategies will be incorporated and which requirements need more discussion and decision making. Prepare talking points with pro's and con's for discussion when inquiring on a sustainability concept which is in question.
- i) Finalize Conceptual design/Programming phase by presenting the above deliverables in a Quality Management Review Meeting with the following stakeholders: Director of Engineering, Manager of Projects, Manager of Planning, Manager of Compliance, and Operational Maintenance Manager.

2. **Schematic design:**

- a) General system types, space allocations, access, preliminary HVAC zoning

review

- b) Initial building layouts including structural components, wall to window ratios, building areas and volumes, and major mechanical spaces.
- c) Building elevations with exterior materials
- d) Building envelope with structural elements and wall & enclosure systems
- e) Building sections including typical foundation details. Indicate floor to floor dimensions, ceiling heights, major structural elements and major MEP transfer or horizontal distribution zones
- f) Engineering Specific Schematic design:
  - i. Energy Model and Life Cycle Cost analysis by Energy Modeling consultant and Director of Engineering – See Energy and System Selection section below for more details. This life cycle cost analysis will be utilized to select the final mechanical systems and provide strategies to further reduce energy use of the building.
  - ii. General MEP Narrative including finalized major mechanical equipment selections and final mechanical space requirements.
  - iii. Sustainability document describing finalized elements to be included in the project selected from 01 81 13.
- g) Finalize Schematic Design by presenting the above deliverables in a Quality Management Review Meeting with the following stakeholders: Director of Engineering, Manager of Projects, Manager of Planning, Manager of Compliance, and Operational Maintenance Manager.

### 3. **Design Development:**

Construction Documents approximately 75% complete to include a specification booklet with all sections represented and editing completed. Documents should generally provide:

- a) Detailed level of design for all disciplines of the design.
- b) Construction document cover page. Refer to Code Section for requirements.
- c) Finalized building layouts, structural designs, elevations, and interiors.
- d) Mechanical equipment placement, routing and sizing of mains, indication of zoning, sample areas with full distribution, early details and schedules, system flow diagrams and schematics.
- e) Electrical distribution, major equipment placements, panel schedules, etc.
- f) Building Automation design elements and overview based on current mechanical design.
- g) Coordinated ceiling space to accommodate mechanical, electrical, plumbing and cable trays.
- h) Updated Sustainability document including finalized elements selected from 01 81 13 which will be included into the design.
- i) Finalize Design Development by organizing the following review sessions:
  - Mechanical Systems
  - Electrical/Lighting Systems
  - Automation Systems
  - Architectural Design/Structural
  - Any other key stakeholder meetings as identified by the Owner

4. **Construction Documents:** Prior to issuance of final construction documents, a Plan Review page turn shall be conducted with the Owner and tenant entity. A 95% complete review set which includes all drawings and all specifications finalized shall be submitted two (2) weeks prior to this review. This period may be extended for larger projects.

The Owners project planner will be responsible for setting up the appropriate review meetings with all stakeholders. In depth reviews by stakeholder group will allow for focused attention to specific areas of the design such as Mechanical, Electrical, Building Automation, Telecommunication design, etc.

A final Energy Model should be run by Owners consultant with predicted final EUI performance.

5. **Construction Administration:** All shop drawings shall be reviewed by Owner during construction, process to be coordinated with design team and General contractor. Owner to designate utilization of preferred tool for construction photo and video documentation, submittals software and punch list. Owner's project management software, Submittal Exchange, Multivista, or other vendor may be required.

### **FM Global Insurance**

1. Any UNMC project that results in a change to protection, occupancy, construction or external exposure (i.e., the installation of a nearby buried pipeline, etc.) should be coordinated with FM Global. This could involve the installation of new sprinklers, construction of a new building, or the installation of a new process that would involve flammable liquids or combustible dusts.
  - a) The Design Professional shall consult with the Owner's Representative for Supplemental Documents including FM Global submission requirements and a copy of the latest edition of FM Global Plan Review Guidelines.
2. For roofing systems, Nebraska falls within the Very Severe Hail (VSH) zone area per FM Global Property Loss Prevention Data Sheet 1-34, Hail Damage, Figure C-1, revised March 2018. Design and install a roof covering assembly that is in accordance with a current and valid FM Approved RoofNav assembly number that meets the recommended fire, hail and wind uplift ratings. FM Global recommends a Very Severe Hail (VSH) rated assembly be used. Plans and specifications for roofing or roof repairs should be forwarded to FM Global for review and comment prior to the start of work.

### **Codes**

1. All healthcare projects shall comply with The Joint Commission currently adopted FGI healthcare facility guidelines and codes as indicated on the code summary document. They

must also comply with the local jurisdictions accepted FGI Health Care Facilities Guidelines and codes, always conforming to the most stringent requirement of the combined codes.

2. All healthcare projects shall comply with the Centers for Medicare and Medicaid Services adopted NFPA codes. It is not acceptable to construct projects to a waiver.
3. Work in state-owned property shall be permitted through the UNMC building official and follow the most recent code summary document and permitting process. Work in non-state owned facilities shall be permitted through the city in which the project is located. Design Professional to consult with Owner for Supplemental Documents.
4. The Construction Documents shall include when applicable, the following:
  - a) List of Codes and Standards
    - i. Include Issuance Date of UNMC/NM Design Guidelines utilized in design. Version of Design Guidelines
  - b) General Information
    - i. Location
    - ii. Description
    - iii. Contact
  - c) Code Solution for Project
    - i. Occupancy Types with Code References
    - ii. Type of Construction with Code References
    - iii. Automatic Fire Sprinkler Use with Code References
    - iv. Seismic Design Factors including Site Class, Risk Category, Design Category
    - v. Special Inspections
    - vi. Energy Code
  - d) General Code Requirements
    - i. Building Height and Code References
    - ii. Building Areas by floor with Code Allowable References
  - e) Building Occupant Load
    - i. Factors used and Code References
    - ii. Load by Level
  - f) Fire Resistive Requirements Required and Provided
  - g) Code Comparison (IBC to NFPA) Analysis with Code References by Chapter
  - h) Area Summary (Net and Gross) by Floor and Use
  - i) Calculated Occupants by Floor and Use
  - j) Plumbing Fixture Requirements and Calculations
  - k) Statement of Conditions Plans
    - i. Wall and Door Ratings
    - ii. Room Designation of type/occupancy type and allowable
    - iii. Accumulated Occupant Load for exit paths
    - iv. Location of Fire Extinguishers, Fire Department Connection, Standpipe, Hose Cabinets, Public Fire Hydrants
    - v. Location of AEDs



5. The project cover sheet shall also include a key plan indicating area of work, and a brief description of the scope.

### **Severe Weather Designated Area and/or Storm Shelters**

1. Utilize ICC 500 – Design of Storm Shelters as a reference for the design of storm shelters for all new occupied structures.
2. Hospitals:
  - a) Follow code requirement for in-patient protect-in-place procedure.

### **Space Types**

This section includes individual Space/Room Design Information. These space/room sheets illustrate the layout and features of some common/typically programmed spaces (but is not fully inclusive of all potential spaces) and provide typical square footages, required Fixture, Furniture & Equipment suggestions as well as detailed information on power, data and other infrastructure requirements. Spaces require further investigation during design and consultation with both users and Facilities Management staff.

Where suggested square footages are given, consultant shall work with Owner to verify and accommodate specific needs per project. It is the goal that the minimum necessary space types be used to accomplish project goals, accommodation of users, and required FF&E in a space, and provide modular flexibility for future use as functions and users change.

### **Classroom**

#### **General:**

Classroom sizes range based on intended occupancy. A standard classroom should be designed for multiple teaching modalities including active, project-based learning, and lecture.

#### **Execution:**

1. Coordinate HVAC considerations with Owner.
2. Floor Finish
  - a) Non-directional patterned carpet tile in a medium tone as to not show marks and stains. In consultation with Owner other materials such as LVT or sealed concrete may be used. 4" min. resilient base to be provided.
3. Light:
  - a) Adequate natural light shall be provided in each classroom through direct window to exterior or borrow lite where adjacent space is appropriate.

- b) Coordinate lighting controls with UNMC A/V team. Provide ability to reduce wall wash or front wall lighting during a classroom presentation.
  - c) Provide 0-10V dimmable lighting.
  - d) Locate lighting controls at instructor station or through A/V control module.
4. Walls:
- a) Paint – Eggshell, min.
5. Ceilings:
- a) Provide acoustical ceiling tile– 2x2 lay-in w/ reflective tile min.
  - b) Provide other finishes, such as painted drywall or other ceiling systems to address acoustical, lighting, A/V and other performance considerations.
6. Doors:
- a) Wood stain grade doors (w/ lite) 36” Standard door size. Where double doors are required, provide removable and keyed center mullion.
7. Data and Power
- a) Show data and power locations on plans coordinating with furniture and equipment.
  - b) In consultation with Owner provide hard wired power and data at all fixed classroom furniture through furniture systems.
  - c) At instructor station, provide power and data drops, quantity determined In consultation with UNMC A/V team.
  - d) If furniture is not fixed, power and data is to be provided in both floors and walls to provide a reasonable ‘grid’ of power and data to support access to these services based on multiple potential furniture configurations.
  - e) Where classrooms have full window walls, provide floor boxes at perimeter of room in place of wall convenience outlets.
  - f) Data and power drops from ceiling may be required based on classroom use.
  - g) Provide low-voltage rough-ins for access control and room scheduler at corridor outside of classrooms.
8. A/V Equipment
- a) Classrooms are to have audio-visual systems in them, for visual display/ projection, audio reinforcement, lecterns, and other considerations to support classroom use.
  - b) Audio-visual systems and their performance is to be coordinated with building services, acoustical, lighting, window treatments and other systems.
  - c) Include detail for blocking and mounting A/V and other equipment as necessary.

- d) Large lecture halls and auditoriums will require A/V closet to support A/V equipment. Determine final size and requirements with UNMC A/V team.

#### 9. Furniture

- a) Mobile classroom furniture and equipment is to be provided in the construction budget unless Owner approves otherwise.
- b) Provide mobile flip-top nesting tables unless specified otherwise by Owner.
- c) For auditoriums, provide fixed tables with integrated power and voice amplification.
- d) Provide classroom chair with cushioned seat and flex back for 2-hour sit
- e) Provide task stool or chair for instructor station.
- f) Provide power adjustable instructor's station, type determined in consultation with users.
- g) Demonstrate ADA clearances in classrooms with furniture shown to scale.
- h) Show location of marker boards, displays, A/V equipment, and instructor's station.
- i) Equipment and furniture layout to be approved by Owner.

#### 10. Window treatments

- a) Provide shades on all exterior windows on digital controller, coordinate openness factor to prevent glare. Coordinate with lighting control system.

#### 11. Acoustics

- a) Consideration of measures of acoustical privacy relative to building systems shall be considered.
- b) Provisions for acoustical privacy shall have special consideration and measures at areas of high acoustical privacy.
- c) STC 50 minimum walls.
  - i. Provide acoustical wall panels as desired in auditorium classrooms.

### **Workplace**

#### **General:**

Provide multiple, flexible work settings including adjustable-height work surfaces, collaboration and break-out spaces, and storage. Provide storage for office supplies and materials, as well as lockable storage for personal items, consolidated in lockers or at each station.

Principles of Workplace Guidelines:

- Increase the use of open work areas and shared offices

- Limit dedicated private office spaces
- Incorporate collaboration spaces supported by robust technology and storage solutions
  - Support in-person, hybrid, and remote work models
  - Apply consistently across all UNMC/NM locations
  - Comply with accreditation requirements (i.e. GME, LCME)
  - Phase implementation as new spaces are created and/or updated

The following table reflects general recommendations for the Assignable Square Feet (ASF) for specific positions and staffing categories.

UNMC Workplace Standards based on space type:

<b>Work Space – Baseline</b>		
<b>Space Type</b>	<b>SF</b>	<b>Other requirements</b>
Touchdown Station (Hoteling, Unassigned)	25	Adjacent to support spaces. Provide locker or file storage nearby. Power/USB module will be provided at desk and task light.
Workbench	25	Adjacent to support spaces. Power/USB module will be provided at desk and task light. Single or Dual monitors and docking station provided. Lockable storage provided at work bench.
Workstation (open office environment)	36-48	Need to be adjacent to support spaces. Power/USB module will be provided at desk and task light. Single or Dual monitors and docking station provided. Lockable storage provided at work station.

Privacy Wall Office	64-100	Need to be adjacent to support spaces. Power/USB module will be provided at desk and task light. Single or Dual monitors and docking station provided. Lockable storage provided at work bench. For enclosed panel office, height of panels to be 64"-90".
Or Shared Private Office (Walled)	80-100	
Private Office (Walled)	100-140	All full-time on campus.
Private Office (Walled)	200-250	All full-time on campus. Need meeting space inside office and second exit.

### **Execution:**

1. Floor Finish
  - a) Non-directional patterned carpet tile in a medium tone as to conceal marks and stains. In consultation with Owner other materials such as LVT or sheet vinyl may be provided. 4" min. resilient base to be provided.
2. Light
  - a) Access to natural light shall be provided when possible.
    - a) Provide indirect lighting sources for general room lighting.
    - b) Dimmable LED lighting
3. Walls
  - a) Paint – Eggshell, min.
  - b) Single wall accent color allowable per project constraints, see branding guidelines for color palette.
4. Ceilings
  - a) Provide acoustical ceiling tile– 2x2 lay-in
5. Doors
  - a) For enclosed offices and suites, lite shall be provided as sidelite or ¼ lite in door as determined by project requirements.
  - b) At huddle rooms, provide acoustical seal at door frame
6. Furniture
  - a) Show furniture and equipment layouts as applicable on floor plans at Schematic Design Phase in compliance with furniture and workplace guidelines.

- b) At Design Development and Construction Documents Phases, provide separate floor plan for furniture and equipment.
- c) Demonstrate ADA clearances in offices with furniture shown to scale.
- d) **Workstation** (in open office environment) standard baseline furniture layout includes:
  - i. adjustable height work surface with monitor arm and surface-mounted power receptacle
  - ii. mobile or stationary lockable pedestal
  - iii. Task chair
  - iv. Additional storage options as advised in FMP “Kit of Parts” in consultation with Owner’s representative.
- e) **Shared Office** standard baseline furniture layout includes:
  - i. adjustable height work surface with monitor arm and surface-mounted power receptacle
  - ii. mobile or stationary lockable pedestal
  - iii. Combination file & bookcase
  - iv. Task chair
  - v. Additional options as advised in FMP “Kit of Parts” in consultation with Owner’s representative.
- f) **Privacy Wall or Private Office** standard baseline furniture layout includes:
  - i. Demountable wall system to maximum 70” A.F.F., or 18” below ceiling, whichever is lower
  - ii. adjustable height work surface with monitor arm and surface-mounted power receptacle
  - iii. stationary return surface
  - iv. mobile or stationary lockable pedestal
  - v. Combination file & bookcase
  - vi. Task chair
  - vii. Guest chair(s)
  - viii. Additional options as advised in FMP “Kit of Parts” in consultation with Owner’s representative.
- g) Huddle Room standard furniture layout includes:
  - i. “D” or round table
  - ii. 3-4 conference chairs
  - iii. Consult UNMC A/V for requirements

## 7. Specialty systems

- a) Provide low frequency sounder base and strobe tied to building fire alarm in any office or work areas occupied by more than one individual.

b) Provide one thermostat for every block of three adjacent office.

8. Data and Power

- a) Show data and power locations on plans.
- b) Provide minimum 1 data line per individual in each office area.
- c) Provide Quad power receptacle per individual in each office area.
- d) Provide convenience outlets on walls without workstations.
- e) Coordinate furniture power feed and location with furniture vendor.
- f) Provide low-voltage rough-ins for access control on exterior side of door if required, per project requirements.
- g) Modular furniture in open workplace environments to include partial switched outlets per Energy Code requirements.

9. Window treatments:

- a) Provide manual shades at all exterior windows, 3% openness factor.

10. Corridors in office areas:

- a) Double loaded corridors shall terminate with natural light whenever possible.
- b) Doors should be offset across corridors (i.e. doors of spaces across a corridor should not align and should be fully offset for visual and acoustical reasons) to maximize privacy.

11. Acoustics

- a) Provide acoustical privacy in private offices, conference rooms, and huddle rooms. Preferable methods are through insulated walls and ceiling tiles/surfaces. STC 45 or above.
- b) Open office environments shall include sound masking.
- c) Consideration of measures of acoustical privacy relative to building systems shall be considered.
- d) Provisions for acoustical privacy shall have special consideration and measures at areas of high acoustical privacy, i.e. counseling rooms, etc.

## **Conference Room**

### **General:**

Provide in office/workplace areas, quantity determined in Office Guidelines above. Coordinate A/V with UNMC A/V team.

### **Execution:**

1. Furniture

- a) Show furniture and equipment layouts as applicable on floor plans at Schematic Design Phase.
  - b) Provide powered furniture as appropriate in consultation with Owner and users with worksurface accessible power and data.
  - c) At Design Development and Construction Documents Phases, provide separate floor plan for furniture and equipment.
  - d) Demonstrate ADA clearances with furniture shown to scale.
2. Light
    - a) Provide natural light or borrow lite where appropriate and where acoustical privacy is not compromised.
    - b) Provide indirect light as general room lighting.
      - i. Provide dimmable LED lighting.
3. Floor Finish
    - a) Non-directional patterned carpet tile in a medium tone as to conceal marks and stains. 4" min. cove base to be provided.
4. Walls
    - a) Paint – Eggshell, min.
    - b) Single wall accent color allowable per project constraints, see branding guidelines for color palette.
5. Ceilings
    - a) Provide acoustical ceiling tile– 2x2 lay-in w/ reflective tile min.
    - b) Provide other finishes, such as painted drywall or other ceiling systems as advised by Owner.
6. Doors
7. Provide lite or sidelite.
8. Data and Power
    - a) Show data and power locations on plans. Assume multiple users with laptops, providing power through furniture or floor boxes depending on intended layout and use.
    - b) Power and data receptacles shall be provided in floors to support equipment use and furniture layout.
    - c) Provide low-voltage rough-ins for access control and room scheduler or digital signage on exterior side of door, as determined by project needs.
9. Acoustics
    - a) Consideration of measures of acoustical privacy relative to building systems shall be considered.
    - b) Provisions for acoustical privacy shall have special consideration and measures at areas of high acoustical privacy.
    - c) STC 50 minimum walls.
10. A/V
    - a) In consult with UNMC A/V support, provide wall-mounted monitor and external camera mounted at sitting height.



- b) Large conference rooms will require A/V rack and/or closet to support A/V equipment. Determine final size and requirements with UNMC A/V team.
  - c) Integrate with lighting controls, as required.
11. Special considerations
- a) Consider donor signage or potential for future signage applications in design.

## **Work Room**

### **General:**

A support room for employees and staff that may include uses for break and office support. May include a copier/printer, mail distribution, supply storage, kitchenette, personal use lockers, and furnishings for eating or break.

### **Execution:**

1. Furniture
  - a. Provide tables and chairs if used as a break area.
  - b. Provide table or counter surface near copier/printer for supplies.
  - c. Provide storage for paper, office supplies.
2. Floor Finish
  - a. Provide LVT if kitchenette is included, non-directional patterned carpet tile if no water is provided in room. Provide 4" min. resilient base.
3. Kitchenette
  - a. Provide space for full-size refrigerator, OFOI
  - b. Provide space for microwave, OFOI. Consult Owner for location.
  - c. Provide counter space for coffeemaker with water line, OFOI
  - d. Provide floor space for trash receptacle, recycling bin, and compost bin. Slim jim 23 gal., 11" x 22"
4. In consultation with Owner, provide mail distribution cubbies with storage cabinet below.
5. Provide digital programmable laminate lockers, quantity determined on a per project basis in consultation with Owner.
6. Provide location for Kronos machine for employee clock-in.
7. Provide floor space for shredding storage bin.
8. Provide electronic access control to space.
9. Data/Power
  - a. Provide dedicated power and data for a combination upright copier/printer
  - b. Provide convenience outlets on each wall and at kitchenette

## **Lactation Room**

### **General:**

Lactation Rooms shall be provided in every new facility or any remodel of over 10,000 impacted SF or project cost of \$1,000,000, or at discretion of Owner's Representative, if such facility does

not currently exist. For buildings over two stories, provide one room per floor. Recommended 1 station per 100 occupants, 2 station per 250 occupants, 6 stations per 1000 occupants.

Rooms can be multi-occupant with individual stalls separated by privacy curtain.

Mamava pods may be considered in lobby areas where building and project parameters do not allow for designated room construction.

Lactation rooms shall not be combined with Wellness Rooms below, but serve pumping/nursing employees and/or students only.

### **Execution:**

1. Signage/identification:
  - a) Room shall be labeled 'Lactation Room'
2. Finishes:
  - a) Non-directional patterned carpet tile in a medium tone as to conceal marks and stains. In consultation with Owner other materials such as LVT or sheet vinyl may be provided. 4" min. resilient base to be provided.
3. MEP Systems:
  - a) Sink and counter surface
  - b) Electrical outlet with USB connection, adjacent to chair
  - c) Dimmable overhead lighting
4. Furnishings:
  - a) Soft lounge chair
  - b) Side table or wall shelf within 18" of power source
  - c) Waste receptacle
  - d) Paper towel dispenser
  - e) Mirror
  - f) Soap dispenser
  - g) Privacy curtain (if applicable)
5. Security/hardware:
  - a) Card reader
  - b) Occupancy-indicator lock

### **Gender Neutral Restroom**

#### **General:**

Gender Neutral restrooms shall be provided in every new facility or any remodel of over \$1,000,000 project costs, or 10,000 SF total impacted square footage if such facility does not currently exist. A Gender neutral restroom shall be a single-occupant room with floor-to-ceiling hard walls and ceiling. In buildings over two stories, multiple facilities shall be considered.

#### **Execution:**

1. Signage/identification:



Anyone can use this restroom regardless of gender identity or expression.

2. FFE:
  - a. Paper towel holder
  - b. Mirror
  - c. Soap dispenser
3. MEP Systems:
  - a. Toilet
  - b. Sink
4. Security/Hardware:
  - a. Occupancy-indicator lock

### **Wellness Room (Reflection, Prayer, Interfaith Space)**

#### **General:**

Wellness room(s) shall be provided in every new facility or any remodel of over \$3,000,000 in project costs, or 10,000 SF total impacted square footage, if such facility does not currently exist. This space shall be used for prayer, reflection, meditation, or other similar functions.

Wellness Rooms when used for prayer shall be adjacent to an Ablution space, described below.

#### **Execution:**

1. Signage/identification:
  - a. “Wellness Room”, or “Prayer Room”, at discretion of Owner’s Representative based on project needs
2. FFE:
  - a. Resilient or cushioned flooring
  - b. Minimal non-representative artwork
  - c. Bench at entry
  - d. Stackable/foldable chairs
  - e. Moveable room dividing screen
  - f. Coat hooks on wall at entry door
3. MEP Systems:
  - a. Dimmable lighting
  - b. Adjustable lamp

4. Security/Hardware:
  - a. Occupancy-indicator lock
  - b. Auto Drop Sill

### **Ablution Space**

#### **General:**

Ablution Space is adjacent to Prayer space. A Room shall be provided with lockable door, or alcove with screening for visual privacy shall be considered as an alternate with approval by Owner's Representative.

#### **Execution:**

1. Signage/identification:
  - a. "Ablution"
2. FFE:
  - a. Paper towel holder
  - b. Mirror
  - c. Soap dispenser
  - d. Waterproof bench
  - e. Coat hook on door
3. MEP Systems:
  - c. Wall sink
  - d. Wall faucet mounted at 20-30" AFF
  - e. (No toilet)
5. Security/Hardware:
  - c. Occupancy-indicator lock

### **Call Room/Sleep Room**

#### **General:**

Call rooms provided per UNMC ACGME Requirements

#### **Execution:**

1. FFE
  - a) Provide twin bed
  - b) Provide night stand with adjacent power
  - c) Provide task lighting near bedside
  - d) Provide worksurface for computer usage
  - e) Provide task chair
2. Provide access to toilet & shower facilities
  - a) Adjacent, private facilities preferred.
3. Provide card access or punch-code lock secure access to sleep room.

4. Provide single station smoke alarm within room.
5. Provide low-frequency sounder base tied to building alarm

### **Space and Access Requirements for Mechanical and Electrical Components**

1. Construction Documents should be correlated and cross-referenced to ensure that concealed mechanical and electrical system components which require inspection, adjustment, service or maintenance, including, but not limited to, VAV boxes, control valves, balancing valves, reheat coils, control devices, fire dampers and balancing dampers, are provided with an appropriate means of access, either through readily removable ceiling panels or properly sized and located access panels and doors. Where access panels or doors are used, their size and dimensioned locations shall be indicated on the construction documents.
2. Generally, Mechanical spaces shall be designed as interior spaces which have been designed to allow for future equipment replacement in mind. Exceptions to this must be approved by Facilities Engineering in writing. Access to mechanical rooms shall be by means of standard stairs which allow carrying of ladders and large equipment needed for maintenance purposes or an elevator. Access solely by means of a ladder is prohibited.
3. Access to a building's roof is preferred to be via stairs to allow maintenance equipment to be carried to the roof more readily. Doors or hatches that enter onto a roof area must be secured with removable cores on locks.
4. Access panels must have removable cores on locks.
5. Zone valves, tamper switches and pressure gauges for fire system must be installed below ceiling and at a height easily viewable (from 5'0" to 6'0" above finish floor).

### **Energy and Systems Selection**

1. The Owner's Energy Modeling consultant shall perform the following:
  - a. Programming/Conceptual design: Baseline energy model - Initial Energy evaluation to determine baseline code compliant EUI.
  - b. Schematic: Life Cycle cost analysis compare baseline code EUI against 3 mechanical system options which are decided by the Director of Engineering in consultation with the design team. This will be utilized to select the mechanical system for the building.
    - i. LCCA will be based on a 40-year investment period and a 6% discount rate, or whichever the design team and energy modeling consultant feel is the most appropriate values given project specifics.
    - ii. The LCCA shall account for orientation, massing, and fenestration of the proposed building design. Where campus energy is the fuel source, coordinate energy loss factors with campus facilities utilities team.
  - c. Construction Documents: at end of design re-run energy model to determine final expected EUI after execution of project.
2. Owner's energy modeling consultant shall submit reports that clearly identify systems evaluated with their predicted EUI, expected annual energy costs, and general mechanical

system parameters utilized. Report shall also outline envelope parameters used including U-values, window-to-wall ratio (WWR), and SHGC values.

3. Owner's energy modeling consultant shall also perform an energy conservation measures (ECM) report to be submitted with the LCCA. Report shall analyze ECM strategies and their % Energy reductions. Minimum variables that shall be analyzed will be: Roof Insulation, Exterior Wall insulation, Window Assembly U-Values, Window SHGC, Infiltration, and Lighting Power Density. A recommendation for ECM's to be used in the design and their total energy savings will be provided in a report.
4. These reports will be evaluated by the owner and the final selections shall be provided to the design team by the end of schematic design.

### **Plan Review**

1. The Owner may, at its discretion, hire a third-party consultant for quality review of the construction documents and shop drawings as necessary to verify installations are as specified.

### **Room Numbering Standard**

Room number assignments to be reviewed by Owner Space Management team for consistency prior to release of Construction Documents.

### **General**

Room number assignments connected to the main campus concourse shall include a building identification number. Independent buildings are referenced by their building acronyms. These room numbers ensure efficient and accurate location for emergency situations and for requesting services. Small vinyl numbers are located on the upper door frame of the entrance to all rooms displaying the adjacent room or hall number. Patient rooms have larger eye-level plaques that coincide with the number on the door frame.

1. Concourse - Patient Care Buildings

Buildings integrated within the main campus concourse are given a building number to allow for wayfinding and locatability when building distinctions are not perceptible by public. Each digit in a room number has a specific designation. The first digit represents the floor the room is on, the next digit or two digits designate the number that has been assigned to the building, and the remaining digits are the room number. In the newer buildings on campus (Buffett and Lauritzen) these separations are indicated by periods.

#### **Existing Buildings:**

Example: 1430

- 1 The first digit indicates 1st floor.
- 4 The next digits indicates Unit 4 University Tower.
- 30 The remaining digits indicates room 30

#### **New Buildings**

Example: 2.12.292

- 2 The first digit indicates 2nd floor.
- 12 The next digits indicates Buffett Cancer Center.
- 292 The remaining digits indicates room 292

2. Independent Research and Education Buildings, Offsite Patient Care Buildings  
Each digit in a room number has a specific designation. The first digit represents the floor the room is on, the next digit is a zero (0), and the remaining digits are the room number.
3. Additional Features:
  - All room numbers for **Hixson-Lied Center** begin with 200 and higher. **Example: 18200, 18331**
  - All room numbers ending in **98** and followed by a letter are stairwells. **Example: 0898A**
  - All room numbers ending in **99** and followed by a letter are public corridors. **Example: 12799C**

### **Sound Transmission Standards**

1. Building Envelope and Room Enclosures: Design and select building systems to provide the following sound transmission resistance:
  - a) Building envelope: STC 35
  - b) Office, research space, conference rooms and restrooms: STC as noted in Space Types Narrative Document – full height partitions, insulation full height, drywall on both side full height,
  - c) Healthcare spaces reference FGI.
  - d) All air returns should be ducted. There are instances where plenum return is acceptable and can be evaluated on a case by case basis with the Owner. Good engineering design shall be utilized in those instances.

### **Access to Roof**

1. Application: Roof access shall be incorporated into the design of each new building as required to accommodate the maintenance requirements of equipment or other systems installed on the roof. In addition, if new equipment or systems are added to an existing building roof, the appropriate roof access must be added as part of the project.
2. Access Type: Access requirements will vary depending upon the amount and type of maintenance required for the systems installed on the roof. Examples of items that require substantial maintenance are HVAC equipment (other than roof exhausters/toilet exhaust fans), photovoltaic cells and "green roof" vegetation.
3. The following list summarizes acceptable types of roof access, beginning with access to systems with the greatest maintenance requirements to the least. Owner (Project Manager and Representative from Building Operations) shall be consulted to determine the appropriate type of roof access.
  - a) Elevator
  - b) Interior stairs w/ exterior door
  - c) Interior stairs w/ large hatch
  - d) Interior ships ladder w/ hatch
  - e) Exterior stairs
  - f) Exterior ships ladder
  - g) Exterior ladder with fall protection

4. Alternating tread stairs are not allowed. In no case shall a portable ladder be required. Exterior ladders from the ground or first floor level to the roof of a one story building shall be avoided due to the propensity for students or the public to climb them. Every effort shall be made to locate said ladder indoors and readily accessible by maintenance staff (preferably in a locked mechanical equipment room). Access to the roof shall not be through a private office or lab, or through a classroom.
5. Any roof access that is accessible to the public shall incorporate a lockable/securable barrier that limits access to appropriate employees. Locks shall be keyed as required by key services.
6. Finish: The level of finish shall be determined by the visibility from the street. In a relatively hidden or obscure location, high quality black paint on steel may be acceptable. However, if the stairway or ladder is visible from the ground or adjacent offices and classrooms, then it shall be galvanized and painted. Aluminum is preferred for highly visible locations.
7. Safety Tie-offs: OSHA compliant safety tie-offs shall be provided as needed to allow safe access to every part of the roof or any equipment mounted thereon.



## Division 00 & 01 Contracting & General Requirements

1. Design Professional shall consult the Owner's Representative for Division 00 and 01 Specifications.
2. Design team shall include a note in Construction Documents Sheet G. Code Reference stating issuance date of UNMC/NM Design Guidelines, indicating version of Design Guidelines utilized for design.

### Closeout Requirements

**01 70 00**

1. As-built document submittal requirements, as applicable based on project requirements.

Category	Document	Format	Responsibility
Contract Document	Record Contract Documents, including Arch, AV, Civil, Core-shell, Elec, Equip, FP, Int, LA, Light, Mech, MEP, Plum, Struct, Tele as listed in BIM Standards & Guidelines)	Revit, .dwg, PDF sheets	AE
	Project phasing plans	Revit, .dwg, PDF	AE
Utilize Owner's Template	Demo'd Life Safety Devices	Excel	AE/GC
Shop drawing	Fire Alarm Plans	Revit, .dwg, PDF	GC
Shop drawing	Fire Sprinkler Plans	Revit, .dwg, PDF	GC
Contract Document	Life Safety Plans	Revit, .dwg, PDF	AE
Shop Drawing	Med Gas Zone Plan	Revit, .dwg, PDF	GC/AE
Contract Document	Pressure Relationship Drawings, labeled with positive/negative pressure relationship	Revit, .dwg, PDF	AE
	Evacuation Maps, editable and posted in required locations	.dwg, PDF	AE
	Furniture Plans	Revit, .dwg, PDF	
Utilize Owner's	Demo'd & decommissioned Equipment	Revit, .dwg, PDF (or list with location)	GC/AE

Template	Including but not limited to: Ice maker, refrigerator, mechanical, electrical		
	Photos pre drywall, pre ceiling, substantial completion	Multivista or other, per Owner Requirement	GC if Multivista not utilized
	O&M Manuals	PDF	GC
	Warranty documentation	PDF	GC
	All Submittals and Shop Drawings	PDF	GC
	Hazardous Material Survey (if applicable) type of materials abated, dwg showing areas	PDF	
	Testing & Balancing Reports	PDF	GC or Cx
	Certificate of Substantial Completion if required	PDF	AE
	Certificate of Occupancy - if required	PDF	
	Attic Stock Inventory List & storage location(s)	PDF	GC

**Application:** New building and major renovation projects over \$5M construction cost must address topics covered in this section as part of the Design Quality Process. Design teams should also reference requirements in other sections of this document, specifically DIV 22, 23, 25, and 32.

The Owner will designate an individual or entity responsible for: tracking the goals described in this section, and working with the design team to monitor and report progress to those goals.

### 1. Sustainable Sites, Ecology, and Equitable Communities

- a) Minimize demolition of sites and buildings whenever reasonable. Reusing materials on-site immediately reduces our carbon footprint.
  - i. Set goals for deconstruction, demolition, and construction waste diversion, and require waste tracking by the contractor during demolition and construction.
- b) Identify the proposed service life for the building and create a plan to adapt to hazard risk over time.
- c) Incorporate green infrastructure and low impact development strategies into the site design to manage onsite 100% of the total volume of runoff calculated for the 95th percentile rainfall event.
- d) Plant more and pave less. Replace high-embodied carbon infrastructure with green alternatives—aim for 70% softscape and 30% hardscape, or better. Improve site biodiversity, connect to and expand regional habitat corridors, and increase site permeability and vegetated area compared to predevelopment conditions.
  - i. Provide shading to reduce the heat absorption of hardscape (driveways, parking lots, bike paths, walkways, courtyards, and plazas), roof surfaces, and wall materials.
  - ii. Effective paving materials should have a minimum SRI of 29.
  - iii. Required SRI values for roofs are based on whether the roof is low-slope (less than or equal to 2:12, minimum SRI of 78) or steep-slope (more than 2:12, minimum SRI of 29). More than 75% of the roof area should meet or exceed these values.
  - iv. Consider any site features to reduce heat island effects.
- e) Utilize recommended site lighting fixtures and propose lighting solutions to satisfy campus safety standards while reducing light pollution.
- f) Utilize the principles of Universal Design.

- g) Design inclusive, equitable environments that empower people to use the mobility method that suits their life situation and consider the end-to-end experience for users of each mobility mode as they interact with the project.
- h) Prioritize people, not vehicles.
- i) Design for bird safety and integrate bird collision deterrent strategies.
- j) Support bicycles and bicyclists with secure and easy-to-use bicycle racks, offer bicycle fix-it stations, and provide shower facilities for cyclists in public buildings near bicycle storage.
- k) Consider and answer the following:
  - i. What is the project's greater reach? How could this project contribute to creating a diverse, accessible, walkable, just, and human-scaled community?
  - ii. Who might we be forgetting? How can the design process and outcome remove barriers and promote inclusion and social equity, particularly with respect to vulnerable communities?
  - iii. What opportunities exist in this project to include, engage, and promote human connection?
  - iv. How can the design support health and resilience for the community during times of need or during emergencies?
  - v. How can the design support the ecological health of its place over time?
  - vi. How can the design help users become more aware and connected with the project's place and regional ecosystem?
  - vii. How can the design build resilience and support adaptation to climate change through nature-based solutions.
  - viii. How can the project support regional habitat restoration?
  - ix. How can the project support equitable access to nature?
  - x. How does the project handle rainfall and stormwater responsibly?

## 2. Energy and Atmosphere

- a) Reduce building energy use and carbon impact by benchmarking, setting targets, and performing iterative energy modeling throughout the design process. Work with the Owner's Energy Modeling consultant:
  - i. At the beginning of the design process, establish benchmarks and set an energy use intensity (EUI) goal and any other key performance indicators, such as carbon emissions, or lighting power density (LPD). Everyone on the team should understand a project's benchmark and its energy goals. Use the Zero Tool to calculate project EUI Baseline and Target. <https://www.zerotool.org/zerotool/>
  - ii. Analyze the project plug load (in W/sf). Determine the typical plug load (in W/sf) for buildings with a similar program and aim for reductions that are quantifiable to the owner. Provide a design and circuitry which allows for a percentage of the plug load to be dedicated occupancy controlled plugs which can be scheduled off.
- b) Comply with Energy Code prescriptive enclosure performance requirements for Climate Zone 5A, including maximum window-to-wall ratio (WWR) and minimum insulation.

- i. In general, primary glazing should be on the south to collect beneficial solar radiation. For the most part, windows should be shaded on the south, east, and west, and minimized on the east and west.
  - ii. Analyze building assemblies to determine the amount of insulation that will provide thermal comfort and efficient energy performance without a diminishing return based on the increased capital cost.
- c) Consider the program of the rooms along the perimeter and how they may benefit from daylight harvesting lighting controls, which benefit the occupants and offer potential interior lighting energy savings.
- d) Commissioning will be required on all projects over \$3M and on smaller projects as determined by need with the owner. Consult with Owner's engineering team for project specific commissioning requirements.
- e) Discuss with the owner the viability of the project to utilize envelope commissioning or a blower door test to verify the building's air tightness, both for a mockup and for the whole building.
- f) Consider and answer the following:
- i. How can passive design strategies contribute to the project's performance and form?
  - ii. How can the project exceed building code efficiency standards to plan for net zero energy and carbon in the future?
  - iii. Can this building be all-electric, or designed for that near future?
  - iv. Can the project be powered by clean, renewable energy sources?
  - v. How can the project provide for continuous performance improvements over its' lifetime?

## 2. Solar

- a) New buildings will be provided as "Solar ready". Provide all infrastructure needed to be connected to a future installed solar system.
- b) Explore the costs and payback analysis of a solar system for the project and provide that information to the Owner for decision making.

## 3. Water Use

- a) Incorporate water reuse and reduction strategies and understand the relationship between energy, water, and carbon.
- b) Develop a water budget analysis (water flow analysis) to determine the water resources available to the project, how much water is needed, and how the water system can minimize the use of potable water. The water budget analysis should consider the outdoor and indoor water resources as a unified system.
  - i. Use low-flow (not dual flush) toilets, sinks, and fixtures. Use WaterSense-labelled fixtures.

- c) Sub-meter irrigation and any other significant process water uses.
- d) Minimize site irrigation from potable water sources.
- e) If the project requires continuity of operations, plan for sufficient potable water storage to serve occupants during the anticipated period of service interruption.
- f) Consider and answer the following:
  - i. How does the project use water wisely, addressing efficiency and consumption while matching water quality to appropriate use?
  - ii. How can the project's water systems maintain function during emergencies or disruptions?
  - iii. Is there a need for a Legionella management plan?

#### 4. Materials

- a) Consider manufacturing, construction, and end-of-life when selecting materials, along with the impacts on source and site ecosystems.
- b) Work with manufacturers and general contractors to understand the best ways to successfully make assemblies and materials that can be reused. Modular items, such as interior partitions and millwork that are attached with mechanical fasteners, are easy to relocate when needs change, preserving not only their embodied carbon but also their value.
- c) Eliminate the use of [Red List](#) materials, which are known to be the most harmful to life. A current list of materials of concern may be found at the International Living Future Institute
- d) Sourcing and Transparency: All projects must demonstrate a responsible selection of materials. The following chemicals of concern, often found in building products, are prohibited in the following product categories:

Product categories:

- i. Composite wood and coatings
- ii. Flooring
- iii. Wall base
- iv. Wall coverings
- v. Paints and coatings
- vi. Wall protection
  - 1. Corner guards
  - 2. Wall protection
  - 3. Handrails
  - 4. Bumper guards

- vii. Furniture
  - 1. Edge banding
- viii. Fabrics
  - 1. Woven, non-woven, and coated upholstery; including finishes, coatings and backings
  - 2. Draperies; including window shade
  - 3. Panel fabrics
  - 4. Acoustical fabrics

Restricted chemicals of concern:

- i. Alkylphenols and related compounds (propylphenol, butylphenol, amylphenol, heptyphenol, octylphenol, nonylphenol, dodecylphenol, methylphenol and ethylphenol.)
- ii. Antimicrobials
- iii. Asbestos
- iv. Bisphenol A (BPS)
- v. California-banned solvents
- vi. Formaldehyde
- vii. Halogenated Flame Retardants
- viii. Polyfluoroalkyl Substances: PFAS (PFCs/PFOA/PTFE)
- ix. Phthalates
- x. PVC
- xi. Toxic Heavy Metals (Arsenic, Cadmium, lead, Mercury)

Permanently installed products: meet Restricted Chemicals of Concern requirement by using any recognized third-party material ingredient disclosure certification program. Provide the information on what program was followed.

- e) Low Emitting Materials
  - i. Select no-VOC or low-VOC interior finishes, building materials, and furnishings, and use materials and products that can prove emission compliance.
- f) Think locally and regionally. Develop a regional materials palette based on what is available locally, especially for heavier materials. Increase your radius to meet product criteria. When possible, design with reclaimed/salvaged materials such as bricks or lumber, and reclaimed components such as furniture systems, raised floors, and commercial doors. Work with your team of consultants to ensure best use of the material from both a functional and end-of-use perspective.
- g) Responsible material sourcing requires time and commitment from the design team. Incorporate product research, specification, review, and tracking in the project budget to ensure requirements for tracking materials declarations, requirements that increase the use of materials and surplus, and material best practices are followed from specification to contractor procurement.
  - i. Sourcing and Transparency: Specify at minimum twenty (20) products with documentation of one of the following:

1. Environmental Product Declaration
  2. Healthy Product Declaration
  3. Declare
  4. Cradle to Cradle
  5. Forest Stewardship Council (100%)
- ii. Prefer manufacturers with a high level of product transparency. If information does not exist, ask and work with manufacturers to produce and provide Environmental Product Declarations (EPDs), Health Product Declarations (HPDs), and Declare labels. Consider products with an extended producer responsibility, especially for FF&E (furniture, fixtures, and equipment), which have a shorter service life. This includes the circular economy model where manufacturers provide products as a service or have a takeback program.
- h) Develop a waste management plan, with input from building management, that estimates quantities of each waste type and identifies how and where they are collected, moved, stored, and set out for pickup. Provide sufficient area for easy segregation, movement, and storage of all discarded materials, including, as applicable, metals, glass, plastics, cartons, paper, cardboard, organic waste (food scraps, compostable packaging, and landscape waste), bulk waste, electronic waste, light bulbs, plastic film, and textiles. To increase accurate sorting and recycling, design central waste and recycling stations rather than individual bins that accumulate unsorted waste. Ensure clear, consistent signage and visual cues at waste segregation and storage locations throughout the building.
- i) Provide sufficient dishwashers and storage for use of durable tableware in food service spaces and water fountains and bottle-fillers to reduce single-use packaging waste.
- j) Work with the contractor to estimate the quantity of waste to be generated during construction and identify measures to reduce waste, such as takeback for surplus materials, just-in-time ordering, reducing packaging, allowing offcuts to be reused, and other lean construction strategies, including balancing cut and fill to allow reuse of excavation materials.
- k) Construction Waste Management: Divert at least 90% of construction debris from landfill. If separation of materials is not possible during construction, achieve 75% landfill diversion. Design Professional shall consult with Owner for Supplemental Documents.
- l) Set embodied carbon targets for high-impact materials, such as concrete, asphalt, wood, steel, flat glass, and insulation, on all projects. For tenant improvement (TI) projects, focus on carpet, gypsum board, and FF&E, and consider product lifespan, reuse, and takeback.
- m) Choose insulation with low embodied carbon; good choices include cellulose or mineral wool. Minimize use of spray foam, and, where used, specify hydrofluoroolefin (HFO) rather than hydrofluorocarbon (HFC) blowing agents.
- n) Provide specification language indicating the contractor will track the carbon footprint of the project. Use industry standards and allow for freedom of business practices from various contractors to perform the analysis and provide the documentation to the Owner



over the course of the construction.

- o) Consider and answer the following:
  - i. How can material selection reduce hazards to occupants and communities throughout the supply chain?
  - ii. What factors or priorities will be considered in making material selection decisions?
  - iii. How are materials and products selected and designed to reduce embodied carbon and environmental impacts while enhancing building performance?
  - iv. How can material selection reduce hazards and support equitable labor practices in the supply chain?
  - v. How does the project promote zero waste throughout its life cycle?
  - vi. How does the project celebrate local materials and craft?
  - vii. How long will the project last, and how does that affect your material?

## 5. Indoor Environmental Quality

- a) Furniture & Finishes: comply with ingredient restrictions listed in Division 09 and 12.
  - i. Specify a variety of options for flexible furniture and seating arrangements, such as adjustable height sit/stand desks, non-desk spaces for planned and unplanned conversation, and opportunities for “meeting in motion.”
  - ii. Avoid flame retardants, formaldehyde, and other chemicals of concern that can off-gas for months or years after installation.
- b) Design circulation spaces with views, daylight, plant materials, and space to hold a conversation.
- c) Demonstrate compliance with relevant standards for ventilation and exhaust. Calculate overall building pressurization.
- d) Provide filtered water bottle fillers in addition to water fountains to encourage effective hydration.
- e) Design to achieve excellent air quality.
  - i. Implement UV treatment in central air handling units to prevent mold growth.
  - ii. If applicable, discuss the viability of operable windows.
  - iii. Include permanent entryway systems or walk-off mats at all entrances.
  - iv. Isolate air intake from odor-causing spaces like garages, housekeeping, laundry areas, copy/print rooms, janitor’s closets, or any other areas that utilize or store chemical cleaners.
- f) Evaluate proposed layouts by identifying the types of activities and expected noise level from interior activity and users’ sensitivity. Create a “sound map” that color codes zones by either “loud,” “quiet,” “mixed,” or “circulation.” If “loud” zones directly border “quiet” zones, consider reprogramming or sound transmission mitigation strategies.

- g) The logical flow of the building should be based on human-powered horizontal and vertical circulation to promote physical activity.
- h) Limit background noise levels from mechanical equipment to 40 dBA in learning spaces and conference rooms. Limit noise to 45 dBA in other regularly occupied spaces.
- i) Design for active living and access to nature. Utilize biophilic design concepts to improve mental and physical health and well-being.
- j) Dedicate space for restoration, relaxation, sensory retreat, or respite.
- k) Provide views of or direct exposure to trees and other forms of vegetation to increase the sense of well-being and satisfaction while reducing levels of stress.
- l) Create floor plates and spatial volumes that facilitate daylight from above and/or the side. (Adequate daylight can only penetrate from perimeter windows to a depth of about 2.5 times the height of the window head, so deeper spaces need either taller windows or an atrium, skylights, a sawtooth roof, or other means of providing for deeper daylight penetration).
  - i. Allow daylight to penetrate from multiple sources and directions to create spaces with more uniform daylighting.
  - ii. Design interior spaces to reflect and illuminate natural daylight through opaque, light-colored, and smooth surface finishes.
- m) Demonstrate luminaires do not produce visual discomfort with glare probability metrics for typical conditions. Except at north facade, provide glare control for occupied spaces that are adjacent to large, glazed openings.
- n) Identify areas for potential thermal discomfort (near exterior walls or windows) and modify programming or design to prioritize thermal comfort.
- o) Increase occupant comfort and satisfaction by providing individual control of their immediate environment through operable windows, individual thermostats, or personal temperature control via fans or low-energy radiant heaters.
- p) Facilitate conversations between building stakeholders and the mechanical engineer on whether relaxed temperature setpoints and setbacks can be included. Discuss opportunities to provide variable thermal zones, as not all individuals are comfortable in the same thermal conditions.
- q) Consider and answer the following:
  - i. How can the design encourage a healthy lifestyle?
  - ii. How can the project provide greater occupant comfort?
  - iii. How can the project be welcoming and inclusive for all?
  - iv. How can the project connect people with place and nature?

## Division 02

## Existing Conditions

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It is imperative that the design team carefully evaluate and document actual field conditions. Field verification of original and renovation as-builts (where available) is necessary. If as-builts are not available from the Owner, Design Professional must create accurate as-builts.

### Assessment

02 20 00

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#### General

1. An accurate, sealed, digital site survey must be developed for all projects where scope of work extends beyond the edge of existing buildings.
  - a. Identify underground utilities.
  - b. Consult with Owner to obtain as much existing information as is available. Owner will assist in contacting private locating firm to identify private utilities as well as public utilities
  - c. Show above and below grade utilities based on record information and on surface evidence.
    - i. Location size, depth and pressure of water and gas mains.
    - ii. Location of fire hydrants and PIV's. Identify if private or public.
    - iii. Location elevation and characteristics of power, cable television, street lighting and communication systems above and below grade.
    - iv. Location size, depth and direction of flow of sanitary sewers, combination sewers, storm drains and culverts serving.
  - d. Identify coordinates of all utilities services in three dimensions X, Y & Z coordinates.
  - e. On case by case basis perform "pot holing" to verify spot elevations depth along length and change in elevation. Consult with Owner for approval of pot holing.
  - f. Spot elevations: If elevations vary from established grade, state established grade. Spot elevations at known benchmarks, manholes, and on paving or other hard surfaces to the nearest .01 foot.
  - g. Boundary and topographic information on one drawing at drawing scale of 1" = 20' minimum.
  - h. Show boundary lines giving length and bearing. On each straight line, interior angles, radius, point of tangency, and length of curved lines.
  - i. Note identity, jurisdiction and width of adjoining streets and highways, width and type of pavement.

- j. Show encroachments across property lines.
  - k. Describe fences and walls and locate width of property lines.
  - l. Show recorded or otherwise known easements and rights-of-way and identify Owners.
  - m. Show zoning of property. Show zoning of adjacent property and property across the street or highways.
  - n. Contours are at 1-foot intervals.
  - o. Identify location of structures, paving and improvements above and below grade in three dimensions X, Y & Z coordinates.
  - p. Location, size and species of trees. Beware that the Migratory Bird Act requires that trees are only removed in summer between migration time period. Trees with active bird nest in that period of time cannot be removed.
2. The Owner maintains a utilities master plan. Following a review of existing documentation, the design team and Owner shall coordinate any additional survey requirements.

#### Hazardous Materials Assessment

1. If any asbestos containing or hazardous material are found to be present, they will be abated by the Owner prior to the Contractor taking the site. Refer to Owner's General Conditions, Specification Section 00 72 00.

#### **Products – Not Used**

#### **Execution – Not Used**

**General**

1. The Owner will provide sealed geotechnical information to the design team as required by the project, that typically includes the following:
  - a. Project Information including site location, existing improvements, existing topography, site history and exploration history.
  - b. Project Description including proposed site development, site retaining walls, site grading, below grade areas and on-site detention.
  - c. Subsurface Conditions including mapped soil units, typical profile, and groundwater. Provide copy of soils report including log of each boring or test pit.
  - d. Recommendations for Design and Construction from a soils engineer including geotechnical considerations, site preparation and earthwork, structural fill composition, structural fill compaction, construction grading and drainage, special construction considerations, and landscaping and grading.
  - e. Footing and Foundation Recommendations including design recommendations and construction considerations
  - f. Lateral Earth Pressures including design and drainage systems.
  - g. Exterior Pavements and Slabs including subgrades, design recommendations, construction and drainage recommendations.
  - h. And other General Comments, including an Executive Summary and all testing reports.
2. A SWPPP (Storm Water Pollution Prevention Plan) is required anytime the project area is over a minimum size as required by AHJ.

**Products – Not Used****Execution – Not Used**

**General**

1. A pre-demolition survey must be completed identifying potential hazardous materials.
2. Demolition should be phased to minimize the disruption of occupants. Notice of demolition must be provided 21 days in advance where demolition is scheduled to impact occupied areas.
3. All demolition must be permitted through Building Official.
4. Comply with NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

**Products – Not Used****Execution**

1. Coordinate temporary barriers, safety and security measures with Owner's construction requirements in Division 01 Specifications.

## Division 03

## Concrete

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Refer also to Concrete Paving, Division 32 13 00

### Concrete Forming & Accessories

**03 10 00**

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#### General

1. Avoid metal treads and risers on exterior stairs. Nosing should be plastic insert that is not affected by salt, or a textured concrete nosing in concrete stairs

#### Products – Not Used

#### Execution – Not Used

### Concrete Reinforcing

**03 20 00**

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#### General

1. Epoxy coated concrete reinforcing is required for areas of exterior concrete that will be regularly exposed to both moisture and de-icing salts, primarily in parking garages.

#### Products – Not Used

#### Execution – Not Used

### Cast-in-Place Concrete

**03 30 00**

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#### General

1. Explore the use of moisture dissipative additives with structure engineer.
2. Do not use curing or sealing compounds on floor surfaces scheduled to receive flooring including but not limited to ceramic tile, quarry tile, resilient tile, carpet, or slate flooring. Cure these areas by moisture curing only.
3. Coordinate layout of snap-ties with architectural elevations where cast-in-place walls are to remain exposed. Architect should indicate pattern and / or typical locations when tie holes are left exposed.
4. Light pedestals must be sized a minimum of 2" beyond anchor bolts/placed and top of pedestal must be sloped to provide positive drainage away from fixture.

5. Hold back sleeves and surface mounted anchors from edge of concrete a minimum of 3”.
6. Concrete testing will be by Owner.
7. See Division 7 for under slab Vapor Barrier requirements.

### **Products**

1. The Owner has developed a standard concrete color mix for Architectural Concrete for incorporating into new building projects. Also see Division 32.
  - a. Exterior to be sandblast textured finish.
  - b. Mockups shall be required and pre-approved prior to use. Final installation must meet or exceed mock-up

### **Execution**

1. Finishes on exposed exterior concrete shall not allow voids larger than 3/8”. Subsequent rubbing or patching must be approved in advance.
2. All projects require certain standards of levelness and flatness. Coordinate tolerances with Project Manager.

## **Precast Concrete**

**03 40 00**

### **General**

1. The Owner has developed a standard pre-cast concrete color mix for incorporating into new building projects and exterior improvements. Also see Division 32.
2. Precast concrete standards will comply with PCI recommendations.
3. Mockups shall be required for all precast products and be pre-approved prior to fabrication. Final installation must meet or exceed mockup.

### **Products – Not Used**

### **Execution – Not Used**



## Division 04

## Masonry

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General statements on the use of masonry:

1. All masonry shall comply with BIA and NCMA Standards.
2. Provide control joints in masonry walls in compliance with BIA and NCMA standards. Review control and expansion joint locations with Owner.
3. No masonry parapet walls.
4. Masonry site walls are not allowed. All site walls over 4 feet must be poured in place. Segmented walls will be considered under 4 feet. See Section on Reinforced Poured Concrete.
5. Concrete masonry units are the preferred back-up material for veneer masonry walls.
6. Bond Pattern: Avoid the use of stacked bond pattern.
7. Mortar joints: Specify and provide concave joints at masonry walls.

### Common Work Results for Masonry

**04 05 00**

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#### **General**

1. Cavity drainage material must be used in compliance with BIA and NCMA standards. Specify a clear airspace, consider drainage board, and provide weeps. Concealed flashing should be peel and stick thru wall flashing with additional support fastening via stainless termination bar (metal stud walls) at the top. Cavity shall be ventilated, and provide weep and ventilation at the bottom via full head joint inserts with mortar net (mesh) to keep cavity open

#### **Products**

1. Exposed metal flashing, prefer pre-finished aluminum or stainless steel. No galvanized flashing or brick ties. Use only stainless steel brick ties.

#### **Execution – Not Used**

**General – Not Used****Products**

1. UNMC and Nebraska Medicine, has standard brick color selection.
  - a. UNMC : Yankee Hill 5050, Medium Red masonry units
  - b. Nebraska Medicine: Buff color masonry
  - c. Designer shall coordinate brick color, size, architecture, as well as mortar color with Owner. Alternates will be considered on a project by project basis, to be coordinated with the Owner.

**Execution – Not Used**

## Division 05

## Metals

1. Where metals are regularly exposed to moisture and de-icing salts detailing must be thoughtfully considered. Use stainless steel or structural plastic.

### Metal Fabrications

05 50 00

#### General

1. Coordinate structural steel supports in all rooms with ceiling mounted equipment. Coordinate mounting requirements with equipment provider. Coordinate ceiling equipment with AV Department and campus AV Coordinator.
2. Metal Stairs:
  - a. Treads should always offset at landings to avoid a 'gooseneck' at the hand and guardrails.
3. Metal Railings:
  - a. Provide compatible anchors for each exterior railing system, no galvanized bolts. No embedded anchors are permitted. Use surface mounted stainless steel anchor plates & bolts or use stainless steel sleeves with stainless steel posts.
  - b. Provide stainless steel handrail system on all exterior stairs.
  - c. On interior stairs, painted steel railing support system are allowed.
  - d. Provide stainless steel or epoxy-primed and top coated finish, prefer Thnemec, for exterior stairs.
  - e. Refer to Division 32 for exterior railings.
4. Metal Stair Treads and Nosings:
  - a. Exterior: Do not use embedded metal stair nosings in areas exposed to regular freeze-thaw cycles or deicing salts. Cast-in-place abrasive inserts considered. Use structural plastic inserts as an acceptable alternate.
  - b. Interior: Metal stair treads in public areas must have concrete filled pans.
5. Metal Bollards:
  - a. Bollards and dock equipment protection shall be 6" metal pipe capped, buried below grade a min of 4'0". Crown top. The standard paint color to be used is Federal Highway Yellow paint color: S01009. Coordinate final locations and color/finish selections with the Owner.

#### Products – Not Used

**Execution – Not Used**

**General Statement**

1. Use of interior wood products shall be closely analyzed for compliance with the applicable codes and building construction type. Blocking, cants, nailers, furring, plywood backing and mounting panels must be fire resistant.
2. Do not use any wood in any roof assemblies, below grade, or in environments that may have moisture. Metal strapping preferred over wood blocking.
3. In cases where used, all plywood and dimensional lumber shall be pressure preservative treated, exterior grade and fire resistant.

**Architectural Woodwork****06 40 00**

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**General – Not Used****Products**

Cabinets (doors, drawers, frames)

1. Quality Grade: Premium, Type A, Flush Overlay.
2. Exposed and Semi-exposed surfaces: High Pressure Decorative Laminate NEMA LD 3
3. Concealed Surfaces: Melamine
4. Drawers and door edge banding:
  - a. HOSPITAL/CLINIC/RESEARCH: PVC-free, Modified Polypropylene; convex; smooth finish; self-locking serrated tongue; of width to match component thickness. Color to best match the laminate. In certain procedure rooms and sterilization areas use solid surface or stainless steel.
  - b. EDUCATION/OFFICE: Prefer plastic laminate door/drawer edges.
5. On medication and secure drawers, provide a fixed shelf integrated into the cabinet above the drawer to prevent unauthorized access from above the drawer.
6. Countertops:
  - a. HOSPITAL/EDUCATION/RESEARCH: The use of solid surface or natural stone counter materials are strongly encouraged in ~~public~~ toilet rooms.
  - b. HOSPITAL: The use of solid surface materials are preferred at all countertop locations if budget allows. Laminate may be substituted if required by budget at locations without sinks or sterile surface requirements.

- c. Solid surface where sinks are located or a sterile surface is required.
  - d. Radius countertops in the horizontal plane at the outside corners.
  - e. If laminate is allowed, seal all exposed wood, including the bottom of open countertops.
7. Hardware (BHMA 156.9):
- a. Adjustable Shelf Supports: Multiple holes with metal shelf supports
  - b. Fixed Shelves: Only allowed if approved by owner or if absolutely needed for structural stability/support.
  - c. Grommets: Provide one to two per individual knee space. Typically locate above electrical and data outlets. Field verify location with owner.
    - i. Doug Mockett & Company brand grommet is preferred, or approved equal.
  - d. Locks:
    - i. HOSPITAL/CLINIC - Stealth Lock or approved equal is preferred in staff areas and for patient lockers.
    - ii. EDUCATION / RESEARCH - Best brand locks or compatible keyways are standard
  - e. Drawer/door pulls: “U” shaped 4” wire pull
  - f. Hinges: European Style (concealed), soft-close
  - g. Drawer Slides: Full extension; heavy duty; side mounted; self-closing/stay closed type
  - h. Countertop supports: Rakks, flush mount, at new construction as this has a concealed vertical leg. Surface mount at renovations. Alternates may be considered with Owner approval.
    - i. <http://rakks.com/counter-support-brackets/?gclid=CP6qisem9LoCFURp7Aodh2oAIQ>

### **Execution – Not Used**



## Division 07

## Thermal and Moisture Protection

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1. On state owned buildings, review the roof design with the State of Nebraska LB 309 Task Force, regardless of roof type. Consult with the Owner for LB309 coordination.
2. Verify insurance review requirements and specification requirements with insurance carrier.
3. The Owner will, AT ITS DISCRETION, hire a third-party consultant as necessary for peer review of the building envelope in construction documents, and shop drawing review. The Owner or its building envelope consultant will provide specific commissioning instructions as they apply to infiltration testing and reports.
4. Thermal and moisture protection assemblies should be inspected and reviewed 11 months after substantial completion of the project.

### Damp-proofing and Waterproofing

07 10 00

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#### General

1. The design team, working with a geo-technical engineer, should closely evaluate site specific soil conditions and specify waterproofing products accordingly.
2. See Division 31, Earthwork.

#### Products

1. Foundation damp-proofing shall be W. R. Grace's system of fluid applied water-proofing, drainage board, and protection board. Work with W.R Grace to select correct system based on condition.
2. Consider the use of under-slab vapor barrier when required by the soils report. Underslab Vapor Barrier: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs.
  - a. Thickness: 15 mil.
  - b. Water Vapor Permanence: 0.01 perm, maximum, when tested in accordance with ACI 302.2R-06.
  - c. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor membrane.
  - d. Recommended Products:
    - i. Stego Industries, LLC; Stego Wrap Vapor Barrier 15-mil (Class A): [www.stegoindustries.com](http://www.stegoindustries.com).
    - ii. Reef® Industries; Vaporguard: [www.reefindustries.com](http://www.reefindustries.com).



3. In conditions where overhead mechanical space may risk water damage to occupied space below, investigate use of moisture protection/water barrier.

### **Execution – Not Used**

## **Thermal & Air Barriers**

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**07 20 00**

### **General**

1. No Asbestos products.
2. Cover board, for re-roofing projects, is Firestone ISOGARD high density cover board with protection board Georgia Pacific Dens Deck.
3. In renovations, the preference is sprayed-on insulation/waterproofing products.
4. In new buildings, the preference is a sprayed-on water proofing on exterior foundations and exterior sheeting.
5. Spray (or roll-on) air barrier product is preferred, with 3<sup>rd</sup> party verification of recommended minimal thickness. Air barriers required on all on exterior walls on the exterior side of the sheeting.
  - a. Consider ABAA Quality Assurance Program requirement for air barrier
6. Integral vapor barrier to be provided on interior of exterior wall.

### **Products**

1. Product preference for continuous air barriers: PROSOCO R-Guard spray wrap; WR Grace Perma-Barrier BP; Sto Gold Coat.

### **Execution – Not Used**

## **Steep Sloop Roofing**

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**07 30 00**

### **General – Not Used**

### **Products**

1. Avoid asphalt and wood shingles on all buildings unless temporary.
2. Preference for shingles: metal, rubber, faux slate, or composite.

## **Roofing and Siding Panels**

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**07 40 00**

## **General**

1. Design for 90 mph min. wind resistance.
2. Where metal panel wall systems are included, specify system that does not “oil can” and remains aligned.
3. Provide 30 year finish warranty.
4. If there is a core, it must be fire resistant.

## **Products**

1. Consider “DRI-DESIGN” rain screen exterior wall panels (no sealant or gasketing required).

## **Execution – Not Used**

## **Membrane Roofing**

**07 50 00**

### **General – Not Used**

### **Products**

1. If vegetative roof is being considered, review long term maintenance with owner.
2. The Owner’s preference for new facilities is a minimum 90 mil EPDM fully adhered roofing system. Price both a 60 mil - 25 year warranty and a 90 mil. - 30 year warranty, as an alternate.
3. Alternative roofing systems (i.e. TPO membrane, standing seam metal, built-up, etc.), will be considered, as appropriate, for individual projects.
  - a. Verify the color of the roofing material.
4. Avoid the use of through wall scuppers on buildings over 3 stories. Integral overflow roof drains are preferred at roof areas including canopies.
5. All roof drains and conductors must be insulated.
6. If non-masonry parapets are used, the parapet is preferred over gravel stop edge conditions.
7. Cover Boards / Protection Boards: Prefer perlite, board faced composite insulation, and glass-mat water resistant gypsum board
  - a. Avoid fiberboard cover boards.

8. Protection Pads: Roof protection pads should be placed along efficient, straight-line paths of travel. Roof protection pads should provide access to equipment and 4 to 6 feet surrounding all user-serviceable, roof mounted equipment. Location of protection pads should be coordinated with mechanical drawings prior to bidding. Where roof protection pads are installed or replaced on single ply membrane roofs, pads should be secured using an approved adhesive that inhibits wind induced uplift and shifting.
  - a. Verify color with Owner.
9. Roof Access: See Owner's Design Principles Access to Roof.
10. Skylights: The use of skylights or light tubes in design is discouraged.
11. Small area and inaccessible roofs: Access to entrance canopies and similar small area roofs should be considered during design.

### **Execution – Not Used**

## **Flashing and Sheet Metal**

**07 60 00**

### **General**

1. All exposed sheet metal shall be prefinished. Material and color shall be reviewed/approved.
2. All new and replacement roofing and sheet metal projects shall be reviewed and approved.
3. Assembly design should conform to latest version of the SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) reference.

### **Products – Not Used**

### **Execution – Not Used**

**General**

1. Design Professional to consult with Owner for Supplemental Documents – UNMC Fireproofing Policy and Nebraska Medicine EC57 Barrier Management Policy.
2. Review fireproofing and fire stopping details and specifications with Owner.
3. Minimize the size of holes made to accommodate conduit, ductwork or other construction items that pass through fire and/or smoke rated partitions.

**Products**

1. HOSPITAL/CLINICAL Firestopping:
  - a. Design Professional to consult with Owner for Supplemental Documents - Nebraska Medicine Firestopping Policy.
  - b. All penetrating items into a fire rated assembly must meet the STI UL system specification. See Link: <http://www.stifirestop.com/>
  - c. Coordinate with STI UL assembly requirements and STI product representatives. Review STI UL Assembly requirements and STI products with owner as there is not a common project for all facilities. Refer to Division 9, Paint Section for marking and identification of smoke and fire rated construction.
2. RESEARCH & EDUCATIONAL Firestopping Policy.
  - a. Acceptable manufacturers are STI, 3M, and Hilti

**Execution**

1. General Contractor shall self-perform all firestopping or shall engage a single Firestop Contractor so perform all firestopping (for penetrations and joint systems) for all trades.
2. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer. STI installers to be "Fit One" Certified through STI.

**Doors and Frames****08 10 00**

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**General**

1. A meeting between Architect, Project Manager, End User, Access Control and Keying must be held prior to finalizing specification of doors and hardware. A separate meeting must be held with Contractor and subcontractor soon after bid and before shop drawings are submitted.
  - a. Where doors swing out of rooms and into public access corridors, doors shall be recessed in niches.
  - b. Rated doors shall have factory-installed labels on the door, on the jamb/hinge side, shall not be painted over, and must remain visible. Rated frames shall be stamped on the hinge side of the frame
  - c. Pocket doors are not allowed. Sliding Doors/"barn style" doors may be allowed on a project by project basis and if approved by Owner.
  - d. Door sizes shall meet all applicable codes at minimum as well as wheelchair, including bariatric size wheelchair, clearances.

**Products**

1. Hollow metal doors and frames should have the following characteristics:
  - a. Hollow metal doors shall be Level 2 minimum and have seamless door edges.
  - b. All Corridor hollow metal doors shall be provided with reinforcing for closers and exit devices.
  - c. All Hollow metal doors and frames shall be prepped per Manufacturer hinge location and for high frequency hinge reinforcement
  - d. Hollow metal doors, where insulated, should utilize a polyurethane based insulation. Avoid the use of polystyrene-based insulation.
  - e. Hollow metal frames shall all receive closure reinforcing.
  - f. All exterior frames, fire rated frames, and frames where smoke partition or zero corridor codes are applied, shall have a 1/8-inch integral kerf formed into the frame soffit on 3 sides to receive a gasket composed of a cellular modified foam core clad in an embossed non-vinyl paint resistant liner which is U.V. stabilized, and shall be equal to Curriseal by Curries Company.

- g. Consider use of stainless steel in Animal Research Facility (ARF)
- h. Frame and Door standard thickness and material:

	<b>Location</b>	<b>Minimum material thickness</b>
<b>Frames</b>		
	Exterior openings	14 ga. (0.067") – Galvanized and supplier shall undercoat back of frames.
	ARF Interior	14 ga. (0.067") – Galvanized and supplier shall undercoat back of frames.
	Interior openings	16 ga. (0.053")
	Interior openings (Over 40")	14 ga. (0.067")
<b>Doors</b>		
	Exterior	16 ga. (0.053") – Galvanized and Insulated
	Interior	18 ga. (0.042") – Beveled at latch jambs

- i. Only fully welded hollow metal frames shall be used.
  - j. Provide hospital stops on door frames in hospital / inpatient care areas.
  - k. Hollow metal doors and frames should be primed for field finishing; rust-inhibiting complying with ANSI A250.10, on back and front side of frame and door manufacturer's standard.
  - l. Prep door frames for electronic devices shall be done by the manufacturer or supplier and should not compromise the assembly rating.
2. Wood doors should have the following characteristics:
- a. Wood doors shall have minimum 1 ¾" hardwood hinge stile reinforcement.
  - b. Wood doors shall be a minimum of 5 ply, solid, Premium Grade construction.
  - c. Where required, fire rated wood doors should comply with applicable positive pressure regulations.

- d. Where required, fire rated wood doors should be specified with additional interior blocking to facilitate the secure and durable attachment of closers, overhead stops, and exit devices without the use of sex bolts and or through door fasteners.
- e. Door Construction:
  - i. Plastic laminate faced doors at clinical locations.
    - 1. Full height “L” shaped, Acrovyn 4000 edge banding is also an option on plastic laminate doors to provide additional protection.
  - ii. Acrovyn doors are preferred in hospital / inpatient care areas.

### **Execution – Not Used**

## **Specialty Doors and Frames**

**08 30 00**

### **General – Not Used**

#### **Products**

- 1. Access Doors and fire extinguisher cabinets should accept Standard Figure eight lock cores. Review size, type, lock and location with Owner’s Building Maintenance.
- 2. Prefer minimum size of 2 foot by 2 foot.

## **Entrances, Storefronts, and Curtain Walls**

**08 40 00**

### **General**

- 1. Provide field quality assurance for fenestration. Consider spray nozzle testing, AAMA 501.2

#### **Products**

- 1. Aluminum doors shall have the following characteristics:
  - a. Aluminum doors shall have minimum 8 inch (medium) stiles.
  - b. All Aluminum will be clear anodized.
  - c. All exterior frames, sill and doors shall be thermally broken.
  - d. Storefronts shall sit on a min. 8” curb when adjacent to exterior surfaces.
  - e. Provide positive drainage away from entrances and storefronts.

## **Execution – Not Used**

### **Windows**

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**08 50 00**

#### **General**

1. Provide field quality assurance for fenestration. Consider spray nozzle testing, AAMA 501.2.
2. Metal windows shall have thermally broken aluminum frames.
3. A workable method for cleaning windows and glass shall be considered and incorporated into the design of any building above two stories. Such provisions shall be reviewed and approved by the Owner. For window cleaning access from the roof, OSHA-compliant tie-off points for both window cleaners and swing stages should be included. Coordinate equipment and system with an Owner selected window cleaning contractor.

#### **Products – Not Used**

### **Execution – Not Used**

### **Hardware**

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**08 70 00**

#### **General**

1. All hardware must be installed per manufacturer's packaged hardware, using the templates and fasteners packaged with the hardware appropriate for the degree of swing shown on the detailed hardware schedule. The hardware supplier is responsible for supplying the proper mounting screws and instructions to the installing contractor. Review hardware sets with Owner's Building Maintenance, Access Control and Keying prior to issuance of Construction Documents and approval of shop drawing submittal. One finish for all building hardware, 626 (US26D) satin, chrome-plated nickel.
2. Design Professional to consult with Owner for Supplemental Documents

#### **Products**

#### **Hinges**

1. Hinges should have the following characteristics:
  - a. Stanley, Hager (Ball Bearing)
  - b. Interior hinges to be 5 knuckle steel, ball bearing, 4 ½ x4 ½ for standard doors.



Coordinate size with size and weight of door.

- c. Prefer continuous hinges on all exterior doors over pivot sets.
- d. Any exterior doors should have stainless continuous steel hinges.
- e. Security doors should have non-removable pins.
- f. At patient care areas consider the specification of swing-clear hinges.

### **Locksets**

1. Locksets should have the following characteristics:

a. All locksets should be:

i. UNMC and New Nebraska Medicine Buildings

- 1. Entry – Best 9K37B15DS3626
- 2. Store Room – Best 93K7D1SDS3
- 3. Class Room – Best 93K7R1SDSZ
- 4. Privacy – Best 93K7L15DS3
- 5. Exit Devices – Best Von Duprin 98 and 99 series
- 6. Von Duprin Panic – With External Rods
- 7. Von Duprin Panic – Both Electrified panic and non-electrified
- 8. Push Button Lock – Best 9KZ37DV15KPSTK626

ii. Existing Nebraska Medicine Facilities - Consult with the Owner the need for Schlage in Nebraska Medicine “legacy” facilities.

- 1. Entry – Schlage ND53LD SPA
- 2. Store Room – Schlage ND80LD SPA
- 3. Class Room – Schlage ND70LD SPA
- 4. Privacy – Schlage ND405 SPA
- 5. Passage – Schlage ND105 SPA
- 6. Exit Devices – Schlage Von Duprin 98 and 99 series
- 7. Von Duprin Panic – With External Rods

8. Von Duprin Panic – Both Electrified panic and non-electrified
  9. Push Button Lock – Schlage CO-100 CO100CY70KP SPA 626 LD
- b. All locksets should have curved lip strikes
- c. All locksets Cylindrical with lever style handles
  - d. Classrooms should have classroom function lockset. The inside lever will always be free for exiting.
  - e. Office locksets on office doors should have push button lock on inside and key on outside only.
  - f. Custodial and storage rooms should have storeroom function locksets.
  - g. Electrical / IT/ Telecom and mechanical rooms should have proximity reader access with storeroom function lockset.
  - h. Double doors should have astragal and “pick-proof” latches. Astragal not required on non-rated patient doors.
  - i. Provide hospital latchsets at patient care areas. Both handles are to face down.
  - j. Doors at patient care areas, including exam and treatment rooms, are not to be lockable.

### **Cylinders**

1. Cylinders should have the following characteristics:
  - a. Lock cylinders DormaKaba Best (No Substitute)
    - i. Consult with the Owner the need for Schlage in Nebraska Medicine “legacy” facilities.
  - b. The Medical Center Facilities Management and Planning Representatives will key and install the final key core.
  - c. Tag and provide the following keys:
    - i. 2 keys for each lock mechanism supplied by Best.
  - d. Cores - "Key Number stamped on the Face".

### **Automatic Door Operators**

1. Automatic Door Operators should have the following characteristics:
  - a. Operators should not respond to remote or switch demand when door is locked. Push

buttons should be hard-wired, or battery operated if conditions are unsuitable for hardwiring.

- b. Horton Operators, 4000 Series, are to be specified for exterior swing doors. No substitution.
- c. Horton Operators, 7000 Series, are to be specified for interior swing doors. No substitution.

### **Astragals and Mullions**

- 1. Astragals or Mullions should have the following characteristics:
  - a. Mullions, where required by code, local fire marshal, or other authority having jurisdiction, shall be keyed removable. Provide a locking core to facilitate authorized removal only. Von Duprin or owner approved equal.

### **Flush Bolts**

- 1. Flush bolts should have the following characteristics:
  - a. Avoid the use of manual flush bolts. Manual flush bolts may be used on equipment and storage room doors.
  - b. In lieu of an astragal, automatic flush bolts are acceptable. No flush bolt hardware should be visible on the inactive leaf.
  - c. Use dust-proof strikes for all bottom bolts.
  - d. Provide coordinator on the automatic flush doors, no gravity coordinators are to be used.

### **Closers**

- 1. Closers should have the following characteristics:
  - a. Norton 7500 Series or LCN.
  - b. Avoid the use of concealed closers.
  - c. Do not use floor recessed closures.

### **Magnetic Hold-Open Devices**

- 1. Magnetic hold open devices should have the following characteristics:
  - a. Magnetic hold-open devices shall fail-safe during a fire alarm event except where fail secure is required.

### **Exit Devices**

1. Exit devices should have the following characteristics:
  - a. Von Duprin RIM exit devices for electrified panic devices. No substitution.
  - b. Where outside trim is locked, exit devices should have breakaway levers and levers matching those on the locksets.
  - c. Where access control devices are installed the following components should be included: Von Duprin 'QEL', Electric latch retraction feature, relay power booster, and power transfer device Von Duprin EP-2 or EP-10 depending on wiring requirements. See other sections which pertain to Access Control and Card Access.
    - i. **EDUCATION/RESEARCH:** Surface mounted rod exit devices are standard.
    - ii. **HOSPITAL/CLINICAL:** Surface mounted rod exit devices are standard. Concealed rod exit devices are acceptable at hollow metal doors. Bottom rod type devices shall not be installed unless required by function or code.

### **Hospital Latch**

1. Hospital latches should have the following characteristics:
  - a. Glynn Johnson

### **Weatherstrip**

1. Weatherstrip should have the following characteristics:
  - a. Pemko, Zero, NGP, Reese

### **Wall Bumpers**

1. Wall bumpers should have the following characteristics:
  - a. Rockwood

### **Door Pulls**

1. Door pulls should have the following characteristics:
  - a. Rockwood, Ives
  - b. **EDUCATION/RESEARCH:** Offset door pulls may be considered.
  - c. **HOSPITAL/CLINIC:** Offset door pulls are acceptable.
  - d. Use decorative end caps on all door pulls.

### **Access Control Hardware**

1. Access control devices will be coordinated and may be furnished and installed by Medical Center. Raceways, wire, cable, and power are typically provided by the contractor.
2. Electronic hardware should not compromise the UL rating of the door or frame.
3. Electronic strikes are recommended. Electrified locksets are not to be used without Owner review and written approval.

### **Execution – Not Used**

### **Glazing**

**08 80 00**

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### **General**

1. Bird Strategy:
  - a. For new buildings, additions and window replacement projects, windows must be designed and specified to reduce bird strikes as much as possible. The AE firm must present options for consideration by the Owner. The Bird-Safe Building Guidelines by the New York City Audubon Society ([www.nycaudubon.org](http://www.nycaudubon.org)) shall be the standard reference.
  - b. Special attention required for glass corners and skywalks, anything that is transparent, especially all the way through a structure.

### **Products**

### **Exterior Glass**

2. 1" insulating Low E glass - ¼" thick heat strengthened float glass hermetically sealed at edges with spacer and sealant and ½" air space.
3. Recent colors utilized have been clear and green. Reasonable alternate colors may be proposed for approval.
  - a. Clear - VE 1-2M#2 by Viracon
  - b. Green - VE 2-2M#2 by Viracon.

### **Interior Glass**

1. Fire rated glass is preferred. No wire glass.

### **Execution – Not Used**

## Division 09

## Finishes

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Attic Stock requirement for all finishes should be as follows (look at on a case by case basis):

1. For renovation or new construction, determine location of attic stock storage during project planning. Where possible, interior space for Attic Stock shall be allocated at a minimum of one room per building.
2. Contractor to stack finishes flat and supported, protect from direct sunlight, water, condensation and other potential causes of damage. Recommend that the room where attic stock be kept is designated and require the Contractor to provide adjustable shelving. See specific quantities under each product description. Scraps will not be considered attic stock. Provide Owner with an inventory at the end of the project. Keep items stored at a minimum of 18" below sprinkler heads.
3. Attic Stock to be reviewed by the Owner. See minimum recommendations below.
  - a. Items per case (Less 1,000 sq ft = 1 full case/More than 1,000 sq ft = 2 cases) KEEP %
    - i. Carpet Tile (full box of carpet)
    - ii. Wall Tile
    - iii. Floor Tile
  - b. Items per sq ft (Less than 10,000 sq ft = 5%/More than 10,000 sq ft = 1%)
    - i. Wall coverings
    - ii. Resilient flooring
    - iii. Ceiling Tile
    - iv. Paint and Special Coatings (but not less than 1 gallon)

### Plaster and Gypsum Board

09 20 00

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#### General

1. Level 5 finish required on all curved surfaces, accented walls highlighted with lights and locations with specialty wall covering, per manufacturer's recommendations. Level 4 finish minimum on other walls. Level 1 finish above ceilings (must still be taped with joint compound and fire stopped where needed). If open ceilings, continue with same level of finish all the way to underside of the structure.

#### Products

1. Mold resistant drywall, with a mold resistance score of 10, shall be used in areas that have the potential for exposure to moisture (i.e. All interior face of exterior perimeter walls, locker rooms, break rooms, kitchenettes, restrooms, nourishment areas, around any icemakers

or refrigerators and any wall partition built below grade).

- a. Basis of Design: USG Corporation; Sheetrock Brand EcoSmart Panels Firecode X
2. Tile backing:
    - a. Basis of Design for wet applications
      - i. GP DensShield
      - ii. USG Durock Glass-Mat Tile Backerboard
    - b. Basis of design for dry applications
      - i.
      - ii. USG Durock Cement Board type behind all wall tile
  3. In corridors & high traffic areas use impact-resilient reinforced gypsum board.
  4. All electrical and communications rooms shall be constructed with minimum 1-hour fire rated drywall partitions and appropriately rated door and frame assembly. Fire-rated plywood to be installed over drywall on all walls and painted white. Do not paint over fire rating label.
  5. Steel framing systems
    - a. Embossed, high strength Steel Studs and Tracks
      - i. Basis of Design
        1. ClarkiDietrich; ProSTUD Drywall Framing
        2. Marino Ware; Viperstud Drywall Framing.

## **Execution**

1. Drywall to structure where required for acoustics.
2. Restrooms: All walls must go to the structure and have acoustic insulation.

## Tiling

09 30 00

### General

1. Design professional shall consider the number of tile joints and the color and clean-ability of the grout when specifying tile in areas that are continually exposed to spills and staining.
2. Verify material specified for setting to meet requirements of application.

### Products

1. Furnish tile of quality certified by the manufacturer to equal or exceed the standard grade requirements of ANSI A137.1. The certification mark shall appear on each label or carton of tile. Coefficient of Friction (C.O.F.) for level, accessible routes shall be a minimum of 0.6 dry and 0.7 wet and for accessible ramps shall be a minimum of 0.8.
2. Verify tile locations are appropriate for use of space in that location.
3. Floors: Porcelain or Stone tile
4. Walls: Porcelain, Stone, Ceramic, or Glass tile
5. All bathrooms and public restrooms: Tile on all walls, to extend floor to ceiling (full height) on plumbing wall, minimum. Extend floor to 5'-0" AFF on all other walls, minimum.
6. Grout is to be stain resistant grout or as recommended by the tile manufacturer and the Tile Council of North America (TCNA) for the application.
7. Epoxy grout shall be used in all wet areas (toilet, kitchen, etc.)
8. Food Service: Tile flooring is not allowed in food service areas.

### Execution

1. Tile to be edged with metal edging on all exposed edges. Use continuous lengths for full height of tile material.
2. Style and profile per building standard.

## Ceilings

09 50 00

### General

1. Avoid the use of exotic or non-standard acoustical ceiling tiles.
2. For all new and major remodel projects, ceiling height shall not be less than 9'-0".
3. Accessible (lay-in) ceiling is required in all areas where access is required above ceiling for operations and maintenance.



4.

## **Products**

1. Armstrong is a preferred supplier.

### **HOSPITAL/CLINIC**

1. Ceiling Tile: 2 x 2 tegular tiles are preferred in hospital public and clinical spaces, where acoustical panel ceiling is specified.
  - a. Standard for Hospital/Clinical public areas  
Manufacturer: Armstrong, Product/Item Ultima RH-90, Beveled Tegular Edge, (1912 HRC), Color: White.  
Grid: 9/16" Prelude Suprafine XL". Color: white.
  - b. Exam spaces  
Manufacturer: Armstrong, Product/Item Ultima RH-90, Beveled Tegular Edge, (1912 HRC), Color: White.  
Grid: 15/16" Prelude Suprafine XL". Color: white.
  - c. Clean Room/Lab Where required by room use,  
Manufacturer: Armstrong, Product/Item#: Clean Room FL / White or Armstrong Clean Room Mylar, square lay-in. (1721), Color: White.  
Grid: 15/16" Prelude XL HRC. Color: white.
  - d. Work areas and low use rooms such as storage  
Manufacturer: Armstrong, Product/Item#: (1910 HRC), square edge lay-in panels. Color: white.  
Size: 2 foot x2 foot by 3/4 inch.  
Grid: 15/16" Prelude XL HRC. Color: white
  - e. Labs and Restrooms that require lay in ceiling  
Manufacturer: Armstrong, Product/Item#: Clean Room FL / White or Armstrong Clean Room Mylar, square lay-in. (1715), Color: White.  
Grid: 15/16" Prelude XL HRC. Color: white

### **EDUCATION/RESEARCH**

2. Ceiling Tile: 2 x 2 tegular tiles are preferred in hospital public and clinical spaces, where acoustical panel ceiling is specified.
  - a. Office Areas, Classrooms, Dry Labs  
Manufacturer: Armstrong,  
Products / Item #: Cirrus square lay-in (574 HRC), Color: White, Size: 24"x24"x5/8",  
Grid: 15/16" Prelude XL HRC, Color: white.
  - b. Public areas and Lobbies  
Manufacturer: Armstrong,  
Products / Item #: Ultima Beveled Tegular (1912 HRC), Color: White, Size:  
24"x24"x3/4", Grid: 9/16" Prelude Suprafine XL, Color: white.

- c. Back of house areas  
Manufacturer: Armstrong,  
Products / Item #: Cirrus Square lay-in (574 HRC), Color: White, Size: 24"x24"x5/8",  
Grid: 15/16" Prelude XL HRC, Color: white.
  
- d. Labs and Restrooms that require lay in ceiling  
Manufacturer: Armstrong,  
Product/Item#: Clean Room FL / White, square lay-in (1715), Color: White.  
Grid: 15/16" Prelude XL HRC. Color: white.

### **Execution – Not Used**

## **Flooring**

**09 60 00**

### **General**

1. All Flooring shall meet or exceed ANSI/NFSI B101.1 High Traction Wet SCOF Value 0.60 minimum unless noted otherwise below.
2. Refer to Division 26 for Static Resistant flooring requirements.
3. Transitions between products to meet all ADA, IBC and local building codes.

### **Products**

1. Resilient Flooring:
  - a. Commercial Lab grade homogeneous PVC-Free Resilient Sheet is the preferred flooring for tissue culture labs. Commercial grade Sheet Vinyl is the preferred flooring for laboratories, exam rooms, procedure rooms and private toilet rooms. Rubber flooring is permitted in labs, corridors and stair towers. Seems to be heat welding in coordinating color. Self-cove base with metal cap.
  - b. EDUCATION/RESEARCH: Research labs to be PVC-Free Resilient Tile, no wax, and direct glued. Color and stain resistant for laboratory stains and chemicals.
  - c. HOSPITAL/CLINIC: Commercial grade PVC-Free Resilient Sheet is the preferred flooring, verify compression rating of flooring for hospital beds/equipment. PVC-Free Resilient Tile also an acceptable product, verify requirements.
  - d. All sheet products to have an integral coved base (6" in some cases) is the preferred flooring for patient rooms, laboratories, exam rooms, procedure rooms and private toilet rooms and where required by FGI Guidelines.

- e. Minimum product warranty: 10 years

## **Execution**

- 1. A moisture test should be performed on all concrete slabs before flooring is installed.

## **Resilient Flooring**

**09 65 00**

### **General – Not Used**

### **Products**

- 1. Resilient sheet flooring
  - a. No wax finish product
  - b. 0.080 inches thick minimum
  - c. Product can be either heterogeneous or homogeneous construction depending on the desired appearance of the space. Homogeneous product to be used in all tissue culture labs.
- 2. Rubber flooring shall be:
  - a. No wax finish
  - b. 3.0 mm thickness minimum, in public corridors or elevators, 3.5mm
  - c. Homogeneous construction
- 3. Vinyl Composition Tile (VCT)
  - a. VCT shall only be used to patch and replace existing flooring systems
  - b. VCT shall be:
    - i. 1/8 inch thick minimum
- 4. PVC-Free Resilient Tile
  - a. LT shall be:
    - i. 0.08 (2.0 mm) inches thick minimum
- 5. Resilient Base
  - a. Base shall be PVC-free thermoset rubber
  - b. Coved base is standard, straight allowable per review with Owner on new construction

projects.

i. Coordinate 4" vs 6" locations with Owner.

c. Job site fabricated corners per manufactures' recommendations.

## **Execution – Not Used**

### **Carpeting**

**09 68 00**

#### **General**

1. Minimum product warranty: 15 years

#### **Products**

1. Tile products are preferred over broadloom products in all areas.

a. Carpet tile shall be:

i. Solution dyed nylon fiber; Minimum recycled content: 30%

ii. Backing:

a) Provides permanent tile dimensional stability

b) Impervious to moisture damage from spills and water extraction cleaning

c) Construction is resistant to edge ravel

d) Construction provides maximum tuft bind

e) Construction is PVC-free

iii. Certified Green Label Plus by Carpet and Rug Institute

b. Coordinate style and color.

2. Provide walk-off carpeting entire in vestibule area or minimum 20 foot inside entrance.

#### **Execution**

1. Installation:

a. Installation:

a. Adhesive shall contain no VOC's.

b. Self-adhering / Peel & Stick systems when approved by owner.

b. Use release adhesive preferred.

**Wall Coverings****09 72 00**

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**General – Not Used**

1. V1. Vinyl Wall Covering allowable only in wall graphic & signage applications, at discretion of the Owner.

**Products****Execution**

1. Follow manufacturer's recommendations for wall prep and execution.

**Painting and Coating****09 90 00**

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**General**

1. Flecked or speckle finish products not allowed.
2. Specifications shall require mock-up walls of all colors and sheens.
3. Special Instances:
  - a. Dry erase paint-applied solution is not allowed.
4. Contact Facilities planner or project manager for standard paint colors.
5. Refer to Division 32 for Bollards and Lot Striping color.

**Products**

1. Interior Paint: All paint to be Sherwin-Williams.
  - a. Field Color: Sherwin Williams Toque White SW7002 is standard white for all field walls.
2. Paint finishes as follows:
  - a. Satin finish is preferred on walls.
  - b. Semi-Gloss: Hollow Metal doors and frames
  - c. Epoxy Finish: high humidity wash down areas used in surgical and restroom areas (where tile not installed).

3. Exterior Paint: Please contact your facilities planner or manager for current information.
4. High Traffic Areas: Satin finish or ceramic protective coating is preference with wall protection (see Section 10 20 00).

### **Execution**

1. Paint to be applied per manufacturer's specifications/recommendations.
2. Paint surfaces behind movable items same as similar exposed surfaces.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior doorframes.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

## **Acoustic Treatments**

**09 80 00**

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### **General**

1. Acoustic Treatment to be installed on walls for large classrooms and conference rooms. Coordinate with AV System.

### **Products**

1. No preferred product. All products and finishes to be approved by Owner.

### **Execution**

1. Installed per manufacturers recommendations.

## Division 10

## Specialties

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### Information Specialties

10 10 00

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#### General

1. The Owner has established Wayfinding and Interior Signage standards. This signage may be included as part of the contract for general construction or may be handled under a separate contract. Design Professional shall consult with the Wayfinding & Signage section and confirm signage standards on a per project basis.

#### Products – Not Used

#### Execution – Not Used

### Interior Specialties

10 20 00

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#### General:

1. For large industrial projects, campus-type projects with multiple buildings, or similar situations, Owner may have separate service contracts for furnishing various accessories and corresponding supplies. If Owner will furnish accessories to Contractor for installation, insert requirements in first paragraph below.
  1. Public-use washroom accessories.
  2. Public-use shower room accessories.
  3. Private-use bathroom accessories.
  4. Custodial accessories.
  5. Cubicle track and curtains
  6. Demountable Wall Partitions
  7. Corner guards and wall protection.

#### Products

1. Toilet Compartments:

- a. Toilet room partitions and stall doors shall be floor mounted.
- b. Prefer partitions to be constructed with either stainless steel, solid surface or high density polyethylene resin.
- c. Provide two coat hooks within each toilet partition – One at ADA height (48" AFF) and one at 60" AFF.
- d. Compartment width needs to include a sufficient allowance for oversized toilet paper dispensers where installed.

2. Privacy Curtains Track:

- a. Heavy duty extruded aluminum cubicle track with satin anodized finish. 1-1/8-inch (28.6 mm) high x 1-1/4-inch (32.8 mm) wide.

3. Privacy Curtain:

- a. Finished Length (top of curtain to bottom of curtain):
  - i. Ceiling heights of 7 feet-6 inches or lower: 78 inches or the ceiling height minus 12 inches.
  - ii. Ceiling heights between 7 feet-7 inches and 8 feet-4 inches: 84 inches
  - iii. Ceiling heights between 8 feet-5 inches and 9 feet: 88 inches.
  - iv. Ceiling heights between 9 feet-1inch and 10 feet: 104 inches.
- b. Finished Width (side of curtain to side of curtain): 100 inches.
- c. Top of Curtain:
  - i. Ceiling heights of 7 feet-6 inches or lower: 7 inch mesh opening unless special circumstances allow for a smaller mesh opening. When curtain is hung, mesh shall not be below 5 feet 6 inches above finished floor unless fire sprinkler code requirements dictate.
  - ii. All other heights: 23 inch mesh opening
- d. Mesh: Raleigh cubicle curtain, flame resistant, nylon mesh, 1/2 inch x 1/2 inch openness factor, with 1" white twill tape with aluminum grommets 6 inches on center. Side hems of mesh shall be finished with 1" white twill tape.
- e. Grommets: quantity of 17 grommets, brushed aluminum finish, equally spaced across width of curtain with grommets in both upper corners.
- f. Seams and Hems:



- i. Top of curtain: 1inch twill tape with grommets
  - ii. Sides of curtain: See above for finish of mesh. Fabric side seams to have 1inch double (French) hem side seams aligned with mesh twill tape side seams.
  - iii. Bottom of curtain: 4 inch double (French) hem with seam and corner weights.
  - g. Tag: Each curtain shall be tagged with a washable, fade-resistant, non-melting fabric tag sewn into the bottom right-hand corner of the curtain. Tag shall be labeled with the length and width of the curtain. (i.e. 78 x 100)
  - h. Tie-back: One tie-back shall be included for each room and mounted at approximately 50 inches above finished floor (must clear wall protection, if applicable). Tie back holder shall be an aluminum wall plate with pressure-sensitive tape and mounted into wall structure with screw fasteners. Tieback material must be bleach cleanable. No fabric tie backs.
  - i. Fabric: Coordinate with Project Owner
  - j. Extra Materials:
    - i. Provide ten extra carriers.
    - ii. Provide extra cubicle curtains (1 per every 3 curtains).
4. Shower Curtains
- a. Support:
    - i. Shower curtain rod and wall brackets should be Imperial Fastener Company IFC-70R & IFC-71B or approved equal.
    - ii. Shower curtain hooks should be Imperial Fastener Company IFC-500 or approved equal.
  - b. Curtains:
    - i. Finished Width:
      - 1. Material to be an Antimicrobial Sure Check Linen by Imperial or approved equal.
      - 2. Shower opening between 24 inches – 39 inches needs to be a finished width of 45 inches.
        - a. Color: Verify building standard with Owner.
      - 3. Shower opening between 40 inches – 54 inches needs to be a finished width of 60 inches.
        - a. Color: Verify building standard Owner.

- ii. Top Hem: To be 1 1/2 inches wide, triple thickness, and double locked stitched.
  - iii. Bottom Hem: To be 1 1/2 inches wide double thickness double lock stitched with weights to hold down shower curtains.
  - iv. Side Hem: To be ½ inch wide turned and single lock stitched.
  - v. Finished length for both widths should be 76 inches.
5. Wall protection
- a. Wall protection shall be provided in all patient care and research buildings, academic and administrative buildings per owner's discretion.
  - b. All department, service, and public corridors shall receive continuous wall protection to 4' AFF or to bottom of handrail when used.
  - c. Patient Rooms in acute care settings shall receive wall protection on side and foot walls, per owners discretion.
  - d. PVC-free Rigid Wall Covering shall comply with the following:
    - i. Chemical resistant (per ASTM D 543)
    - ii. Impact resistant (per ASTM F 476-84)
    - iii. Abrasion resistant (per ASTM D 4060)
    - iv. UL Class A/1 fire rated and labeled
    - v. California 01350 Testing (VOC Emissions)
    - vi. Cradle-to-Cradle Certified Silver
  - e. 48 by 96 inch sheets or 48 x 120 inches for roll, per project requirements
  - f. Standard 0.060 sheet thickness
6. Corner guards:
- a. Stainless Steel corner guards to be provided in all patient care and research buildings. Academic and classroom buildings shall require corner guards in main public corridors only. Other occupancies, at Owners discretion..
    - i. Coordinate height of corner guards and wall protection with Project Manager. Height is typically:
      - ii. Public corridor full height
      - iii. Service corridor full height
      - iv. Waiting areas and lobbies: 4' AFF
      - v. Coordinate handrail with wall protection.
7. Handrails and grab bars :
- a. Surface mounted assembly consisting of a continuous extruded aluminum retainer with snap-on cover and integral shock absorbing cushion where indicated. Brackets, caps and corners to be all color matched.
  - b. End caps and corners shall be attached to allow post installation adjustment.

- c. Attachment hardware shall be appropriate for wall construction.
- d. Natural wood is not allowed on the grab bar.
- e. Color of materials should also coordinate with a bumper guards, crash rails or wall protection and to be approved by Owner.
- f. Profile example as follows:

<https://www.c-sgroup.com/acrovyn-wall-protection/handrails/hrb-10cn>

8. Toilet and Bath Accessories:

- a. Finish to be satin stainless steel in lieu of bright polished where applicable.
- b. Baby Changing tables should be provided in public restrooms, both sexes:
  - i. Basis of Design:Koala Kare KB110-SSRE.
  - ii. Furnished and installed by Contractor.
- c. Toilet Paper Dispenser:
  - i. Furnished and installed by Contractor.
  - ii. Recessed single roll dispenser in patient rooms similar to Bobrick B-6677. Furnished and installed by contractor
  - iii. At large public restrooms, install large roll type dispensers similar to Georgia Pacific 59209. Coordinate with grab bar locations. Furnished and installed by contractor
- d. Paper Towel Dispenser:
  - i. Furnished and installed by Contractor.
    - 1. Use recessed or semi recessed stainless steel enclosure to fit paper towel roll dispenser.
      - a. Enclosure model that fits Tork Elevation Matic
    - ii. Manual roll paper dispensers are preferred in public restrooms. Tork Elevation® Matic® Hand Towel Roll Dispenser, White. Furnished by owner, installed by contractor. (These can only be used where ADA clearances are not applicable, see 4" max projection rule)
      - a. Product: 5510202

- b. SCC: 10073286625127.
- iii. Electric hand dryer (Business occupancies only). Furnished by contractor, installed by contractor.
  - 1. Bradley Model Aerix+ High Speed, Vertical Dual-Sided Hand Dryer. Model Number 2921-S
  - 2. Not allowed on patient floors or clinics.
- iv. Patient Rooms: towel dispensers are preferred in patient rooms similar to Bobrick B-359 for use with Tork multifold towels.
- v. Do not install combination paper towel dispensers/trash disposal units.
  
- e. Soap Dispenser:
  - i. Furnished by owner, installed by contractor.
  - ii. Soap Type:
    - 1. Nebraska Medicine: Liquid Soap
    - 2. UNMC:: Foam Soap
    - 3. Clinics: Prefer Liquid Soap
- f. Grab Bars:
  - i. Furnished and installed by contractor.
- g. Coat Hooks:
  - i. Furnished by contractor, installed by contractor.
  - ii. Single hat and coat hook: Peter Pepper Products 2001
    - 1. Coat Hook Specifications:
      - a. Size:  $\frac{3}{4}$ "W x 3- $\frac{3}{4}$ "H x 3"D
      - b. Finish: Natural Anodized Aluminum
      - c. Mounting Method: Wall Anchor or screw mount
  - iii. Wall coat rack: Peter Pepper Products 2141 AL
    - 1. Coat Hook Specifications:

- a. Size: 8 ¼" w x 4" h x 2 ¾" d
- b. Hooks: 3 hooks
- c. Finish: Natural Anodized Aluminum
- d. Bar Material: Extruded Aluminum flush plate
- e. Mounting Method: Wall Anchor mount
- f. Installation: Install one bar of 3 hooks per office, verify number of bars and installation location for open office areas.
- g. Install the bar on the wall behind the door at 5'-6" AFF to center of bar and 18" from the corner behind the door to the center of the bar.
- h. Sanitary Napkin Disposals:
  - i. Furnished and installed by contractor.
  - ii. In multi-stall women's restrooms, provide in all individual stalls.
  - iii. Where mounted in walls, provide similar to Bobrick B-353.
- i. Shelves: Consideration should be given to additional shelving in restrooms. Furnished and installed by contractor.
- j. Sanitary Napkin Dispenser:
  - i. Provide large public restrooms only.
  - ii. Furnished and installed by Contractor.
  - iii. Similar to Bobrick B-37063. Coordinate need and style with Project Manager.
- k. Shower Seats:
  - i. Furnished by contractor, installed by contractor.
  - ii. Similar to Bradley 9557.
  - iii. Required in ADA showers. Coordinate need for non ADA showers with Owner.
- l. Toilet Seat Paper Dispensers are not to be installed in new construction. Seat Paper Dispensers are only located in areas where they are already provided.
- m. Alcohol Dispenser:
  - i. Furnished by Owner, installed by contractor

- ii. Alcohol Based Hand Rubs Dispenser (ABHR) Installation Information
  - 1. Note: Some jurisdictions are requiring a Drip Pan below the ABHR Dispenser. Currently not enforced by the NE State fire Marshal. Provide blocking inside wall for future re-interpretation.
  - 2. No more than 37 ABHR dispensers in any smoke compartment
  - 3. Dispenser must be greater than 4 feet apart.
  - 4. No Dispensers in carpeted corridors in non-sprinkled smoke compartments.
  - 5. No electrical switches, outlets, wire-mold or equipment within 1 inches of either side of the dispenser edge or below within 1 inches of either side of edge of cover plate. See NFPA exhibit 18/19.64
- iii. Coordinate location with owner and AHJ requirements. Refer to location guideline sheet.
- n. AED Cabinet: Brand: JL Industries. Clear cabinet. The Alarm key switches are to be key #1452 (JL Industries). Coordinate location with owner, generally in public areas. Local Audible alarm and tied back to security monitoring station work is by contractor. Cabinet is furnished by owner and installed/wired by contractor. Verify with owner on number and placement. Recommend one on each building level.
- o. Stop the Bleed Kits: Locate next to AEDs.
- p. Evacuation plans – Recommend 8.5x11 landscaped in a holder; where possible, they are placed close to the Emergency Guides. The evacuation plans should also include information on the designated severe weather-safe areas. This recommendation would not apply to Nebraska Medicine’s emergency guides which are placed in departments and include Department Specific Information. UNMC emergency guides are posted in the elevator lobbies and by the exit stairs at a minimum in UNMC Buildings. The Building Specifics information refers to the Evacuation and Severe Weather plans posted in the building.
- q. Emergency Preparedness Procedures Guides – These should be posted in the elevator lobbies and next to the exit stair in UNMC Buildings/areas

## **Execution**

- 1. Contractor to coordinate final mounting location of all toilet room accessories with Project Manager prior to installation. Mounting locations should comply with applicable codes and regulations. Note that paper towel dispensers may be difficult to unlock and service if mounted at the high end of the acceptable mounting range.

**General – Not Used**

**Products**

1. Recessed Stainless steel fire extinguisher cabinets with beveled corner (if partially recessed or not recessed) are preferred.
  - a. Coordinate product and location with Owner.
  - b. Fire Extinguishers shall meet codes, Owner type requirements and be provided and installed by Contractor

**Execution – Not Used**

**Storage Specialties**

**10 50 00**

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**General – Not Used**

## Division 11

## Equipment

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1. Design Professional to plan and contractor to install utility connections for all project equipment provided by Owner or Contractor

### Vehicle and Pedestrian Equipment

**11 10 00**

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#### General

1. Required equipment should be coordinated with Project Manager.
2. Loading dock requirements will vary greatly between buildings depending upon size and program. Where a raised loading dock is not provided, a lift platform should be considered. Coordinate with Owner's logistics and delivery management team.
3. Nebraska Medicine: Consider electric over hydraulic equipment. Coordinate with the Project Manager.
4. Dock Leveler: Air bladder is preferred over hydraulic.

#### Products – Not Used

#### Execution – Not Used

### Waste Management Equipment

**11 17 00**

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#### General

1. Provide interior and exterior dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals.
2. All conference rooms, classrooms, elevator lobbies, common use spaces, lounges, and kitchenettes should have a recycling container for mixed metal and plastic.

#### Products

1. Waste Watcher bin for interior/non-public facing spaces. Need green bin, lid, and sign holder.  
Bin: Item number 103725; 23G, one end pre-drilled for sign frame, dark green, Mobius loop  
Lid: Item number 103766; circle opening, dark green  
Sign Frame: Item number 103804, dark green



2. Spectrum bin, (ellipse, cube, ellipse makes a single triple bin) for public spaces. Three bins connected, paper bin locked, and then vinyl wrapped. Generally referred to as “triple bin”  
Cube: Item number 101772; 24G, predrill both sides for connector, with liner, grey RAL7015  
Cube Lid: Item Number 102033; Silver  
Ellipse: Item number 101774; 22G, predrill for connector, with liner, grey RAL7015

Ellipse Lid: Item number 102029; circle opening, silver

Ellipse Lid: Item number 102030; slot opening, silver; custom slot opening, to be 1”x10.815” hinged, with lock installed and UNINEB key

Spectrum Connector Kit Hardware, Item number 101773

Busch Systems

81 Rawson Avenue

Barrie, ON L4N 6E5

Phone: 800-565-9931

[www.buschsystems.com](http://www.buschsystems.com)

Sales rep: Jeff Bound, 800-565-9931 x1240 [jbound@buschsystem.com](mailto:jbound@buschsystem.com)

Vinyl wrap done by Anderson Signs.

Anderson Signs, Inc.

2432 N 84<sup>th</sup> Street

Omaha, NE 68134

John Anderson: [john@andersonsignsinc.com](mailto:john@andersonsignsinc.com) 402-397-4342

3. Blue paper bins for officeNot to be used in public spaces.
  1. John provide info

## **Execution**

1. Office of Sustainability has ordered both types of bins, completely assembled, for reduction in price and immediate availability. Please email [LiveGreen@unmc.edu](mailto:LiveGreen@unmc.edu) with quantity, date needed, and project cost center or JazzID.

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## **Food Service Equipment**

**11 40 00**

### **General**

1. Coordinate Food Service Equipment with campus Vendor and building infrastructure (HVAC, plumbing, electrical)

### **Products**

1. UNMC (EDUCATION/RESEARCH): subzero refrigerators: Prefer water cooled to air cooled when possible. Coordinate with Campus Utilities for connection potential to water systems.

2. Hospital: Coordinate refrigerators with clinical needs and current approved equipment list. Verify temperature monitoring requirements and potential integration into building management systems.

### **Execution – Not Used**

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## **Educational and Scientific Equipment**

**11 50 00**

### **General**

1. UNMC Lab & Scientific Equipment: Coordinate project specific equipment standards and requirements with Project Manager.
2. Audio Visual Equipment:
  - a. Refer also to Campus IT Standards. Coordinate with Project Manager and campus AV Coordinator for current I.T. and A/V requirements.
  - b. Architect/Engineer to coordinate backbone requirements with the Project Manager to determine extent to be provided by the contractor.
  - c. PROVIDE USER FRIENDLY VIDEO/DATA PROJECTOR AND AV CONTROLS: Faculty need a user friendly AV system control unit that is conveniently located and clearly labeled.
  - d. Room size and configuration will determine whether flat-screen monitors or projectors and screens are to be installed. Coordinate with the Project Manager.
  - e. See Division 27 for cabling color standards.
3. Projection Screens:
  - a. During the programming phase, the Design Team should determine if two screens will be required within classrooms. The increasing use of comparative images has driven the standard classroom toward twin screen configurations.
  - b. Recess projection screens in a pocket in the ceiling above the projection wall. A continuous trough across the projection wall will facilitate easy screen changes in the future.
  - c. Screens should be located to maximize viewing for all students / participants. Coordinate with campus AV Coordinator for specifications. Coordinate with campus AV Coordinator if screens are to be specified and supplied by the contractor for fabric, motorized options, and mounts.
4. Projectors:

- a. CEILING MOUNT A VIDEO/DATA PROJECTOR: Campus AV Coordinator to provide specifications Data, AV and electrical connections are to be installed as close to ceiling mount as possible.
- b. Connections to connect presenter devices, laptops, tablets, etc., are to be provided per specifications from campus AV Coordinator.

**Products – Not Used**

**Execution – Not Used**

## Division 12

## Furnishings

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**Art**

**12 10 00**

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### **General**

1. A Percent of Construction Budget is required for Art for state funded projects.
2. The process for selecting the art will be coordinated by the Owner.

### **Products – Not Used**

### **Execution – Not Used**

## **Window Treatments**

**12 20 00**

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### **General**

1. Roller shades
  - a. Provide roller shades at all exterior windows (except research labs).
  - b. Buildings to standardize on single color.
  - c. Standard Openness factor is 3%. Evaluate for blackout or 1% openness, or dual shades based on building orientation and room use.
  - d. Black out shades should be used for preventing glare on screens, sleep/oncall rooms, and patient rooms. Black out shades used alone, or in combination with 3% openness shade.
  - d. Roller shades are to be constructed with a heavy duty commercial clutch
  - e. Breakaway control cord to be utilized in all patient care areas.
  - f. Determine manual or motorized control based on room use.
2. Horizontal blinds located between 2 panes of glass utilized only in research lab spaces and interior windows in patient care areas, as determined by owner.
3. Curtains and drapes are not permitted unless requested specifically by owner.

### **Products**

1. Acceptable brands are: Mecho M5, Draper NEXD, SWF Contract Pro Series or equal approved by Owner.

## **Execution**

1. Outside mount for roller shades is preferred.
2. Provide Somfy RS485 motor to accommodate integration with lighting control system.
3. Where motorized shades are present, coordinate with AV control system.

## **Furniture**

**12 50 00**

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### **General**

1. No furniture allowed in fire egress corridors.
2. Meet all code requirements.
  - a. Fire Codes: (UFAC Class 1, NFPA 260 Class 1, California Bulletin 117E)
3. Durability or Abrasion: 100,000 Double Rubs.
4. Fixed tables (otherwise assembly occupancy) with power. Preferred vender is Hi5.
5. Mobile chairs.
  - a. Height adjustable.
  - b. 5 star base.
6. Chairs requiring tablet arms should be able to support a person's weight.
7. Seating: Provide multiple types within waiting areas.
8. Final finishes to be approved by owner.
9. Demountable Partitions:
  - a. DIRTT Environmental Solutions, and Steelcase Privacy Wall are preferred.
  - b. Solid Panels: Anodized aluminum framing and extrusions with face mounted tile attachment allowing 3 inches for clear wall cavity. Manufacturer must be able to provide factory installed power that includes electrical cutout, electrical box with mounting brackets, and faceplate with armored cable (12 gauge wire) for hard wire connection to the appropriate base building junction box. Manufacturer provided face tile finish options are painted MDF, thermofoil, magnetic marker board, veneer, Xorel wrapped or back-painted glass (all finishes determined by function of the space).
  - c. Doors for Demountable Walls: Wall system must integrate manufacturer's own sliding,

pivot or butt hinge door(s).

- d. Use thermofoil (finished 5 sides) panels instead of MDF for DIRTT Wall System or similar system.
- e. Gaskets between panels for DIRTT Wall System or similar system. Gasket seals for all vertical and horizontal reveals must be provided by manufacturer.
- f. Glass: Butt-glazed corners and seams where applicable.
- g. Accessory attachment(s): Provide 6 hanging hardware 'hooks' & 2 coat hooks per office.

### **Products – Not Used**

### **Execution – Not Used**

**Integrated Construction****13 40 00**

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**General**

1. X-ray radiation protection requirements will be verified with Owner but included in construction scope of work.
2. RFI/EM Shielding:
  - a. RFI/EM Shielding vendors, and construction scope of work, shall be coordinated with the Owner.
  - b. RF enclosure doors without copper “fingers” are preferred.

**Products – Not Used****Execution – Not Used**

**General**

1. The following design criteria applies to all electric and electro-hydraulic elevator systems:  
Verify issue year of document with state and local requirements where applicable.
  - a. ASME A17.1, *Safety Code for Elevators and Escalators*
2. Coordinate with Nebraska State Elevator Inspector to determine exact design criteria, identify repetitive construction deficiencies, and other “lessons learned”, prior to advertising construction documents.
3. Machine-Room-Less (MRL) elevator systems create some operations and maintenance issues that can impact business continuity of the facility. Pros/cons of MRL elevator systems vs. traditional elevator systems must be evaluated during design to determine which system is in the best interest of the occupants.

**Products**

1. For non-combustible elevator hoistways, the following fire protection/detection design guidance shall be utilized unless otherwise approved by Owner.
  - a. If elevators penetrates more than three stories, elevator hoistway will be vented to the outside per IBC section 3004, regardless of the exceptions allowed by IBC section 3004.1.
  - b. If elevator penetrates more than two stories, an electrically-operated vent damper (normally closed) will be provided at the top of the elevator hoistway. Operation of hoistway vent shall be “fail safe” such that the vent damper opens upon loss of power. Hoistway vent damper shall also have manual “OPEN-AUTO-CLOSE” electric control provided in the Fire Alarm Control Panel to allow Fire Department personnel to open or close the vent as needed. The manual “OPEN” and “CLOSE” functions shall over-ride any “AUTO” control of the hoistway vent. Provide end-switches as required to monitor and visually indicate the position of the hoistway vent when fully OPEN and fully CLOSED.
  - c. Do not provide sprinkler protection at top of elevator hoistway per NFPA 13-2002, section 8.14.5.5. (Note – Elevator car enclosure materials must comply with ASME A17.1.)
  - d. Do not provide heat detectors in elevator hoistway. Provide smoke detector at top of elevator hoistway per NFPA 72-2002, section 6.15.3.6 for control of hoistway vent and to “flash the hat”.



- e. Provide sidewall spray sprinkler in pit of elevator hoistway (mounted no higher than 2 feet above the pit floor) per NFPA 13-2002, section 8.14.5.1, including a deflector to direct the water flow downward. (Note 0 Due to the accumulation of dirt and debris in the hoistway pit potentially creating a fire hazard, it is beneficial to retain this sprinkler even when using non-combustible hydraulic fluid.)
  - f. All electrical equipment and devices located in the hoistway pit below 48" A.F.F. shall be NEMA 4 "watertight" rated and each device shall be clearly labeled.
  - g. Provide sprinklers in elevator machine rooms along with smoke detectors and heat detectors per ASME A17.1, sections 2.8.2.3 and 2.27.3.2.1.
  - h. Provide sprinklers in elevator lobbies on each floor along with smoke detection (but no heat detection) per ASME A17.1, sections 2.8.2.3 and 2.27.3.2.1.
  - i. Smoke detectors (located in elevator lobbies, elevator hoistway, or elevator machine room) shall initiate elevator "Phase 1" emergency recall operation per NFPA 72-2002, section 6.15.3 and IBC section 3003.2 and activate "flash the hat" visual signals.
  - j. Heat detectors located in elevator machine rooms shall initiate elevator "shunt trip" power shutdown before sprinkler operation per NFPA 72-2002, section 6.9.4 and IBC section 3006.6. (Note – Control power for shunt trip relays must be supervised per NFPA 72-2002, section 6.15.4.4.)
  - k. Provide elevator machine room with independent HVAC per ASME A17.1, section 2.7.5.2 and IBC section 3006.2. If the elevator system is connected to "emergency" or "optional standby power", the HVAC system shall also be connected to "emergency" or "optional standby power" as appropriate.
2. Consider installing water flow switch or OS&Y valve on branch sprinkler lines serving elevator pit and elevator machine room (although not required, it may be advantageous to retain these items for fire alarm annunciation separate from rest of building).
  3. Sump pumps located in elevator hoistway pits shall not be directly connected to a sanitary sewer line. The sump pump discharge line must be separated by atmosphere (i.e. air break). "Oil Minder" sump water monitors or equivalent shall not be installed unless reviewed/approved by the Medical Center and the State Elevator Inspector.
  4. If the elevator system is connected to "emergency" or "optional standby" power, the sump pump system shall also be connected to "emergency" or "optional standby" power as appropriate.
    - a. In elevator machine rooms, verify that a minimum 7'-0" A.F.F. clearance is provided/maintained. Mechanical, electrical, plumbing, fire protection, et al. systems foreign to the elevator system shall not penetrate the envelope of any elevator machine rooms or hoistways. Fire-rated access panels in elevator machine rooms or hoistways are not acceptable.

5. If the elevator machine room is located on the "designated level" for elevator recall and shares a common wall with the elevator hoistway, then the smoke detector(s) located in elevator machine room shall cause the elevator to return to an "alternate level". Verify with ASME A17.1
6. Hydraulic lines and electrical conduits serving the elevator machine rooms and/or hoistways shall not be routed below grade.
7. Contact the owner at the beginning of design to determine the appropriate Medical Center campus elevator identification number (e.g. UNMC (EDUCATION/RESEARCH) Elevator No. 23) and include this elevator identification number in the construction documents for future reference purposes.
8. Use of Design Professional's standard, un-edited, elevator system diagrams and details is not acceptable. Elevator systems design diagrams/details must be properly and clearly modified to reflect requirements of the Nebraska State Elevator Inspector and the Medical Center campus. Details shall also show interconnection wiring of the elevator system(s) with the fire detection and alarm, fire suppression, access control, telecommunications, electrical, and mechanical (HVAC and plumbing) systems.
9. ASME A17.1 edition Elevator and Escalator code:  
2.27.8 Switch Keys (This is required by ASME A17.1 and does not need to be stated for new construction.)
  - a. The key switches required by 2.27.2 through 2.27.5 for all elevators in a building shall be operable by the FEO-K1 Key. The keys shall be Group 3 Security (see 8.1). A separate key shall be provided for each switch. These keys shall be kept on the premises in a location readily accessible to firefighters and emergency personnel, but not where they are available to the public. This key shall be of a tubular, 7 pin, and style 137 construction and shall have a biting code of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key. The key shall be coded "FEO-K1." The possession of the "FEO-K1" key shall be limited to elevator personnel, emergency personnel, elevator equipment manufacturers, and authorized personnel during checking of Firefighters' Emergency Operation (see 8.1 and 8.6.11.1).
  - b. The 515 barrel key **cannot** be used.
10. Review elevator system access control/card reader and phone requirements with the owner during design and incorporate into the construction documents as necessary.
11. Coordinate finishes by campus building standard and function with the owner.
  - a. Avoid stone, ceramic tile or seamed flooring in elevator cabs.
12. Consider machine-room-less elevators for passenger traction elevators for elevators over 4 stops as required by ASME A17.1.
13. No proprietary software or hardware for maintenance is allowed, unless vendor provides that free of charge for any elevator maintenance provider.

14. Review floor designations and button arrangements (must be vertical with high number on top) with Owner. Review recall floor with Owner and local fire official.
15. Mandate Position Indicator on Primary and alternate floor at each elevator. Prefer to have indicators on all floors and located outside of door frame on adjacent wall or above door.
16. Require 3D door edge closing protection.
17. All controls must be electronic for new and any level of renovated elevators.

### **Execution – Not Used**

## **Other Conveying Equipment**

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**14 90 00**

### **General**

1. All new Pneumatic Tube Station locations require a traffic study and shall be coordinated with owner.

### **Products**

1. SwissLog Translogic is the sole source vendor.

### **Execution – Not Used**

Note: Refer to Division 01 for general requirements also applicable to this section.

**Common Work Results for Fire Protection****21 05 00**

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**Fire Damper Testing Protocol**

1. Section below to be inserted in construction documents.
2. It shall be required that all fire dampers and combination fire/smoke dampers installed in the facility shall include an appropriately sized access panel (12 inch by 12 inch where possible) located within 12 inches of the damper on the same side as the fusible link or actuator for visual inspection and repairs of damper. Required dampers are to be inspected before occupancy and then again at the end of warranty by contractor. The testing required will be in accordance with code and manufacturers requirements. At a minimum it should include the following steps.
  - a. All tests shall be completed in a safe manner by personnel wearing personal protective equipment.
  - b. Full unobstructed access to the fire or combination fire/smoke damper shall be verified and corrected as required.
  - c. If the damper is equipped with a fusible link, the link shall be removed for testing to ensure full closure and lock-in place if so equipped.
  - d. The operational test of the damper shall verify that there is no damper interference due to rusted, bent, misaligned, or damaged frame or blades, or defective hinges or other moving parts.
  - e. The damper frame shall not be penetrated by any foreign objects that would affect fire damper operations.
  - f. The damper shall not be blocked from closure in any way.
  - g. The fusible link shall be reinstalled after testing is complete.
  - h. If the link is damaged or painted, it shall be replaced with a link of the same size, temperature, and load rating.
  - i. All inspections and testing shall be documented indicating the location of the fire damper or combination fire/smoke damper, date of inspection, name of inspector, and deficiencies discovered.
  - j. The documentation shall have a space to indicate when and how the deficiencies were corrected.
  - k. All documentation shall be maintained and made available for review by the AHJ.

3. The fire protection system information shall not be shown combined with mechanical HVAC systems and/or plumbing systems drawings. Separate Fire Protection/ Detection/Alarm drawings shall be prepared that show a combined fire protection engineering design including fire suppression and fire- and/or smoke- rated walls, floors, ceilings, dampers, etc. A fire protection system riser diagram should also be included that shows where all of the zone valves, flow switches, test stations, etc. will be located. This plan will be coordinated with life safety drawings and updated on master set of drawings post construction.
4. All new buildings shall be protected by a hydraulically designed wet-pipe automatic sprinkler system designed to comply with the requirements of NFPA 13 and the facility insurance underwriter.
5. All facilities shall be fully sprinklered, this includes all areas requiring coverage as defined by NFPA 13. This does not include fully enclosed shafts or utility chases and other concealed spaces as indicated in NFPA 13, 8.15.1.2 (2007 and newer). Elevator hoistways shall be sprinklered at 24" above finished floor of hoistway. Stairwells are to be sprinklered at the top and lowest levels of the well.
6. For freestanding clinical spaces confirm through IBC Para. 903.3.1.1.1 if sprinklers are required. If sprinklers are not required, they still may be desired for loss prevention. Coordinate this with Owner.
7. Work in existing facilities shall be performed under and comply with facility fire watch protocols refer to fire watch section of this document. OWNER insert fire watch protocol.
8. For sprinkler coverage requirements of pass-throughs, wardrobes, fixed furniture, and closet systems refer to NFPA 13, chapter 8, 8.1. (2007 and newer) and Nebraska state fire marshal official interpretation 09-01 dated April 2010. Confirm coverage requirements with AHJ prior to construction and denote on drawings.
9. Rooms including medical equipment, technology, or operations systems with which equipment or contents damage could present extensive monetary or operational hardships should be considered for clean agent type fire suppression system which is preferred. Alternately, pre-action interlock type dry pipe systems may be considered if approved by deviation request. These room types include but are not limited to MRI, Linear Accelerator, CT, EP, Robotic functions, Data Center, special research equipment areas, and main electrical rooms. These rooms should be coordinated with the Owner on each individual case.

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## **Sprinkler Systems**

**21 13 13**

### **Design requirements**

1. Standpipe system shall be provided where required by code, when using standpipes manual dry and manual wet should be used where possible. System shall comply with the requirements of NFPA 14.

2. A dry-pipe system shall be provided in areas subject to freezing including stairwells, lobbies, vestibules, dock areas, overhangs, etc. where spaces could be exposed to freezing temperatures if a door is accidentally left open. Glycol systems shall not be used.
3. Coordinate with state fire marshal for clarification of requirement for exterior fire sprinkler alarm device.
4. Fire protection system isolation valves and Post Indicator Valves (PIV's) must be supervised by the fire alarm system. There shall be a minimum of one individual zone valve per floor with test drain.
5. Dedicated, private fire service mains shall be installed complying with requirements of NFPA 24. Minimum fire service pipe size shall be 6 inch diameter. A listed indicating water control valve shall be installed, supervised at the fire alarm control panel. Sectional control valves shall be installed to permit sectionalization in the event of a water main break. Fire service mains shall be flushed in accordance with NFPA 24 and a Contractor's Material and Test Certificate for Underground Piping shall be completed and signed by the contractor and the owner's representative.
6. In buildings classified as high-rise, an automatic or semi-automatic standpipe shall be installed complying with requirements of NFPA 14. The standpipe shall be permanently attached to a water supply capable of meeting minimum required flow rate and design pressure. The standpipe system shall be designed such that system demand can be met by the water supply and by each fire department connection provided with the system, and shall have at least two remotely located fire department connections for each zone.
7. Fire services shall be arranged with sufficient clearance for maintenance of all components. There shall be minimum 48" clearance on service side of fire sprinkler entrances.

### **General**

1. Submittals: Submit the following in accordance with Section, "Submittal Procedures":
  - a. Technical Data/Catalog Cut Sheets.
  - b. Detailed Shop Drawings. Provide floor plans indicating final device locations and all routings of sprinkler piping. Include on drawings a detailed description for this project, including classification of occupancies and commodities per NFPA 13. (Manufacturer's standard generic descriptions are not acceptable.)
  - c. Hydraulic Calculations. Provide hydraulic calculations to indicate total water requirements, design area of water application, minimum rate of water application (density), etc. as required by NFPA 13.
  - d. System riser diagram with zone valves, flow switches, test stations, pressure gauges, etc. properly located and identified.

- e. Completion Documents and Permanent Records in accordance with NFPA 13 and NFPA 25.
  - f. Test Report in accordance with NFPA 25.
  - g. Operation & Maintenance (O&M) Manuals. Provide three (3) hard copies and three (3) electronic CD copies of Operation and Maintenance Manuals outlining step-by-step procedures required for system startup, operation, and shutdown. The manual shall also include outline maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manual shall include the manufacturer's name, model number, service manual, parts list, and a complete description of equipment and their basic operating features. O&M Manuals shall be approved prior to training.
  - h. As-built drawings of the system in facility layering convention and BIM standard.
2. Submissions to Fire Marshal: In addition to distribution requirements for Submittals specified in Division 1 Section "Submittals," the fire protection system shop drawings and product data shall first be submitted to the Engineer and facilities for review. After the initial submittal(s) have been reviewed by the Engineer and facilities and review comments have been incorporated, submit fire protection/alarm system shop drawings to the State Fire Marshal's office for review and approval. Fire protection system shop drawings shall be submitted simultaneously with the fire protection sprinkler system shop drawings for concurrent review. On receipt of comments from the AHJ, submit final shop drawings to Engineer and facilities for review. Submit the AHJ approved and stamped original shop drawings to facilities for archive purposes.

### **Products**

1. CPVC fire sprinkler piping is not allowed.
2. Provide Watts or Ames brand double-check backflow preventer.
3. Provide threaded/screwed piping for sizes smaller than 2". Provide Victaulic type or welded for piping 2" and larger.
4. Piping Materials:
  1. Standpipes and Risers: Standard weight (Schedule 40) black steel with threaded, welded, or grooved joints.
  2. Wet-Pipe Automatic Sprinkler Piping: Standard weight (Schedule 40) black steel with threaded, welded, or grooved joints. Schedule 10 black steel pipe with welded or grooved joints may be used for pipe sized 2 inches and larger.
  3. Dry-Pipe Sprinkler Piping: Standard weight (Schedule 40) galvanized steel with same connection types as indicated above.
5. Basis of design and preferred product shall be Viking brand sprinkler heads.

6. Sprinklers shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum pressure rating.
7. Sprinkler Finishes:
  - a. In areas of minor renovation where only head relocation is needed, heads will match visible adjacent heads. In areas of major renovation heads will comply with below.
  - b. Concealed White sprinklers shall be used in white drywall and ACT ceiling systems. In aesthetic clouds, or colored soffits concealed colors shall be coordinated with owner.
  - c. Clean room heads shall be used in OR's, Endoscopy, Pharmacy, Clean Room type Research Spaces and other similar occupancy rooms.
  - d. Upright, Pendent, and Sidewall Sprinklers: rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes; white polyester finish in natatoriums. Provide cages on upright heads in exposed ceiling areas, mechanical rooms, and similar areas.
  - e. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
  - f. Recessed Sprinklers: Bright chrome, with chrome escutcheon.
  - g. Pendant type Sprinklers: Bright chrome, with bright chrome escutcheon.

### **Execution**

1. No other mechanical, electrical, or architectural systems shall be supported by or in contact with fire sprinkler and fire sprinkler support systems.
2. Provide multiple, valved vents at high points on each level in the fire protection sprinkler piping.
3. Sprinkler heads locations relative to ceiling tile system shall be specified as centered in both directions on a 2X2 grid. Use U.L. listed commercial braided stainless steel flexible sprinkler hose assemblies (i.e. flexible hose) to facilitate placement of sprinkler heads in tee-grid ceiling systems. Maximum flexible drop length to be 36", fully supported with direct attachment flexible hose ceiling brackets. Maximum total bending of flexible hose not to exceed 270 degrees at manufacturer's listed minimum bend radius and not touching any other system in the ceiling cavity.

### **Templates/Details and Specific Installations – Not Used**

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## **Fire Pumps**

**21 31 13**

### **Design requirements**



1. Fire-Pump Controllers: UL 218 and NFPA 20; listed for electric-drive, fire-pump service and service entrance; combined automatic and manual operation; factory assembled and wired; and factory tested for capacities and electrical characteristics.
2. Pressure-Maintenance (Jockey) Pumps: Factory-assembled and -tested pumps with electric-motor driver, controller, and accessories and specialties. Include cast-iron or stainless-steel casing and bronze or stainless-steel impellers, mechanical seals, and suction and discharge flanges machined to ASME B16.1, Class 125 dimensions unless Class 250 flanges are indicated and except that connections may be threaded in sizes where flanges are not available.
3. Fire Pumps: UL 448, factory-assembled and -tested, electric-drive, centrifugal fire pumps capable of furnishing not less than 150 percent of rated capacity at not less than 65 percent of total rated head and with shutoff head limited to 140 percent of total rated head.
  - a. Single-Stage, Horizontally Mounted, Split-Case Fire Pumps: Double-suction type with pump and driver mounted on same base and connected with coupling.
  - b. Driver: UL-listed, NEMA MG 1, open-drip proof, squirrel-cage, induction motor complying with NFPA 20 and NFPA 70. Include wiring compatible with controller used.
  - c. Preferred Manufacturers
    - i. A-C Pump; ITT Industries.
    - ii. Aurora Pump; Pentair Pump Group.
    - iii. Peerless Pump Company.
  - d. Where pressure reducing valves are necessary, they shall be installed in areas that allow for testing without the disruption of services or inconvenience to patient care or other activities.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/details and specific installations – Not Used**

**Common Work Results for Plumbing****22 05 00**

1. Systems that are not being reused are to be removed in their entirety including hangers, hanger support, anchor, and fastening systems. Remove systems back to active mains, cap, and insulate. Where system removal leaves penetrations in wall, floor, and roof systems; patch back to match existing rating and leave finished appearance.
2. Domestic heating hot water systems shall be generated at 140°F and delivered at 120°F. System should be capable of high temperature sanitization to eliminate biological growth.
3. Provide a water meter at each new building. Coordinate size and placement with UNMC plumbing inspector and MUD. Contractor shall account for meter cost and capital facilities fees in their project cost. Gate valves for water meter shall be 600# minimum.
4. Mechanical rooms shall be provided with at least one hose bib with backflow preventer in the supply piping. All equipment drains, blow down lines and such shall be piped to a floor drain with an approved air gap fitting. In general, floor drains should be 4" in size. Floor sinks will be installed in new mechanical rooms, floor drains will be installed as needed in existing mechanical rooms.
5. Trench drains are preferred in mechanical room locations where their installation provides for better service to equipment, coordinate floor drain versus trench drain systems with Owner.
6. Separate rooms and labs shall have isolation valves on hot and cold water supply and recirculation piping, allowing isolated maintenance to proceed in each room without affecting adjacent areas. Back-to-back restrooms shall be individually isolated with valves. Valving shall also be provided to allow various portions of the building to be isolated. (i.e. wings, floors, etc.) During pre-construction, consultant shall review isolation points with facilities.
7. Domestic cold water and hot water source and routing to renovated space shall be reviewed with facilities to ensure service comes from the correct source and main.
8. Recirculation shall be coordinated with UNMC engineering and utilize automatic flow control valves. Distributed domestic water circulation pumps shall not be used.
9. Garbage disposals shall not be installed.
10. All plumbing valves shall be able to be reached and turned via reasonable access.
11. Individual water lines with valves at branch from main and recessed wall mounted valve boxes shall be installed to standard refrigerator ice-makers.
12. Coffee stations and/or stand-alone ice makers shall be installed with a minimum ½" dedicated pipe with a ¼ turn all brass shut off valve. Coffee makers and stand-alone ice

makers shall have a dedicated floor sink inside the base of the cabinet OR a cup sink mounted in countertop to dedicated P-trap to properly vented waste line. For clarification, refer to Omaha Plumbing Code or UNMC plumbing inspector.

13. Backflow preventers shall be installed as required by code for ice-makers, soap dispensers, eye-wash, mop sinks and other similar equipment without listed, approved integral backflow. Water cooled condensers and process systems connections shall also be provided with backflow prevention. Where several process items are connected in proximity consideration should be given to a consolidated process loop. Backflow preventers shall be redundant on critical applications.
14. Location of backflow preventers shall be in adjacent utility room where possible (less than 15'), device and piping shall be labeled for its service. Where remote installation is not possible, location shall be under sink or adjacent counter allowing required clearance for service.
15. Eye-wash shall be installed according to ANSI Z358.1-2009 and OSHA 29 CFR 1910.151(c). Model shall be Guardian G1806 90 swivel deck mounted, swing style with automatic actuated valve, tempering valve, and backflow prevention.
16. DI systems shall be provided with an aux out or bacnet connection availability for communication to the BMS system of the alarms generated for notification.

## **Meters and Gages for Plumbing Systems**

**22 05 19**

### **Design Requirements**

1. Meters shall be gear-type meters.

### **General – Not Used**

### **Products**

1. Manufacturers
  - a. Pressure Gauges –Tericce, Ashcroft, Weiss, Marsh, US Gauge, Weskler, Weston and Ernst, Winters
  - b. Thermometers – Tericce, Weiss, Marsh, Weskler, Weston and Ernst, Winters, Ashcroft, Winters, Taylor Environmental, Palmer, Marshalltown

### **Execution**

1. Install thermometers in the following locations:
  - a. Inlets and outlets of each domestic water heat exchanger.
  - b. Inlet and outlet of each thermal-storage tank.
  - c. Inlet of main recirculation pump and major recirculation zones

- d. Inlet and outlet of mixing valves

### **Templates/Details and Specific Installations – Not Used**

## **General Duty Valves**

**22 05 23**

### **Design Requirements**

1. For all water system valves:
  - a. 2" and under shall be ball valves with stainless steel ball and stem and TFE seat.
  - b. 2½" and larger shall be water service butterfly valves with stainless steel disk and shaft with bolted flanges or a lugged butterfly valve.
    - i. Bubble tight shutoff service and dead-end service
    - ii. Body: Cast iron, ductile iron or cast bronze
    - iii. Seat: replaceable EPDM

### **General – Not Used**

### **Products – Not Used**

### **Execution – Not Used**

### **Templates/details and specific installations – Not Used**

## **Identification for Plumbing and Piping Equipment**

**22 05 53**

### **Design Requirements**

1. In state owned facilities, all piping and equipment labeling shall be per ANSI/ASME A13.1. In non-state owned facilities, all piping shall additionally comply with current Omaha Plumbing Code labeling requirements.

### **General – Not Used**

### **Products – Not Used**

### **Execution – Not Used**

### **Templates/details and specific installations – Not Used**

## **Plumbing Insulation**

**22 07 00**

### **Design Requirements**

1. All sanitary drain piping, traps, and floor drains receiving cooling condensate below 65°F shall be insulated for minimum of 15 feet downstream of where the condensate enters the drain line. Insulation shall be a minimum of 1" thick.

**General – Not Used**

**Products – Not Used**

**Execution**

1. Install field-applied jacket on piping as follows:
  - a. On exterior piping.
  - b. On all changes in direction and fittings.
  - c. In areas subject to traffic and damage exposed in mechanical rooms and tunnels, 8' and below.
  - d. On exposed piping insulated in finished spaces including storage rooms, closets, and work areas.

**Templates/details and specific installations – Not Used**

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**Design Requirements**

1. No plastic (ABS/PVC/CPVC/PEX) or fiberglass piping is allowed for general piping systems unless application requires and system is approved by deviation request to Owner's plumbing inspector. Applications other than general including specialty systems, lab piping, etc. may be allowed and are listed in this standard.
2. Non-rising stem gate valves are not allowed on above ground piping installations.
3. Copper push joints (Sharkbite type) are not allowed.
4. Solder joints shall be no closer than 18" from a brazed joint.
5. If brazing is used, it shall only be used on piping 2" and above.
6. Pro-press style fittings are acceptable. Nothing larger than 2 1/2" without approval of UNMC Plumbing Inspector. Renovation should be the primary area of use of this style of joint.
7. Pro-press style fittings shall not be installed closer than 24" to a solder or brazed joint.
8. Victaulic brand mechanical joints is allowed for piping 2.5" and larger.
9. Primary Water mixing Valves 1/2" and larger shall have external threaded spring check valves with an adjacent union for service / replacement.
10. Wall Hydrants must have adjacent isolation valve.
11. Trap seal guards shall be used on all floor drains and all floor sinks.
12. All floor sinks and floor drains shall have integral clamping ring/pan assembly.
13. Trap seal guards shall be used unless trap seal primers are required by code.
14. Sensor faucets shall be piped such that hot water is connected less than 8' from a circulated main. All other hot water fixtures shall be provided with recirculation at a maximum distance of 12' or as required by the IECC, whichever is less.
15. Drinking fountains/water coolers shall not include integral water filtration and filtration status readout.
16. All backflow prevention devices shall be required to have a strainer with valve for blowdown and factory air gap and shall be provided with floor drains directly beneath them.

**General – Not Used****Products**

1. Manufacturers
  - a. Vacuum Breakers – Cash Acme, Conbraco, Watts, Woodford, Apollo
  - b. Atmospheric Backflow Preventers - Conbraco, Watts, Apollo

- c. Reduced Pressure Principle Backflow Preventers – Conbraco (Apollo), Watts (model 009 not permitted)
- d. Double Check Backflow Prevention Assemblies – Conbraco (Apollo), Watts, Ames
- e. Water PRV – Conbraco, Watts, Cla-Val, Fisher
- f. Water temperature limiting devices – Leonard Valve Company, Powers, Symmons, Watts
- g. Primary Thermostatic or Digital Water mixing Valves – Lawler, Leonard, Powers, Symmons
- h. Wall Hydrants – Woodford, JR Smith, Watts, Josam, Tyler
- i. Water Hammer Arrestors – Sioux Chief, JR Smith, Watts, Josam, Zurn, Wade
- j. Trap seal Guards – Wolverine Brass
- k. Trap Seal Primers (strongly prefer guards, not primers) – Sioux Chief, JR Smith, Watts, Wade, Precision Plumbing Products
- l. Water fountains/coolers – Elkay, Halsey Taylor, or approved alternate, must include bottle fill station

### **Execution**

1. Install isolation valves and pressure gauges on the inlet and outlet of water pressure reducing valves and a by-pass around the valve with regulator to allow for maintenance. Note pressure typically runs above 80 psi on main campus, therefore PRV's shall be required. On applications outside of main campus, highest measured available water pressure shall dictate necessity. Refer to facilities standard detail and MUD requirements.
2. Install all backflow preventers, valves and piping between 18" and 60" from finished floor and properly support the assemblies to allow for accessible maintenance. Comply with MUD and Omaha Plumbing Code.
3. Install temperature-actuated water mixing valves with check valve and shutoff valve on inlets and with shutoff valve on outlet to allow for maintenance. Point of use mixing valves for hand washing applications shall be adjusted so that the discharge water temperature is 90-100°F.
4. There shall be isolation valve before all hammer arrestors.
5. Swing check valves shall be installed in the horizontal position with threaded joints, with an adjacent union for service / replacement.
6. Soft-seated check valves shall have a union and ball valve installed within 6" of the valve.
7. Contractor shall be required to circulate the system with cleaner for a minimum of 24 hours and then flush to an air and contaminant free discharge for a minimum of 30 minutes and until owner's satisfaction that the systems is clean. Report shall be submitted to the Owner's compliance department.

### **Templates/Details and Specific Installations – Not Used**

## **Domestic Water Pumps**

**22 11 23**

### **Design Requirements – Not Used**

1. Pressure at highest elevation shall be minimum of 25 psi. Where city water pressure cannot provide this, a booster shall be required.

### **General – Not Used**

#### **Products**

1. Manufacturers
  - a. Booster - Aurora Pump, Bell & Gossett, Systecon, Canariis, Unosource Control, Tigerflow,
  - b. Circulation – Armstrong, Aurora, Bell & Gossett, Grundfos, Taco, Fairbanks

### **Execution – Not Used**

### **Templates/Details and Specific Installations –Not Used**

## **Sanitary Waste and Vent Piping and Specialties**

**22 13 16**

### **Design Requirements**

1. Cleanouts for sanitary shall not be located in and above electrical rooms, communications rooms, radiology rooms, diagnostic and treatment rooms, procedural rooms, and other rooms of similar acuity.
2. All Sanitary piping shall be 2" minimum up to fixture outlet connection.
3. Install supports for vertical cast-iron soil piping a minimum of every 10 feet. In cases where plumbing takeoffs are in-wall, appropriate support shall be provided to minimize piping movement.
4. No 1/4 bends shall be used to change direction from horizontal to vertical. Short sweeps or long radius elbows shall be used.
5. Double combo Y 1/8 bends are not allowed in horizontal positions.
6. Install hangers on all no-hub P-traps above ground.
7. No-hub systems with hangers over 18" shall be braced to structure a minimum of once every 10'. Piping 5" and larger at any changes of direction shall be braced.
8. For No-hub systems, bands should all be heavy duty. For 4" and smaller pipe, minimum 4 clamps per coupling. For larger than 4", minimum 6 clamps per coupling. (ASTM C1540)
9. No double sanitary Tees for back to back lavatories or sinks. They must be piped



separately.

10. Any plastic piping utilized shall be minimum Schedule 40.
11. If copper piping must be used for specialty sanitary piping applications, it shall be Type L copper only.
12. All Mechanical rooms which contain steam or water heating sources over 140°F will have EPDM pipe couplings used back to main. This is to prevent pipe failures due to excessively heated water entering the system.
13. Deep seal traps shall be used where floor drains are provided in pressurized rooms or built up air handling unit casings. Ensure trap depth is capable of retaining water in the trap at the applied maximum possible air pressure.
14. Sanitary Vent roof penetrations and locations shall be carefully coordinated with Owner's Engineering team to ensure that no venting will enter outside air streams. Maximum reasonable distances (no less than 25') will be provided wherever possible to avoid fresh air intakes.
15. Sanitary vent piping shall be installed per latest Omaha Plumbing Code.

## **General – Not Used**

### **Products**

1. Manufacturers
  - a. Heavy Duty Hubless Couplings – ANACO Husky, Mission Rubber Company, Tyler Pipe
  - b. Transition Couplings – Fernco Inc., Mission Rubber Company
  - c. Shielded Nonpressure Transition Couplings – Mission Rubber Company
  - d. Horizontal Cast-Iron Backwater Valves – Josam, JR Smith, Tyler, Watts
  - e. Drain Outlet Backwater Valves – Josam, JR Smith, Watts
  - f. Cast Iron Wall Cleanouts – Josam, JR Smith, Tyler, Watts
  - g. Floor Drains – Josam, JR Smith, Tyler, Watts
2. Sanitary piping shall be hubless, standard weight, Cast-Iron or PVC by prior approval by UNMC Engineering.
3. Couplings for sanitary systems shall be shielded heavy duty stainless steel.

4. Branches serving dedicated Dialysis box waste shall be piped in solvent welded CPVC from the box to the main. CPVC shall not pass through floor.

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Design requirements**

1. Cleanouts for storm shall not be located in and above electrical rooms, communications rooms, radiology rooms, diagnostic and treatment rooms, procedural rooms, and other rooms of similar acuity.
2. Storm requirements shall meet the same requirements as sanitary listed above.

**General – Not Used****Products**

1. Storm piping shall be hubless, standard weight, cast-iron or PVC by prior approval of UNMC Engineering and shall meet the standards above for Sanitary piping.
2. Couplings for sanitary systems shall be shielded heavy duty stainless steel.

**Execution**

- 1) Final inspection test with UNMC Plumbing Inspector for overflow piping.

**Templates/Details and Specific Installations – Not Used****Sump Pumps****22 14 29**

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**Design Requirements**

1. Units shall be duplex with control panel that is capable of staging pumps based on water level and sends out high and alarm status to BMS.
2. If copper piping is used, it shall be Type L copper only.

**General – Not Used****Products**

1. Manufacturers
  - a. Submersible – Aurora, Metropolitan, Weil, Meyers, Zoeller, Hydromatic, Grendex
  - b. Submersible for Elevator Service – Stancor, Liberty, Hydromatic

**Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Shall be installed such that access to salt delivery is adjacent, accessible, and travel is not through critical or public areas.
2. Units shall be redundant duplex or triplex, so that a unit is always in function during regeneration in critical research or clinical areas. General higher education, outpatient clinics may use simplex style softening systems with off hour's regeneration.
3. Brine tanks shall utilize mechanical float control.
4. Systems to be softened include all domestic hot water systems and RO/DI system supply.

**General – Not Used****Products**

1. Manufacturers Bruner, Culligan, Siemens, Woods Bros. Industries
2. Provide water testing kit to make chemical tests necessary for controlling operation and adjustments of brine dosage.
3. Systems shall have all electronic controls.
4. Systems shall be equipped with brine-saver feature / brine-recovery feature.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Domestic Hot Water Heaters****22 35 00**

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**Design requirements**

1. Under counter or distributed instantaneous hot water heaters shall not be used.
2. Water heaters will be instantaneous type with digital mixing valve and no storage are preferred. Systems which could benefit from hot water storage due to use of a heat recovery chiller system or high temperature storage for disinfection control will be considered but must be approved in writing by UNMC/NM Engineering.
3. Generally natural gas water heaters are not preferred. Preference would be to utilize main building heating water system with boosting temperature systems to reach disinfection temperatures.
4. Controls design for domestic hot water system shall be coordinated with UNMC Energy Team. If BacNet connection is available on the system being provided that option should be selected.

**General – Not Used**

**Products**

1. Manufacturers
  - a. Ace, Armstrong, Aerco, AO Smith, PVI

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Plumbing Fixtures****22 40 00****Design requirements**

1. Patient room caregiver sinks shall be sensor operated, hard wired.
2. Patient bathroom sinks shall be manual.
3. Public area, public use faucets shall be sensor operated, hard wired, and shall have a hot/cold check valve upstream of the mixing valve.
4. Staff support area faucets shall be wristblade manual.
5. Patient toilets shall be floor set, back outlet with bedpan washer
6. Public toilets shall be floor set, back outlet with sensor flush valve, battery operated.
7. Buildings with lavatory sensor faucets may be provided with central tempered water mixing valve with recirculation system, preferably in a mechanical space if possible and provide an adjustable tempered water system to each sensor faucet.
8. All urinals shall have cleanouts above fixture for sewer access
9. All bathrooms of two or more toilets shall have an “end of run” cleanout in the ADA compliant stall, above the flood rim of the fixture for sewer access. If there are multiple bathrooms back to back (gender specific, etc.), only one cleanout is required, and shall be located in men’s bathroom ADA stall.
10. All break room sinks shall have a cleanout above the fixture for sewer access.
11. All mop sinks shall have FRP or stainless steel wall protection.

**General – Not Used****Products**

1. Manufacturers
  - a. Lavatory/Sink Faucets - American Standard, Chicago Faucet, Delta Faucet, Kohler Co, Moen, T&S Brass and Bronze Works, Inc, Wolverine Brass
  - b. Lavatory/Sink Faucets (sensor) – Chicago, Sloan, Hydrotek (research), American Standard

- c. Bathtub/Shower Faucets - American Standard, Chicago, Delta Faucet, Kohler Co, Moen, Powers, Symmons, Wolverine Brass, Crane, Coyne and Delany, Eljer, Hydrotek, Kohler, Omni, Sloan Valve, T&S Brass and Bronze Works
  - d. Fixture Support – Josam Co, JR Smith, Tyler Pipe, Zurn, Wade, Watts, Josam
  - e. Water Closets – American Standard, Briggs Plumbing Products, Crane Plumbing, Kohler, Toto, Eljer
  - f. Flush valves – Sloan (EBV-200A or 500A with Royal or Regal flush valve), Toto, Zurn
  - g. Toilet Seats – Bemis, Church, Beneke, Centoco, Olsonite, Sperzel
  - h. Urinals – American Standard, Briggs Plumbing Products, Crane Plumbing, Kohler, Toto, Eljer
  - i. Lavatories - American Standard, Eljer, Kohler, Briggs, Crane, Toto
  - j. SS Kitchen Sinks – Just, Eljer, Kohler, American Standard, Briggs, Elkay, Moen
  - k. Service Sinks – American Standard, Fiat, Kohler, Crane, Creative Industries, Standard Elsemere, Stern and Williams, Swan, Mustee and Sons
  - l. Bathtubs - American Standard, Kohler, Briggs, Crane
  - m. Pre-manufactured System Showers - Aqua Glass, Aqua Bath, Kohler
  - n. Emergency Plumbing Fixtures – Guardian, Speakman, Water Saver
  - o. Electric water coolers – Halsey-Taylor, Elkay, Haws, EBCO, Sunroc
  - p. Water supply stops – Dahl, Wolverine Brass
2. Water supply stops will be quarter-turn and all brass. No plastic stems.
  3. Bathtub drains shall be hand operated at the drain and not linkage type.
  4. All faucets in clinical areas shall be plain-end type or laminar as approved by Nebraska Medicine infection control department.
  5. Faucets in patient care areas shall have laminators at the base of the faucet, not at the end of the neck.

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Medical Gas Systems**

**22 61 13**

**Design Requirements**

1. Medical gas outlets in back to back headwalls and patient room partitions shall be installed with combination fire/sound putty pads to prevent noise transmission.

2. Area alarms shall be installed in patient areas to allow for acuity adaptability in the future.
3. Zone valves shall be installed to allow for easy immediate access by nursing staff and be zoned by acuity, corridor access, and fire partition.
4. Designers shall refer to and update the existing combined system medical gas riser when designing medical gas systems. An updated riser shall be submitted back to owner at close of design.

## **General – Not Used**

### **Products**

1. All Medical gas outlets shall be DISS style connector.
2. Manufacturer
  - a. Medical Gas WALL/Console Outlets – Connection Type: DISS, all back boxes shall be compatible with the Ohio Medical IFM front assembly
    - i. Ohio Medical
    - ii. Powerex
    - iii. BeaconMedaes
  - b. Medical Air and Oxygen IFM Front Assemblies: Connection Type: DISS
    - i. Ohio Medical (currently under US Patent)
  - c. Medical Air Systems: Scroll Pumps
    - i. Powerex (Powerex/Anest-Iwata pumps)
    - ii. BeaconMedaes (Atlas Copco pumps)
    - iii. Patton’s Medical (Hitachi pumps)
  - d. Medical Vacuum Systems: O2 Assured, Dry Claw Pumps
    - i. Powerex, (Busch or Elmo Rietschle pumps)
    - ii. BeaconMedaes (Busch pumps)
    - iii. Patton’s Medical (Busch pumps)
  - e. Medical Gas Alarm Panels
    - i. Powerex
    - ii. BeaconMedaes
  - f. Medical Gas Zone Valve Boxes – all must include optional Area Alarm Sensor Mounting and Gas Backfeed port.
    - i. Powerex
    - ii. BeaconMedaes
  - g. Medical Gas Automatic Manifolds
    - i. Powerex
    - ii. BeaconMedaes
3. Ownership Information of Equipment manufacturers:
  - a. Ohio Medical, owned by Tenex Capital Management, New York, NY
  - b. Powerex, owned by Berkshire Hathaway, Inc., Omaha, NE
  - c. BeaconMedaes, owned by Atlas Copco, Nacka Municipality, Sweden

- d. Patton's Medical, owned by Elgi Compressors, Coimbatore, India
- 4. All vacuum piping shall be Type L hard copper tubing.
- 5. Piping Materials for Field-Installed Positive Pressure Medical Gas Systems.
  - a. Type L except Type K shall be used where operating pressures are above a gauge pressure of 1275 kPa (185psi) and the pipe sizes are larger than DN80 [NPS 3 (3 1/8 in. O.D.)].

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

**Chemical Waste Piping**

**22 66 53**

**Design Requirements – Not Used**

**General – Not Used**

**Products**

- 1. Glass piping is required for above ground acid waste piping.
- 2. Heat fused polypropylene pipe (Fuseal type) shall be only allowed on a case-by-case basis where the chemicals are known and are compatible with the piping system. An exception to use material other than glass must be asked for in writing and list out the chemical which could be disposed of in this drain system.
- 3. Underground acid waste piping shall be polypropylene or CPVC.
- 4. Acid and chemical waste vent piping penetrations/routing to be coordinated with PM/owner representatives
- 5. Acid waste dilution tanks are not permitted without prior approval of PM

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**



**Design Requirements**

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1. New or existing to remain air handling equipment shall not be started when dust producing activity is still present. When air handling equipment is needed as the only option to temporarily condition spaces for proper curing of construction products an ICRA will be performed that will evaluate conditions and define protective measures. If AHU's are started during dust producing activities and system is not protected, the entire system including return, equipment, and supply will be terminally cleaned.
2. Systems that are not being reused are to be removed in their entirety including hangers, hanger support, anchor, and fastening systems. Remove systems back to active mains, cap, and insulate. Where system removal leaves penetrations in wall, floor, and roof systems; patch back to match existing rating and leave finished appearance.
3. Provide adequate maintenance clearance and pull spaces for all mechanical equipment, piping, valves, fittings, coils, tube bundle, and accessory items without removing walls. Also provide adequate clearances to allow for removal and re-installation. Provide unions, flanges, and valves to permit disassembly of piping and equipment.
4. All mechanical systems components and controls shall be provided with a minimum 1-year warranty, from the date of substantial completion. Specific mechanical components may have longer warranty periods and shall be specified in each specific specification section. Warranty shall be unconditional and include material, labor and response within 24 hours of notification.
5. No dielectrics of any kind will be allowed, including waterways. Threaded brass valves shall be installed with a minimum 3" Brass nipple and a brass coupling to provide a dielectric connection.
6. No heat tracing systems unless specifically approved by Engineering department in writing.
7. Provide access doors in ductwork and/or architectural elements where required to access all equipment requiring maintenance and/or adjustment. This equipment includes but is not limited to sensors, dampers, actuators, control devices, valves, etc. These system components shall be installed such that distance from access door permits easy access and servicing. Access doors shall be sized to provide appropriate access based on height of access required and activity. Install such that access door is fully operable without the removal of architectural elements such as ceiling tees, support, etc. Install in a location such that stepping or leaning over permanent equipment or furniture is not required. Where access doors are required in architectural elements that provide a fire and/or smoke rating, access door shall maintain the rating.
8. Cooling Source:
  - a. Every project on campus shall have first consideration for cooling plant be the campus chilled water loop. If project location, budget, or life cycle cost makes connecting to

campus chilled water not feasible, alternate energy sources may be evaluated. Preference is given to green energy sources such as ground source heat.

- b. Summer chilled water design supply water temperature should be 45°F, with a minimum return water temperature of 60°F. Winter chilled water EWT design temperature should be 50°F for systems not operating economizer.

9. Heating Source:

- a. The design for heating will generally require the use of the central utility plant steam system or be served from the centralized 140°F heating water systems as location permits.
- b. In buildings located a prohibitive distance from the campus steam mains or heating water loops, heating may be provided by high efficiency condensing boilers systems or geothermal systems. Hot water shall be designed at no more than 140°F unless steam is required by the operation. The primary fuel for a boiler installation shall be natural gas, healthcare occupancies shall provide redundant heating and fuel source as required by code. Boilers shall be high efficiency condensing style.
- c. Design parameters for campus steam systems: 115 psi saturated steam. Entrances to buildings shall use a 2-stage 1/3 2/3 style PRV reducing station.
- d. Design parameters for campus heating water loop: 140°F EWT / 110°F LWT design temperatures, reset to 100°F EWT in summer.
- e. Where a building is provided with steam from the campus distribution system the steam shall be the direct energy source for the domestic hot water heating. Note: Pressure / Temperature ratings required for equipment, valves and piping are described elsewhere in these design standards.
- f. Building heating and cooling systems which are to be extended or modified will require analysis of the existing mechanical systems to determine the capacity available for expansion.

10. Back-up systems must be provided for projects where critical research, experiments, patient care, etc., require uninterruptible heating and/or cooling. Standby equipment and/or back-up systems shall be discussed with the Owner for systems serving critical areas such as laboratories, research, animal holding, and patient care.

- a. Contract drawings shall indicate equipment that is intended for standby service.

11. Projects shall satisfy the following redundancy requirements:

- a. If steam heat exchangers are used as heating source, each heating water system shall be provided with two converters, each sized for 100% or three at 50% of the total anticipated load to provide for redundancy and future expansion.
- b. Where hot water boilers are selected as the primary heating source, the boilers shall be sized as outlined for heat exchangers above.

- c. Cooling source redundancy shall comply with current healthcare guidelines for system serving healthcare occupancies. Cooling for research areas shall be fully redundant. For outpatient, ambulatory, business occupancies, administrative, general classroom areas, redundancy requirements shall be such that loss of any single piece of equipment still allows for 100% of normal operating capacity online.
  - d. Cooling for IT rooms shall be provided by fan coil unit connected to campus chilled water system. Fan coil shall be on alternate power, equipment branch. A separate cooling only volume box shall also be connected as a back-up source where rooms are adjacent to VAV air handling systems. Unit should be sized for 50°F winter chilled water temperature.
  - e. When the building is served from campus chilled water a single tertiary building pump shall be utilized with a full sized bypass.
12. Buildings shall be designed for no more than 15 psi piping pressure loss on the cooling and heating hot water systems.
- a. Pumping for heating systems shall be arranged such that a minimum of two pumps are provided, both sized at 100%, or three at 50% of the total anticipated load to provide for redundancy and future expansion. Pumping for cooling shall be arranged in the same manner if the building is equipped with independent cooling.
  - b. If there is a steam fed heating hot water generator in the building, then it should be designed to only pump through it when campus heating hot water is unavailable.
13. Physical space in the mechanical rooms adjacent and convenient to heating and cooling equipment shall be reserved, and piping sizing shall be considered to anticipate future expansion where expansion future system expansion is possible.
14. Spaces with cooling requirements below 68 and humidity requirements of 50% will require a separate dedicated air handling or cooling system for that area.
15. Spaces that require temperatures outside the 68-75 range and outside 40-60% RH shall be clearly documented on the plans.

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**Common Results for HVAC****23 05 00**

- 1. Outside design temperatures shall be:
  - a. Summer: 95°F db and 78°F wb
  - b. Winter: -10°F
- 2. Indoor design conditions for non-clinical spaces, not governed by Healthcare Code:

- a. Summer, Cooling: 75°F / 50% RH – (mechanical and electrical rooms 90°F)
  - b. Winter, Heating: 70°F / 40% RH minimum – (mechanical and electrical rooms 55°F)
  - c. IT rooms: 75°F maximum / 30% RH
  - d. Operating Rooms: 68°F to 75°F / 60 to 40% RH
    - i. \*Humidification ranges may need to vary for labs, library, etc. Review with project manager on a project by project basis
3. Indoor design conditions spaces in clinical areas:
- a. Temperature and Humidity according to healthcare code listed in front of this document coordinated with departmental or equipment requirements which may exceed minimum healthcare code requirements.
  - b. Humidification shall be considered to maintain a minimum of 40% RH, which exceeds code requirements.
  - c. Operating at higher humidity levels during extreme winter weather will require the building envelope and fenestration areas to be designed and properly constructed to prevent condensation. Refer to Architectural divisions. If the building envelope and fenestration areas are not designed to prevent condensation during extreme cold weather, the space relative humidity may be reset to code minimum values based on outside air temperature. The use of an outdoor air reset schedule for humidity setpoint shall be reviewed and approved by the Owners engineering department.
  - d. The use of water side economizer may be considered to reduce energy usage associated with humidification. Coordinate use of water side economizer with facilities.
4. Duct work shall be designed for no more than 0.08" wc pressure loss per 100'. Higher friction rates may be used in shafts with a maximum velocity of 2500 fpm, however this should be limited as much as physically possible to decrease energy intensity of the system. Ductwork should be sized based on sum of peaks for hospital occupancies. Diversity of loads can be used for research laboratories and educational spaces subject to discussion with Owner's Engineer department. Energy Code requirements shall still apply.
5. AHU's serving Patient Care areas, or lab spaces shall not use diversity when sizing the air handling system. The sum of full peak load shall be utilized. Education and Administration spaces shall use proper engineering design diversity for sizing of the air handling unit, but will also consider all possible future expansion of the system when sizing. These parameters will be discussed with UNMC Engineering during the design development phase.
6. Design Engineer to provide system static pressure expected operating point at design conditions per Energy Code model for each air handler for balancing. Design Engineer shall not approve balance report if measured values exceed expected operating point by more than 10% and shall be responsible for leading reconciliation.

7. **Deviations:** The consulting engineer shall review and discuss with the Owner's Engineering department if specific needs require deviation from the above schedule. Where individual user requirements exceed these limits, appropriate systems shall be provided for localized environmental control.
8. **Ventilation Air:** Ventilation air shall conform to the latest ASHRAE standard for natural and mechanical ventilation. Air intakes shall be located so as not to introduce foul air (i.e. near cooling towers, exhausts, vehicle emissions, garbage dumpsters, etc.). In addition, intake, relief, and exhaust louvers shall not be at grade level due to potential tampering/security concerns.
9. Zoning of the systems shall be in accordance with sound engineering judgment relating to varying load conditions, function of space, occupancy schedules and such. Final zoning shall be discussed during schematic and again during design development phase with UNMC Engineering. In general, no more than three offices/spaces shall be on a single zone.
10. Zoning of HVAC systems shall comply with current healthcare codes allowing for the following:
  - a. Individual control of patient rooms
  - b. Independent pressure and temperature control of AIIR's, PE's, and OR's.
  - c. Exam Rooms, Administrative spaces, and general areas with like utilization and exposure shall be grouped at a maximum of 3 rooms per zone.
11. **Acoustics:** Ductwork shall be installed so as to trap sound from room to room to provide for sound privacy. In clinical and administrative plenum return areas (when plenum is approved for use), walls shall go to structure and return air connections will be provided with a combination acoustical/visual barrier to prohibit sound transmission.
12. On demolition work all refrigerant reclaim shall be coordinated with facilities. Owner shall have first right of reclaim.
13. All refrigeration compressors shall be specified with a minimum 5-year warranty.
14. The chilled and heating water piping layouts shall be logically designed to provide organized distribution systems which permit the isolation of distinct sections without the disruption of the entire building. This includes provision of a major branch to each section and installation of isolation valves at every major branch. Isolation valves shall also be provided at all unit connections.
15. Design ductwork and piping systems to sustain dead-head pressures. In the rare occasion where this isn't possible for the ductwork, written permission from the UNMC Mechanical Code Authority is required. Pressure relief doors will not be utilized. Provide pressure switches in the supply and return mains. Ductwork shall be designed so that there is a 25% safety factor between the duct class and the required setpoint of the safety pressure switch to avoid nuisance trips and protect ductwork.

**Design Requirements – Not Used****General**

1. Ductwork cleaning shall be performed by NADCA certified individuals or companies and performed in accordance with NADCA ACR 2006.

**Products – Not Used****Execution**

1. Ductwork shall be delivered to the site protected on both ends and sealed. It shall be staged in the same manner and remain protected until installation. At the close of each working day, all open sections shall be capped/sealed for protection. This includes equipment.
2. Existing ductwork supply and return shall be cleaned concurrent with renovation. The system shall be cleaned back to the equipment of service which also shall be cleaned.
3. New ductwork systems may be required to be cleaned prior to substantial completion if units are started during dust producing activities or not properly protected during construction.

**Templates/Details and Specific Installations – Not Used****Motors (also applies to 22 05 13 Plumbing Motors)****23 05 13**

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**Design Requirements**

1. The brake horsepower of equipment that the motor is serving shall not exceed 80% of the nameplate horsepower of the motor. Motors shall not include service factor when sized.
2. All motors above 3/4 HP shall be driven by VFD's. ECMs will be considered on a case-by-case basis and would not require a VFD.
3. In all cases where feasible systems shall be direct drive and eliminate belts.
4. Any equipment shipped with variable pitch motor sheaves shall be replaced. After the proper speed has been determined and all balancing is completed and accepted, variable sheaves shall be replaced with fixed sheaves. Fan sheaves shall be of the non-adjustable type.
5. Provide motors that are 1750 RPM at 60Hz. Motors for condensate pumps may operate at 3500 RPM.
6. Motors 3/4 HP and larger shall be three phase.
7. Motors smaller than 3/4 HP shall be single phase.

8. Enclosure: Open drip proof (ODP) for motors installed indoors and out of the airstream.  
Totally-enclosed fan-cooled (TEFC) for motors installed outdoors or within the airstream.
9. Coordinate with Architect and Structural Engineer to provide support for chain falls to allow installation and removal of motors.

### **General – Not Used**

### **Products**

1. Motor efficiencies shall comply with the current energy code, be inverter duty rated, and NEMA's Premium Efficiency Motor Program. Motors shall be "NEMA Premium<sup>®</sup>" efficient with full load efficiency levels in accordance with ANSI/NEMA standard MG 1 (latest edition). "Motors and Generators" Table 12-12
2. All motors connected to variable frequency drives 5 HP and above shall be equipped with AEGIS bearing protection ring or approved equal.
3. Manufacturers
  - a. Baldor, Dayton, Emerson, Regal Beloit/Marathon, Rockwell Automation/Reliance, Toshiba, US motors, General Electric; Energy Saver, Siemens

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Coordinate meter requirements, meter type, location, and installation detail with UNMC Utilities on each project.
2. Coordinate meter sizing with UNMC Utilities department to ensure operational flows are measurable.
3. See Section 33 61 13 for steam and chilled and hot water meter information.
4. See section 25 35 01 for coordination requirements.

**General – Not Used****Products**

1. Manufacturers
  - a. Chilled & Heating Hot Water Flow Meters – refer to section 33 61 13
  - b. Steam Flow Meter – refer to section 33 61 13
  - c. Pressure Gauges –Tericce, Ashcroft, Weiss, Marsh, US Gauge, Weskler, Weston and Ernst, Winters
  - d. Thermometers – Tericce, Weiss, Marsh, Weskler, Weston and Ernst, Winters, Ashcroft, Winters, Taylor Environmental, Palmer, Marshalltown
  - e. Wye Strainers – Armstrong International, Hoffman Specialty ITT, Spirax Sarco, Keckley, Metraflex, Mueller Steam, Spence Engineering, and Victaulic

**Execution**

1. Install thermometers in the following locations:
  - a. Inlet and outlet of each thermal-storage tank
  - b. Inlet and outlet of each hydronic boiler.
  - c. Inlet and outlet of each hydronic zone.
  - d. Outside-, return-, supply-, and mixed-air ducts.
  - e. Inlet and outlet of any heat exchanging device excluding volume box reheat coils.
  - f. Inlet and outlet of each hydronic coil in air-handling units.
  - g. Two inlets and two outlets of each hydronic heat exchanger.
  - h. Two inlets and two outlets of each chiller.

**Templates/Details and Specific Installations – Not Used**



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**Identification for HVAC and Piping Equipment****23 05 53****Design requirements**

1. All piping and equipment labeling shall be per ANSI/ ASME A13.1-2007.
2. Provide waterproof, permanent equipment labels on all equipment. Each piece of equipment shall have a unique name and number and indicate design criteria such as cfm, gpm, psi, etc.
3. Provide laminated system sheets on all pump systems which indicate hydronic fluid type (chilled water, hot water, etc.) whether there is glycol present and mixture used, pressures the system was designed for, designed maximum flows the system should provide, and temperatures the system should operate at. Attach laminated sheet at eye level on piping mains entering or exiting the pumps.
4. Provide system labels on pumps and pressure gauges which indicate design pressures which should be observed.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used**

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**Testing Adjusting and Balancing for HVAC****23 05 93****Design requirements**

1. On all renovation projects re-using existing equipment a Pre-Test of systems shall be performed benchmarking system performance prior to any design activity taking place.

**General**

1. TAB agent shall be contracted directly to Owner and shall be independent of the installing contractors. TAB shall be coordinated and scheduled by GC.

**Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used**

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**HVAC Insulation****23 07 00**

**Design Requirements**

1. Supply air ductwork shall be externally insulated. Return air transfer in special applications where noise or other criteria is an overruling factor may be lined if it does not serve patient care and is approved via deviation request.
2. Supply air ductwork shall not be internally lined. If acoustics require internally lined ductwork, all other sound reducing measures must be fully exhausted first and then a written request listing out the expected replacement cost in 10-15 years must be given to the occupants to fully understand the future impact.

**General – Not Used****Products – Not Used****Execution**

1. Install field-applied jacket on piping as follows:
  - a. On exterior piping.
  - b. On all changes in direction and fittings.
  - c. In areas subject to traffic and damage exposed in mechanical rooms and tunnels, 8' and below.
  - d. On exposed piping insulated in finished spaces including storage rooms, closets, and work areas.
2. All insulated ductwork in mechanical rooms where any portion is below 8' shall be insulated with ductboard to protect against ripping and tearing.

**Templates/Details and Specific Installations – Not Used****Fuel Gas Piping****23 11 23****Design Requirements**

1. Any exposed fuel gas piping 2" and smaller shall be threaded. All other piping shall be welded.
2. New services shall have a regulator and meter furnished by MUD.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. All air separators shall be combination air/dirt separators. Coalescing type are the only allowed type. Centrifugal types are not allowed.
2. Manual air vents shall be provided at all high points of piping systems. Hose-end drain valves shall be provided at all low points of piping systems. For all chilled water connections to water cooled equipment loops provide hose-end drain valves on supply and return piping for emergency hook-up of domestic water. Provide vent valves on manual air vents, 1/4 in ball valve, 150 PSI.
3. Safety relief valves shall not be larger than 3/4".
4. All components shall be designed for 150 psi minimum. Design conditions may require higher pressure ratings for specific applications.
5. Expansion tanks shall be pre-pressurized bladder type.
6. Show locations of expansion joints, loops and anchors on drawings. Expansion loops shall be used wherever needed to eliminate maintenance problems with joints.
7. Three way valves are generally discouraged in design and must be pre-approved in writing by Owner's engineering team.
8. All valves 2" and smaller in size shall be ball valves. Refer to Section 22 05 23 for more details.
9. Provide thread-o-lets for all control devices. UNMC Strategic Energy Initiatives group will review details during design for locations and coordinate with contractor.
10. For hydronic connections other than steam, flexible connections shall be rubber spherical with retaining rods designed by the Design Engineer.
11. Pipes which are 2-1/2" and larger shall be welded black steel, all other sizes shall be Type L copper or threaded black steel.
12. Hydronic heating water shall be water on all systems not subject to freezing. Outside air coils and other hydronics subject to freezing shall be propylene glycol, minimum 35%. In less common applications, such as snow melt systems, remote radiators, or other heating systems where fluid is directly exposed to outdoor air conditions and/or not circulating under normal operation, higher percentages of glycol may be used. In these instances, the system shall be designed to meet manufacturer requirements.
13. Water cooled process equipment is preferred over air cooled. Provide equipment with solenoid valve and auxiliary contacts to the building automation system. On large systems with multiple water-cooled devices and separate process loop should be considered.

**General – Not Used****Products**

1. Manufacturers
  - a. Air Vents, Automatic – Spirotherm/Spirotop, Metraflex, Armstrong, Hoffman Specialty
  - b. Expansion Tanks – Aurora, Amtrol, Thrush, Armstrong Pumps, Bell & Gossett ITT, Taco, Patterson
  - c. Air/Dirt Separators – Spirotherm, Taco 4900 Series only, Bell & Gossett, Armstrong
  - d. Strainers (in-line wye and valve combination) – Griswold Controls, FDI, Nexus, Auto-flow
  - e. Strainers (single Basket and tee) – Armstrong International, Hoffman Specialty ITT, Spence Engineering, Victaulic of America, Keckley, Metraflex, Mueller, Spirax, Tate
  - f. Strainers (suction diffuser) – Aurora, Bell & Gossett ITT, Armstrong Pumps, Armstrong, Mueller, Taco, Victaulic of America
  - g. Valves, Automatic Flow control – Griswold Controls, FDI, Nexus, Auto-flow, Belimo
  - h. Valves, PRV (water) – Bell & Gossett ITT, Watts Control Valves, Conbraco, Armstrong
  - i. Valves, pressure relief (water) – Armstrong Pumps, Bell & Gossett ITT, Kunkle, Watts, Taco, Farris, Teledyne Farris, Conbraco
  - j. Valves, triple duty – Aurora, Bell & Gossett ITT, Victaulic of America
  - k. Reduced Pressure Backflow Preventer – Watts (3/4” and up), Conbraco (1/2” and below)

### **Execution**

1. Provide strainers at all equipment and coil connections.

### **Templates/Details and Specific Installations – Not Used**

## **Hydronic Pumps**

**23 21 23**

### **Design Requirements**

1. See redundancy requirements in front end of this document.
2. Heating water pumps shall be on alternate power, equipment branch.
3. See 23 05 13 motors for grounding and drive requirements.
4. Provide 2-way valves on all variable speed pumping systems.
5. Three way valves shall not be used in system design. When minimum flow requirements must be met, an end of line 2 way valve which is designed to meet the minimum additional flow may be utilized.
6. Relief valves shall be designed to minimize potential for catastrophic problems on the campus hot water system – i.e. minimal size discharge for thermal hydrostatic relief only and not full system discharge.

**General – Not Used****Products**

1. Manufacturers
  - a. Single suction, heating, cooling and condenser pumps – Aurora Pump, Armstrong Pumps, Bell & Gossett ITT, Patterson, Gould, Sulzer (Paco), Peerless, Fairbanks
  - b. Double suction, heating, cooling, and condenser pumps - Aurora Pump, Armstrong Pumps, Bell & Gossett ITT, Patterson, Gould, Sulzer (Paco), Peerless, Fairbanks
  - c. In-line Pumps - Aurora Pump, Bell & Gossett ITT, Grundfos, Gould, Peerless, Fairbanks, Armstrong
  - d. Flexible Pump Couplings – Doge Regupol Para-flex, Woods Sure-flex, Lovejoy
2. Pump product submittals shall include pump curves, and performance data.

**Execution**

1. All pumps shall be realigned and dynamically balanced in the field after installation.

**Templates/Details and Specific Installations – Not Used****Steam and Condensate Piping****23 22 13****Design Requirements**

1. Steam system components shall be designed for 150 psig working pressure to minimize the need for system relief valves.
2. Safety relief valves shall not be larger than ¾” except on boilers. Coordinate with UNMC Utilities for questions or exceptions.
3. All steam supply valves up to 150 PSI:
  - a. 2” and smaller shall be 2” Ball valves 600WOG – 150SWP, stainless steel ball and stem, TFE seats and seals.
    - i. Valves on steam traps shall follow the steam supply valve requirements above.
  - b. Valves 2 ½” and larger should be rising stem gate valve or high-performance butterfly.
4. Piping 2” and below shall be threaded. Larger than 2” shall be welded.
5. Steam systems shall have double block and bleed on building mains as well as any take off from the main.
6. Steam piping shall be ASME Schedule 40 B31.1, Condensate piping shall be schedule 80.
7. For steam, flexible connectors/vibration isolation shall be stainless steel braided type, verify installation details for vertical / horizontal, and anchoring.

**General – Not Used****Products**

## 1. Manufacturers

- a. PRV (pilot operated) – Armstrong, Hoffman, Fisher, Masoneilan, Spence, Spirax Sarco
- b. Safety Valves (steam) – Kunkle, Watts, Conbraco, Consolidated
- c. Steam Traps
  - i. For low pressure (less than or equal to 30 psig) Float and Thermostatic manufactured by Armstrong Intl, ITT Hoffman, Spirax Sarco, Gestra, Spence
  - ii. For high pressure (>30 psig), use Gestra F&T or inverted bucket steam trap.
- d. Steam Wye Strainers – Armstrong International, Hoffman Specialty ITT
- e. Flange Gaskets – Flexitaulic

**Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Steam powered pumps may be considered on a case-by-case basis, coordinate with Owner.
2. Condensate pumps to be provided with factory installed valves between tank and pump.
3. Pumps to be duplex with integral control panel equipped with high/low/alarm operation and auxiliary alarm out.
4. These should be low NPSH type pumps.
5. High pressure condensate return should be injected into the bottom of the piping.
6. Condensate tank should be cast iron.
7. Floats shall be protected from turbulence of incoming flow to prevent undue wear and tear on pivot mechanisms.
8. Pump control should have an alternator mechanism with high level remote alarm capabilities.
9. Condensate should be piped to allow diversion to drain with adequate manual valving.
10. Condensate traps shall be provided with upstream and downstream valves and inlet strainer to allow for removal and replacement of trap without shutting down steam or condensate systems.

**General – Not Used****Products**

1. Manufacturers
  - a. Skidmore, Armstrong, Sta-Rite, ITT Bell & Gossett, Thrush, Shipco

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Refrigerant Piping****23 23 00**

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**Design Requirements**

1. Refrigerant choices will be coordinated with the facilities engineering department on a case by case basis.

**General – Not Used****Products – Not Used**

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****23 25 00 HVAC Water Treatment and Chemical System****23 25 00****Design Requirements**

1. All hydronic piping systems shall be flushed with Biocide prior to final filling of system.
2. Owner shall witness test final flushing of piping systems. Contractor shall be required to flush for a minimum of 15 minutes or until owner's satisfaction that the systems is clean. Report shall be submitted to the Owner's compliance department.

**General – Not Used****Products**

1. Manufacturers
  - a. Rochester Midlands
2. HP loop system treatment shall be CLT300 by Rochester Midlands.
3. Closed loop systems shall be CLT2 by Rochester Midlands.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Metal Ducts and Accessories****23 31 13****Design Requirements**

1. All fire smoke dampers shall be equipped with end switches with position indication. End switches may report to BMS front end and indicate position open, closed, or neither. See controls section.
2. Duct liner will not be used in any patient care system. See insulation section for details.

**General**

1. Provide any publicly accessible access doors (not requiring a ladder for access) with a keyed core which accepts "Best" lock cylinders.

**Products – Not Used****Execution**

1. Ductwork will be cleaned, sealed with plastic, and protected with plastic at all times while on



site.

2. All high-pressure ductwork (ductwork from the AHU to the inlet of the VAV box) will be 100% leak tested.

### **Templates/Details and Specific Installations – Not Used**

## **HVAC Fans and Power Ventilators**

**23 34 16**

### **Design Requirements**

1. Fans shall be provided with automatic backdraft control dampers interlocked with motor.
2. Roof mounted exhaust fans shall be direct drive where possible.
3. See 23 05 13 motors for grounding and drive requirements.
4. For maximum energy efficiency, high plume exhaust shall be two stage fans. Design Engineer shall provide minimum speed for required plume height discharge.

### **General – Not Used**

### **Products**

1. Manufacturers
  - a. Lab Exhaust Fans – Strobic, Greenheck, Cook, Twin City
  - b. Power Ventilators – Greenheck, Acme, Cook, Carnes, Penn Barry, Twin City
  - c. Ceiling Exhaust Ventilators – Greenheck, Acme, Cook, Carnes, Penn Barry
  - d. In-line Fans – Greenheck, Acme, Cook, Carnes, Penn Barry, Twin City

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

## **Air Terminal Units**

**23 36 00**

### **Design Requirements**

1. Air terminals serving Operating Rooms, invasive procedural areas, and rooms considered class B and C by current healthcare code shall be double wall Construction.
2. Air Terminals serving all other areas to be Steri-Liner grade insulation with minimum 3/4" thickness.
3. Air Terminal reheat coils shall be designed at 140°F maximum heating water temperature with a 20°F delta T. Reheat coils shall generally be 2 rows. Three row coils will be allowed

when required, four row coils are not allowed with written deviation approval from the Owner. VAV boxes shall be sized to maximize between proper sizing for good control at low flows, and appropriate coils to provide reheat that are still cleanable if needed.

4. Maximum static pressure drop on terminal units including reheat coil shall be 0.5”.
5. Rooms requiring positive pressure that shall be operated in occupied/unoccupied mode including but not limited to OR’s, PE, Research rooms shall be equipped with return air boxes to allow the room to remain positive in unoccupied mode.
6. Terminal Units to be provided with controls enclosure, coordinated with UNMC Engineering.
7. Lab and research spaces requiring pressure control shall use Venturi type air valves or standard VAV boxes with high speed actuators.
8. Fan Powered boxes will not be used.
9. When more than one box serves a room, the designations shall be Box 101.1, 101.2, etc. Letter designations after room numbers are reserved for the room numbering systems.
10. System shall be designed for supply air temperature reset which will require that interior zones be designed for 60°F supply air temperature or warmer.

### **General – Not Used**

#### **Products**

1. Manufacturers
  - a. Air Terminal Units - Krueger, Price, Titus, Tuttle & Bailey
  - b. Room Pressure Control Air Valves – Projects will be designed around Critical Room Controls systems. CRC Air Valves will be purchased as part of the BAS system. See BAS Installation Matrix for details.
2. Identification: Provide label on each unit indicating plan number, cfm range, cfm factory-setting, and calibration curve (if required). Boxes shall be individually numbered and numbered with the room number to help identify location of box. Multiple boxes in one room shall have designations as listed above in item 9 (101.1, 101.2 etc.).
3. Air Terminal Units to be provided with 4 quadrant airflow sensors and brass tees in airflow sensing tubing (in lieu of plastic caps which dry out and crack over time causing loss of proper control of the box).

### **Execution – Not Used**

1. If a space has a fumehood or the potential for a future fumehood, or a room pressure monitor is needed, Room Pressure Control Air Valves shall be used for room pressure control. Otherwise, normal Air terminal units will be used for zone hvac control.

**Templates/Details and Specific Installations – Not Used****Diffusers, Registers, and Grilles including OR Distribution****23 37 13**

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**Design Requirements**

1. Laminar air terminals serving Operating Rooms, invasive procedural areas, and rooms considered B/C by current healthcare code shall be capable of receiving a HEPA final filter. System static pressure will be designed to accommodate the terminal with HEPA final filtering.
2. Low wall return grilles are required for areas that have the potential for anesthesia gases.

**General – Not Used****Products**

1. Manufacturers
  - a. Krueger, Precision Air, Price, Titus, Tuttle & Bailey

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Commercial Kitchen Hoods****23 38 13**

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**Design Requirements**

1. Shall be equipped with occupied / unoccupied status interlocked with make-up air system. Shall utilize demand control ventilation with hood sensing system and all make-up air shall be both heated and cooled.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Exact filter sizes shall be as follows. Half-size filters are permissible only as specifically approved by deviation request. No odd sizing shall be accepted.
  - a. HEPA: 24.0" x 24.0".
  - b. MERV 8 thru MERV 15: 23-3/8" x 23-3/8".

**General – Not Used****Products**

1. Final Filtering selections shall be discussed with Owners Engineers and designed based on occupancy and usage of the spaces being served.
2. HEPA Filters shall be 11.5" deep and should be equivalent performance to AAF MEGAcel, 0.7" IAPD at 500FPM, 99.99" efficiency.
3. Pre-filters for air handling units shall be 2" depth, MERV 8.
4. All equipment shall be selected with a minimum 2" filter media section.
5. Manufacturers – AAF, Eco-Air Products, Cam-Farr, Flanders

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Boilers****Design Requirements – Not Used**

1. This section applies ONLY to Boilers which are provided in buildings which are not connected to the main campus steam/hot water system. Generally high efficiency (95% minimum) Condensing modular style boilers are preferred.
2. Provide BacNet capability to allow owner to connect to Building Automation System.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design requirements**

1. See redundancy requirement in general requirements. Where plate and frame or shell and tube water-to-water or steam-to-water heat exchangers are used, the design shall be redundant such that capacity is met in an N+1 arrangement. If steam control valve is larger than 1.5" (approximately 900 lb/hr), then control valves shall be split 1/3-2/3. In all cases, control valve(s) shall have a bypass around the control valve to allow for emergency service.
2. If served by steam, heat exchangers shall be served by low pressure steam.

**General – Not Used****Products**

1. Manufacturers
  - a. Shell and Tube – Aerco, Bell & Gossett, Armstrong, Taco, Dunham-Bush, Patterson-Kelley, Adamson
  - b. Plate and Frame – Alfa Laval, Patterson-Kelley, Tranter, Bell & Gossett, Armstrong

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Chillers, Condensers, and Evaporative Condensers****Design Requirements**

1. See general requirements for system selection requirements and redundancy.
2. Campus chilled water is the base for all projects on campus. This section applies to projects which are not connected to campus systems.
3. Provide BacNet capability to allow owner to connect to Building Automation System.
4. When campus chilled water is a prohibitive distance, air-cooled chillers provided on projects shall be designed with a 105°F ambient outdoor condition and Manufacturer list shall be reviewed on a case by case basis by the Utilities department. These chilled water systems shall be designed to campus chilled water standards to allow for future tie-in to the campus system.
5. See 23 05 13 motors for grounding and drive requirements.

**General – Not Used****Products – Not Used****Execution – Not Used**

**Templates/Details and Specific Installations – Not Used****Air-to-air Energy Recovery Units****23 72 00****Design Requirements**

1. Air to Air Energy recovery units shall be utilized whenever possible. 100% exhausted laboratory spaces shall use a run-around energy recovery loop integral to the exhaust fan plenum. Energy recovery using other means shall be reviewed on a case by case basis.
2. See 23 05 13 motors for grounding and drive requirements.
3. Provide BacNet capability to allow owner to connect to Building Automation System.

**General – Not Used****Products**

1. Noncondensing energy recovery coils shall have a maximum of 8 rows and 11 fpi.
2. Condensing energy recovery coils shall have a maximum of 6 rows and 10 fpi. Any condensing section shall have integral 316 stainless steel double wall insulated drain pan.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****AHU's and packages AHU's****23 74 00****Design Requirements**

1. Mechanical design engineer shall initiate a meeting with Owner's Engineering Team during design and before purchase, regarding the selection of air handling units for projects. Potential vendors, layout options, design concerns, and intended layouts of the unit components will be presented and discussed.
2. Heating Coils on AHU's shall be designed at maximum 140°F EWT with 40 degree delta T.
3. Cooling Coils shall be maximum 8-row (6-row is preferred), and 10 FPI, they shall not exceed 450 fpm, and they shall be designed for 45°F EWT and a 15°F delta T. Exceptions to these rules will be considered but must be submitted in writing.
  - a. The temperatures leaving the cooling coils and the air handling unit after fan heat shall be clearly identified on AHU performance schedule.
  - b. Multiple cooling coils may be required to achieve required performance.
4. No turbulators are allowed.

5. Coils shall have stainless steel casings.
  - a. The humidifier, or space for a future humidifier, shall be located between the heating and cooling coils for draw-through units. For blow-thru units, it shall be downstream of the fans.
6. Fans shall be selected to prevent stall or surge at all anticipated operational conditions.
7. Design Engineer to list out dirty filter design performance on AHU performance schedule.
8. Unit leakage and duct leakage shall be considered in unit design and included for in equipment ratings, specifically fan and coil ratings.
9. Evaluate and provide performance information on drawing schedules for air handlers:
  - a. Airflow expected total when all boxes are at minimums.
  - b. Airflow expected at maximum flow conditions including expected diversity.
  - c. Maximum anticipated airflow with one supply fan not operational.
  - d. Airflow at 100% OA (full economizer mode)
10. Each fan of a fan array style Air Handler shall be equipped with a means of automatic isolation (e.g. zero pressure loss backdraft damper) in the event of a fan failure. This isolation shall have a pressure drop of 0.05" or less.
11. Units 50,000 cfm and larger or in critical service shall have a demising wall splitting the unit into two roughly equal flow tunnels with access to both tunnels and isolation dampers to control flows, or an alternate design which allows the owner flexibility in doing repairs on air handling units serving critical 24/7 areas.
12. See 23 05 13 motors for grounding and drive requirements.
13. Fans shall be plenum style, direct drive. Design shall provide for return or relief fan. Coordinate return/relief fan application with Owner.
14. Air handling units shall be provided with UV lights downstream of the cooling coils for microbial growth control (generally 7.5W/SF intensity). An interlocked automatic kill switch shall be provided on the AHU section door to disable the light when the door is opened. Protective glazing is required on the AHU window section. Higher intensity UV lights for air stream disinfection (typically in the 20W/SF range) will be discussed based on area served and use case and must be discussed with Owner's engineering team.
15. **All air handling equipment shall be located inside the building** with adequate space for service. Exceptions to this rule must be given in writing by the Owner.
16. Air side economizer cycle with enthalpy control shall be used in all air handling systems to provide "free" cooling when outside conditions are acceptable.
17. Air intakes shall meet the current healthcare code for healthcare occupancy, in non-healthcare occupancy, locate building air intakes as high as possible to ensure the cleanest possible air. Devote special attention to fume exhaust systems to make certain that the exhaust contents escape boundary layer entrainment and subsequent contamination for the

building or its neighbors.

18. Poor mixing of air due to layout of OA intakes in relation to return air on air handling units is common and causes low temperature trip outs on units. Design engineer is encourage to use air blenders or other design methods to ensure full and thorough air blending at the unit.
19. VFD's in the mechanical room shall be inside an enclosure with proper ventilation fans and filters to prevent excessive heat within the cabinet. VFD's shall not be stacked more than two rows vertically. Successful contractor shall review the VFD cabinet design and wiring configuration with Owner's engineering team and the specialty controls consultant.
20. For packaged Air Handling Units: Provide BacNet capability to allow owner to connect to Building Automation System. Packaged controls on air handlers must be carefully coordinated and considered with the Owners BAS consultant for design implications and best applications.

## **General – Not Used**

### **Products**

1. Manufacturers
  - a. Annexair, Climatecraft, Haakon, Nortek, Semco, Trane Others as approved by UNMC Engineering
2. Unit shall have integral 316 stainless steel double wall insulated drain pan at humidifier, cooling coil, and preheat coil sections.
3. Stacked coils to have intermediate drain pans. Coil heights greater than 54" are recommended to be stacked. Stacked coils shall be independently supported so that each coil may be removed without removing the other. Each coil section shall have valves for independent isolation.
4. All coil and humidifier piping to be extended to the exterior of the casing and sealed at the factory.
5. Units shall have double wall thermally broken housing with foam injected panels. Indoor Units shall have a 2" wall thickness with a minimum R value of 12. Outdoor units (if allowed) will have a wall thickness of 4" and a minimum R value of 25.
  - a. Unit should not sweat at 75°F / 85%RH and 50°F SA temp.
6. Walls, ceiling, and floors of units shall be insulated. Floors shall have either upgraded coatings or materials for longevity
  - a. Floor shall be watertight with welded seams and no penetrations through the floor.
  - b. Minimum of 1" collar around interior perimeter of the unit.
7. Filter racks – when the unit will have HEPAs, it shall have final filter racks immediately upstream of the HEPAs.
8. Doors shall have a minimum width of 24" and minimum height of 72" unless unit height



dictates otherwise. Each door shall have a NPT test port from the factory with the same construction as the rest of the unit.

- a. Door handles shall be metal industrial compression style latches (Ventlock or equivalent).
  - b. Doors at fan sections shall be large enough to remove the fans and motors.
  - c. Fan section to have a structural I-beam for mounting a trolley to assist in motor removal for pieces that larger than 100 lbs.
9. Hinges must allow door to be completely removed and reinstalled for maintenance without compromising the integrity of the unit structure.
- a. Doors must open against unit pressure.
10. TAMCO dampers shall be used as basis of design.
11. As stated in 23 05 00, the strong preference is to have ductwork rated for full fan capacity. To prevent excessive over-pressurization of the ductwork, install high pressure cutout switch on supply air fans in lieu of pressure relief doors. Pressure relief doors shall not be used.
12. Leakage through any door or opening shall be considered part of the unit leakage during testing. No internal or external taping of any door(s) allowed during testing.
13. Provide double pane safety glass windows at all access doors.
14. Provide air handling units with appropriate quantity of LED lights to allow visibility of inside of unit. LED Lights shall be provided at all access and fan sections and have an externally mounted and labeled light.
15. Where possible engineer shall specify unit to have single point disconnect and empty conduit runs to minimize or eliminate electrical and control penetrations from the contractor by having these done at the factory.
16. Provide air handling units with one externally mounted duplex GFCI receptacle with cover for each fan section.
17. Designs which utilize fan arrays shall have fans which are individually wired. The most efficient quantity of fans shall be determined and discussed with PM, Owner's Engineer, and Utilities).
18. Each fan shall have its own VFD and premium efficiency motor.
19. Fan wheels shall be fully welded and true air foil type fans.
20. Base rails shall be provided as needed for clearance of condensate traps to be installed above the finished floor.
- a. Design Engineer shall specifically call out height needed for traps off of the AHU.
  - b. A combination of pad and base rail is acceptable to make the appropriate height needed for the traps.
21. Fans shall be internally isolated from unit either individually or as a fan array assembly.

## 22. Leakage and Panel Deflection testing

- a. Owner's Compliance Team shall witness all air handler field testing at initial start-up prior to any other testing or pressurized start up.
  - i. No pressure shall be put on the unit without written authorization from the Owner.
    1. Typically, 2" of pressure will be allowed to be put on unit for pre-testing but this needs to be authorized in writing by the Owner.
- b. In design, the Design Engineer shall designate the specific pressure at which the tests will occur. It will be a calculation of 1-1/2 times the design total static pressure for both panel deflection testing and leakage testing.
- c. The Design Engineer shall designate on the contract drawings the AHU discharge design operating pressure a reference location from the model and any key downstream pressures such that it can be determined by the commissioning team if the unit is operating as designed.
- d. Panel deflection testing
  - i. Deflection shall be measured at 4 points around the cabinet. Each point shall be located at largest unsupported span on that side at the mid-point of the panel height. Dial micrometer will be used against panel to measure deflection. Pass fail criteria will be L/200 at 1.5x design static pressure. Testing report shall be submitted to engineer and owner.
  - ii. Manufacturer shall provide factory-trained supervisor onsite for the duration of the deflection and leakage testing and document all reported conditions and pass fail criteria.
  - iii. An owners compliance representative shall be present and sign off on deflection testing.
- e. Leakage testing
  - i. Leakage Test will be done in the field after final assembly and all penetrations have been made.
  - ii. AHU shall not leak more than 1/2 percent of unit design cfm at 1-1/2 times the design total static pressure in both positive and negative pressures. Manufacturer shall seal all leaks and submit test report to Design Engineer and Owners Engineering department. An owners compliance representative shall be present and sign off on Leakage testing.

23. Manufacturer shall provide start up service in conjunction with contractor and owner on all air handling units greater than 2500 cfm.

24. Exceptions to above standards may be considered on a case-by-case basis for less critical buildings. An example is utilizing packaged, modular air handling units. All exceptions must be clearly documented and approved by deviation request.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Computer Room Air Conditioning Units and Small Split Systems****23 81 00****Design Requirements**

1. The use of split systems shall be discussed with UNMC Engineering Team. The design and location of where to place heat rejecting equipment will be agreed to as a team based on multiple factors appropriate to each building such as maintenance concerns, heat loads in Mechanical rooms, etc. Decisions regarding the location and type of split systems utilized will be documented by the design engineer and provided to the project planner for project records.
2. Mechanical rooms shall be conditioned to standards stated earlier in this reference guide and shall take into consideration when air cooled equipment has been installed in the space to provide proper temperatures.
3. All refrigeration equipment shall have 2 foot all around or manufacturers or code required clearance minimum.
4. Startup shall be provided by installer. Copies of start-up sheets shall be provided to the owner.
5. Water source heat pump and water-cooled condensers shall be considered for these applications.
6. If available, provide units with BacNet capabilities for integration to the owner's Building Automation System.
7. Computer Room Air Conditioners which are dedicated to IT functions shall be coordinated with UNMC-NM Engineering and UNMC-NM Information Technology

**General – Not Used****Products**

1. Manufacturers
  - a. CRAC Units – Liebert, DataAir, Stulz
  - b. Split Systems – Mitsubishi, Carrier, Daikin, Lennox

**Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Generally, UNMC-NM prefer to utilize central air handler systems with central plant utilities for HVAC design. When plant utilities are not available and a Heat Pump system is determined by the owner and engineer to be the proper system solution, the following shall generally apply:
  2. Heat pump loop shall be designed to operate at 70°F.
    - a. System shall be designed for 90°F maximum and 50°F minimum.
  3. Insulate heat pump loop lines with minimum of ½” of fiberglass insulation with vapor barrier.
  4. Generally, heat pumps shall not have water flow through them when they are not operating. Heat Pumps at end of runs may be utilized with flow through them in lieu of a 3-way valve for minimum flow requirements of the pump, alternatively an appropriately sized 2 way valve may be used to meet minimum flow requirements.
  5. Startup shall be provided by installer. Copies of start-up sheets shall be provided to the owner.
  6. Heat pumps shall be mounted on vibration isolation pads across their entire base or suspended with spring hangers.
  7. Heat Pumps shall be supported with maximum 24” hose kits with (in direction of flow):
    - a. Inlet piping components: Isolation valve, union with PTT, strainer with blow down, PTT
    - b. Outlet piping components: PTT, 2-way control ball valve, automatic flow control valve, PTT, union, isolation
    - c. Pressure drop across the hose kit shall be evaluated by the Design Engineer and shall not exceed 3 psi at design flow rates.
  8. Heat Pumps shall be provided with packaged controllers which are BACNet capable over Ethernet (or MSTP).

**General – Not Used****Products**

1. Manufacturers
  - a. McQuay, Trane, Mammoth, Florida Heat pump, Climate Control, Water Furnace

**Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Design Requirements – Not Used****General – Not Used****Products**

1. Manufacturers
  - a. Fan Coil Units - McQuay, Multi-Aqua, Trane, Williams
  - b. Unit Ventilators - McQuay, Trane, Modine
2. Fan Coil Units shall be selected without packaged controllers. Owner prefers to utilize custom controls consisting of control valves, sensors, relays, and thermostats for these units for control.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Electric and Hot Water Radiant Heating and Cooling Units****Design Requirements – Not Used****General – Not Used**

1. Electric Heating (reheat coils or radiant) shall not be used in new construction and will only be considered when no other options are available. Electric heating shall be discussed and approved by UNMC Engineering.
2. No ceiling mounted radiant heating will not be allowed of any type unless it is accompanied with an air moving device to push the heat down.

**Products**

1. Manufacturers
  - a. Trane, Dunham Bush, Sterling Heating Equipment, Airtherm, Vulcan Radiator

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Humidifiers**

**Design Requirements**

1. The owner's sustainability goal drives the campus towards reducing steam distribution and expanding our hot water campus infrastructure. In assistance to that goal the owner desires to reduce the dependence on steam to buildings by making design decisions which help eliminate steam use in the building. Adiabatic humidifiers and point of use steam will be considered and should be discussed on a per project basis.
2. Humidifiers shall be located inside air handling units and provided appropriate absorption distances. Duct mounted humidifiers shall not be used except as required for OR's and other similar exceptions; coordinate these locations with UNMC Engineering.
3. Humidifier tubes shall be double jacketed and insulated.

**General – Not Used****Products**

1. Manufacturers
  - a. Armstrong, Dri-Steem, Pure, Nortec, Herrmidifier

**Execution – Not Used****Templates/Details and Specific Installations – Not Used**

**Building Automation System (BAS) Process**

1. UNMC/NM utilizes a specific and unique process to design its building automation systems for projects. More details can be found in the 25 Series section of these guidelines.
2. The building automation system shall be treated as a separate and specific subcontract to the project. This subcontract will be held directly by the General Contractor and will not be subbed under the Mechanical contractor. The subcontract is viewed as a “low voltage” subcontract and should be procured and bid separately from the normal/high voltage electrical work. Transparency in parts pricing is required to ensure owner’s pricing from the preferred vendor is utilized for the project and a markup shall be proposed by the bidding contractor for handling of the parts.
3. The owner utilizes a specialty BAS Design consultant on projects which have construction documents and work scope containing Building Automation Systems work. The design sheets will be designated with a TC and a 25 series specification will be provided outlining construction requirements.
4. A matrix has been developed to outline the areas of work on the BAS system and can be found the 25 series section of this document. The low voltage contractor is primarily responsible for parts and installation with some coordination of set up as outlined in the matrix of responsibilities. Programming of the system is performed by the specialty BAS design consultant. All graphics/trends/alarms/reports are performed by the Owners Automation Team. Commissioning of these systems shall be discussed in other sections of this guideline and described in the matrix of responsibilities.
5. The Architect and Engineering consultants will coordinate with Owner’s project manager the procurement of the BAS Design consultant on the project.

**Direct Digital Controls for Building HVAC Systems****25 35 00**

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**Design Requirements**

1. Design team will inquire with owner which energy management system shall be utilized for their specific project. BMS system shall be reviewed and coordinated with Owner’s Engineering Team prior to construction documents.
2. No wireless Building Automation Systems or components shall be utilized without express written permission from the Owner’s Engineering Team
3. Reference “UNMC-NM Controls Installation Responsibility Matrix” in this document for understanding roles and responsibilities for installation of BMS Systems at UNMC-NM.

Include this matrix in construction documents on the temperature controls (TC) design sheets.

4. Supply static pressure sensors, building static pressure sensors, differential pressures for pumps, and any other necessary pressure sensors needed for proper building control shall be shown on drawings and coordinated between the Mechanical and the Temperature Control design engineers for proper placement and control.
5. All heating and cooling systems shall utilize outside air reset.
  - a. System shall be designed for supply air temperature reset which will require that interior zones be capable of cooling with 60°F supply air temperature or warmer in the winter months.
6. Design engineer shall provide CFM's in the field level device schedules at a minimum the following values: Max Cooling CFM, Max Heating CFM, and Minimum CFM flows. Note: DXR set-up requests additionally for Minimum Heating CFM, and Minimum Ventilation flows. Advise for clarity design engineer utilizes notes describing that the Minimum flows apply to heating, cooling, and ventilation requirements.
7. All projects will be capable of occupied/unoccupied setbacks to control energy usage:
  - a. Medical Office Buildings, Higher Education, Academic, and General Office
    - i. Office, conference rooms, education spaces, exam rooms, and other similar rooms shall utilize occupancy sensors interlocked with the building management system to allow rooms to be reset to unoccupied based on sensor input with offset.
    - ii. General and common areas shall be capable of occupied/unoccupied based on time of day schedule or occupancy. Spaces shall be provided with plate style sensor without adjustment. Coordinate override in these spaces with UNMC Energy Group.
    - iii. Outside air damper control shall be evaluated for use of CO2 sensors to reset outside air.
    - iv. Large auditoriums, conference rooms, training rooms, and gathering rooms shall use CO2 sensors to reset outside air.
  - b. Hospital
    - i. Any rooms that are required by Joint Commission to be pressure monitored shall be tied into the BMS and not controlled manually.
    - ii. FGI guidelines shall be followed. In certain cases, UNMC/NM applications require the design to exceed that of FGI guidelines and shall be followed. Examples are noted in the following sections.
    - iii. Patient rooms shall be equipped with combination motion/IR occupancy sensors with auxiliary contacts and shall signal occupied/unoccupied status.
    - iv. Class B and C operating/procedure and C-section rooms shall be equipped with both supply and return boxes. Rooms shall set back required air changes based on occupied / unoccupied status. Status shall be from combination of current sensor on procedure lights and motion sensors in rooms. System shall fail to occupied mode.



Indication of status shall be visible in room. Room setback will only affect air changes; temperature, humidity, and pressurization will remain in range.

- v. Low wall return grills are required for areas that have the potential for anesthesia gases.
  - vi. Class A Procedure rooms, radiology, X-ray rooms, and Endoscopy rooms shall be capable of unoccupied setbacks. Rooms shall remain under appropriate pressure as indicated by code in all modes of operation. Room setback will only affect air changes; temperature, humidity, and pressurization will remain in range. Return airflow boxes will be required to properly control pressurization to the room during unoccupied setbacks.
  - vii. Administrative, outpatient clinical, exam, and business type occupancy services areas to be reset to unoccupied based on sensor input with offset.
- c. Research Labs
- i. Spaces where airflow and pressure must be coordinated with hoods or pressure controlled shall use supply and return boxes in combination with sash sensing systems.
  - d. Areas other than labs shall fall under "Medical Office Buildings, Higher Education, Academic, and General Office".
8. All projects shall incorporate the following energy savings strategies:
- a. All systems shall have air-side economizer, water-side economizer, or heat recovery chiller system based on economic analysis. In some cases, combinations of all three shall be used to allow the facility future flexibility based on energy rate.
  - b. Air-handling systems on variable air-volume systems shall be equipped with static pressure reset in all cases.
  - c. Specify Digital Lumens "Encelium" lighting management control system to optimize energy management and control including daylight harvesting.
  - d. All systems shall utilize supply air temperature reset schedules based on OA temperature, VAV box demands, and return air humidity/dewpoint.
9. Sequence of operation, additional points requirements:
- a. Condensate pump shall have a CT for monitoring of operation of the pump.
  - b. Sump/Sewage pumps shall report high level and pump proof of status (typically a current switch) for monitoring of operation. Mechanical Engineer shall coordinate this detail with the controls design team.
  - c. Critical rooms where operations are temperature dependent shall report high temperature alarm. These include but are not limited to IT rooms, elevator equipment rooms, electrical rooms, etc.
  - d. UV lights systems shall report run time and alarm at end of life based on run hours.

- e. Rooms requiring pressure control: Lab, Protective Environment, Airborne Infectious Isolation, Operating Rooms, and other similar rooms shall report pressure alarm.
- f. Operating Rooms shall have temperature and humidity trending capability at front end.
- g. Steam-to-water converters shall have lead/lag automated.
- h. Pumping systems shall have lead/lag automated.
- i. Exhaust fans shall have enable/disable and status.
- j. Pressure relief doors shall have end switches reporting individually to BMS. BMS shall report open, closed, or neither.
- k. Isolation dampers shall be equipped with position switch indicators. Dampers at AHU's and main branches shall communicate individually with BMS and indicate location and position open, closed, and neither. Design team shall discuss with Owner's engineering team the viability of providing position monitoring via the BMS on fire and smoke dampers in the system.
- l. Fire Smoke Dampers shall not be combined into an Isolation damper used for control. Isolation dampers will be used for BMS control and connected to the BMS system. Fire Smoke Dampers are monitored and controlled by the fire alarm system.
- m. Glycol or chemical feed tanks shall report low limit.
- n. Water source heat pumps shall be controlled through BMS. An alarm relay contact shall be provided on each heat pump to communicate the alarm directly to the BMS from the heat pump.
- o. DI water or RO water systems shall be connected to the BMS system for monitoring and notification of alarm of the system. Connection will be made to the alarming point on the system, and the pump will be monitored for on/off status via current sensor.
- p. Domestic Water system will be monitored by the BMS. Monitor circulation pumps and any control valves associated with the system.

### **General – Not Used**

### **Products**

1. Manufacturer: To be decided on a case by case basis by the owner.

### **Execution**

<b>UNMC-NM Controls Design Responsibility Matrix</b>				
	<b>MEP Design Engineer</b>	<b>BAS Consultant *</b>	<b>UNMC Energy Group</b>	<b>Notes</b>
<b>Design Phase:</b>				
MEP Construction Drawings and Specifications	C	R	r	
Temperature Controls Construction Drawings and Specifications	R	C	r	Design will include sensor layouts, safety devices, parts lists, wiring diagrams, Sequence of Operation, and Points list and will be incorporated as "TC" designated sheets in the construction documents. Specifications will be written following the 25 35 00 UNMC Guide specifications and issued as part of the construction documents.
<b>Construction Phase:</b>				
MEP Shop Drawings	R	r	r	These will be created by the awarded MEP Sub contractors. BAS Consultant will only secondary review shop drawings of MEP equipment which connects to the BAS.
Controls Shop Drawings	r	R	r	These will be created by the Low Voltage sub-contractor and consist of cut sheets of all purchased parts (no layout drawings necessary due to TC sheets provided in CD's)
C = Create				
R = Primary Reviewer				
r = Secondary reviewer				
* Owner will choose the BAS consultant and the design consultant will hold their contract for the design				

**See next page for Install responsibility matrix**

### UNMC-NM Building Automation System (BAS) Installation Responsibility Matrix

	BAS Consultant *	Contractor **	Owner	Notes
<b>Construction Phase:</b>				
All BAS control devices (panels, controllers, sensors, valves, actuators, etc.) indicated on TC design drawings and specifications	R	F & I	r	Parts will be procured by the successful Low Voltage contractor as listed on the TC Sheets. Parts to include CRC Control packaged air valve and all controls components and peripherals. Owner's pricing will be utilized for the purchase of all parts and a transparent billing including all parts and associated mark up by the contractor for handling will be provided to the Owner for review and approval. Any and all parts ordered by the Low Voltage contractor but being installed by the mechanical contractor will be delivered to the mechanical contractor.
Low voltage and network wiring/conduit for all devices as indicated on TC design drawings and per specifications	R	F & I	r	
BAS System Network Router		F & I		Router will be purchased by the Low Voltage Contractor, specific model required will be provided by Owner at time of parts purchasing
Network Wiring from Router to UNMC Network			F & I	This wiring and connection is provided by UNMC IT
BAS System Network Switches			F & I	By UNMC IT
Network wiring from all BAS panels to Patch Panel in IT closet	R	F & I	r	Contractor is responsible for running all networking homeruns from BAS Panels back to UNMC IT closets and connecting to patch Panel.
Creation of all Points, ABT File, point to point check out, load to front end software, and Programming	C		R	Programming to include programming of all critical room controls. Owner to contract directly with the BAS Consultant for all Installation work.
BAS System Graphics Creation, Trending, Alarms, and reports			C	
BAS Start up and Troubleshooting	C		R	BAS consultant will work directly with contractor to ensure equipment is working properly.
Testing & Balancing Support to operate control system			C	The owner and BAS consultant will provide all necessary support needed by the Testing and Balancing contractor to gain access to and operate the BAS system as needed for balancing activities
Fire Systems Integration Coordination	C	C		Contractor and BAS Consultant will work directly with the Fire Systems Installer to ensure proper interlock operations to the HVAC/BAS systems
Commissioning	See note		C	The owner will self perform commissioning of the Building Automation system or independently hire a third party consultant. Commissioning scope of work to be defined in the specifications. If third party consultant is engaged for commissioning, BAS consultant will be required to provide "Cx Testing" services for the project. If Owner self performs commissioning the owner will self perform all "Cx Testing".
<b>Close out:</b>				
As- Builds - BAS hardware/wiring/sensors	R	F	r	Contractor will provide the BAS Consultant with marked up as-builts to be used to update the design to final as-built documentation
As-Builts - BAS software files/programming	F		R	As-built final sequences of operations will be incorporated into the final BAS as-builts. Back up files of final programming will be provided
Final quality review of CRC set up and installation		F		Critical room controls will be purchased with a "final quality review" by the vendor. The BAS consultant will do initial full set up and review and notify vendor when ready for final quality review.
Training - Building Automation System	C		R	
<b>Warranty:</b>				
Building Automation Systems trouble calls			C	Trouble calls will be routed to UNMC Controls group. UNMC Controls will determine if warranty call needed for Programming (BAS Consultant) OR hardware/wiring/sensor (LV Subcontractor) or Both if needed.
BAS Programming Warranty Service response	C			
BAS hardware/wiring/sensor warranty service		C		
C = Create (a skilled service is performed)				
F = Furnish (a product is provided)				
I = Install (physically install the product)				
R = Reviewer r = secondary review				
* Owner will hire the Programming Consultant direct				
** The contract for the BAS Installer will be held directly by the General Contractor, it <b>will not</b> be subbed through the Mechanical Contractor.				

**Templates/Details and Specific Installations – Not Used****Commissioning****25 37 00****Performance Requirements**

1. Commissioning shall generally be performed on all projects which implement changes to the building automation system or any other major changes to the infrastructure or building envelope.
  - a. Commissioning may be self performed by Owners Engineering Group or:
  - b. The owner will at its discretion hire a third party commissioning agent based on workload and size of project to be commissioned. Design engineer shall coordinate with Owners Project team and Engineering Team to determine if third party commissioning will be provided and what the scope will be. Owners engineering team will provide oversight on all commissioning provided by others.

Note: Refer to Division 01 for general requirements also applicable to this section.

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**Common Results for Electrical****26 05 00**

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1. Application
  - a. Each division of this Standard is intended to assist the electrical engineer with design information which is considered unique to the campus electrical systems. The campus prepared this document to serve as a vehicle to insure consistency, quality, and maintainability in electrical system design on Campus.
  - b. Every effort shall be made during design to insure that the systems meet the following criteria :
    - i. The systems shall be safe;
    - ii. The systems shall be affordable;
    - iii. The systems shall be energy efficient;
    - iv. The systems shall be maintainable;
    - v. The systems shall be flexible;
    - vi. The systems shall be reliable;
    - vii. The systems shall be durable.
2. Details – Request applicable campus standard installation and construction details from the project manager.
  - a. Available details include:
    - i. Card Access Rough-ins and Cabling
    - ii. Temperature Controls Rough-ins and Cabling
    - iii. Automatic Transfer Switch Monitoring
    - iv. Building Electrical Metering (Shark Meter)
3. Fire Penetration – Reference other sections for fire barrier penetration requirements.
4. Demolition – Remove existing cables, conduits, cable trays which will be abandoned as part of project. Removal shall be included back to their source. Where existing previously abandoned raceways or cables are encountered indicate them to be removed. Do not abandon equipment in-place unless coordinated with facilities representative. Verify with Owner if any existing items should remain for future use. Direct contractor to field label with future intended purpose. Re-support existing cables and conduits that must remain.

5. Owner may at its discretion hire a third party commissioning agent to commission electrical systems.
6. Warranty - All electrical systems components and controls shall be provided with a minimum 1-year warranty from date of substantial completion. Specific electrical components may have longer warranty periods. Warranty shall be unconditional and include material, labor and response within 24 hours of notification. Refer to other sections for additional warranty requirements.
7. Equipment Serviceability and Access - Design shall provide for service and maintenance access to all equipment. Service area shall comply with codes and shall be planned for reasonable human access. Provide access doors of good quality (min size = 24"x24") for all equipment that needs maintenance or access. Coordinate the electrical systems design with all disciplines to allow access to equipment for maintenance. Consider access panels in the project design to minimize quantity required. Provide corridor and congested space cross sections for coordination.
8. Removal - Design shall include plan for installation and eventual future removal of equipment from new and existing space. Plan shall indicate sizes of major pieces of equipment and clearly marked paths of removal and egress for this equipment from point of installed equipment-to-equipment loading area exterior to building. Entire egress path shall be coordinated for removal of equipment. Preference is to remove all equipment through elevators to ground level. An egress path of equipment through removable louvers is acceptable provided louver locations are crane accessible.
9. Coordination - Provide sections and detailed drawings to indicate installation of utilities through tight spaces, i.e. mechanical spaces, corridors, under deep beams, etc.
10. Application of Essential Systems
  - a. Application of Alternate Power – Refer to Supplemental Documents for guidance.
  - b. Application of Uninterruptible Power Supplies (UPS) – Refer to Supplemental Documents for guidance.
  - c. Application of Alternate Power System Branch Separation – Refer to Supplemental Documents for guidance.
    - i. [OWNER to supplement]
    - ii. Guidance is provided here for general compliance. This listing is more detailed than the code defines and includes some recommendations that do not have specific supporting code language. It is advised to consult the authority having jurisdiction for verification in those cases. Indication of code-required emergency source is included, however emergency source should still be considered for other items not specifically required by code as indicated in the Supplemental Document "Application of Emergency Power".
11. Dual Primary Sources – Dual primary sources shall be considered for inpatient buildings and outpatient critical care buildings. In settings where dual sources are unavailable, generator configurations that provide additional capacity for full back-up of maximum utility demand shall be considered as an alternative. In addition to dual sources, dual primary transformers with service equipment configured as main-tie-main should be considered.

12. Flood Protection – Locate utility service equipment, main distribution equipment/routing and generator source equipment/routing above 100 year flood plain and above anticipated maximum flood elevation for other sources of major flooding (interior piping mains, interior storm water mains, exterior site drainage, etc.).
13. Run Time - Generator fuel run time shall be minimum 24 hours, plus minimum additional 24 hours when full to accommodate refueling between monthly tests (Total runtime of 48 hours). Identify projects of Seismic Category “C” with Owner for potential need of minimum 96 hour runtime.
14. Wet Procedure Locations - NEBRASKA MEDICINE has performed a risk assessment identifying that no areas within their clinical services (patient care or procedural/surgical care areas) are wet procedure locations as defined by NFPA-99. Subsequently, NEBRASKA MEDICINE does not require the use of isolated power systems.
15. Behavioral Health – To maintain safety of patient care in this environment certain construction requirements are unique to this area. Provide the following safety enhancements in all areas occupied by patients: Limited fire alarm pull stations. Tamper resistant screws. Tamper resistant hospital grade receptacles. GFCI circuit breakers for room circuits. Dedicated room receptacle circuits to allow shut-off of receptacle circuit – without interruption of lighting or interruption of other rooms. Include staff emergency call buttons throughout.
16. Acceptable Manufacturers – Although U.L.-listed and approved as an acceptable electrical manufacturer, any electrical equipment manufactured by G.E. should be closely scrutinized for proper application on campus. Any facilities considered “mission critical” and requiring business continuity need to be evaluated on a case by case basis.

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## **26 05 13 Medium Voltage Cables**

**26 05 13**

### **Design requirements**

1. Underground splices of medium voltage cables generally not allowed:
  - a. Utilize load-break or dead-break elbow junctions for continuation of medium voltage cable sections.

### **General – Not Used**

### **Products**

1. Medium voltage cables shall be single conductor, 5kV or 15KV as required, 220 Mills, 133% insulation with ethylene propylene rubber (EPR) insulation, type MV-105, 100% copper tape shield and PVC jacket.
2. Medium voltage cables shall be factory tested.
3. Medium voltage cable terminations shall be 5kV or 15KV class as required, single conductor, heat or cold-shrinkable stress control.
4. All terminations on systems above 1000V shall be made with stress relief type insulating



terminations.

5. Conductors: Copper
6. All medium voltage cables exposed in manholes, pullboxes, and vaults shall be arc-proofed and fire taped. Nominal 15kV feeder circuits must be physically separated with a steel or concrete barrier from emergency 5kV feeder circuits. For new construction, 5kV and 15kV circuit conductors shall not be contained within common manholes or pullboxes.

### **Execution**

1. Perform megohmmeter (or VLF – very low frequency) testing and high-pot insulation testing for installations of new medium voltage cables, splices, and terminations upon completion of installation prior to putting into service. Megohmmeter and high-pot testing shall not be conducted on existing medium voltage cables, splices, or terminations without consideration for potential accelerated insulation damage that could potentially result from the testing of aged cables. Tests performed shall be in compliance with NETA Acceptance Testing Specifications. When testing existing cables, testing voltage shall not exceed operating voltage.

### **Templates/Details and Specific Installations – Not Used**

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## **Low-Voltage Electrical Power Conductors and Cables**

**26 05 19**

### **Design Requirements**

1. Wiring shall be installed in raceways.
2. No wiring splices below grade.
3. Dedicated neutral conductors shall be utilized for all branch circuits (provide with color coded tracer stripe on conductor insulation). Circuit breaker handle ties with shared neutral conductors are not acceptable.
4. Refer to “Raceways and Boxes” section for conduit application.

### **General – Not Used**

### **Products**

1. Conductors shall be copper. Aluminum conductors shall not be used except by written approval by the Project Manager.
2. Conductors below 4/0 shall have type THHN-THWN insulation.
3. Minimum power conductor size shall be 12 AWG.
4. All conductors shall be stranded.

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

## **Low-Voltage Transformers**

**26 05 20**

### **Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Coil Material: Copper or Aluminum.
3. Vibration Isolation: Isolate core and coil from enclosure using vibration-absorbing mounts.
4. Insulation Class (15 kVA and larger) with the exception of substation transformers: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above a 40 deg C ambient temperature.
5. Insulation Class (less than 15 kVA): 185 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above a 40 deg C ambient temperature.
6. Energy efficient transformers shall be specified.
7. Standard DOE energy efficient (NEMA TP-1) minimum. CSL3 compliant transformers shall be considered by reviewing comparative life cycle cost. Coordinate project selection with the Project Manager.
8. Transformer sound ratings shall be 5dB below NEMA ST-20 standard levels.

### **General – Not Used**

### **Products – Not Used**

### **Execution**

1. Dry-type transformers rated 75kVA or less shall be wall-mounted or suspended from structure above to conserve wall/floor space for other equipment.
2. Where transformers are suspended from structure above, extend steel strut supports to the adjacent wall for lateral sway bracing.

### **Templates/Details and Specific Installations – Not Used**

## **Grounding and Bonding for Electrical Systems**

**26 05 26**

### **Design Requirements**

1. In addition to the following, the grounding system must meet the requirements of the National Electrical Code.
2. Grounding conductors shall be copper. Insulated copper equipment grounding conductors will

be provided within each feeder and branch circuit.

3. The complete grounding electrode system shall be designed and detailed on the drawings. Design notes such as “Ground per NEC” with a generic grounding symbol are not acceptable. Coordinate with structural engineer to show where grounding connections to concrete foundation rebar, light pole bases, structure steel, etc. are to be made. Resistance to earth of the grounding electrode system shall be less than five (5) ohms.
4. Grounding electrode conductors, transformer grounding backbones, and telecommunications grounding backbones routed within the building interior shall be installed in metallic conduit (bonded with ground bushings at each conduit termination), or exposed if secured and remote from potential damage.
5. New buildings, additions and major electrical renovations shall provide a grounding system riser separate from the telecommunications system grounding riser.
6. The grounding system must be clearly detailed on the drawings and be splice free. Use irreversible compression connectors for interior applications and exothermic connections for exterior applications.
7. Telecommunications main grounding bus bar (TMGB) to be provided in the telecommunications room. Connect TMGB to building electrical system grounding. Provide a telecommunications grounding system throughout the building per TIA/EIA Standards.
8. Provide grounding at building transformer to include bare ground loop with four (4) ground rods connected to transformer with two (2) down leads at opposite corners.
9. For UNMC projects, the State Electrical Division has confirmed that all 480V feeder circuit conductors from 13.8kV and 4160V transformers serving new buildings will be considered as service entrance conductors. Overcurrent protection, bonding, and grounding will be installed in accordance with NEC Article 230.

### **General – Not Used**

### **Products**

1. Grounding conductors to be copper.

### **Execution**

1. All feeders and branch circuits shall utilize a metallic conduit system suitable as an equipment ground and shall also contain an insulated equipment grounding conductor (Exception: exterior underground feeders and branch circuits)
2. Rigid metal conduit shall be utilized under floor for branch circuits to slab-on-grade floor boxes in patient care areas and research areas to maintain required grounding. Floor boxes in this application shall be metallic.
3. Grounding backbones shall be continuous. Any taps shall be made with compression tees attached to a continuous backbone conductor.
4. Grounding tests consistent with NFPA-99 requirements shall be performed upon initial installation. Documentation of grounding tests shall be submitted for facility testing records.

**Templates/details and specific installations – Not Used****Hangers and Supports for Electrical Systems****26 05 29****Design Requirements**

1. Conduit shall be independently supported from building structure by using steel or malleable iron straps. Do not share supports with duct or piping systems.

**General – Not Used****Products – Not Used****Execution**

1. Supporting conduits and equipment from the following shall be prohibited unless otherwise approved in writing by UNMC.:
  - a. Mechanical ductwork or piping.
  - b. Ceiling or lay in T-Grid.
  - c. Roof or roof deck.
  - d. Structural bridging between bar joists

**Templates/Details and Specific Installations – Not Used****Raceways and boxes for Electrical Systems****26 05 33****Design Requirements**

1. All power wiring shall be run in approved raceways.
2. Conduit shall be utilized for conductors and cables routed underground. Direct burial cable is not acceptable.
3. Utilize direct burial PVC to protect site lighting circuits and low voltage branch circuits.
4. EMT conduit shall be utilized for all interior (above ground) feeders and branch circuits and shall be concealed when installed for finished spaces.
5. Flexible metal conduit limited to 6' lengths.
6. Liquid-tight flexible metal conduit shall be utilized for connection of vibrating equipment and transformers (when not located within an above-ceiling plenum space).
7. Manufactured flexible metal cable assemblies (MC/AC/HCF) shall not be utilized, except in lengths not to exceed 6' where specifically allowed by the AHJ.

- a. Under written special exception from the PM, manufactured flexible metal cable assemblies may be utilized for normal branch circuit wiring methods within a room where project cost savings are considerable. In this application, branch circuit connections between rooms and homerun portions of the circuit shall still be installed in EMT conduit.
8. Threaded rigid conduit shall be utilized for exposed exterior applications and areas subject to physical damage (including loading docks, and stub-ups from below ground and through floor slabs. IMC conduit is a suitable substitute for threaded rigid metal conduit in sizes 4" and larger.
9. Surface metal raceways in finished spaces shall only be utilized where specifically coordinated with Project Manager.

### **General – Not Used**

#### **Products**

1. Minimum conduit size shall be 3/4". Flexible conduit to be allowed in concealed spaces as follows:
  - a. Vertical drops (not horizontal) in steel stud walls to receptacles and switches
  - b. In ceiling spaces with lengths not exceeding six (6) feet.
  - c. Light fixtures.
2. Underground conduit shall be PVC schedule 40. Do not direct bury cables.
3. Conduits routed underground for medium voltage power feeders, low voltage transformer secondary feeders, and telecommunications backbone cables shall be concrete encased. Concrete mixture shall include bright red color dye throughout.
4. In ground boxes shall be polymer reinforced concrete.
5. Fittings shall be set-screw type. Steel or cast construction (contractor's option).

#### **Execution**

1. Provide manholes in duct runs at 500' intervals. Provide manholes of sufficient size for optimal safety when accessing and additional space for future conduits.
2. Boxes shall not be installed back-to-back.
3. Device locations in back to back headwalls and patient room partitions shall be installed with sound putty pads to prevent noise transmission.
4. Branch circuits shall not be routed within slabs or below slabs on grade, except where routing below grade is the only concealable method (Example: island counters).
5. All low voltage cable routed within walls shall be installed within a conduit system for physical protection.
6. Feeders and branch circuits from separate Essential Electrical System branches or Optional Standby branches shall not route through shared enclosures fabricated with internal

separation barriers. Each branch shall utilize separate enclosures.

## **Templates/Details and Specific Installations – Not Used**

### **Cable Trays for Electrical Systems**

**26 05 36**

#### **Design Requirements**

1. Where allowed by system voltage classification, cabling for all low voltage systems shall utilize cable tray for cable management. Tray shall be provided for routing of cables through accessible ceilings in aisles of large rooms and all corridors. Include cable tray on all projects, new and renovation.
2. Coordinate cable tray design with all other disciplines.
3. Conduits from each low voltage device shall run continuous from the device box location to the nearest cable tray, and shall be rigidly attached to the tray with cable tray manufacturer's conduit fitting. Cable must transition from conduit to cable tray directly without routing in free air.

#### **General – Not Used**

#### **Products**

1. Wire basket style with minimum 8" clearance above for cable installation. Obstructions within that clearance shall not exceed 3' along the length of the cable tray between access points.
2. Support cable tray metal strut trapeze suspended from two (2) threaded rods at sides. No center support or single wall support. Grippler aircraft cable supports connected only to the wire basket tray are not acceptable.
3. Coordinate cable tray design with all other disciplines so that cable tray is mounted at a constant elevation above finished floor. A "roller coaster" cable tray layout interwoven between utilities piping and ductwork is not acceptable.
4. Provide shop drawing submittal of cable tray installation details illustrating how tray will be mounted (attachment points, transitions, supports, etc.).

#### **Execution**

1. Cable tray bending radius shall be minimum of 24".
2. Intentionally bond cable tray to building steel a minimum of every 100' with bonding jumper grounding conductor.
3. Bundle cables of common systems within the tray. Include a single tray divider to further separate voice/data cabling from all other systems.
4. Provide manufactured fire rated cable pass-thrus at locations where cable tray is interrupted by full-height wall partitions and through floors. Provide conduit sleeves in continuous lengths where cable tray routing is interrupted by inaccessible ceilings.

**Identification for Electrical Systems****26 05 53****Design Requirements**

1. All major electrical equipment (i.e. disconnect switches, starters, panelboards, switchboards, transformers, etc.) to be identified with adhesive secured plastic lamicoïd labels. Labels to include unique name, source and system (Normal, Life Safety, Standby Source, etc.). Coordinate names with campus electricians.
2. System color code:
  - a. Critical Branch: Orange
  - b. Life Safety Branch: Yellow
  - c. Equipment Branch: Violet
  - d. UPS Branch: Green
  - e. Normal Branch: Gray (Natural Galvanized Finish)
  - f. Optional Standby: Black
  - g. Fire Alarm: Red
  - h. Nurse Call: Blue
  - i. Low Voltage Systems: White
3. Electrical Equipment Labels
  - a. Include: Name, Branch Source, Source Fed From, Voltage
  - b. Engraved Nameplate – White lettering with background color to match associated system color code.
4. Mechanical Equipment Labels (Engraved)
  - a. Include: Name, Branch Source, Source Fed From, Voltage
  - b. Engraved Nameplate – White lettering with background color to match associated system color code.
5. Conduit System Color Identification:
  - a. EMT conduit shall be pre-manufactured and pre-colored to match associated system color code. Boxes and covers painted to match.
6. Where more than one source of power enters a piece of equipment, provide a warning label identifying the sources and the disconnect locations.

7. Require updated “as built” electrical circuit schedules/directories in each panelboard.
8. Identify receptacles with clear adhesive film label on device faceplate indicating branch panel and circuit number. Also label wall surface behind faceplate.
9. Label the outside of all junction and pull boxes with permanent marker indicating the circuit number/name and source panel so that all conductors within the box are identified. Identify system contents if not used for low voltage cabling.
10. Provide markers for medium voltage power circuits and feeder conduits and conductors, to include nominal voltage and circuit designation. Provide plastic name tags on each medium voltage conductor to include circuit designation and phase.
11. Color coding for power conductors:
  - a. 208V Phase A: Black
  - b. Phase B: Red
  - c. Phase C: Blue
  - d. Neutral: White
  - e. 480V Phase A: Brown
  - f. Phase B: Orange
  - g. Phase C: Yellow
  - h. Neutral: Gray
12. Control system conductors shall be labeled indicating system type, source panel and wire number/identified.
13. Cable insulation or jacket color to be as follows:
  - a. Fire Alarm - Red
  - b. Data – Yellow
  - c. Voice – (Verify application of VOIP per project)
  - d. Access Control – Yellow
  - e. Television - White
  - f. Patient Monitoring (GE) – Orange / Purple as designated
14. Device Color
  - a. Essential Electrical System or Optional Standby – Red
  - b. UPS Branch – Blue
  - c. Normal Branch – Architectural selection or building standard



## 15. Wiring Device Plate Labels

- a. Include: Branch panel source name and circuit number. Add clarification of item served by each wall switch when applied to ganged wall switches.
- b. Adhesive Film Label in general applications.
- c. Engraved Device Plate in heavily cleaned areas
  - i. Healthcare: Inpatient Sleeping Rooms, Critical Care Locations, Outpatient Exam and Procedure Rooms, Toilet Rooms, Lab, Sterile Supply, Soiled, Clean, etc.
  - ii. Research: Animal Holding Rooms

### **General – Not Used**

### **Products – Not Used**

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

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## **Overcurrent Protection for Electrical Systems**

**26 05 73**

### **Design Requirements**

1. Fault Study - Provide a short circuit study of the new or renovated electrical distribution system. The study must include normal, and alternate power sources. The short circuit study shall provide the three-phase bolted short circuit current values and the worst case short circuit values (if other than three phase bolted).
2. Coordination Study - Provide a coordination study of the protective devices of the new or renovated electrical distribution system. Study shall include time-current curves of the actual devices which exist and which will be installed. Verify with the Owner's representative that devices upstream of the renovated system have been coordinated appropriately.
3. Arc Flash Study and Labeling - Indicate in the contract documents for the installing contractor to provide an arc flash study of the new or renovated electrical distribution system and the arc flash signage to be provided on electrical equipment per NFPA 70E. Labeling shall meet requirements of the most current edition.
4. Provide an "as-built" copy of the short circuit calculation, the protective device coordination study, and the arc flash calculation/results as a separate shop drawing submittal with the Operating and Maintenance Manuals.

### **General - Not Used**

### **Products – Not Used**

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

**Design Requirements**

1. Power monitoring meters shall be installed at each service entrance to individual buildings. Provide meter, current transformers, potential transformers, over current protection local conductors and connections, and remote monitoring cabling and connections.
  - a. Provide Shark 200 or equal approved by UNMC Director of Utilities.
  - b. This utility building meter is in addition to the maintenance building meter required by the switchboard section. Contractor shall provide both meters.
  - c. Submit detailed shop drawing illustrating elevation detail of meter mounting configuration and coordination with other equipment components. Include point-to-point detail of meter connections.
2. Communication
  - a. All metering must connect to and communicate with the central campus utility monitoring system. The utility monitoring system consist of an existing network with one or more control panels in each existing building and a graphical web server. New construction projects must provide integration with the Owner's chosen building automation systems.
  - b. Coordinate with Integration and Controls section of this standard. Instrument grade CT (no less than 2% accuracy). No split CT's. Include shorting blocks.
  - c. Drawings shall include campus standard detail for meter integration. Request detail from Owners Engineering department.

**General – Not Used****Products – Not Used****Execution**

1. Contractor to verify phasing, voltage and current for any power monitoring.
2. Before space is occupied, meters should be tested and verified by UNMC Utilities.

**Templates/Details and Specific Installations – Not Used****Network Lighting Controls****26 09 43**

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**Design Requirements**

1. UNMC/Nebraska Medicine is sole sourced on Legrand Encelium X GB II Wired Lighting Management System. Use only Encelium system and components when designing for Main (Midtown) Campus, Saddle Creek Campus, Scott Campus, Bellevue Medical Center or, Village Pointe new construction or renovations.
2. All control devices, including switches, occupancy sensors, daylight harvesting sensors,

relays, dimmers, graphical touch screens, energy control units, etc. shall be shown in their intended install locations on the lighting sheets or dedicated lighting control sheets.

3. Include sheet details specifying lighting control channel zoning (with up to 8 channels per energy control unit) with device counts per channel not to exceed 90 devices.
4. UNMC/Nebraska Medicine has standardized on the “2 Button” switch as our preferred basis of design for hallways, offices, study rooms, restrooms, exam rooms, open offices, and any other spaces not specifically called out for a higher tier of switch controls. “3 Scene” switches are typically used in conference rooms, large meeting spaces, spaces with integrated AV controls, or spaces with multiple lighting control zones/relays where predefined, recallable scenes are necessary. UNMC/Nebraska Medicine does not allow “4 Button” switches to be used for lighting controls. “5 scenes” switches are only to be used as needed due to the complexity of the lighting controls within a space/room under the same rules as “3 scene” switches. Industrial push buttons (IPB) are to be used in utility, mechanical, electrical spaces. For damp areas, damp rated IPBs are to be used.
5. UNMC/Nebraska Medicine has standardized on Encelium LVS sensors for use in all spaces with Encelium LMS controls. Substitutions are to be approved by UNMC/Nebraska Medicine Energy Group on a per project basis.
6. Where tunable white fixtures are specified, DALI type 8 drivers must be used. Interface to Encelium system is provided by a Encelium DALI bridge device. See manufactures documentation for installation instructions and limitations of DALI bridge.
7. Exterior lighting shall be controlled by Encelium LMS relays. Additionally, all exterior lighting shall be dimmable to conform with night lighting setbacks and campus energy saving goals.
8. Wherever possible, control exterior lighting with Encelium wired relays/controls located within the building envelope. No control devices shall be located outdoors with the exception of devices specifically rated for outdoor use and where locating controls indoors is not possible. In spaces where recommended distances for dimming wire are exceeded, as in the case of parking lot poles, use Encelium X WSLCs paired with an Encelium X Wireless Manager and repeater WCMs as needed to control fixtures. Wireless manager and repeaters shall also be located indoors.
9. Lighting controls in individual building/floors shall be capable of independent control from the central server in the event of a network outage for up to 30 hours.
10. Lighting control cabling within walls and where routed exposed shall utilize conduit and boxes. Cable may be routed without conduit when concealed above accessible ceilings if provided with cable support at regular intervals or in existing cable tray.
11. Design Professional to consult with Owner for Supplemental Documents – LED Lighting Installation and Programming.
12. UNMC/Nebraska Medicine prefers Pharos Controls LPC for all exterior, complex interior, or “building level” DMX control installations. For individual room color control in non-public spaces, use a lumentouch 2.0 with ethernet data connection for management/integration.
13. In applications where RGBW color changing lighting is desired, all control devices and their associated components, such as splitters or DMX distribution boxes, shall be located indoors and accessible for maintenance personal.

## **General – Not Used**

### **Products**

1. System shall use Comtran 34842-1000-BX 18/2 Plenum Rated (Red/Black) cable. Cable lengths are custom, installed by the electrical contractor and terminated with Encelium cable terminations where required.

## **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

## **Secondary Unit Substations**

**26 11 16**

### **Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Unit substations shall utilize primary disconnecting and protection as indicated above in Medium Voltage Switchgear. Transformers shall be epoxy-cast dry-type, but VPI dry-type may be considered for value engineering purposes. Liquid-filled transformers may be used indoors when applied with all associated construction and protection requirements.
3. Dimensions of the complete unit substation including primary switch, transformer and secondary switchboard must be drawn to scale and verified with equipment manufacturers. Room layout shall provide for a minimum of two exits at opposite ends of the substation line up. Doors exiting the room shall swing out.
4. Primary conductors, entering the substation from below, are preferred. Length of medium voltage feeder circuit inside facility must be minimized and concrete-encased to be considered outside the building.
5. Transformers shall be sized appropriately for the load to be fed with consideration for future building expansion. Spare capacity (25% min.) shall be included in the sizing of the transformer. Spare capacity shall be coordinated during design with cost premiums and presented to the owner.
6. Secondary main disconnect and protection shall be provided for transformer and switchgear protection. Ground fault protection shall be provided for ratings 1000A and above, and shall alarm to Central Utilities Plant. Where draw out circuit breaker is provided as a main disconnect, instantaneous tripping shall not be provided. Provide instantaneous tripping on the feeder circuit breakers only.
7. Provide prepared spaces or spare breakers. Each project shall be considered for spare device space and Ampere capacity; however 20% should be standard.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

## **Medium-Voltage Transformers**

**26 12 00**

### **Design Requirements**

1. Exterior medium voltage transformers shall be liquid-filled, with a temperature rise of 65 deg-C. Insulation liquid shall be less flammable, environmentally friendly, edible seed oil.
2. Dead front terminations to be provided. Include dual primary switches (300A). No “V” or “T” blade switching allowed without prior written approval from Owner’s Electrical Engineer or UNMC Director of Utilities.
3. Current limiting fuses in series with bayonet fuses.
4. Medium voltage transformers to have a nominal impedance of 5.75%. ANSI standards shall be met for maximum and minimum values.
5. Transformer shall be four nominal 2.5 percent taps 2 above and 2 below rated primary voltage.
6. Transformers applied for normal power source applications shall utilize aluminum windings. Alternate power applications shall utilize copper windings.
7. Provide elbow MOV-type surge arrestors with feed-through inserts on the primary electrical bushings of transformer.
8. Transformer shall be mounted on a 6” high concrete pad above grade.
9. Exterior areaway vault mounting of transformers should be avoided. Exterior transformers should be mounted on-grade.
10. Transformer secondary raceways shall be sealed with “Rayflate” sealing system or U.L.-listed expanding foam sealant as appropriate. Raceway stub-ups shall extend at least 3 inches above surface of housekeeping pad to prevent water infiltration into the building.

**General – Not Used**

**Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used****Medium-Voltage Switchgear****26 13 00**

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**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by S&C.
2. Switchgear shall be rated 15kV, minimum 600A, metal clad. Duty-Cycle, Fault Closing 40,000 symmetrical Amperes.
3. Standard -- Indoor gear shall be installed on a concrete housekeeping pad, minimum height 4". Outdoor switchgear use (only by special approval) shall be installed on a concrete pad with conduit openings coordinated with supplied manufacture.
4. Mechanical Interlock: Prevent opening switch and/or fuse compartment door unless switchblades are open, and prevent closing switch if door is open.
5. Key interlock (Kirk) provides to maintain safety.
6. Provide surge arresters, distribution class, metal-oxide-varistor type, in cable termination compartments in each phase of circuit. Coordinate rating with circuit voltage to ground.
7. Determine that indoor switchgear can be brought into the building. Identify any building systems which require removal to create a pathway.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used****Switchboards****26 24 13**

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**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Provide prepared spaces with hardware for future circuit breakers.
3. Utilize circuit breakers for distribution feeder and branch circuit overcurrent protection. The use of fused switches and bolted pressure switches should be avoided within the distribution system.

4. Bus Material: Tin-Plated Copper
5. Reserve space for future switchboard sections where achievable.
6. Provide with full-feature building meter for maintenance use. Meter to include: Currents, Voltages, kW, kVAR, PF, Freq, Accumulated kWh, and Max kW Demand. This is in addition to the utility building meter specified under the utilities section of these guidelines.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Panelboards**

**26 24 16**

**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Hinged door in a door covers shall be provided for each panelboard. Trim of shall be surface or flush to suit conditions of installation.
3. Where flush mounted boards are installed provide an additional number (25%) of spare empty conduits, with pull strings extended from board to an accessible location.
4. Bolt on breakers to be used.
5. Provide a minimum of 15% space for spare breakers.
6. Bus Material: Tin-plated copper bus.
7. Single-section 84 circuit panel tubs are acceptable.
8. Breaker Tab Locks – Provide on all unused spare breakers

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Motor Control Centers**

**26 24 19**

**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. The use of VFD's should limit the need for Motor Control Centers. Identify any application of motor control centers with the Project Manager.
3. VFD's mounted within a Motor Control Center will not be acceptable.
4. Coordinate device requirements with Enclosed Controllers, above.
5. Maximum number of motor controllers per vertical section shall be six.
6. NEMA Class I-B wired sections are desired.
7. Sub-meter at the MCC level as appropriate for energy metering.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Enclosed Busway Assemblies**

**26 25 00**

**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Enclosed busways shall be aluminum or copper and include a copper ground conductor.
3. Enclosed busways shall be evaluated on a project by project basis. Examples of used laboratories, auto mechanics, shops.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Design Requirements**

1. Light switches shall be specification grade 120/277V, 20A.
2. Cover plates shall be satin finish stainless steel. Device and plate material and colors shall be coordinated with the architect and shall consider the building standard.
3. Wiring device grounding terminal to be connected to outlet box with bonding jumper.
4. Wiring devices shall not be mounted back to back. Offset wiring device to avoid sound travel. Acoustic putty pads or batt insulation is acceptable where back-to-back mounting is unavoidable.
5. Maintain code-required separation of device box penetrations through fire wall membranes, or provide fire rated putty pads as required.
6. Normal power receptacle color to be coordinated with architect. See identification section for color of Critical Branch and UPS branch receptacles.
7. Hospital grade 20A receptacles shall be utilized for all receptacle devices in Hospital and Clinic occupancies. All other areas shall utilize 20A commercial specification grade.
8. Tamper resistant receptacles for Pediatrics locations, Inpatient Rooms, and Public Waiting areas.
9. Wiring device and device plate colors shall match the individual building standard.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used****Fuses****Design Requirements**

1. Provided non-renewable cartridge fuses. Voltage rating shall be consistent with circuit voltage.
2. For Feeders provide Class L, RK1, J or RK5.
3. For Motor Branch Circuits provide Class RK1 or RK5.
4. For Other Branch Circuits provide Class RK1, RK5 or J.
5. Speed and curve characteristics shall meet the requirements of the distribution system. Coordinate with other devices in the distribution system so that the fuse:

- a. Carries the load current,
- b. Will be capable of interrupting the minimum fault current,
- c. Will protect downstream equipment, and
- d. Will coordinate to interrupt a minimum portion of the distribution system.

### **General – Not Used**

### **Products – Not Used**

### **Execution – Not Used**

### **Templates/Details and Specific Installations – Not Used**

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## **Enclosed Switches and Circuit Breakers**

**26 28 16**

### **Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Fusible and Non-Fusible Switches: Heavy Duty Type.
3. Provide disconnect switches at all motors so that the condition/status of the switch and motor are easily discernable from either location.
4. Provide early break auxiliary contacts in motor disconnect switches for motors that are fed from variable frequency controllers.
5. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
6. Place switches so that the operator may be able to stand to the side of the switch during operation.
7. Enclosures shall be as follows:
  - a. NEMA 250, Type 12, unless otherwise indicated to comply with environmental conditions at installed location.
  - b. Outdoor Locations: NEMA 250, Type 3R.
  - c. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - d. Animal Holding Areas: NEMA 250, Type 4X, stainless steel.
  - e. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
  - f. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C and as appropriate for the hazardous nature of the environment.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**26 29 13 Enclosed Controllers**

**26 29 13**

**Design Requirements**

1. Power Distribution Equipment shall be specified to be provided by Square D, Cutler Hammer, GE, or Siemens.
2. Manual Controllers: Quick-make, quick-break type toggle or pushbutton action, and marked to show whether unit is "OFF," "ON," or "TRIPPED." Provide overload relay which is ambient-compensated with inverse-time-current characteristics. NEMA ICS 2, Class type shall be coordinated with the distribution system. Relays shall have heaters and sensors in each phase, matched to nameplate, full-load current of specific motor to which they connect and shall have appropriate adjustment for duty cycle.
3. Magnetic Controller: Full voltage, non-reversing, across the line. Control Circuit shall be 120V, obtained from integral control power transformer with sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity. Overload relays shall be ambient-compensated type with inverse-time-current characteristic. NEMA ICS 2, Class tripping characteristic shall be coordinated with the power distribution system. Provide heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.
4. Provide pilot lights in the enclosure cover. Green shall indicate running, red shall indicate not operating.
5. Nameplates shall be provided to identify load name and location, switch operation and pilot light meaning.
6. Enclosures shall be as follows:
  - a. NEMA 250, Type 12, unless otherwise indicated to comply with environmental conditions at installed location.
  - b. Outdoor Locations: NEMA 250, Type 3R.
  - c. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - d. Animal Holding Areas: NEMA 250, Type 4X, stainless steel.
  - e. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
  - f. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C and as appropriate for the hazardous nature of the environment.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Variable Frequency Controllers**

**26 29 13**

**Design Requirements**

1. Systems shall incorporate energy conservation in their designs, such as variable air volume distribution and variable frequency drives for fans and pumps.

**General – Not Used**

**Products**

1. ABB 550 or ABB 580 are the campus standard VFDs.

**Execution**

1. All VFDs for the project shall be by the same manufacturer.

**Templates/Details and Specific Installations – Not Used**

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**Packaged Engine Generators**

**26 32 13**

**Design Requirements**

1. [OWNER to insert campus generator distribution narrative]
2. When off campus, engine generators are preferred to be located outdoors. Engine generator to be located outdoors adjacent to the main electrical distribution system. But sufficiently separated from normal power equipment to prevent simultaneous catastrophic failure. Engine location to be considered to be remote from building air intake.
3. Noise generated by the radiator and the engine silencer to be kept to acceptable levels considering the adjacent buildings and property lines.
4. Engine generators shall be diesel. Fuel tank shall be integral (belly mounted) to the engine generator skid. Diesel fuel tank will provide minimum run time (as defined by the use) before refueling, unless otherwise discussed with university personnel. Coordinate run time with Project Manager. Diesel engine generator shall meet the latest State of Nebraska DEQ Code requirements.
5. Engine generators shall be provided with control panel, block heaters and all related accessories.

6. Coordinate reporting of generator alarms with Project Manager.
7. All classifications of engine generator applications shall meet the NFPA 110, 10 second requirements. Testing of generator and associated systems to follow NFPA 110.
8. Provide emergency lighting, supplied from a self-contained battery source, to illuminate the space around the generator.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Central Battery Inverters**

**26 33 23**

**Design Requirements**

1. Central battery inverters to include solid state electronic control, charger, inverter and batteries.
2. Batteries shall be lead calcium, heavy duty type mounted in separate enclosure from central battery inverter unit compartment.
3. Evaluate individual batteries or generators vs. inverters to determine life cycle cost. Central battery inverters only allowable if reviewed and approved by the Project Manager.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Static Uninterruptible Power Supply**

**26 33 53**

**Design Requirements**

1. Uninterruptible power supplies to be provided to meet project requirements. Meet with the Owner's representative during the programming phase to determine standby power requirements.
2. Static uninterruptible power supply to be dual conversion type and include solid state electronic control, rectifier charger, inverter, static bypass transfer switch, maintenance bypass, system controls and batteries.
3. Alarm the server during times the UPS is connected to the battery.

4. Batteries shall be sealed, heavy duty type.
5. Static uninterruptible power supply to be located in clean and environmentally controlled room.
6. Illustrate rack UPS connection configuration on plans to communicate intended equipment plug connection strategy.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Power Factor Correction Capacitors**

**26 35 33**

**Design Requirements**

1. Avoid the need: Use high power factor ballasts and motors.
2. Power factor in the building must be kept at a minimum of 0.85. If correction capacitors are recommended coordinate the need with the Project Manager.
3. Where variable speed drives are used in the distribution system consideration should be given to possible resonant frequency interferences.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Transfer Switches**

**26 36 00**

**Design Requirements**

1. Circuit breaker type transfer switches shall not be specified.
2. Open delayed transition automatic transfer switches with adjustable center “off” position.
3. Bypass isolation transfer switches, for Life Safety, Critical, and Emergency branches. Also consider for other branches where building or clinical operations are reliant on a single branch.
4. Consider two critical branch ATS sources to critical care environments (in lieu of service from one critical branch source and one normal branch source).

5. Provide amperage metering within cover of the ATS: GE Zenith MX350 or prior approved equivalent
6. If on Campus, coordinate and include detail for HK Scholz PLC controls interface to East and Central Utilities Plant generator controls. Request detail from the Project Manager.
7. Limit transfer switches to 600A maximum capacity (prevents serving too many items from a single branch).
8. Design to accommodate interrupting ratings resultant from paralleled campus generator operation.
9. Provide transfer switch with load shed control features.
10. Provide transfer switches with NEMA 3R or NEMA 4 rated enclosures. Provide additional protection against accidental water infiltration by adding roofed drip pans above transfer switches, “drip legs” in feeder conduits, stand-off brackets on exterior walls, etc. for increased protection against accidental flood damage caused by weather or water line breaks.

#### **General – Not Used**

#### **Products – Not Used**

#### **Execution – Not Used**

#### **Templates/Details and Specific Installations – Not Used**

### **Lightning Protection**

**26 41 13**

#### **Design Requirements**

1. Evaluate each project to provide a lightning protection system installed according to the Contractors of the Underwriters' Laboratories Master Label Code No. U/L-96A. In general, U.L. “Master Label” is not a mandatory requirement and does nothing to verify that the installation is fully compliant since lightning protection contractors are self-regulating. To ensure quality, require U.L. field inspection services to be performed to inspect the as-built lightning protection system, document noted deficiencies and corrective actions, and fully document findings in a U.L. field services inspection report.
2. Conceal down conductors. Design drawings shall include information on lightning protection design, component application, and down conductor routing. Lightning protection systems shall not be purely “performance-spec’ed”. Construction documents must show lightning protection plans, installation details, counterpoise ground rings, etc. and include specialty details that could affect building aesthetics and/or warranties of roofing systems or roof-mounted equipment. Considering the lack of maintenance on lightning protection systems, the design should exceed minimum requirements of NFPA 780, UL96A, and LPI.

3. For buildings with high value of high-tech information technology equipment proposed to be installed (for example, at DGC), a fully compliant lightning protection system is considered mandatory. Improved levels of surge protection devices and supplemental grounding shall also be incorporated into the design.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Surge Protective Devices**

**26 43 13**

**Design Requirements**

1. Provide transient voltage surge suppression at the main service entrance switchgear for the building. SPD to be active filter sine wave tracking type.
2. Provide surge protection, appropriate for the level of sub distribution, where sensitive electronic equipment is installed downstream. Coordinate type of equipment, which should be connected to SPD protected system, with the end user.
3. At a minimum the following equipment should be connected to a SPD protected system:
  - a. Laboratory Equipment
  - b. Servers
  - c. Fire Alarm
  - d. Security Equipment
  - e. Medical Diagnostics Equipment
  - f. Main Telephone Equipment Rooms
4. Where the following equipment is provided in the project, harmonic filtering and/or cancellation protective equipment must be provided:
  - a. Variable Speed Drives
  - b. Welders
  - c. Non-linear power supplies
5. Surge protection devices shall be provided at the following levels of the distribution system:
  - a. Utility Service
  - b. Transfer Switch Load-side Distribution Point



6. All SPD units to be supplied from a branch circuit breaker and mounted separate from the panel. Utilize oversized flush-mounted covers when mounted with adjacent flush panelboards.
7. Minimize SPD conductor lead lengths per manufacturer's requirements.
8. Illustrate location of SPD's on floor plans. Provide elevation details to show where SPD's will be physically mounted relative to electrical panels. In areas where aesthetics is a concern, panelboards and SPD's should be mounted remotely in an electrical closet or provide appropriate recess-mounted enclosures and access covers to conceal. SPD's shall not be mounted above ceilings due to increased lead length and accessibility problems.

#### **General – Not Used**

#### **Products – Not Used**

#### **Execution – Not Used**

#### **Templates/Details and Specific Installations – Not Used**

## **Interior Lighting**

**26 51 00**

### **Design Requirements**

1. Lighting for interior spaces should consist of LED sources.
2. Request approval for non-LED applications.
3. Source color temperature typically 3500 deg K.
4. Retrofit projects shall be considered for areas where existing Incandescent, T8, or T12 Fluorescent fixtures are encountered.
5. Light Fixture selections will be coordinated with the UNMC Energy Group and the UNMC Project Planner.
6. Exit Sign: to match building standard
7. A red circular Life Safety Sticker shall be installed visibly on or adjacent to all life safety branch light fixtures.
  - a. Incandescent lamps shall be used sparingly and only with special permission from the university.
8. Life safety lighting will be achieved through the use of 24 hour lighting in the corridors with spacings that achieve the required minimum 1 fc lighting level. Install lighting controls to allow switching and dimming for unoccupied times.
9. Illumination of the means of egress shall not rely on availability of a single circuit for illumination.
10. Decorative fixtures shall be coordinated with the Project Manager and UNMC lighting

controls team.

11. Classroom lighting control shall include separate switching for:
  - a. Rows of luminaires near the projection screen,
  - b. Multi-level illumination via 0-10v dimming of LED fixtures
12. Photo sensors in large day lit common areas and exterior rooms to reduce the use of artificial illumination.
13. Specify light fixtures with maintenance in mind. Access to fixtures must be physically possible.
14. Submit photometric calculations and iso-plots for specialty use areas requested by the Project Manager.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Exterior Lighting**

**26 56 00**

**Design requirements**

1. Site lighting to be LED.
2. All outdoor lighting selections should limit light pollution and glare.
3. Specify an individual fuse for each fixture or group of fixtures mounted on a pole. The fuse shall be located in the pole hand hole. Spare underground conduits shall stub out and away from the pole base to allow future access.
4. Emergency lighting shall be provided along the entire exterior path to the “public way” as identified by the Fire Marshal.
5. The use of three-phase circuits should be considered for circuiting of large parking areas to maximize circuiting efficiency and allow for continued (reduced) illumination upon the loss of a single circuit.

**General – Not Used**

**Products – Not Used**

1. If controls are needed for exterior lighting, the Site standard for control of the LEDs is Osram’s Encelium control system.

**Execution – Not Used**



Note: Refer to Division 01 for general requirements also applicable to this section.

**Common Results for Communications**
**27 05 00**
**Design Requirements**

- IT Telecommunications room are dedicated, centrally located rooms in service corridors to serve each floor in enterprise buildings. Room size varies based on criteria below. Each room's requires a dedicated HVAC zone, separate from other spaces within the building. The room is secured physically with card reader, and ITS core lock. The room is monitored through a security camera located inside.

	Small	Medium	Large	Extra Large
Floor Size	<5K Sq Ft	5K -10K Sq Ft	>10K Sq Ft	>20K Sq Ft +
CAT6A Cables	< 240	336	480	960
HVAC	8973.55 BTUs	8973.55 BTUs	10,499 BTUs	20,998 BTUs
Room Size	10 X 8	10 X 10	10 X 12	10 X 12

- IT equipment cabinets shall be installed and grounded to building threaded bus bar (TCB) within the same IT Telecommunications room. The IT cabinet's principal purpose is to house IT network and Telecommunications equipment. Systems not directly associated with IT network and Telecommunications require separate equipment cabinets. Those systems not directly associated: Public Address, Television, Nurse Call, OBIX Fetal Monitoring, GE Patient Monitoring, Sitter Cameras, HVAC Controls, Access Control, Video Surveillance, Fire Alarm.
- Cables shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the outer surface of ceiling and sidewalls shall be supported by structural components of the building in such a manner that the cable or conductors will not be damaged by normal building use. Such cables shall be attached to structural components by straps, staples, hangers, or similar fittings designed and installed so as to not damage the cable. The installation shall also conform to Article 300.4 "Protection against Physical Damage" - NFPA 70, 2002ed. This is inclusive of all cables, specifically: Class 1 circuits, Class 2 circuits, Class 3 circuits, Communications circuits and equipment, Community Antenna Television, Radio Distribution Systems, Network-powered Broadband Communications Circuits and equipment, Optical Fiber cables.

4. IT will install wireless access point enclosures, color to match ceiling tile color. Subdued, black, enclosures will be install in subdued, black ceilings, and white enclosures will be used in light colored ceilings.

### **General – Not Used**

### **Products**

1. Access point location shall allow a tech to remove and service an access point without needing to remove a ceiling tile or get an above ceiling permit.

See owner's IT department for specific access point enclosure needed. Campus standard enclosure is: Terra Wave TW-CTEN-2X2-3802U.

### **Execution – Not Used**

### **Templates/Details and Specific Installations**

### **Design Requirements**

1. Plenum rated cable
2. Designer shall coordinate with UNMC IT:
  - a. Communication Room Location/Modification/Construction
  - b. Cable Routing / Areas Served
  - c. Technical Specifications as Edited by UNMC IT
3. Conduit coming up to a cable basket will be 1" routed to the cable basket and attached to the cable basket with a connector.
4. Standard pull box size shall be 4-11/16" square box and 2-1/8" deep.
5. IT Data switches are typically quad cord (2 cords for required capacity, and 2 additional cords for A/B redundancy). Primary cords should plug into critical branch with local UPS (and/or critical branch UPS source), secondary cords should plug into normal branch.
  - a. Critical Branch Receptacles (with local UPS): (1) NEMA L14-30 plug suspended with SO cord into the rack, terminating 5-6 feet above the floor. This receptacle will serve a local UPS furnished by UNMC IT. UPS output contains (2) NEMA L6-20 receptacles that will serve 2 cords of the quad cord switch. If UPS is not local and a central critical branch UPS will be utilized, provide (2) NEMA L6-20 plugs for direct connection to the switch in lieu of the (1) NEMA L14-30 specified above.
  - b. Normal Branch Receptacles: (2) NEMA L6-20 plugs each suspended with SO cord into the rack, terminating 5-6 feet above the floor. These receptacles will directly serve the remaining 2 cords of the quad cord switch.

Electrical Outlets	Small	Medium	Large	Extra Large
Local Rack Mounted UPS	L5-20 Critical Branch L5-20 Normal Branch 5-20 (4) Critical on wall	L14-30 Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall	L14-30 (2) Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall	L14-30 (2) Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall
Central, Building UPS	L5-20 UPS Branch L5-20 Normal Branch 5-20 (4) Critical on wall	L14-30 Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall	L14-30 (2) Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall	L14-30 (2) Critical Branch L6-20 (2) Normal Branch 5-20 (4) Critical on wall

6. Copper Patch Cable from Data Switch to Visipatch 360 is provided by UNMC IT
7. Mounting frame to always be .
8. Information Outlet (Jack) to be Category 6A Systimax part # 760092411.
9. Voice and data cabling will be provided by the Construction Contractor under project specifications developed by UNMC IT.
10. Require contractor to complete as-built cabling drawings 30 business days prior to owner move-in and to complete cabling/outlet installation 30 days prior to owner move-in to allow for UNMC IT preparation for activation.
11. Network Data and Phone System distribution equipment shall be located in a room separately secured from all other systems. The room shall be dedicated to UNMC IT use. Other rooms shall not be configured to require access through this room.
12. Acquire construction contract specification from UNMC IT.
13. Install 2 cables per data outlet; 2 cables, 2 jacks per box

**Structured Cabling for Voice and Data – Inside Plant**

**27 11 00**

**Design Requirements**

**Related Documents**

1. Drawings and General Provisions of the Contract apply to work specified.
2. Applicable Standards:
  - a. EIA/TIA-568-B. "Commercial Building Telecommunication Standard".
    - i. EIA/TIA-568-B.2-1 Category 6 Test Parameters.
  - b. EIA/TIA-569-A. "Commercial Building Standard for Telecommunications Pathways and Spaces".
  - c. EIA/TIA-67. "EIA/TIA Telecommunications Systems Bulletin, Additional Transmission Specifications for Unshielded Twisted Pair Cabling Systems"
  - d. EIA/TIA-606. "The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings."
  - e. EIA/TIA-607. "Commercial Building Grounding and Bonding Requirements for

Telecommunications”.

### **Contractor Qualifications**

1. Contractor shall be BICSI Certified and have a staff member who shall be responsible for overseeing the planning, design, and installation processes for the building telecommunications communication cable infrastructure.
2. A Building Industry Consultant Services International (BICSI) Certified Technician shall supervise each work crew on the site.
3. The Contractor shall be a Certified System Installer of the Warranted Structured Cable System.
4. The Contractor shall include 3 references of similar scope jobs completed in the last 2 years.
5. The Contractor shall not sub-contract this work out to any other contractor. All employees must be on permanent staff and have been employed by the Contractor for a period of not less than twelve months.
6. List of preapproved contractors:
  - a. ESI Communications
  - b. Tred-Mark
  - c. Kidwell

### **Definitions**

1. MAIN CROSS CONNECT (MC): The MC is the location within the building where the entire communications cable infrastructure originates. It includes: the physical location, enclosure, cable and cable management hardware, termination hardware, distribution hardware, and patching and equipment cabinets or racks. EIA/TIA-569 refers to the room housing the MC as the “Equipment Room”.
2. HORIZONTAL CROSS CONNECT (HC): The HC is the location in a building where a transition between the backbone or vertical riser system and the horizontal distribution system occurs. It includes: the physical location, cable and cable management hardware, termination, hardware, distribution hardware, cross connection, patching, and equipment racks.
3. BACKBONE PATHWAY: The Backbone Pathway consists of a series of conduits, sleeves, chases, and vertical raceway which connect the MC to HC or HC to HC. It houses the vertical and/or backbone system.
4. BACKBOARD: Backboard refers to the plywood sheeting lining the walls of telecommunications facilities. Backboard also refers to the entire wall-mounted assembly, including cable management, cable blocks, and equipment racks
5. Telecommunications: EIA/TIA-568B refers to telecommunications as any transmission, emission or reception of signs, signals, writings, images, and sounds, or information any nature by cable, radio, visual, optical or other electromagnetic systems.

6. Telecommunications Closet (TC): A Room housing telecommunications equipment, including MC, HC, Backbone Pathways, and Backboards. The Term Telecommunications Room is used interchangeably with TC.
7. SYSTEM CERTIFICATION: Upon complete installation and performance confirmation by the contractor, the manufacturer shall certify and warranty the Channel per 1.6A. The channel components include the work area outlet and patch-panel connectors, cable, and patch cords.

### **SYSTEM DESCRIPTION**

1. Telecommunications Communication Infrastructure shall consist of the all components as required to complete the intended function of a warranted Communication Cable Infrastructure. The function of the Telecommunications cable infrastructure is to transmit voice and data signals from a PC workstation or telephone set back to the campus voice/data communication networks. All components required for the above shall be provided for a fully tested operational system per the latest EIA/TIA standards.
2. Telecommunication Communication infrastructure in a facility shall consist of:
  - a. Cable jack locations consist of a category 6A cable.
  - b. The building copper backbone will consist Category 6A, 25pr copper cable terminating from the MC to each of the TC's. Both ends being terminated on Visipatch 360 cable blocks.
  - c. The building fiber backbone will consist of 24 strand 8.3/125 single mode fiber that will extend from the Main Communications Closet (MC) terminating at each of the telecommunications closets (TC's) in equipment cabinets, part numbers: B-Line V382930BCXXTVVVB or B-Line V452942BCXXTVVVB.
3. The design objective is to ensure that the building and campus cable pathways will be capable of supporting the cabling requirements for the useful life of the building (based on 50 years). The building horizontal cable plant is expected to accommodate telecommunication requirements for a minimum of 10 years.
4. Cable runs from a communication room to a workstation location will not be longer than 90 meters. Cable baskets will be used for the major cable pathways leading from the communication rooms.

### **Scope of Work**

1. This portion of the project includes voice/data horizontal cabling, voice/data building riser cable and voice/data outside plant cable.
2. The Contractor shall provide and install all components per this specification for the warranted system including but not limited to items as follows:
  - a. Optical fiber backbone and riser cable.
  - b. Optical Fiber Distribution Centers and Connecting Hardware.
  - c. Innerduct (Innerduct shall be the same orange color for all fiber on the job).
  - d. Horizontal Twisted pair copper workstation cabling.



- e. Copper backbone cable.
  - f. Connectors (fiber and copper).
  - g. Cable Termination Blocks with legs (110, Visipatch 360 or equivalent).
  - h. Telecommunications information outlets.
  - i. All Horizontal and Vertical cable support and cable management.
  - j. Modular Patch Panels.
  - k. Cable basket (other than cable basket shown on the EC series of plans).
  - l. Plywood for Telecommunications (in addition to plywood shown on the EC Series of plans).
  - m. Graphic for MAC posted in Telecommunication Rooms.
  - n. Wide base Cat 6 J-hooks.
  - o. Velcro Cable ties.
  - p. Labels.
  - q. "D" rings.
  - r. Nuts, bolts, screws.
  - s. Other miscellaneous hardware.
  - t. IT equipment cabinet.
  - u. Fire Stopping.
3. The Contractor shall:
- a. Provide all labor, materials, equipment tools, utilities, and services required for a complete job as specified herein.
  - b. Give notice to all agencies requiring advance notification and comply with all regulations specified by all governing agencies having jurisdiction over the performance of the work.
  - c. Coordinate with Owner's representative to ensure that any interference or interruptions of Owner's operation is anticipated and scheduled.
  - d. Include site survey prior to bid.

### **Horizontal Cabling**

1. The Horizontal cable provides connections from the horizontal cross connect field to the information outlets (IOs) in the work areas. It consists of the horizontal transmission media, the associated connecting hardware terminating this media and IOs in the work area. Each floor of a building is served by its own Horizontal Subsystem.

2. Contractor shall supply horizontal cables to connect each information outlet to the backbone subsystem on the same floor.
  - a. Unless otherwise noted on the floor plans or within this document, the type of horizontal cables used for each work location shall be 4-pair unshielded twisted pair (UTP)
  - b. The 4-pair UTP cables shall be run using a star topology format from the administration subsystem (Telecommunications closet) on each floor to every individual information outlet. All cable routes to be approved by UNMC prior to installation of the cabling.
  - c. The length of each individual run of horizontal cable from the administration subsystem (Telecommunications Closet) on each floor to the information outlet shall not exceed 90 meters in length.
  - d. Contractor shall observe the bending radius and pulling strength requirements of the 4-pair UTP cable during handling and installation.
  - e. Each run of cable between the termination block and the information outlet shall be continuous without any joints or splices.
  - f. In suspended ceiling and raised floor areas where walker duct, cable baskets or conduit are not available, the Contractor shall bundle station cable with Velcro type cable strap at appropriate distances. The cable bundling shall be supported via "J" hooks attached to the existing building structure and framework. Plenum cable will be used in all areas.
  - g. Every effort will be made to schedule the requirements under this Contract in such a manner so as to complete all above ceiling work prior to ceiling tile installation. In the event Contractor is required to remove ceiling tiles, such Work shall not break or disturb grid and must be coordinated with the General Contractor.
  - h. The 4 pair UTP cable shall be Underwriter's Laboratories (UL) listed type CMP as stated later in this section.
  - i. Station cables and tie cables installed within ceiling spaces shall be routed through these spaces at right angles to electrical power circuits.

### **Workstation Cable**

1. Wired Connections
  - a. 90-meter maximum length of cable per run
  - b. 4-pair UTP category 6e cable EIA/TIA 568 continuous runs – NO splices
  - c. All cable runs shall be terminated using Visipatch 360 System Category 6 (part #108561143, 108523937) in the Telecom closets.
  - d. Termination end of the cable will be labeled as follows in a fashion as specified by the Owner:
    - i. Information outlet and termination points within the MC and TC closets shall use the following numbering scheme XXXXX-YY. Where XXXXX is the data closet

room number and YY is the individual outlet location. I.E. 1050-05 on the faceplate means the outlet originates from Telecom room 1050 and the outlet number is 05. This same numbering scheme should be used at both ends of the cable.

- ii. All runs will be numbered consecutively.
  - e. Testing of all installed Category 6A Communication cable shall be performed using a TIA Category 6A and ISO Class E standard handheld tester and performed to the latest revision of TIA/EIA-568-B documents. All reports shall be recorded and presented to UNMC – Telecommunications before acceptance. Complete, end to end test results must be submitted in electronic format.
  - f. All work performed will comply with EIA/TIA 568A commercial cable standards.
2. Wireless Access Points
- a. Two category 6A cables are required per WAP.
  - b. Terminate WAP cable end on Commscope Ceiling Connector Assembly 760235586.
  - c. Route CCA through wireless access point enclosure. Terra wave Wi-Fi ceiling tile. Part : TW-CTEN-2X2-3802U
3. Installation Guidelines:
- a. Before installation, the cable installer will contact /coordinate with the designated UNMC – Telecommunications personnel the final layout for communication room location
  - b. Pair un-twisting after termination for 4 pair UTP cable shall not exceed Warranted Manufacture’s recommendations.
  - c. Maximum pulling tension should not exceed 25 LB per 4 pair UTP cable or manufacture’s recommendations, whichever is more stringent.
  - d. Minimum bending radius for 4 pair UTP cable shall not exceed 4x the OD or manufacture’s recommendations whichever is more stringent.
  - e. Cable shall not be bent at sharp or at right angles, use sweeping bends.
  - f. Velcro type cable ties shall not be over-tightened.
  - g. Cable shall not be knotted or show evidence of being un-knotted

### **Fiber Optic Backbone Cable Distribution**

1. The building fiber backbone will consist of individual runs of a 12 strand 8.3/125 single mode fiber that will extend from the Main Communications Closet (MC) terminating at each of the telecommunications closets (TC’s). All Fiber in a cable run shall be from the same manufacturer and shall be the same type.
2. Fiber shall be installed in Innerduct and supported by cable basket, conduit, or wide base j hooks, and shall be securely fastened with Velcro ties at a minimum interval of 5 FT. Installation shall be per manufacturer guidelines and TIA standards.

- a. Fiber installation shall not exceed pulling tension. Bending radius shall not be exceeded. A minimum 10 FT service loop shall be provided at each terminal location. Service loop enclosures shall be provided to support fiber service loop.
  - b. Vertical Distribution Fiber Optic cable runs shall be in Innerduct and supported to structure.
3. Exposed fiber shall be identified to avoid physical damage.
  4. Fiber Tests shall be performed per warranted standards.
  5. Fiber shall be protected by Innerduct. (plenum rated)
  6. All Fiber strands shall be terminated and tested.
  7. Fiber Connectors shall be LC and SC-APC.

### **Voice Copper Backbone Cable**

1. The building copper backbone shall consist of Cat 5, 25pr. Copper Communication Cable. This cable shall be installed between the MC and each of the TC's. Both ends will be terminated on SYSTIMAX® Visipatch360.
2. Cable shall be supported independently. Cable shall be installed in accordance with Manufactures instructions / recommendations and TIA standards. All cable shall be affixed to the backboard via D Rings and Velcro cable ties. All customer side IDC wall fields and patch panels shall be included.

### **Outside Plant Copper and Fiber Optic Cable**

1. COPPER – OUTSIDE PLANT
  - a. The Copper Feeder Cable required will consist of 25-pair Category-3. It must be rated for use in a utility tunnel. This cable will require protective devices to be provided and installed on both ends of the cable. Protective devices shall be properly installed on all outside plant cable:
  - b. Grounding and bonding will meet the National Electrical Code (NEC) as well as local codes which specify additional grounding and/or bonding requirements.
2. FIBER – OUTSIDE PLANT
  - a. Outside Plant Fiber Optic backbone cable will consist of 25 strands 8.3/125 single-mode fiber. Both ends will terminate with 20-“LC“ and 4-SC-APC connectors, and install in a rack mountable enclosure. The cable must be armored indoor/outdoor plenum rated.
    - i. Contractor shall supply electrical protection devices that will prevent electrical surges on the cable from entering buildings.
    - ii. It shall be the responsibility of the contractor to secure any permits required for the construction of the outside plant.
    - iii. All outside plant cable grounding and bonding shall meet the National Electrical Code (NEC) as well as local codes which specify additional grounding and/or

bonding requirements.

### **Submittals**

1. Qualifications as follows:
  - a. BICSI or Systimax Certified Technician Certification.
  - b. Warranted Structured Cable System Certified Installer Certification.
  - c. Reference of 3 jobs of similar scope in the last two years, including personnel.
2. Manufacturer System Certified Passive Channel Components including but not limited to:
  - a. Copper Cable and Modular Connectors.
  - b. Fiber Optic Cable and Connectors.
  - c. Patch Panels.
  - d. 110 Blocks.
  - e. Outlet Face Plates.
  - f. Consolidation points.
3. Cable basket Raceway layout:
  - a. Telecommunication Room Cable basket (if required).
4. Tie Wraps:
  - a. Velcro tie wraps shall be used inside and outside the Telecommunication Room.
5. Final Telecommunication Riser layout.
6. Labeling Scheme and List of Jack Numbers.
7. Telecom Room Acceptance Criteria Checklist. Design Professional to consult with Owner for Supplemental Document.
8. IT Scope of Work Responsibility Matrix. Design Professional to consult with Owner for Supplemental Document
9. As Built drawing generated in AutoCAD (latest Version).

### **General – Not Used**

### **Products**

1. All products shall be new and brought to the job site in original manufacturer's packaging. Electrical components (including Innerduct) shall bear the Underwriter's Laboratories label. All communications cable shall bear flammability testing ratings per TIA Guidelines.

### **Manufacturers**

1. The Warranted System Certified Manufacturer shall be:
  - a. SYSTIMAX® Systemax Gigaspeed 71Series Structured Cable Solution
2. Cable Management:
  - a. Vertical Cable Management Slotted Wall type, Panduit or equivalent.
  - b. Panduit Horizontal Cable Management Slotted wall type, Panduit or equivalent.
3. Fire Stopping: Intumescent Putty, Putty Pads, Collars, Pillows.
  - a. Refer to UNMC Compliance Department for list of allowed fire stopping manufactures.

#### **Pre-approved Contractors for the installation of Voice/Data Cabling**

1. The following contractors have been pre-approved for installation of IT cabling:
  - a. Kidwell Inc.
  - b. Tred-Mark
  - c. Miller Electric
  - d. Commonwealth Electric
  - e. ESI Communications

#### **Plenum Rating: All Components shall be plenum rated**

1. Fiber Cable.
2. Copper Cable.
3. Inner Duct.
4. Velcro Tie Wraps.
5. Cable Supports.

#### **Cable Slack**

1. Copper:
  - a. Cable Slack at the HC shall include 7 FT in the cable basket as near as possible to the cabinet. The Slack shall not be coiled. Cable slack bundles shall not exceed 24 cables. Bundled cables shall be terminated on the same patch panel row.
2. Fiber:
  - a. The building riser fiber backbone will consist of 24 strand 8.3/125 single mode fiber that will extend from the Main Communications Closet (MC) terminating at each of the telecommunications closets (TC's). Both ends will terminate with SYSTIMAX® LC connectors. The MC shall have a 72 port Lightguide Distribution Shelf (part #700007289), rack mounted.

- b. All fibers will be run in 1" Plenum rated corrugated Innerduct and terminated in the TC's with LC type connectors in wall mounted Lightguide Distribution Shelves equipped with sufficient panels, couplers and jumper storage shelves to terminate and secure all fibers.
- c. Contractor shall observe the bending radius and pulling strength requirements of all backbone cables during handling and installation.

### **Face Plates**

1. Face Plates shall match and shall be of the same manufacturer as used throughout the building for electrical services.
2. Each information outlet location shall have a duplex jack with a single gang stainless steel faceplate.
  - a. SYSTIMAX® 2 port mounting frame
  - b. SYSTIMAX® 4 port mounting frame
  - c. SYSTIMAX® 1 port stainless steel wall phone covers

### **Raceways**

1. General:
  - a. All telecommunication cables shall be independently supported, all horizontal and vertical raceway support shall be included.
  - b. All telecommunication cabling shall be routed in the main cable basket system. Cable routed 5 FT or greater from the cable basket shall be supported by Category 5/6 wide based J-hooks, and strapped on the J-hook with Velcro strips. The distance between "J" hooks shall not exceed 5 FT, and cable sag between "J" hooks shall not exceed 12 IN, or per cable system manufacture specification if more stringent requirements.
  - c. Raceway shall be cable basket or J-hooks, all other raceway shall be approved by Owner.
  - d. Cable Routing shall be perpendicular to building lines.
  - e. Cable bending radius shall not exceed 2 IN or manufacturer's requirements, whichever is greater.
  - f. Cable basket fill shall not exceed TIA guidelines.
  - g. Remove any sharp edges or burrs from raceway.
  - h. Fiber and Copper Cable: Fiber or copper cable entering a TC shall be routed in cable basket to the destination or affixed to the backboard via "D" Rings and Velcro cable ties, all cable shall be neatly bundled, and tied.
  - i. Cable basket as shown on the plans is provided by others. Provide additional cable basket within the telecommunication rooms to route cable to the racks if the tray indicated on plans is not adequate.

- j. Vertical Cable basket: Vertical cables spanning the stacked Telecommunication Closets shall be used as cable management.
  - k. Telecommunication Cable shall be neatly bundled in corridor and telecommunication room cable basket with Velcro type cable straps at a maximum distance of 5 foot intervals. Cables shall be neatly bundled and trained at all 90deg bends in cable basket. All voice/data communication cable shall be bundled separately from all other Low Voltage Systems cable.
  - l. Cable basket installation provided under this contract or under another contract shall be coordinated with other site contractors. Exact corridor cable basket path may not be installed as shown on plans due to site conditions. Account for additional cable basket bends, clearance restrictions, and raceway modifications as site allows. Coordinate all raceway modifications with the Owner.
  - m. Cable basket installed under this contract shall match other cable basket on the job.
  - n. Pathway installations to be inspected and approved by Owner IT personnel.
2. Conduit:
- a. Conduit shall have minimum bend radius as follows:
    - i. Conduit bends for 3/4 IN – 1 1/2 IN conduit shall be at least 6 times conduit ID.
    - ii. Conduit bends for 2 inch and greater conduit shall be at least 10 times conduit ID.
    - iii. For Fiber Optic cable, conduit bends shall always be at least 10 times conduit ID.
  - b. Each exposed conduit end shall include a plastic bushing to protect data cable.
  - c. Conduit fill shall be calculated per TIA-569 Table 4.4-1.
  - d. Where telecommunication conduits exceed 100 FT or (2) 90 degree bends, appropriately sized pull boxes shall be installed. Manufacturer minimum bending radius shall be followed.
3. Raceway practices NOT allowed:
- a. Cable SHALL NOT be supported by the suspended ceiling.
  - b. Cable SHALL NOT be supported by the suspended ceiling support cables.
  - c. Cable SHALL NOT be supported by the suspended ceiling T-Bar Grid.
  - d. Cable SHALL NOT be supported by power conduit.
  - e. Bridal ring type supports SHALL NOT be used.
  - f. Surface mounted raceway SHALL NOT be used.
  - g. Under Carpet Systems SHALL NOT be used.
  - h. Plastic type cable ties SHALL NOT be used.
4. Sleeves:



- a. Telecommunication Room Sleeves are provided by others. Coordinate sleeve use with Electrical Contractor and Owner. Sleeves shall be provided for Owner's future use as indicated on the plans.
5. Innerduct:
- a. Fiber shall be enclosed in Innerduct.
  - b. Innerduct shall be 1 inch diameter and corrugated. Inner duct shall be the same color for the same fire rating on the job. Spare Innerduct shall include a pull string and be capped at both ends. Continuous lengths of Innerduct shall be used, splices and/or splice couplings are not permitted.
  - c. Spare horizontal Innerduct shall be identified at both ends and extend 18 inches into rooms.
6. All cable shall be neatly bundled and trained with Velcro type cable straps at a maximum distance of 5-foot intervals outside the telecommunications room, and as required within the telecommunications room. Standard locking plastic type cable ties shall NOT be used.

### **Cable Management**

1. Cable Management shall be sized as required to accommodate cable and patch cord management for proposed rack layout. For 'percent of fill', include worst case station cabling and active component separation.
2. Cable Management shall be included as follows:
  - a. Quantity (2) vertically between racks.
  - b. Vertically on both sides of the rack.
  - c. Cable management shall be back to back, for rack back and front cable management.
  - d. Horizontally adjacent to each patch panel on rack front and back.
  - e. Horizontally adjacent to each Switched Hub and FDC.
  - f. Vertical Cable Management shall be minimum 4" x 4".
  - g. Horizontal Cable Management shall be minimum 2U (3.5inch).
3. Velcro type cable straps shall be used for cable bundling in the cable basket, J-hook cable fasteners, and telecommunication room tray and rack management. Standard locking plastic cable ties shall NOT be used.
4. Horizontal and Vertical Cable management shall be sized as required to accommodate cable, cable slack, and patch cord slack, with minimum 25% spare space for future use. Cable and patch cords shall be managed to allow for maximum space for future use. Cable management size shall be calculated based on cable and cord count. Calculations for 25% spare space shall be based on 100% full equal to loose fill at 40% calculated fill.
5. Cable management enclosures shall include a cover to hide cable.

### **Telecommunications Room Equipment**

1. Active Equipment shall be installed by others.
2. Passive Equipment shall be installed under this contract.

### **Telecommunications Room Wall Plywood**

1. Provided by Division 16 as indicated on Drawings

### **Telecommunications Grounding**

1. Telecommunications Grounding Bus-bar provided by others. Route #6 AWG green insulated ground cable from Passive Equipment including cable baskets and cabinets to ground bar. Provide all connections conforming to the NEC and NFPA.

### **Labeling, Moves, Adds and Changes (MAC), Graphics and Software**

1. The Contractor shall be responsible for printed labels for all cables and patch cords, distribution frames, and information outlets according to Owner's Telecommunication specifications. The typical information outlet numbering scheme on the faceplates are XXXXX-YY where XXXXX is the Telecom room number and YY is the individual outlet location. I.E. 1050-05 on the faceplate means the outlet originates from Telecom room 1050 and the outlet number is 05.
2. No handwritten labels will be accepted.
3. Locate the 'Moves Adds and Changes Graphic' in the Telecommunications Room. The graphic shall be generated in AutoCAD (latest Version). A copy of this files shall be provided to the Owner upon job completion.

### **Firestopping**

1. Cable basket penetrations through rated walls shall be fire stopped with STI "EZ Path" cable pathway and fire stop device.
2. Cable penetrations through rated walls shall be fire stopped.
3. Sealing material and application method shall meet local fire and building code authorities and UNMC/Nebraska Medicine Compliance Department requirements
4. Any openings created for the contractor and left unused shall be sealed by the Contractor.
5. Coordinate with UNMC/Nebraska Medicine Barrier Management to document and certify all penertrations.

### **Testing and Documentation**

1. Copper Cable Testing
  - a. Testing of all copper cable shall be performed prior to system cutover. 100 percent of the horizontal and riser cable pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage or grounds. Horizontal cable pairs shall be tested from the information outlet to the TC. The CAT6A cable runs shall be tested for conformance to the specifications of EIA/TIA 568-B for Category 6A standards for basic links. Testing shall be done with an EIA/TIA TSB-67 UL Certified Level 2 test set. Any pairs not meeting the requirements of the standard shall be brought into

compliance by the contractor, at no charge to the Owner. Complete, end to end testing results and test data sheets shall be downloaded from the tester, and provided to the Owner in electronic format

## 2. Optical Fiber Cable Testing

- a. Testing of all Fiber Optic cable shall be performed. Testing shall consist of a bi-directional end to end using an OTDR and performed per EIA/TIA 455-61 or a bi-directional end to end power meter test performed per EIA/TIA 455-53A. The system loss measurements shall be provided at 850 and 1310 nanometers for multimode fibers and 1310 and 1550 for single mode fibers.
  - i. Preinstallation cable testing
  - ii. The Contractor shall test all lightguide cable prior to the installation of the cable. The Contractor shall assume all liability for the replacement of the cable should it be found defective at a later date.
  - iii. Loss Budget
    1. Fiber links shall have a maximum loss of:
    2.  $(.5\text{dB per km}) + (.4\text{dB})(\text{number of connectors}) = \text{maximum allowable loss}$ 
      - a. A mated connector to connector interface is defined as a single connector for the purpose of this document.
      - b. Loss numbers for the installed link shall be calculated by taking the sum of the bi-directional measurements and dividing that sum by two.
      - c. Any link not meeting the requirements of the standard shall be brought into compliance by the contractor, at no charge to UNMC.
      - d. Documentation shall be provided in both hard copy and in electronic format.

## 3. Preinstallation cable testing

- a. The Contractor shall test all lightguide cable prior to the installation of the cable. The Contractor shall assume all liability for the replacement of the cable should it be found defective at a later date.

### **Unit Prices**

1. Provide itemized Unit Price for horizontal cabling drops. Unit prices are good for 3 months after Owner Occupancy to an area. Provide ADD Unit Price. Coordinate with Bid Form.
  - a. One (1) Cat 6A and one (1) Cat 6A Warranted cables.
  - b. 200 feet.
  - c. Termination at patch panel and work area outlet.
  - d. Connecting hardware and wall plate.
  - e. Five (5) J-hooks.

- f. 1 fire wall penetration.
- g. Wall Conduit Stub-up.
- h. All cutting and patching of building elements as required.
- i. No workstation patch cords.

### **Execution**

1. The BICSI Certified Contractor Staff Member shall submit propose layout design drawings for this entire Communication Cable System and shall provide reflect final layout upon completion of this project.
2. The design plans shall include but not limited to details as follows:
  - a. Wall Field layout/design (copper and fiber communication cable)
  - b. Riser for Voice and Data.
  - c. Inner Connection Diagram.
  - d. MAC Graphic.
3. All proposed Communication Cable will comply with the appropriate fire and safety codes specified by Federal, State, and local regulations. All wall penetrations will be through conduit and fire stopped. Specific conduit size will be determined during the design process of a facility, but will never be smaller than  $\frac{3}{4}$  IN, and will always include a pull string.
4. Cable Termination shall be T568B (AT&T).
5. All pairs of all cables shall be terminated.
6. Contractor shall install the Warranted Structured Cabling system as described in this specification and attachments, and the contract documents.
7. Communication Cable Separation:
  - a. Communication cables shall be separated from power cables by 2 IN.
  - b. Where possible communication cables shall be routed perpendicular to power conductors.
  - c. Communication Cables shall not run parallel for 3 FT to large power feeders in conduit 1-1/4 IN or larger.

### **Acceptance**

1. Acceptance of the Warranted Structured Cabling System, by Owner, shall be based on Owner approval of installation per this specification and upon the receipt of a Job Specific Manufacturer "System Certification". All requested documentation shall be submitted to Owner.

### **Templates/Details and Specific Installations – Not Used**

**Television Systems****27 41 33**

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**Design Requirements**

1. RG6 Coax with White Jacket for locations without IPTV systems. Confirm cable provider requirements with Owner.
2. Healthcare locations require data jack for IPTVs and nurse call integration. Confirm with Owner.

**General – Not Used****Products**

1. IPTV locations require TeleHealth approved products. Confirm with project manager.

**Execution – Not Used****Templates/Details and Specific Installations – Not Used****Public Address and Notification****27 51 16**

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**Design Requirements**

1. Public Address not allowed in Cable basket. Confirm need and locations with Owner.

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used****Nurse Call / Code Blue Systems****27 52 23**

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**Design Requirements**

1. Any area that is considered to be new construction, renovation (full or partial), or needing upgraded in a space that is Nebraska Medicine owned and does not have known tentative construction plans will use Rauland's R5 hardware throughout the entirety of that clinic or unit area. Biomed may approve the usage of non-Rauland equipment based on evaluation of feasibility of obtaining full call light system install.
2. Coordinate light and tone or voice system with the Owner. Confirm Rauland products and locations with Owner and nurse call vendor. Coordinate TV integration requirements with Owner and nurse call vendor.

3. Provide rough-ins for Owner’s staff locator system.
4. Finalize room naming convention with users prior to approval of Nurse Call shop drawings.

**General – Not Used**

**Products**

1. Rauland products only.

**Execution – Not Used**

**Templates/Details and Specific Installations**

**1. Applicable To All Areas**

Area Name	Room Name	FGI Requirements	NMC Standards	Comments
Dressing room	Dressing room		Pull for Help, Dome Light	
Fitness	Fitness Center		Push For Help, Dome Light	
Lactation	Lactation room for visitors or staff		None	
Lactation	Lactation room for patients		Pull for Help, Dome Light	
Lobby	Dressing room lobby		None	
Lobby	Lobby		None	
Nutrition	Lactation Nutrition Station (AKA milk mixing room)		Duty station	
Nutrition	Nourishment (refrigerator, food) (patient)	Duty Station optional	None	
Staff Relief	Provider sleep room		None	
Staff Relief	Staff lounge/break room	Duty Station optional	None	
Toilet Room	Staff toilet room		None	
Toilet Room	Patient toilet room (non-hospital licensed)	Not required	Pull for Help, Dome Light	
Toilet Room	Patient toilet room (hospital licensed)	Emergency Call Station	Pull for Help, Dome Light	3-2-23: Conflicts between Title 175 and FGI Outpatient Clinic requirements (both adopted by Nebraska DHHS)
Toilet Room	Public toilet room	Not required	None	
Utility	Equipment storage	Not required	None	
Utility	Clean Supply Room	Duty Station optional	Duty Station	
Utility	Clean Linen Storage	Not required	None	
Utility	Clean Workroom (ex: sterilizing room)	Duty Station Required	Duty Station	
Utility	Soiled Workroom/Utility Room	Duty Station Required	Duty Station	
Utility	Soiled Holding Room	Duty Station optional	None	
Utility	Door entries		Dome light per entry	
Work Area	Physician Workroom		None	
Work Area	Reception/Unit Secretary		Nurse Console	
Work Area	Medication Safety Zone	Duty Station Required	Duty station	
Work Area	Video monitoring tech station		Nurse console	
Work Area	Nurse station (outpatient)	Nurse master station	Staff Terminal	
Work Area	Nurse station (procedural and inpatient)	Nurse master station	Nurse Console	
Work Area	Multipurpose Room (Conference or education room)	Duty Station optional	None	

## 2. Inpatient

Area Name	Room Name	FGI Requirements	NMC Standards	Comments
Inpatient	Seclusion room anteroom	Staff Assist, Emergency call station	2 Button Station (Code Blue, Staff Assist)	
Inpatient	Interior human decontamination room		2 Button Station (Code Blue, Staff Assist)	
Inpatient	Low-acuity patient care station (vital signs, scale)		None	
Dementia	Alzheimer's and other dementia unit patient bedroom	Patient station	n/a	
ED	Triage room or area	Patient station, Staff Assist	Patient Call Light, Dome Light, Patient Station (Code Blue, Staff Assist)	
ED	Treatment room	Patient station, Staff Assist	Patient Call Light, Dome Light, Patient Station (Code Blue, Staff Assist)	
ED	Hallway patient location (patient in bed)		1 2-jack station, Patient call light, Dome Light	
Hospice	Hospice and/or palliative	Patient station, Emergency call station	n/a	
Inpatient	Patient toilet and/or shower room	Bath station	Pull for Help with audio for toilet, Pull for Help for shower	3/1/23: 1 device has to have audio
Inpatient	Med/Surg bed (per bed)	Patient station, Staff Assist, Emergency call station	Patient call light, Patient station (Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient	ICU bed (per bed)	Patient station, Staff Assist, Emergency call station	Patient call light, Patient station (Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient	Observation unit patient care station	Patient station optional, Staff Assist, Emergency call station	Patient call light, Patient station (Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient-Women	NICU bed	Staff Assist, Emergency call station	Patient call light, Patient station (NICU Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient-Women	Newborn nursery	Staff Assist, Emergency call station	Patient call light, Patient station (Peds Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient-Women	Continuing care nursery		2 Button Station (Infant RRT, Infant Code)	
Inpatient-Women	L&D room and L&D recovery room	Patient station, Staff Assist, Emergency call station	Patient call light, Patient station (OB Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	
Inpatient-Women	NICU home trial room		Patient call light, Patient station (Code Blue, Staff Assist), 2 2-station jacks, Staff Terminal, Dome Light	

## 3. Outpatient

Area Name	Room Name	FGI Requirements	NMC Standards	Comments
Clinic	Exam room	Not Required	Push for Help, 4-button, Dome Light, Patient Call Light optional	3-2-23: Conflicts between Title 175 and FGI Outpatient Clinic requirements (both adopted by Nebraska DHHS)
Clinic	Curtain separate procedure space (Ex: Dialysis, Infusion); staff always in vicinity		1 2-jack, Pendant, Dome Light	PT could have curtain pulled
Clinic	Curtain separate procedure space (Ex: Dialysis, Infusion); staff not in vicinity		1 2-jack, Pendant, Dome Light	
Clinic	Procedure room (including endoscopy); staff always present	Staff Assist, Emergency Call Station	Push for Help, Dome Light	
Clinic	Procedure room; staff not always present	Staff Assist, Emergency Call Station	Push for Help, 1 2-jack, Patient Call Light, 4-button, Dome Light	
Clinic	Consultation/Education room		Push for Help button (optional), Dome Light	
Clinic	Control room with window		Push for Help button, Dome Light	
Clinic	Low-acuity patient treatment station (vital signs and scale)		Push for Help button, Dome Light	

## 4. Procedural

Area Name	Room Name	FGI Requirements	NMC Standards	Comments
Dialysis	Dialysis facility home training room	Patient Station Emergency Call Station	n/a	
Dialysis	Dialysis facility patient toilet room	Toilet Call Room Station	n/a	
Dialysis	Hemodialysis patient care station (inpatient)	Patient Station, Emergency Call Station	Staff Terminal, Patient Call Light, Patient Station with 2 buttons (Code Blue, Staff Assist), Dome Light	
ECT	ECT pre-treatment room patient care area	Staff Assistance Station, Emergency Call Station	Patient Station (Code Blue, Staff Assist), Patient Call Light, Dome Light	
ECT	ECT recovery patient care station	Staff Assistance Station, Emergency Call Station	Patient Station (Code Blue, Staff Assist), Patient Call Light, Dome Light	
ECT	ECT treatment room	Staff Assistance Station, Emergency Call Station	Patient Station (Code Blue, Staff Assist), Patient Call Light, Dome Light	
Procedure	Cesarean delivery room	Staff Assistance Station, Emergency Call Station	Staff Terminal, Dome Light	
Procedure	Class 1 imaging room (hospital)	Staff Assistance Station, Emergency Call Station, Patient Station optional	Staff Terminal will be in control room, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Class 2 imaging room (hospital)	Staff Assistance Station, Emergency Call Station	Staff Terminal will be in control room, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Class 3 imaging room (hospital)	Staff Assistance Station, Emergency Call Station	Staff Terminal will be in control room, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Class 1 imaging room (outpatient)	None	Push for Help button, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Class 2 imaging room (outpatient)	Staff Assistance Station, Emergency Call Station	Push for Help button, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Class 3 imaging room (outpatient)	Staff Assistance Station, Emergency Call Station	Push for Help button, Dome Light, Patient Call Light (if machine does not already have one)	
Procedure	Operating room (inpatient)	Staff Assistance Station, Emergency Call Station	Staff Terminal, Dome Light	
Procedure	Operating room (outpatient)	Staff Assistance Station, Emergency Call Station	Push for Help, Dome Light	
Procedure	Phase 1 PACU patient care station (inpatient)	Patient Station optional, Nurse Master Station optional, Staff Assistance Station, Emergency Call Station	Staff Terminal, Patient (non-pillow speaker), Patient Station with 2 buttons (Code Blue, Staff Assist), Dome Light	
Procedure	Phase 2 recovery patient care station (inpatient)	Patient Station, Nurse Master Station optional, Staff Assistance Station, Emergency Call Station	Staff Terminal, Patient (non-pillow speaker), Patient Station with 2 buttons (Code Blue, Staff Assist), Dome Light	
Procedure	Phase 1 PACU patient care station (outpatient)	Patient Station, Staff Assistance Station, Emergency Call Station (Staff Assist and Emergency call can be combined)	Push for Help, Dome Light	
Procedure	Phase 2 recovery patient care station (outpatient)	Patient Station, Staff Assistance Station, Emergency Call Station [1 device should be permitted to cover all]	Push for Help, Dome Light	
Procedure	Pre-procedure patient care room (inpatient)	Patient Station, Staff Assistance Station, Emergency Call Station, Nurse Master Station optional, (1 device should be permitted to cover all)	Staff Terminal, Patient (non-pillow speaker), Patient Station with 2 buttons (Code Blue, Staff Assist), Dome Light	
Procedure	Pre-procedure patient care room (outpatient)	Patient Station, Staff Assistance Station, Emergency Call Station [1 device should be permitted to cover all]	Push for Help, Dome Light, Patient Call Light, 1 2-jack station	
Procedure	Control room (inpatient)		Staff Terminal will be in control room, Dome Light	
Procedure	Control room (outpatient)		Push for Help, Dome Light	
Procedure	Dosimetry Workroom (no patient care)		None	
Procedure	Block room		??	
Procedure	Blood draw		Push for Help button, Dome Light	

## Other Systems

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1. OBIX Fetal Monitoring Network Coordination
  - a. Coordinate construction contract requirements for OBIX Fetal Monitoring network with Owner's Bio Med and the Project Manager. Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices.
2. GE Patient Monitoring Network Coordination
  - a. Coordinate construction contract requirements for GE Patient Monitoring network with Owner's Bio Med and the Project Manager. Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices.
  - b. Orange Cat6a cables with orange jacks (Match Owner's IT data cable specifications)
  - c. Purple Cat6a cables with purple jacks (Match Owner's IT data cable specifications)
  - d. Coordinate application of quantity and color with Owner.
  - e. In addition to end-device patient monitoring outlets, coordinate cabling requirements for CIC computer/display locations.
3. Sitter Cameras
  - a. Coordinate construction contract requirements for Sitter Camera system with Sentrixx Security. Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices.
4. EPIC Neuron Coordination:
  - a. Coordinate construction contract requirements for EPIC Neuron cabling system with Owner's BioMed.
  - b. Yellow Cat6a cables with yellow jacks (Match Owner's IT data cable specifications)
  - c. EPIC Neuron Homerun Cabling – Single cable to associated Owner's IT network data distribution location.
  - d. Convenience Port Cabling – Combination of multiple data outlets from Neuron Box location to convenience port locations.
  - e. Mount homerun cable in separately labeled faceplate than convenience port distribution.
5. Audio Visual Coordination
  - a. Coordinate construction contract requirements for Audio Visual network with AV Manager and the Project Manager. Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices.
6. HVAC and Lighting Controls Provisions



- a. Design Professional to consult with Owner for HVAC and Lighting Controls provisions. Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices.

## 7. Distributed Antenna System

### a. DAS Background

- i. The Owner currently has a neutral host DAS to enhance cellular coverage to certain buildings and levels across the midtown Omaha campus.
- ii. The DAS is designed with respect for future expansion to existing buildings that currently do not have DAS coverage as well as to new construction slated for the future.
- iii. The long term goal would be to have 100% DAS coverage to the major/critical facilities throughout the entire campus.

### b. DAS Requirements

- i. Manufacturer: SOLiD Technologies. Model: Alliance
- ii. No alternatives will be accepted.
- iii. Contractor is required to be a SOLiD Technologies certified systems integrator.
- iv. Contractor must provide certification and written approval from SOLiD.

### c. Qualifications

- i. Contractor is required to work in conjunction with Owner's preferred DAS Integrator.
- ii. Upon request, Owner will provide the preferred DAS Integrator's contact information.
- iii. Must be a preferred integrator in Nebraska with the wireless service providers.

### d. Pre-design Requirements

- i. Contractor to attend and participate in pre-bid site walks as requested.

### e. Design Requirements

- i. Design must be validated utilizing the iBwave design platform
- ii. The following iBwave deliverables are required in .pdf format:
  1. Logical diagram
  2. Floor plan layout
  3. LTE RSRP predictions
  4. Link Budget
  5. EMF Report

6. Bill of Materials
  - iii. Design coverage must meet or exceed all (5) of the major wireless service providers' (AT&T, Sprint, T-Mobile, US Cellular, and Verizon) key performance indicators (KPIs).
  - iv. Design will be based on the expansion of the existing DAS.
- f. Installation Requirements
  - i. Contractor to work in conjunction with Owner's preferred Low Voltage Installer
    1. Owner will provide the preferred Low Voltage Installer contact information.
    2. Low Voltage Installer will perform the physical installation of the ½" coaxial cable (including connectors), coaxial jumper cables, splitters, couplers, and serving antennas.
  - ii. Contractor to work in conjunction with UNMC/Nebraska Medicine's preferred Fiber Provider in order to obtain fiber connectivity from the head-end to the respective IDF locations.
  - iii. Contractor to install all DAS remotes in their corresponding IDF locations.
  - iv. Contractor to install all DAS head-end equipment, if required, in the main head-end, located in University Tower basement in room 0404.
  - v. Contractor to perform sweep testing of ½" coaxial cable. 1. Sweep tests must meet or exceed WSP standards.
  - vi. All equipment must be labeled.
- g. Optimization, Acceptance Testing, and Closeout Requirements
  - i. Contractor to optimize the DAS upon completion of installation.
  - ii. Contractor to perform walk testing with WINd, or similar WSP approved, data collection platform.
  - iii. Closeout documentation must be provided as proof of a fully functional and complete system
    1. As-built design, performed in iBwave, to capture any approved design modifications made in the field.
    2. Coaxial cable sweeps passing WSP standards.
    3. Walk tests results, utilizing WINd, or similar, passing WSP standards.
    4. Photos of all active equipment locations. a. Documentation must be provided for proper labeling, grounding, and overall cabling aesthetics.

## **Division 28**

## **Electrical Safety and Security**

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Note: Refer to Division 00 for general requirements also applicable to this section.

### **Common Results for Safety and Security**

**28 05 00**

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#### **Design Requirements**

1. Safety and Security equipment cabinets shall be located in a room separate from IT network data and phone distribution equipment.

#### **General – Not Used**

#### **Products – Not Used**

#### **Execution – Not Used**

#### **Templates/Details and Specific Installations – Not Used**

### **Access Control**

**28 13 00**

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#### **Design Requirements**

1. Access Control – Coordinate construction contract requirements for access control with Owner's Public Safety Support Services. Lenel OnGuard is the access control software used on the Omaha campuses and satellite locations. Consequently, only four integrators are approved as Value Added Resellers by Lenel (Commonwealth Electric, Palladin Technologies (formerly VTI). Location for control cabinets, and associated power/data/pathway accommodations. Requirements for conduit, box, and cabling associated with devices. Design Professional to consult with Owner for Supplemental Documents - composite cable specification and standard door device wiring details from Public Safety Support Services.

#### **General – Not Used**

#### **Products – Not Used**

#### **Execution – Not Used**

#### **Templates/Details and Specific Installations**

#### **Single door with electric strike:**

Wire: 1 run of UNMC Composite Cable (See Attached wire spec sheet)

Reader:

- If mounted on wall: HID MultiClass Signo 40NKS-00-000000

- If mounted on doorframe: HID MultiClass Signo 20NKS-0000000

Door Contact: GRI model# 150RS-12

Strike: Von Duprin Part# 6211 US32D 12VDC FSE DS

### **Single crash-bar door with electric rim strike:**

Wire: 1 run of UNMC Composite Cable (See Attached wire spec sheet)

Reader:

- If mounted on wall: HID MultiClass Signo 40NKS-00-000000
- If mounted on door frame: HID MultiClass Signo 20NKS-00-000000

Strike: HES model# 9600-12/24-630-LBM

- If strike has to be substituted to one without LBM, an EPT-IO and Touch-bar switch REX

Door Contact: GRI model # 150RS-12

### **Single door with Electrified panic:**

Wire: 1 run of UNMC Composite Cable (See Attached wirespec sheet)

Reader:

- If mounted on wall: HID MultiClass Signo 40NKS-00-000000
- If mounted on door frame: HID MultiClass Signo 00NKS-00-000000

Door Contact: GRI model# 150RS-12 GRI 8080-TWG

Electrified panic: Von Duprin Model# EL 99L with RX switch

- Power Supply for Electrified panic: Von Duprin PS 914

### **Power Supply option boards:**

W/ 2 zone controller Card:

- VonDuprin 900-2RS (will operate 2 EL 991's from same card read)

W/ Auto operator signal:

- VonDuprin 900-4RL (for use with Automatic dooropener)

### **Securitron CEPT Power Transfer Device:**

\*Note No Electrified Hinges\*

Resistors

\*Note: All Input Devices have to have a resistor at the device\*

- GRI 6644

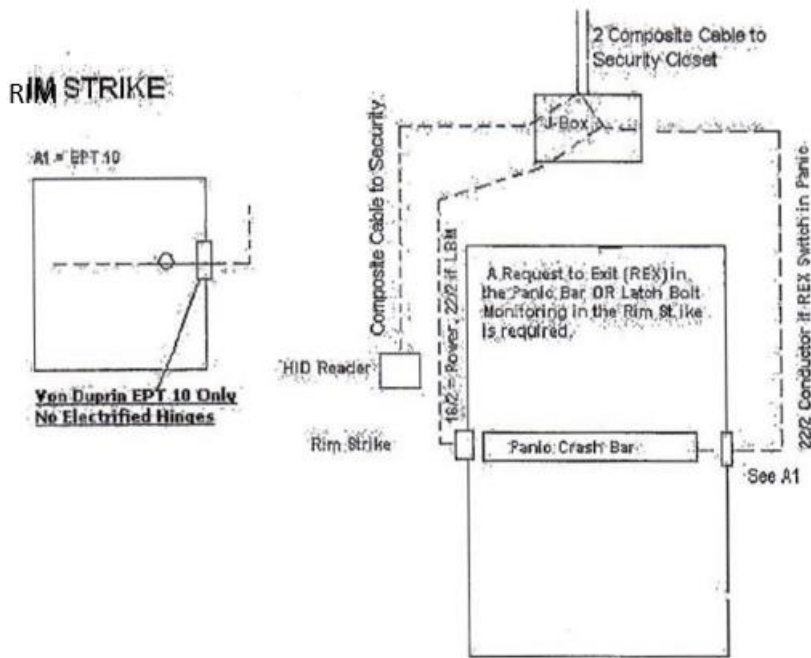
**Electric Strike w/HID Card Reader:**

**Reader cable**  
 Black = power-  
 Red = power+

White= clock  
 Green = data 0  
 Blue = green led  
 Brown = beeper

**Strike cable**      REX Cable  
 Black = power -      White = REX  
 Red = power +      Green = REX

**Contact Cable**  
 Red = door contact  
 Black = door contact



Note: CEPT Only if Crash-bar with Touch-bar REX Switch.

## Electrified Panic w/HID Card Reader

**Reader cable**  
 Black = power-  
 Red = power+  
 White = clock

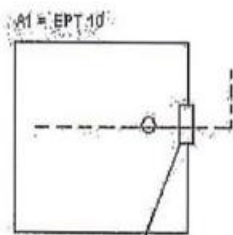
Green = data 0  
 Blue = green led  
 Brown = beeper

**Strike cable**  
 Black = electrified panic power supply  
 Red = electrified panic power supply

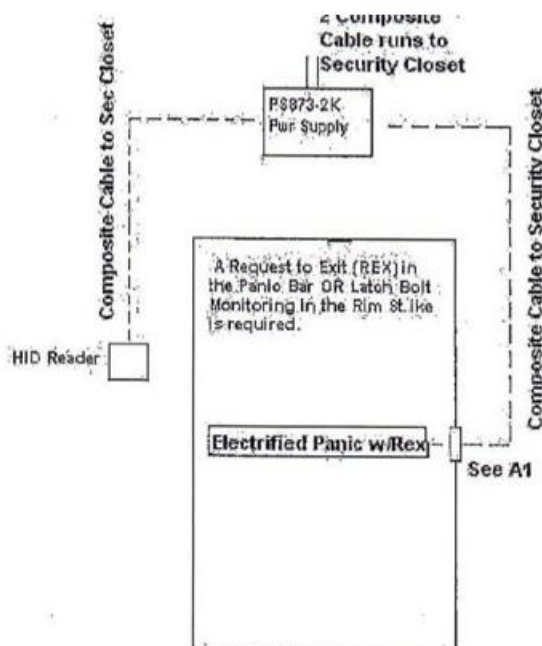
**Contact Cable**  
 Red = door contact  
 Black = door contact

**REX Cable**  
 White = REX  
 Green = REX

### Electrified Panic



**Yon Duprin EPT 10 Only**  
**No Electrified Hinges**



See A1

Note: PS 914-2RS Power Supply  
 Transfer Hinge = CEPT  
**LNL AL 600 ULX 4CB6**

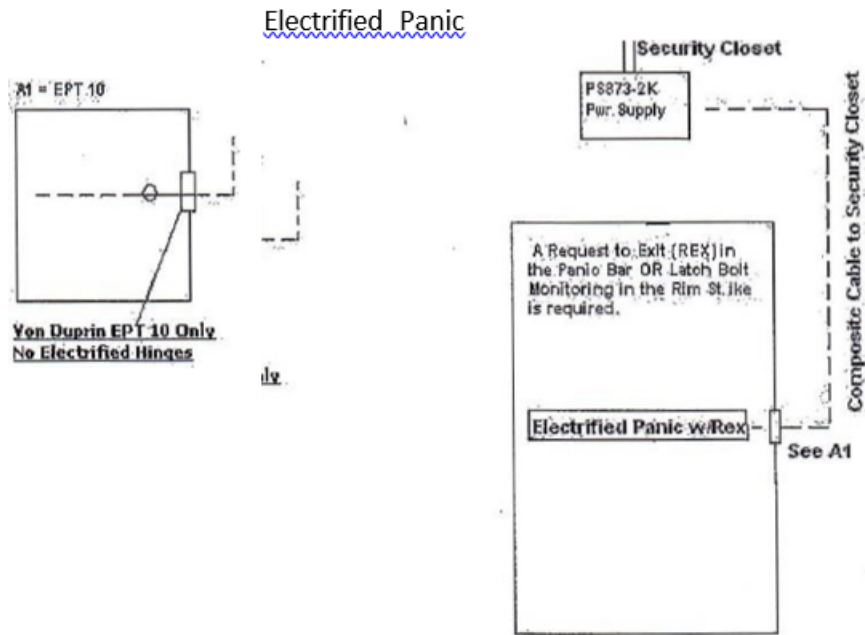
Electrified panic (no card reader)

**Reader wire = spare**

**Strike cable**

Black = electrified panic power supply  
 Red = electrified panic power supply

Contact Cable	REX Cable
Red = door contact	White = REX
Black = door contact	Green = REX



Note: PS 914-2RS Power Supply  
 Transfer Hinge = CEPT

**Electrified Panic w/HID card reader and handicap opener**

**Reader Controls Opener**

**Reader cable**  
Black = power-  
Red = power+  
White= clock

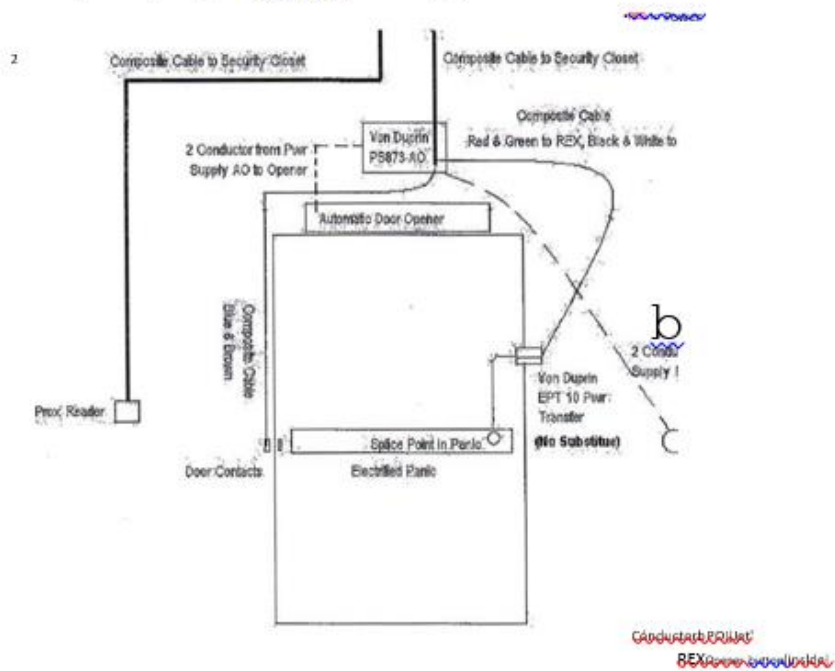
Green = data 0  
Blue = green led  
Brown = beeper

**Strike cable**  
Black = electrified panic power supply  
Red = electrified panic power supply

**Contact Cable**  
Red = door contact  
Black = door contact

**REX Cable**  
White = REX  
~~Green = REX~~

Separate 1 8/2 or 22/2 = Opener button to Power Supply REX.



Note: PS914-4RL. With the configuration above a card read will cause the door to open automatically.

Transfer Hinge = CEPT



**Electrified Panic w/HID card reader and handicap opener**

**Card Reader & Opener separate, 2 actions required.**

**Reader cable**

Black = power-  
Red = power+  
White = clock

Green = data 0  
Blue = green led  
Brown = beeper

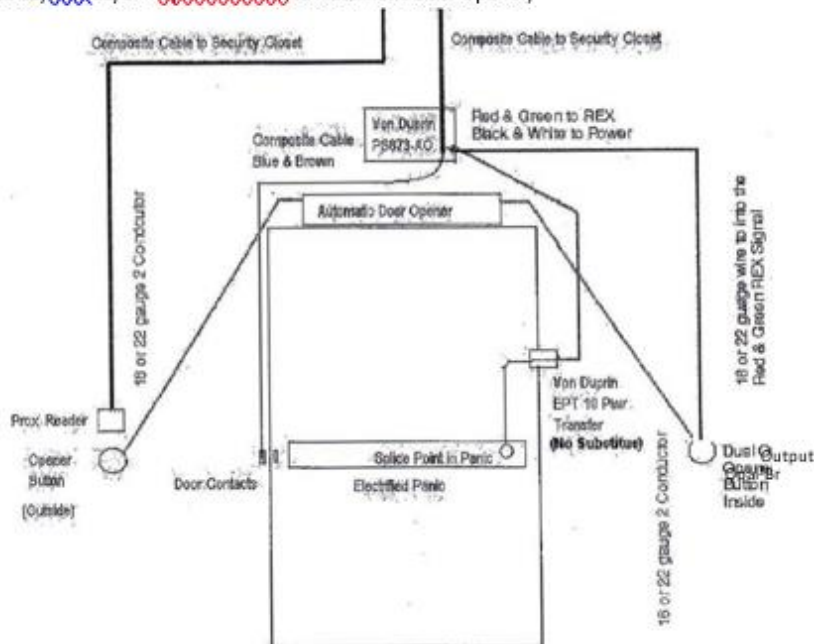
**Strike cable**

Black = electrified panic power supply  
Red = electrified panic power supply

**Contact Cable**  
Red = door contact  
Black = door contact

**REX Cable**  
White = REX  
~~Green~~ = REX

Separate 18/2 or 22/2 = Opener button to Automatic Door Opener,



Note: **PS914-4RL** Power Supply. With the configuration above a card read will not cause the door to open automatically. A Card read and pushing the opener button are required to utilize the automatic opener. Door will only unlock with card read, no control of the opener.

Transfer Hinge = CEPT

### **Panic Buttons**

One cable run 18/2 = panic button

### **Garage door:**

#### **Reader Wire:**

- Black = power-
- Red = power+
- White = clock
- Green = data 0
- Blue = green led
- Brown = beeper

#### **Strike Wire**

- Black = overhead door control
- Red = overhead door control

#### **Contact Wire**

- RED = Door Contact
- Black = Door Contact
- REX Wire = Spare

#### **Door Contacts:**

180RS-12 for ¾" contacts and 184RS-12 for 1" contacts. Resistor Model 6644

**Design Requirements**

1. Campus Video Management Services – Milestone video software is the contracted system used on all Omaha campuses and satellite facilities, also managed through the Public Safety Support Services department. Coordinate all system specifications/requirements and installation procedures with this office. There are several Milestone integrators in the Omaha area including Commonwealth Electric, Palladin Technologies, Sentrixx, others.
2. Axis brand cameras, models to be determined by Public Safety Support Services depending on the need of the project
3. Cameras will be connected to the Milestone VMS (Video management system)
4. Cameras will be connected to the nearest NM closet via CommScope Cat 6a cable (Current Campus standard)

**General – Not Used****Products – Not Used****Execution – Not Used****Templates/Details and Specific Installations – Not Used****Fire Detection and Alarm****Design Requirements**

1. The fire detection and alarm system information should not be shown combined with communications systems and/or specialty systems drawings. Separate Fire Suppression/ Detection/Alarm drawings shall be prepared that show a combined fire protection engineering design including fire suppression and fire- and/or smoke- rated walls, floors, ceilings, etc. A fire alarm riser diagram should also be included that shows where all of the booster power supplies will be located.
2. Smoke detectors are required to be located by all booster power supplies and the main Fire Alarm Control Panel (FACP) per NFPA 72.
3. Need to clearly specify that all fire detection and alarm system wiring be plenum-rated and installed in conduit (3/4" minimum) without exception. Use of cable tray for fire detection and alarm system wiring is not acceptable.
4. For duct-mounted smoke detectors, add remote indicating light/test/reset station for each detector regardless of location. Locate remote test stations in accessible location flush with ceiling directly below associated device. See NFPA 72-2002, section 5.14.5.8.

5. Using printed labels, identify each detector base with appropriate system address number to assist in maintenance and trouble-shooting.
6. Do not install any smoke- and/or heat- detectors within 36 inches of any HVAC supply/return air diffuser/grills.
7. Review application of exterior fire sprinkler alarm device with Project Manager and Fire Marshal.
8. Use red cable for alarm NAC wiring and SLC wiring. Differentiate between NAC and SLC circuits with color-coded phase tape. Paint fire alarm system junction boxes and junction box covers with red paint.
9. Coordinate any mass notification needs per project. If mass notification is pursued under the project, add that the fire alarm system shall have the capability of being used for emergency mass notification per Unified Facilities Criteria (UFC) 4-0211-01 from the FACP location and from UNMC's remote campus alarm receiving station.
10. Fire suppression system isolation valves in and Post Indicator Valves (PIV's) must be supervised by the fire alarm system.
11. Provide FPLR-CI (circuit integrity type) cable for the riser circuitry to exceed the requirements of NFPA 72-2002, section 6.9.4, "Survivability from Attack by fire". Use UL-listed, 2-hour rated fire alarm cables as manufactured by DrakaUSA "LifeLine" products, or approved equal.
12. Provide dedicated fire alarm relay on each floor for future use by UNMC Access Controls Group to release electric door strikes during fire alarm condition. UNMC Access Controls Group will provide/install wiring from the fire alarm relays to each electric strike as required.
13. Provide new addressable fire detection and alarm system with the capability to be used for emergency mass notification per Unified Facilities Criteria (UFC) 4-021-01. See NFPA 72-2006, Annex G (provides guidance for the application, installation, location, performance, and maintenance of mass notification systems).
14. Connection to UNMC's Central Dispatch. Provide project specific detail to show how the new fire alarm control panel will be connected to UNMC's central monitoring system using new/existing communications lines. Coordinate scope of work with UNMC Telecomm Dept., prior to installation. Also, the campus is converting to the EST "Fireworks" fiber-optic communications network. Provide necessary communications hardware revisions needed to communicate to Central Dispatch via fiber-optics.
15. Coordinate with HVAC designer and verify that damper actuator for elevator hoistway vent located at top of hoistway is provided with dry contacts as required to monitor OPEN and CLOSED damper positions at the Fire Alarm Control Panel.
16. The fire detection and alarm system shall be a noncoded, addressable-analog type system with manual and automatic alarm initiation means. The system shall be activated into the alarm mode by actuation of any alarm initiating device. The system shall remain in the alarm mode until the initiating device is reset and the fire alarm control panel is reset and restored to normal. Alarm initiating devices shall be connected to Signaling Line Circuits (SLC's), Class B, Style 4.5, in accordance with NFPA 72. Alarm notification appliances shall be connected to Notification Appliances Circuits (NAC's), Class B, Style X, in accordance

with NFPA 72.

17. Provide dedicated "Fire Alarm Circuit" in accordance with NFPA 72, section 4.4.1.4.1. Indicate "life safety" branch circuit numbers on "as-built" shop drawings including branch circuits for fire/smoke dampers and elevator hoistway smoke relief damper.
18. Provide intelligent "3-D" multisensor analog detectors. The multisensor analog detectors shall use a light scattering type photoelectric smoke sensor and a fixed-temperature ambient temperature sensor to sense changes in air samples from its surroundings. The integral microprocessor shall employ time based algorithms to dynamically examine values from the two sensors simultaneously and initiate an alarm based on that data. The multisensor detectors shall be capable of adapting to ambient environmental conditions.
19. Submittals
  - a. Submit the following in accordance with Section, "Submittal Procedures":
    - i. Technical Data/Catalog Cut Sheets.
    - ii. Detailed Shop Drawings. Provide shop drawings in accordance with NFPA 13, Chapter 22. Provide layout drawings indicating floor plans with final device locations and routings of piping and connections. Include on drawings a detailed description for this project, including hazard occupancy classifications and water density (gpm/ft<sup>2</sup>).
    - iii. Electrical Calculations. Include battery sizing calculations and voltage drop calculations for panels, amplifiers, and Notification Appliance Circuits.
    - iv. System riser diagram with device addresses, conduit sizes, and cable/wire types and sizes.
    - v. Voice/Alarm Signaling Service: Equipment rack layout, grounding schematic, amplifier power calculations, redundant amplifier sizing and single-line connection diagram.
    - vi. Completion Documents and Permanent Records in accordance with NFPA 72-2002, sections 4.5 and 10.6 respectively. Include final device address list after programming system.
    - vii. Test Report in accordance with NFPA 72-2002, Chapter 10.
    - viii. Operation & Maintenance (O&M) Manuals. Provide three (3) hard copies and three (3) electronic CD copies of Operation and Maintenance Manuals outlining step-by-step procedures required for system startup, operation, and shutdown. The manual shall also include a back-up copy of the fire alarm system program, outline maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manual shall include the manufacturer's name, model number, service manual, parts list, and a complete description of equipment and their basic operating features. O&M Manuals shall be approved prior to training.
  - b. Submissions to Fire Marshal: In addition to distribution requirements for Submittals specified in Division 1 Section "Submittals," the fire alarm system shop drawings and product data shall first be submitted to the Engineer and UNMC for review. After the

initial submittal(s) have been reviewed by the Engineer and UNMC and review comments have been incorporated, submit fire alarm system shop drawings (original, reproducible vellum media) to the State Fire Marshal's office for review and approval. Fire alarm system shop drawings shall be submitted simultaneously with the fire suppression sprinkler system shop drawings for concurrent review. On receipt of comments from the AHJ, submit final shop drawings to Engineer and UNMC for review. Submit the AHJ approved and stamped original shop drawings to UNMC for archive purposes.

- c. Additional Submissions to UNMC: Upon completion of the project, provide UNMC with full password access for fire alarm system programming and configuration including password access to change any fire alarm control panel function (e.g. revise control output functions, add/remove devices, device address locations, etc.). Also provide a complete backup copy (CD) of system program and database.

## 20. CONTRACTOR QUALIFICATIONS

- a. Installer Qualifications: The installing Contractor shall provide NICET Fire Alarm Technicians to perform the installation of the system. A NICET Level 2 (or higher) Fire Alarm Technician shall supervise the installation of the fire alarm system. NICET Level 2 Fire Alarm Technicians shall install and terminate fire alarm devices cabinets, and panels. The installing Contractor shall be an authorized representative of the Fire Alarm Control Panel (FACP) manufacturer for both installation and maintenance of units required for this Project.
  - b. All conduit and wiring required for the installation of the fire alarm system and electrical work shall be completed by Class A Journeymen electricians or Class A Master electricians, licensed in the State of Nebraska.
21. Fire alarm notification appliance device color shall be red. Ceiling-mounted appliances may be white.
  22. Duct smoke detection will be provided where any HVAC smoke dampers are required. Smoke detector will initiate damper operation. Fire alarm system shall shutdown associated HVAC fans through direct connection of associated damper to the detector.
  23. AHU shall shutdown only upon alarm of detectors located at the unit. Field dampers shall close only upon alarm of branch duct detectors or area spot detectors.
  24. Duct Smoke Detectors: Locate remote status and alarm indicator and test station in ceiling directly below the device. For 100% outside air applications or high humidity applications, use aspiration type smoke detection systems such as VESDA, FFAST, or approved equal. Xtralis type XAS-1 detection is unacceptable.
  25. Install fire alarm interface devices less than 3 feet from the device controlled.
  26. Provide dedicated 120 volt line voltage branch circuit and connection to each fire alarm equipment item or device requiring a line voltage source. In buildings with an emergency generator, branch circuit shall be served from a "life safety" or "emergency" branch source.
  27. Prior to disabling fire alarm devices for the purposes of construction, the Contractor shall follow campus fire alarm impairment process.

28. Any necessary fire watch required due to impairment of either the existing fire sprinkler system or the existing fire alarm system shall be coordinated with the Project Manager.

**General – Not Used**

**Products – Not Used**

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

**General**

1. Finish grading must provide positive drainage away from the building perimeter. Historically, freshly graded areas that are located above backfill settle during the first year of occupancy and have resulted in negative drainage conditions.

**Products – Not Used****Execution – Not Used**



**Design Requirements**

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1. All new building projects shall receive usable, hard-surfaced outdoor space and associated garden and greenspaces.
  - a. Provide accessible, quiet outdoor spaces that include seating for 5% of total site users.
2. All outdoor spaces shall conform to ADA guidelines
  - a. Ramps shall be minimized wherever possible
3. Outdoor amenity spaces shall be located according to the following:
  - a. Accessible route exists between the building and outdoor space
  - b. Outdoor space to have 12-month access and usability
    - i. Provide shading of space during summer months
    - ii. Hard surface to accommodate users with mobility devices
    - iii. Provide furnishings to accommodate outdoor dining and outdoor workspaces.
  - a. Garden and greenspaces should be located and designed to compliment hard-surfaced outdoor space and to contribute to health and wellness of building occupants
  - b. Site furnishings within outdoor space to be coordinated with separate furnishing guidelines and UNMC
4. Provide informative signage for unique site elements including but not limited to rain and restorative gardens, outdoor fitness spaces, interpretive paths and spaces, etc.

**Bases, Ballasts, and Paving****32 10 00**

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**General**

1. Avoid the use of asphalt paving in the following areas:
  - a. Pads under compactors: Static and impact loading causes deformation and premature failure
  - b. Loading dock areas: Heavy vehicle traffic can cause deformation and premature failure
    - i. If proposed, hot-mix asphalt paving should be designed to withstand projected loading.
  - c. Liquid Oxygen storage or delivery.
  - d. Concrete Sideway, curbs, gutters, and aprons when using asphalt.
2. Where asphalt, use 5 inch base and 2 inch top coat, Consider Kevlar reinforcing to extend life.
3. Concrete Sidewalks:

- a. Must be 6' wide minimum to facilitate efficient snow removal.
  - b. Standard concrete sidewalks to be concrete:
    - i. 5" thick on 2" compacted base for standard sidewalks.
    - ii. 7" thick concrete on 2" compacted base, next to curbs or where heavy loading is possible.
  - c. Outdoor accessories (benches, waste receptacles, bollards, and light standards) need to be placed outside of the 6' clear sidewalk width.
  - d. Avoid the use of exterior stairs. Ramps facilitate snow removal and are preferred where site grading permits. Ramps must be ADA standards.
  - e. Avoid the use of ferrous metal nosings on exterior stairs. Use 316 stainless steel, plastic, or stamped texture in concrete.
  - f. Install ADA parking stall signage in landscaping where provided. If not possible, and signs are required to be placed in the sidewalk, verify that proper clearances are provided.
4. Concrete Parking and Drives on grade
- a. Drive minimum thickness: 7" concrete on 2" base - limestone or recycled concrete.
  - b. Parking minimum thickness: 5" concrete on 2" base - limestone or recycled concrete.
  - c. Any design within city jurisdiction to comply with AHJ requirements.
5. Curbs and Gutters
- a. Concrete required at all curbs, sidewalks, gutters and drive aprons.
  - b. Rolled curbs are preferred over straight curbs.
6. Parking
- a. Parking geometrics should minimize the interaction of vehicular and pedestrian traffic.
  - b. Design of parking lots should meet NPA (National Parking Association).
  - c. Align islands to facilitate efficient snow removal.
  - d. Parking stalls should be:
    - i. 9'-0" wide x 18'-0" deep minimum
    - ii. Every park lot should have the minimum number of ADA spots. Coordinate the campus parking load and distribute close to building entrances proportional to the user demand at each entrance.

2. Lot Striping color and Signage: Review signage and location / color of striping for visitors and employee parking with Campus Parking.

### **Products – Not Used**

### **Execution – Not Used**

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## **Site Improvements**

**32 30 00**

### **General**

1. Site Walls:
  - a. Over 4 feet must be cast-in-place concrete, under 4 feet, consider segmented walls.
  - b. Masonry site walls not allowed. See Division 4.

### **Products**

1. Ornamental fencing should be powder-coated aluminum, bar type.

### **Execution – Not Used**

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## **Irrigation**

**32 80 00**

### **General**

1. Irrigation:
  - a. Permanent irrigation for turf and shrubbery should be included in exterior projects and coordinated.
  - b. Piping sleeves must be provided under all paved walkways to facilitate later installation of irrigation systems and not installed initially.
  - c. Emergency shut-offs should be provided and easily accessed from the exterior of buildings
  - d. Keyed Hose bibs should be placed at regular intervals around new buildings (100' min distance apart recommended)
  - e. Must have testable backflow device, meter and rain sensor.
  - f. Separately meter irrigation system. Verify source of water location.

- g. Verify source of water with owner.
- h. Installation must meet City of Omaha guidelines, or shall otherwise be approved by Owner

### **Products – Not Used**

- 1. Preferred manufacturers
  - a. Toro

### **Execution – Not Used**

- 1. Location of controller shall be designated by owner
- 2. Irrigation system shall be designed with zones based on water-use of plantings (tree, shrubs, and groundcovers, lawn, etc.)

### **Plantings**

**32 90 00**

#### **General**

- 1. Maintain open views to building entrances, signage, bike parking areas, sidewalk intersections, seating and gathering areas, and parking lots from adjacent sidewalks and streets.
  - a. Shrubs and perennials shall not exceed 3'-0" height in these areas.
- 2. All deciduous nursery stock shall be grown in USDA cold hardiness zone 5b or colder.
- 3. Fruit-bearing plantings shall not be planted adjacent to or overhang paved areas.
- 4. Provide soils stabilization for slopes over 3%.
- 5. Turfs, grasses, and shrubs:
  - a. Sod shall be rhizomatous tall fescue (RTF) as produced by members of the RTF Turf Producers Association.
  - b. Plantings should be held back from edge of paved surfaces due to salt removal.
  - c. Do not plant tall grasses or shrubs adjacent to monument signs.
  - d. Provide a variety of zone appropriate grasses and shrubs. Do not group all one species in one area.
- 6. Trees:
  - a. All tree plantings shall be planted in accordance with Nebraska Arborist Association guidelines. [www.Plantnebraska.org](http://www.Plantnebraska.org) or [www.retreenebraska.org](http://www.retreenebraska.org)
  - b. Trees shall be planted minimum of one canopy width away from building face.
  - c. Minimum of 10' between centerline of underground utility and trunk of tree.
  - d. Trees for a single project shall achieve the following: no more than 10% of any species, 20% of any one genus, and 30% of any one family.
  - e. Slope grade on islands away from trees.
- 7. All plantings shall receive shredded hardwood mulch to a consistent depth of 3"
  - a. Mulch shall be pulled back from and not contact base of trees.

- b. Chocolate colored mulch shall be utilized unless Owner exception is given.

### **Products**

1. Provide turf fescue grass from Todd Valley Farms.

### **Execution**

1. Maintenance
  - a. Contractor shall be responsible for care and maintenance including watering of all new plantings and sod until substantial completion.

## Division 33

## Utilities

Note: Refer to Division 00 for general requirements also applicable to this section.

### **General Utility requirements**

**33 00 00**

1. Designer shall coordinate route of utilities with Owner. All removal and install work shall be coordinated through the PM, who should be engaging the Utilities team as per the underground work process. This includes courtyards, grass, trees, brush, roads, paved areas, and site monuments.
2. Renovations of any structure that still has a combined sewer/storm system will include separation of the systems within the building and independent dedicated storm and sewer mains brought to the existing combined sewer system and per all MUD connection requirements.
2. Campus tunnel systems are limited on space and include provisions for future utilities. New tunnel systems shall be designed to accommodate future utilities, existing tunnel clear areas need to be coordinated with Owner prior to routing anything through existing tunnels. Where new systems are to be routed through existing tunnels, a detailed coordination drawing shall be submitted to Director of Utilities for review. No systems shall cross internal to tunnel systems.
3. Coordinate all earthwork on campus with Owner.

### **Domestic Water Distribution**

**33 21 00**

#### **Design Requirements**

1. No plastic piping is allowed.
2. Install isolation valves and pressure gauges on the inlet and outlet of water pressure reducing valves and a by-pass around the valve to allow for maintenance.
3. Non-rising stem gate valves will be allowed only on underground applications.
4. When underground copper piping is utilized only Type K piping is allowed.
5. New facility structures should have consideration given to having two (2) redundant domestic water entrances from 2 mains. Coordinate requirement with Owner and Director of Utilities.
6. Fire services to structures shall be independent.

#### **General – Not Used**

#### **Products**

1. Manufacturers
  - a. Double Check Backflow Prevention Assemblies - Ames Fire & Waterworks, Conbraco, Watts, Apollo
  - b. Gate Valves – Mueller Co
  - c. Corporation Valves and Curb valves - Mueller Co

**Execution – Not Used**

**Templates/Details and Specific Installations – Not Used**

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**Underground Hydronic Distribution**

**33 61 13**

**Design Requirements**

1. On all projects the first preference is for full tunnel systems. Where this is not feasible, all utility lines shall be direct buried. Use restrained joint ductile iron, on all sizes above 4", in no cases shall thrust blocks be used. Thrust blocks shall be designed and stamped by the Design Engineer.
2. For all services, insulation in manholes or vaults:
  - a. Insulation for the valves shall be nonwetting Pyrogel, Techlite or Rubatex rated for the conditions of the manhole.
  - b. Fiberglass or mineral wool insulation is not allowed in manholes or vaults or in locations where wetting conditions or physical damage to the insulation can reasonably be expected.
3. Chilled water
  - a. In tunnel systems, piping shall be Standard Schedule welded steel. All joints shall be welded or flanged.
  - b. Mechanical joint systems are limited to Victaulic and shall have a quality control program with go/ no go gauges and ability to purchase 10 year no leak insurance including consequential damages. Typically mechanical joints will be limited to non-critical areas where leakage does not cause catastrophic problems.
  - c. For direct buried pipe in contact with ground, pipe shall be Grade 52, cement lined class 250 ductile iron.
  - d. When transitioning from tunnel to direct buried (or vice versa), shall use mechanical restrained flange joint, such as MegaLug. Use of anchor rods to wall is not allowed.

- e. Chilled water system and components shall be designed to 150 psi and hydrostatically tested to 225 psi with no leakage allowed.
- f. Direct buried piping shall be tested before being buried.
- g. Direct buried piping shall be buried such that, at a minimum, the bottom of the pipe is below the frost line.
- h. Direct buried butterfly valves are allowable with riser stems within 2' of the surface. These valve shall be bidirectional zero leak at 200 psi differential for dead end service.

#### 4. Heating hot water

- a. In tunnel systems, piping shall be Standard Schedule A53 EWR welded seam steel or better.
- b. Mechanical joint systems are limited to Victaulic and shall have a quality control program with go/ no go gauges and ability to purchase 10 year no leak insurance including consequential damages. Typically mechanical joints will be limited to non-critical areas where leakage does not cause catastrophic problems.
- c. Direct buried heating water systems shall be in pre-insulated, prefabricated piping system with HDPE jacket and 3" foam filled insulation. Piping shall be Standard Schedule.
- d. Heating hot water system and components shall be designed to 210°F and 200 psi and hydrostatically tested to 300 psi with no leakage allowed.
- e. Direct buried piping shall be tested before being insulated or buried.
- f. Direct buried piping shall be buried such that, at a minimum, the bottom of the pipe is below the frost line.
- g. Direct buried pipe shall have high performance butterfly valves that are located in vaults or manholes.
- h. Only if required, for buried heating hot water lines, U type expansion is required for all buried mechanical applications.

#### 5. Steam

- a. In tunnel systems, piping shall be Schedule 40 A53 EWR welded seam steel or better.
- b. Direct buried steam systems shall use insulated conduit piping system, Ric-Wil type or approved equal. Confirm requirement with UNMC Utilities. Steam systems shall properly slope, minimum of ¼" per foot in direction of steam flow. If conditions require condensate to flow in opposite direction of steam, Design Engineer shall demonstrate appropriate slope to allow appropriate drainage to the trap system.



- c. Steam system and components shall be designed to 350°F and 150 psi and hydrostatically tested to 225 psi with no leakage allowed.
  - d. Direct buried piping shall be tested before being insulated or buried.
  - e. Direct buried piping shall be buried such that, at a minimum, the bottom of the pipe is below the frost line.
  - f. For direct buried piping, valves shall be in a manhole or vault.
  - g. For buried steam lines, U type expansion is required for all buried mechanical applications.
6. Condensate
- a. In tunnel systems, piping shall be Schedule 80 A106 seamless steel or better.
  - b. Direct buried condensate systems shall be in pre-insulated, prefabricated piping system with HDPE jacket and 3" foam filled insulation. Piping shall be Schedule 80.
  - c. Condensate system and components shall be designed to 250°F and 150 psi and hydrostatically tested to 225 psi with no leakage allowed.
  - d. Direct buried piping shall be tested before being insulated or buried.
  - e. Direct buried piping shall be buried such that, at a minimum, the bottom of the pipe is below the frost line.
  - f. Condensate shall be brought into the bottom of the condensate return header.
  - g. No condensate flash tanks allowed.
7. All buried campus piping outside buildings shall be provided with underground warning #12 tracer wire, insulated, stranded and tied to each pipe.
8. All building system entrances shall use Link-Seal modular penetration seal or approved equal.
9. Steam meters shall be sized for no more than the normal operational maximum conditions and not the sum of all possible steam consumption. Steam meters shall be sized to meter the minimum anticipated steam flow in all operational conditions. If two meters need to be installed to facilitate this, it should be reviewed and coordinated with UNMC Utilities to ensure appropriate operation, reading and maintenance.

**General – Not Used**

## **Products**

1. Manufacturers
  - a. Perma-Pipe Piping Systems, Rovanco Piping Systems, Inc., Thermacor Process, L.P. Ric-wel
2. Factory-fabricated and -assembled, airtight and watertight, drainable, pressure-tested piping with conduit, inner pipe supports, and insulated carrier piping, fabricated so insulation can be dried in place by forcing dry air through conduit.
  - a. Carrier Pipe: Schedule 40 steel pipe complying with ASTM A 53/A 53M, Type E, Grade B with ends for welded joints.
  - b. 3" mineral-Wool Pipe Insulation.
  - c. Conduit: Spiral wound, steel. Cover with a high-density polyethylene jacket.
3. No expansion joints in manholes are allowed.
4. Valves shall be lug or flange (not wafer) coated disc, resilient seated butterfly type, 200 psi bi-directional dead-end service, with gear actuator on valves over 8" diameter.
  - a. Manufacturers: Bray, Dezurik
5. Steam Meter:

Manufacturers: ABB Swirl meter; Yokagawa Vortex
6. Condensate Meter:

Manufacturers: Niagara gear type meter
7. Chilled Water and Heating Hot Water Meter:

Manufacturers: ABB Magnetic; Yokagawa Magnetic

## **Execution**

1. Steam shall be metered on the inlet and shall be placed with 10 diameters straight pipe length upstream and 5 diameters straight pipe length downstream. Installed per manufacturers recommendations.
  - a. Steam meter shall have a 3 valve-bypass with lockable valve on the bypass side.
2. Condensate meter shall be installed on the pumped condensate outlet per manufacturer's recommendation.
3. Chilled water and heating hot water shall be metered on the inlet and outlet and shall be placed with 10 diameters straight pipe length upstream and 5 diameters straight pipe length downstream. Installed per manufacturers recommendations and without bypass.
4. Each system shall be connected to BMS and be installed with calibration and measuring

ports at the limits of the straight length of pipe.

5. All meters shall be operational and able to record use prior to service being turned on.
6. Provide complete system isolation immediately at the point of service entrance.
7. No water/fluid make-up shall be provided on systems that directly come from plant, i.e.: Chilled water and heating water systems. If heating water system can be independently isolated and operated, make up water connections shall be provided.
  - a. Make-up must be provided for segregated steam generated heating water systems.
8. Air/dirt separation will be done at the Utility Plant and shall not be done in individual buildings.

**Templates/Details and Specific Installations – Not Used**