



Architectural and Engineering Design Standards

**Capital Management Department
University of Iowa Hospitals & Clinics**

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INTRODUCTION

This document has been prepared to assist Design Professionals preparing professional services in the design, construction and maintenance of UIHC Facilities. This document has been reviewed and approved by a Standards Oversight Committee made up of UIHC representatives from Capital Management, Maintenance/Engineering, Communication Technology Services, Respiratory Therapy, Epidemiology, Ancillary Services, Guest Services/Housekeeping, and Safety & Security.

Preferred materials guidelines have been selected on the basis of extensive analysis. However, the most important guideline in the selection of construction materials is the strict compliance with mandatory building codes and industry reference standards. There may be particular circumstances in which, in the judgment of the Design Professional, cost effective viable alternatives are warranted. We welcome such recommendations and will consider each one of them carefully prior to implementation. As a part of the design process, the Design Professional shall submit in writing rationale for areas where specified manufacturers or products are not being utilized. Those instances require Owner approval. A form has been provided in Appendix K, and shall be filled in by the Design Professional. The completed form shall be returned to the Owner for approval during design.

The University of Iowa Hospitals & Clinics incorporates green principles in the placement, design and construction of new facilities and major renovation projects, targeting a minimum standard of Leadership in Energy and Environmental Design (LEED) Silver certification. Major project is defined as a facility over 20,000 gross square feet. A major capital renovation is defined as a construction budget that will cost more than 50% of the facility's replacement value. UIHC accomplishes this certification by focusing on the ecological, social and economic performance of each project. Design Professionals are required to adhere to these principles and strive for sustainability in all designs. This document will be updated periodically. Updates to this standard will only be made after careful consideration by members of the UIHC Standards Oversight Committee. A procedure has been developed for formal application of changes to the standard. Contact the Capital Management Department for the applicable forms.

Use of this standard does not relieve the Design Professional from adhering to engineering practices, applicable codes, etc. Where there is a conflict between the contents of these standard and applicable codes that which is more stringent will take precedence.

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Revision	Date	Description
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Revision	Date	Description
13	11/01/16	<ul style="list-style-type: none">• Updated Appendix E - UIHC Infection Control Specification (Section 01515)• Updated Section 4.19 – Updates to Division 27 added as Appendix• Added Appendix N – Division 27 - Communications

REVISION HISTORY

1. GENERAL REQUIREMENTS

1.1 Application of Design Standards

As addressed in the Introduction, these standards shall be adhered to for all UIHC projects in UIHC controlled facilities. It is the responsibility of the Design Professional to adhere to the standards herein. As a part of the design process, the Design Professional shall submit to the Owner in writing an explanation of instances where sections of the standards are not being followed. Each relevant design phase will not be considered complete until it has been established that the standards herein are adhered to.

1.2 Applicable Documents

This section contains a list of the codes, regulations and standards that Design Professionals shall utilize for projects at UIHC. This section is split into two subheadings to differentiate the required codes and guidelines from reference standards for specific applications.

1.2.1 Building Codes and Standards

At the time this document was released, the following codes and standards were approved by the state of Iowa that all design and construction at UIHC shall adhere to. Design professionals shall validate these are current before a project begins.

Note: The Iowa State Building Code Chapter 301, 2011 edition establishes IBC 2009 for the general requirements for building construction in the state of Iowa. However, the fire safety requirements of the Life Safety Code, NFPA 101 2000, supersede those of IBC 2006 and shall be adhered to per Section 301.3(1) of the Iowa Building Code. ADA – Title III Regulations- 28 CFR Part 36; Appendix A 2010 ADA Standards for Accessible Design.

Licensed Healthcare Facilities-

- FGI Guidelines for Design and Construction of Hospitals and Healthcare Facilities, 2010
- CMS Conditions of Participations, Subchapter G, Part 482
- Iowa State Fire Code {IAC 661 – Chapter 205}
- Iowa State Building Code {IAC 661 – Chapters 300, 301, 302, 303, 310, and 350}
- Iowa State Electrical Code {IAC 661 – Chapter 504}
- Iowa State Mechanical Code {IAC 461 – Chapter 61}
- Iowa State Plumbing Code {IAC 461 – Chapter 25}

State Owned Facilities-

- Iowa State Fire Code {IAC 661 – Chapters 200 and 201}
- Iowa State Building Code {IAC 661 – Chapters 300, 301, 302, 303, 310, and 350}
- Iowa State Electrical Code {IAC 661 – Chapter 504}
- Iowa State Mechanical Code {IAC 461 – Chapter 61}
- Iowa State Plumbing Code {IAC 461 – Chapter 25}

1.2.2 Reference Documents

The following sections include applicable standards that should be utilized for reference when designing for individual applications.

1.2.2.1 Telecommunication Applications

Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, ANSI J-STD-607-A, 2002

Standards for Telecommunications Pathways and Spaces, ANSI/TIA/EIA-569-B, 2003

Commercial Building Telecommunications Cabling Standard, ANSI/TIA/EIA-568-B Hospital Signaling and Nurse Call Equipment, UL 1069

1.2.2.2 Fire Safety, Safety and Security Applications

Factory Mutual Data Sheets

Code of Federal Regulation (CFR) Title 10 – Energy, Chapter 1 – Nuclear Regulatory Commission (NRC); www.nrc.gov/NRC/CFR/index.html

Part 20 (10 CFR 20), Standards for Protection Against Radiation

1.2.2.3 Electrical Applications

Standard for Emergency and Standby Power Systems, NFPA 110, 1999

Standard for the Installation of Lightning Protection Systems, NFPA 780, 2004

Standard for Installation Requirements for Lightning Protection Systems, UL 96A, 2001

Standard for Electrical Safety in the Workplace, NFPA 70E OSHA 29 CFR-1910, Subpart S

1.2.2.4 Heating, Ventilation and Air Conditioning Applications

Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A, 1999

Guideline for Environmental Infection Control in Healthcare Facilities: MMWR 2003; 52 (No. RR-10): 1-2, CDC/HICPAC 2003 – for design of isolation rooms

1.2.2.5 Exterior Applications

Iowa DNR Storm Water Discharge Regulations, <http://www.iowadnr.com/water/stormwater/forms.html>

1.2.2.6 Casework Standards

Architectural Woodwork Standards 2014

1.2.2.7 Heliports & Elevators

Standard for Heliports, NFPA 418, 1995

Iowa Administrative Code, Chapter 89A, Elevators

1.2.2.8 Roof Tie-Off Anchors

Window Cleaning Safety Standard, ANSI/IWCA 14.1-2001

1.2.2.9 Roof System Design Standards

All roof systems at UIHC shall be designed by the Design Professional or a qualified consultant to comply with the current versions of the following standards (see 2.1.5 FM Global Roof Compliance Process and Divisions 05, 06, and 07 for additional information):

FM Global RoofNav (www.fmglobal.roofnav.com)

1. Internal Fire: Meet Class 1 (steel decking) or Class NC (concrete decking).
2. Exterior Fire: Meet Class A.
3. Hail: Meet Severe Hail (SH).
4. Wind: Meet the more stringent of either FM Global RoofNav Calculator or ASCE/SEI 7-10 (using Risk Category 3/4 Wind Map).
5. Identify roof systems with rating-compliant RoofNav Assembly Numbers and specify these assembly numbers.

FM Global Loss Prevention Data Sheets 1-28, 1-29, & 1-49

ASCE/SEI 7-10 (Use Risk Category 3/4 Wind Map)

UL Fire Resistance Directory

NRCA Manual 2016

ANSI/SPRI ES-1

SMACNA Manual 2015

Roof Manufacturer's Published Design and Installation Requirements

1.2.2.10 Pharmacy Applications

United States Pharmacopeia (USP) Reference Standards; including USP 797, (Or USP 800 when issued)

1.2.2.11 Lasers

American National Standard for the Safe Use of Lasers in Health Care Facilities, ANSI Z136.3-2005

1.3 Risk Assessment/Infection Control

Every project has unique safety considerations. All construction projects shall develop a risk assessment and infection control strategy. The infection control measures are outlined in Section 01 35 33 Interim Infection Control measures of the specifications, the latest version of which is in Appendix E. The UIHC Project Risk Assessment procedure shall be followed, and a completed risk assessment form shall be presented to the Project Risk Assessment Committee twice during the design for approval.

The following is a list of design considerations that should be included in projects where applicable: zoning of construction, egress issues, lockout/tagout, exit signs in construction areas to be covered or extinguished, pedestrian vehicular traffic, parking, critical life safety shutdowns, fire alarm/sprinkler shutdowns...

1.4 Site Design Considerations

During design, it is incumbent on the Design Professional to perform existing condition checks, including checking dimensions of spaces, a review of existing utilities and infrastructure, etc.

During the existing conditions checks, it is the Design Professional's responsibility to adhere to the UIHC Infection Control standards. Use of plastic enclosures will be required in several areas of the hospital for above ceiling inspections. Contact the Owner's Rep. to obtain information on the infection control classification for areas.

1.5 Utility Energy Incentives

All projects should be considered for the MidAmerican Energy Rebate for Construction program. The earlier in the design process this is reviewed, the more potential savings can be gained. Review the specifics of the program at the following website – http://www.midamericanenergy.com/pdf/ee_eaa_brochure.pdf

1.6 Existing Hospital Finishes

Verify with the Owner's Representative if existing finishes used within the project area are to be retained for the project. In areas where existing finishes won't be used Owner approval is required.

2. DESIGN DELIVERABLES

2.1 Design Deliverable Requirements

This section contains information regarding what is required from the Design Professional during the design process. It represents the minimum acceptable level of document performance and quality. These requirements are not intended to add to the basic design contract but rather clarify and define the expectations under the terms of the contract. Please see Appendix M for Capital Management's Design Process.

2.1.1 State of Iowa Board of Regents Submissions

The Design Professional is required to assist with the creation and printing of the Schematic Design Booklet for submission to the State of Iowa Board of Regents for projects with budgets exceeding the minimum thresholds. The booklet requirements vary depending on the size, type and complexity of the project but will include a project location map; colored floor plans; elevations and/or color renderings to convey the look and feel of the spaces; basic budget and schedule information and other documents requested to help the State of Iowa Board of Regents understand the character and scope of the project.

2.1.2 Schematic Design

The schematic design documents should illustrate the general scope of the project and the relationships of the project components. The schematic design documents are conceptual in nature and the drawings are generally presented as a single-line type drawing showing the type of construction, materials and provide a visual organization of the overall project.

The required information should be assembled into a project booklet or binder with drawings and submitted to the Owner's Representative with the completed Schematic Design Required Deliverables Checklist (Appendix A). When the schematic design submission is approved by the Owner the signed checklist will be sent back to the Design Professional as formal permission to begin design development.

The minimum acceptable level of information required for the schematic design submission is as follows:

1. Written Requirements
 - a) Detailed code analysis indicating the applicable codes, standards, guidelines, construction types, occupancy classification, seismic requirements and relevant assumptions.
 - b) Current space program signed off by the department. The program will include net square feet (NSF), and departmental gross square feet.
 - c) Cost estimate with a detailed explanation of any variance to the Owner's construction cost estimate.
 - d) LEED checklist indicating which points project will attempt or not attempt and which point are being evaluated.
 - e) Updated project schedule, include plan (if necessary) for meeting the Owner's milestone dates.
 - f) Document survey of mechanical, electrical, plumbing and telecom systems and any issues that may affect this project.

2. Drawing Requirements

a) General

- i. All drawing sheets shall contain the official project title, project number, drawing revision date, scale information and indicate drawing orientation.
- ii. Provide symbol legend and abbreviation list for all design disciplines.
- iii. All architectural, structural, mechanical and electrical drawings shall indicate their respective preliminary requirements for construction phasing, temporary HVAC & power requirements, Infection Control and Interim Life Safety Measures. Emphasis should be to minimize the impact of the proposed construction activities on the adjacent area's operations.
- iv. Include preliminary demolition plans for all design disciplines showing the existing area and clearly differentiating between existing and new work.

b) Architecture drawings shall include:

- i. Life safety plan showing egress pathways, occupant loads, fire ratings and area separations, applicable codes, construction types, occupancy classifications and other assumptions or requirements.
- ii. Project site map identifying the contractor's route for moving supplies and debris to and from the project site while minimizing the impact to patient care areas.
- iii. Floor Plans for new work – single-line drawings are acceptable. Drawing should convey space allocation with the intended partition layout. Major areas should be designated with their critical adjacencies identified.
- iv. Identify locations of maintenance and utility areas such as housekeeping, mechanical, electrical, telecommunication and communication rooms.
- v. Departments and rooms should be labeled with the proper names and include net square feet and programs square feet on the drawing.
- vi. Roof Plans, showing roof perimeters, major penetrations, primary and overflow drainage devices, valley and ridge lines, slopes, and access points.
- vii. Equipment: indicate preliminary location of any imaging, medical, kitchen and lab equipment and other special features. Equipment should be coordinated for all disciplines and preliminary M/E/P provisions should be indicated.
- viii. Special Conditions – Identify any special conditions such as shielding, isolations room, laser equipment rooms, clean rooms, automatic doors, etc.
- ix. Provide elevations, perspective renderings, and/or sections necessary to illustrate and explain complex spaces, building intersections, and high impact areas.

c) Mechanical drawings shall include:

- i. One-line riser diagram with point of connection information for plumbing/ vent, domestic water, medical gasses, steam and hydronic systems.
- ii. Mechanical Equipment Schedules for major equipment including air handling units, heat exchangers, exhaust fans, return fans, etc.
- iii. Preliminary ventilation schedule that includes, Room Name, Served by AHU#, airflow direction, pressure differential, and required air changes per hour (ACH).
- iv. Preliminary one-line diagrams for duct layouts, chilled water, heating hot water, plumbing, steam and condensate piping, include point of connection information.
- v. Floor plans should include preliminary mechanical room layouts (major equipment only) and roof mounted equipment layout, space requirements for servicing should be indicated.
- vi. Roof Plans showing roof perimeters, major penetrations, and primary and overflow drainage devices.

- vii. Preliminary temperature control diagram that graphically identifies heating/ cooling zones and thermostat locations.
 - viii. Preliminary fire protection drawings identify fire protection zones, major equipment and note any special requirements like pre-action or chemical systems.
- d) Electrical drawings shall include:
- i. Preliminary electrical one-line distribution diagram. Indicate location of switchboards, motor control centers, panels, transformers, emergency generator.
 - ii. Preliminary core lighting layout with typical lighting types and levels
- e) Communication drawings shall include:
- i. Identify telecommunication room location/s. Include dimensions of room
 - ii. Identify communication room location/s. Include dimensions of room
 - iii. Preliminary security diagram showing the zones of security and the level of security at each affected opening.
 - iv. Preliminary fire alarm diagram with panel location.

2.1.3 Design Development

The design development documents should further develop and refine the schematic design documents, giving more detail and information. The Design Professional shall provide drawings and other documents to fix and describe the size and character of the entire project. The final design development submission should include all drawing sheets and schedules there should be no need to add additional drawing sheets or schedules after design development.

The required information should be assembled into a project booklet or binder with drawings and submitted to the Owner's Representative with the completed Design Development Required Deliverables Checklist (Appendix B). When the design development submission is approved by the Owner the signed checklist will be sent back to the Design Professional as formal permission to begin construction documents.

1. Written Requirements
 - a) Updated code analysis with an executive summary of changes to the previous submission.
 - b) Updated space program information with an executive summary of any changes to the previous submission.
 - c) Specification for all disciplines and sections – provide information about materials, acceptable manufacturers, equipment, components and specific project requirements. Specification should be CSI Master Format 2004.
 - d) Interior finish/ Material Selection Board/s.
 - e) Cut-sheets for proposed mechanical, electrical and plumbing fixtures.
 - f) Cut-sheets for proposed equipment purchases
 - g) Room data sheets for every room and space signed off by the Stakeholders.
 - h) Updated cost estimate with an executive summary of any variance to the previous submission and to the Owner's original construction cost estimate. Include a list of suggested protective alternates and their estimated costs.
 - i) Updated project schedule, include plan (if necessary) for meeting the Owner's milestone dates. Schedule should also include the anticipated construction schedule with durations for each construction phase.
 - j) Preliminary Architect/ Engineer Compliance Disposition form (See Appendix H).

2. Drawing Requirements

a) General

- i. All drawing sheets and schedule, however incomplete, should be included in the drawing set submitted at the end of design development.
- ii. All sheets should contain the official project title, project number, drawing revision date, scale information and indicate drawing orientation.
- iii. Provide symbol legend and abbreviation list for all disciplines.
- iv. All architectural, mechanical and electrical sheets shall indicate their respective requirements for construction phasing, temporary HVAC & power requirements, Infection Control and Interim Life Safety Measures.
- v. All areas shall be numbered with the Owner assigned room numbers, see Section 3.1 UIHC Room Numbering for details. Room numbers should be used consistently on all drawings and schedules.
- vi. Updated demolition plans showing the existing area and clearly differentiating between existing and new work. Indicate any salvaged materials, items to be saved and re-installed, restricted hours for noisy/disruptive work and debris removal, required fire watch, special signage or pedestrian traffic rerouting and any other special infection control requirements for the demolition phase.

b) Architecture drawings shall include:

- i. Updated life safety plan should include egress travel distances, area calculations - allowable and actual areas, exit widths - required and actual exiting.
- ii. Updated project location map, should include debris removal route, dumpster location, debris chute location.
- iii. Updated floor plans should include key dimensions, corridor width dimensions, column lines and labels, locations of all partitions, doors and door swing, windows, plumbing fixtures, millwork, equipment, lockers, pneumatic tube stations, fire extinguisher cabinets and mechanical chases. Update special conditions such as shielding, isolation rooms, laser equipment rooms, clean rooms and automatic doors. Rooms should be labeled with name and number and include as-drawn square footage information.
- iv. Updated roof plans, which are to include all perimeters, roof penetrations, primary and overflow drainage devices, walkways, equipment, access points, valley and ridge lines, slopes, tapered insulation, and roof attachment enhancement zones at perimeter and corner areas. Detail drawings shall be provided showing the roof assembly cross section(s), attachment details, and flashing details at all perimeters and at major penetrations.
- v. Equipment: update floor plans and schedules. Floor plan should show the location and represent the actual size. The equipment schedule should indicate equipment type, make, model, room number, dimensions and required utility connections and capacities for both new and existing equipment. Indicate Owner furnished items and contractor furnished items and installation assignments (OFCI, CFCI, etc.). Coordinate equipment locations and utility connection information with all disciplines.
- vi. Updated furniture layout, include selected vendor's furniture layout. Coordinate with power, lighting, and communication drawings.
- vii. Include preliminary manufacturer site specific drawings (reference only) for major Owner furnished equipment like imaging equipment, hydrotherapy pools, operating room equipment, etc.
- viii. Identify any areas that will need extraordinary floor preparation including expansion joint preparation, self-leveling compound, grinding for floor drain slop, bead blasting and skim coating.
- ix. Interior elevations for typical areas and unique situations should include furniture, fixtures, millwork, computers, plumbing fixtures, electrical outlets, nurse call, medical gas outlets and all new and existing Contractor and Owner furnished equipment.

- x. Include typical wall type sections showing wall composition, materials and fire ratings with UL test numbers.
 - xi. Preliminary door and frame schedule indicate hardware groups, special hardware, security and electrical requirements.
 - xii. Preliminary window schedule, include glazing, frame type and finish.
 - xiii. Preliminary finish drawing/s depicting material selections for walls, flooring, base, and ceiling. Include decorative flooring & ceiling patterns/ elements.
 - xiv. Preliminary reflected ceiling plan showing ceiling heights, bulkheads, soffits, light fixtures, diffusers, grills, access panels, patient lifts, cubical curtain track and all devices that penetrate or are mounted in/upon finished ceiling. Coordinate reflected ceiling plan with the mechanical and electrical drawings.
 - xv. Preliminary interior signage locations shown on the floor plan with standard details and message schedules.
- c) Mechanical drawings shall include:
- i. Preliminary mechanical room floor plans should indicate equipment location, size, and the required space for equipment maintenance and service. Plans should include all equipment including air handling units, return fans, exhaust fans, heat exchangers, pumps, humidifiers, water condition systems and the required electrical panels, disconnects, systems control panels, and variable speed drive (VSD) locations and mounting methods.
 - ii. Preliminary equipment schedule with sizes and capacities indicated
 - iii. Updated ventilation schedule should now also include supply, return, exhaust and transfer size, quantity, type, CFM each, CRM total.
 - iv. Updated temperature control diagram with zones and thermostat locations clearly identified.
 - v. Preliminary smoke damper schedule showing related smoke zones and matrix showing responsibility for power wiring, control wiring, step-down transformer placement and zoning and who provides and installs the dampers.
 - vi. Preliminary temperature control schematic and sequence description.
 - vii. Updated roof plans showing roof perimeters, all proposed rooftop equipment and penetrations, primary and overflow drainage devices, stacks, plumbing vents, rooftop piping, and piping and equipment supports.
 - viii. Identify, and include section drawings for areas with a potential for coordination problems such as corridors, mechanical rooms and operating rooms. Show both new and existing utility placements with dimensions. Include structural members, architectural features and all trades and utilities.
 - ix. Acoustical and vibration control analysis (if required).
 - x. Location and routing of ductwork and piping with sizes, capacities and point of connection information.
 - xi. Updated riser diagram for plumbing, domestic water, steam and medical gasses with point of connection information.
 - xii. Indicate all plumbing fixtures, floor sinks and drain locations. Include preliminary fixture schedule.
 - xiii. Indicate special systems such as medical air, laboratory air, non-potable water, reverse osmosis, de-ionized water systems, etc. Indicate required equipment locations and piping requirements.
 - xiv. Identify fire pump requirements and size and other equipment schedule/ locations.
 - xv. Specify sprinkler system types; dry, wet, pre-action and/or chemical.
 - xvi. Specify sprinkler head type (concealed, semi-recessed, and exposed).
 - xvii. Identify sprinkler areas located with hazard classification.
 - xviii. Stand pipe locations.
- d) Electrical drawings shall include:

- i. Further development of one line electrical distribution diagram, including normal / emergency / life safety power. Include point of connection information.
 - ii. Light fixture layout should be shown in the reflected ceiling plan (RCP) with fixtures labeled and a fixture schedule. This should include general lighting, emergency lighting (clearly identified) and exit signs. Indicate dimming where necessary.
 - iii. Preliminary equipment layouts and schedules with sizes, capacities and locations. Include required chases and details if appropriate.
 - iv. Preliminary panel schedule.
 - v. Any special features (under floor raceways, access flooring, etc.) should be further detailed.
 - vi. Mechanical area floor plans should indicate required space, with required clearances shown, for electrical equipment and panels.
 - vii. Power distribution equipment (schedule and locations), feeder sizes, emergency generator size / location.
 - viii. Roof plans showing roof perimeters, all proposed rooftop electrical equipment, roof penetrations, rooftop conduits, raceways and cable trays, and support systems.
- e) Communication drawings shall include:
- i. Communication plan shall be developed further and include telephone, data, nurse call locations, special nurse call and signal light systems, fire alarm pull stations, horn/strobes, fire alarm panels, door security, automatic door operators, cameras, and duress button locations. Include low voltage responsibility matrix on drawing showing required work and responsibilities.
 - ii. Show telecommunication room (TR) location/s with the standard room configuration. Coordinate electrical and HVAC requirements for TR.
 - iii. Show complete pathway for low voltage wiring including cable tray, include standard pathway detail on drawings.
 - iv. Show communication room location/s and indicate panel mounting locations. Coordinate electrical and HVAC requirements for communication room.
 - v. Further develop security diagram showing locations of duress buttons, camera locations, zones of security and the level of security at each affected opening.
 - vi. Roof plans showing roof perimeters, all proposed rooftop communication equipment, roof penetrations, rooftop conduits, raceways and cable trays, and support systems.

2.1.4 Construction Document

The construction documents should be a refinement of the design development documents. No substantive changes from the approved design development documents shall be made without prior consultation and approval of the Owner. All portions of the documents should be fully detailed and all elements that relate to constructability defined. The more detail included with the plans ensures the best project in terms of quality and will result in accurate pricing and a lower number of request for interpretation (RFI) and changes to the contract.

The A/E shall coordinate communications between the Owner and the State of Iowa Fire Marshall's Office to receive written approval to bid the project.

The required information should be assembled into a project booklet or binder with drawings and specifications and submitted to the Owner's Representative with the completed Construction Documents Required Deliverables Checklist (Appendix C). When the construction documents submission is approved the signed checklist will be sent back to the consultant. This will allow the Design Professional to invoice for 100% of the construction documents portion of their fee.

1. Written Requirements
 - a) Final Basis of Design document with an executive summary of any changes to the previous submission.
 - b) Final code analysis with an executive summary of changes to the previous submission.
 - c) Final space program information with an executive summary of any changes to the previous submission.
 - d) Complete specification in CSI Master Format
 - e) Final Interior Finish Color Board/s.
 - f) Statement of coordination verifying that all ductwork, piping, conduit, lighting, cable tray, bus duct, and other above ceiling facilities will fit at the stated height above the finished floor.
 - g) Final cost estimate with an executive summary of any variance to the previous submission and to the Owner's original construction cost estimate. Include separate estimates for any construction alternates, allowances, or unit prices not included in the base bid.
 - h) Updated project schedule, include plan (if necessary) for meeting the Owner's milestone dates. Schedule should also include the anticipated construction schedule by phase and critical path and key milestones dates identified for the major components of the construction.
 - i) Final drawing review approval or written approval to bid project from the State Fire Marshal's office.
 - j) Copy of the signed and sealed Energy Code Statement of Review Form (if required because of the Project size and type).
 - k) Draft Advertisement for bid.
2. Drawing Requirements
 - a) General
 - i. All drawing sheets shall contain the official project title, project number, drawing revision date, scale information and indicate drawing orientation
 - ii. Provide symbol legend and abbreviation list for all disciplines
 - iii. All areas shall be numbered with the Owner assigned room numbers. Room numbers should be used consistently on all drawings and schedules.
 - iv. All architectural, mechanical and electrical sheets shall indicate their respective requirements for construction phasing, temporary HVAC & power requirements, Infection Control and Interim Life Safety Measures.
 - v. Completed demolition plans for all disciplines.
 - vi. Include final manufacturer site specific drawings (reference only) for major Owner furnished equipment like imaging equipment, hydrotherapy pools, operating room equipment, etc.
 - b) Architecture drawings should include:
 - i. Complete life safety plan.
 - ii. Complete project location map.
 - iii. Complete floor plans for every level wall partitions dimensioned from the grid or column reference system. All rooms should be shown with correct room number and label.
 - iv. Complete roof plans incorporating all perimeters, roof penetrations, primary and overflow drainage devices, walkways, equipment, access points, valley and ridge lines, slopes, taper insulation, and roof attachment enhancement zones at perimeter and corner areas. Detail drawings shall be provided showing the roof assembly cross section(s), attachment details, and flashing details for all perimeters, penetrations, and primary and overflow drainage devices. Equipment locations and configurations of flashing details shall be carefully coordinated with the mechanical, electrical, and communication drawings and details.

- v. Complete ADA plan and drawings, including but not limited to, dimensions for clearances, mounting heights for fixtures and devices and specified door hardware for path of travel. Create an ADA "Punch List" to address outstanding ADA issues.
 - vi. Complete interior elevations for typical areas and unique situations. Elevations should include furniture, fixtures, millwork, computers, plumbing fixtures, electrical outlets, nurse call, medical gas outlets and all new and existing Contractor and Owner furnished equipment.
 - vii. Final casework floor plan complete elevations and details.
 - viii. Final equipment plans and schedules. Coordinate equipment locations and utility connection information with all disciplines.
 - ix. Include final furniture layout, include selected vendor's furniture layout. Coordinate layout with power, lighting, and communication drawings. Include pathways and electrical circuits for powering freestanding panels and workstations where required.
 - x. Typical wall type sections showing wall composition, materials and fire ratings with UL test numbers.
 - xi. Complete door and frame schedule. Include elevations with required undercut and frame/door clearances, and details for all head and jamb conditions.
 - xii. Complete window schedule, include glazing, frame type and finish. Include elevations and details for all head, jamb and sill conditions.
 - xiii. Complete finish drawing/s showing colors and material selections for walls, flooring, base and ceiling. Include decorative flooring & ceiling patterns/ elements.
 - xiv. Complete reflected ceiling plan showing ceiling heights, bulkheads, soffits, light fixtures, diffusers, grills, access panels, patient lifts, cubical curtain track and all devices that penetrate or are mounted in/upon finished ceiling. Coordinate reflected ceiling plan with the mechanical and electrical drawings.
 - xv. Interior signage locations shall be shown on the floor plan complete with standard details and message schedules.
- c) Mechanical drawings should include:
- i. Complete mechanical room layouts with equipment locations with required maintenance clearances shown.
 - ii. Complete duct and pipe sizing layouts.
 - iii. Complete riser diagram for plumbing, domestic water, steam, and medical gasses with point of connection information.
 - iv. Complete equipment schedules.
 - v. Final section drawings for areas with a potential for coordination problems such as corridor, mechanical rooms, operating rooms. Show both new and existing utility placements with dimensions. Include structural members, architectural features, all new trade work and existing utilities.
 - vi. Complete roof plans showing roof perimeters, all proposed rooftop equipment and penetrations, primary and overflow drainage devices, stacks, plumbing vents, rooftop piping, and piping supports. Clearances shall be noted for all equipment and piping. Detail drawings shall be provided for all roof curbs, roof drains, overflow drains, rooftop equipment, and rooftop supports, and shall be carefully coordinated with the Architectural Drawings. Unique details or areas with complex coordination needs explained on the drawings through elevations, sections and notes.
 - vii. Complete temperature control zone drawings showing thermostat and TAB locations.
 - viii. Complete ventilation schedule.
 - ix. Complete smoke damper schedule showing related smoke zones and matrix showing responsibility for power wiring, control wiring, step-down transformer placement and zoning and who provides and installs the dampers.
 - x. Complete control schematic, point listing and sequence of operation.

- d) Electrical drawings should include:
 - i. Complete one line diagram of the electrical power distribution system
 - ii. Final locations of primary distributions switchgear, transfer switches, emergency generators, transformers, disconnects and other electrical equipment.
 - iii. Complete electrical floor plans clearly identify circuiting and other requirements for outlets, equipment, step-down transformers, dampers and signal systems.
 - iv. Complete roof plans showing roof perimeters, all rooftop electrical equipment, roof penetrations, rooftop conduits, raceways and cable trays, and support systems. Clearances shall be noted for all equipment and rooftop conduits, raceways, and cable trays. Detail drawings shall be provided for all rooftop equipment, roof penetrations, and rooftop supports, and shall be carefully coordinated with the Architectural Drawings.
 - v. Complete lighting and power panel schedules.
 - vi. Lightning protection plans (if required) with required UL testing information identified.
- e) Communication drawings shall include:
 - i. Final communication drawing with responsibility matrix on drawing outlining the required work and responsibilities.
 - ii. Final security systems drawing with responsibility matrix on drawing outlining the required work and responsibilities.
 - iii. Final fire alarm drawings.
 - iv. Final roof plans showing roof perimeters, all rooftop communication equipment, roof penetrations, rooftop conduits, raceways and cable trays, and support systems. Clearances shall be noted for all equipment and rooftop conduits, raceways, and cable trays. Detail drawings shall be provided for all rooftop equipment, roof penetrations, and rooftop supports, and shall be carefully coordinated with the Architectural Drawings.

A formal design review is required at 90% CD completion. The drawings and specifications should be complete at this point. The Owner will review the complete set and provide comments. The Design Professional will incorporate the review comments into the final set of documents to be released for bidding. See Construction Documents Required Deliverables Checklist (Appendix C) for required submittals.

2.1.5 Record Documents

1. The Design Professional shall provide two CD(s) or DVD(s) of Record Documents (drawings and specifications) including revisions made during construction, within thirty (30) days following final acceptance of the project. These documents shall incorporate all accepted Change Orders, changes made via the submittal process, supplemental documents, and changes noted on the Contractor's Mark Ups. Send Record Documents CD(s) or DVD(s) to: University of Iowa Hospitals and Clinics Capital Management 800 Evashevski Drive, HPR3 SB6, Iowa City, Iowa 52242.
2. The format for all electronic documents on CD(s) or DVD(s) shall be as follows:
 - i. The Project Manual shall read "Construction Set" or "Record Documents" as appropriate on the front cover and shall be a multi-page .pdf and have blank pages inserted.
 - ii. Drawings shall be labeled "Construction Set" or "Record Documents" as appropriate in the revision area of the title block and on the cover with a date. They shall include both single page .pdfs and .dwgs files named with U of I "project number-sheet title."

- iii. All .dwgs files shall have all x-refs bound and all raster attachments included. Entities created with AutoCAD extensions shall be exploded or exported so they are correctly represented in AutoCAD, AutoCAD map or AutoCAD Set or Architectural Desktop.
- iv. The CD(s) or DVD(s) shall be labeled with U of I Project Number and Construction Set or Record Documents as appropriate.

2.1.6 FM Global Roof Compliance Process

UIHC is insured by FM Global. As such, the roof's design and installation will be required to meet FM Global standards. There are specific processes that shall be performed in proper sequence by the Design Professional and Contractor, to ensure that FM Global requirements are met. The Design Process shall be performed by the Design Professional prior to bidding the project. The Construction-Phase Process shall be performed by the Contractor, in accordance with requirements spelled out in the bid documents by the Design Professional.

Design Process

1. Determine interior fire, external fire, and wind ratings using FM Global RoofNav website rating calculator process. Severe Hail (SH) rating to be used.
2. After determining ratings, perform search for FM Global Approved RoofNav Assemblies and associated Assembly Numbers for specified roof membrane manufacturers, using the RoofNav database. Roof system selection within RoofNav shall include only those components and application methods meeting UIHC's roofing standards, and meeting membrane manufacturer's requirements for issuance of the warranty types as required by UIHC's roofing standards.
3. Include RoofNav Assembly Numbers in the bid documents for the specified roof systems.
4. Specify all aspects of the roof system (i.e. decking, carpentry, insulation/cover board, roofing membrane, and roof-related sheet metal) to meet the requirements of FM Global Loss Prevention Data Sheets (LPDS) 1-28, 1-29, and 1-49 and RoofNav.
5. Submit bid specifications to FM Global for acceptance for bidding. Thomas Lauer of FM Global is UIHC's representative, and should be contacted for assistance with review coordination. Tom can be reached at 319.466.1190 or thomas.lauer@fmglobal.com.
6. Incorporate the resolution of FM Global's review comments into the final bid documents or by addenda if review comments are received after bid documents are issued.

Construction-Phase Process

1. Installing Contractor prepares roofing and roof related sheet metal submittals, FM Global RoofNav "Contractor Package" for each assembly, and preliminary FM Global Form X-2688 – Application for Acceptance of Roofing System for each assembly, and submits to the Design Professional for review. This submittal package shall demonstrate that all aspects of the roof system and roof related sheet metal work comply with the specifications and represent combinations of products that comply with the specified RoofNav Assembly Numbers.
2. Roofing manufacturer and Design Professional assist Contractor with this submittal, as necessary. Review and revisions shall proceed until the submittal is judged to be capable of passing FM Global review and approval.
3. Contractor then transmits roofing and roof related sheet metal submittals, FM Global RoofNav "Contractor Package" for each assembly, and FM Global Form X-2688 – Application for Acceptance of Roofing System for each assembly to FM Global for review and approval.

FM Global reviews and provides comments. If all of the prior steps have been completed satisfactorily, FM Global approval should be a turnkey process. This step, in conjunction with final field review, will provide the formal acceptance for the roof system.

3. DRAWINGS & SPECIFICATIONS

3.1 UIHC Room Numbering

The Department of Engineering Services assigns all room numbers within the University of Iowa Hospitals and Clinics. The Design Professional should submit an electronic floor plan for room number assignments toward the end of the schematic design after the floor plan is set. Drawings should be sent to Renae Meyer at (renae-meyer@uiowa.edu) in an AutoCAD format. Please allow up to ten working days for room number assignment. The Design Professional shall use the assigned room numbers for all design development drawings and schedules.

Subsequently, when there are any changes to the floor plan during the later stages of design or construction the Design Professional is responsible for sending electronic drawings to Engineering Services for room number modifications.

No project should move beyond Schematic Design without UIHC assigned room numbers.

4. ARCHITECTURAL & ENGINEERING STANDARDS

4.1 Division 01 – General Requirements

01 35 33 Infection Control: See Appendix E for the Infection Control specification

01 41 00 Regulatory Requirements

1. All Construction Documents shall include:
 - a) The editions of those codes upon which the design is based.
 - b) Interim life safety measures that are specific to each project.
 - c) For projects that are solely mechanical in nature, fire code drawings are required to be included in the bid set. These are necessary to identify fire and smoke walls that will, in turn, clearly identify where fire stopping and smoke proofing measures are required. Fire code drawings showing current fire and smoke walls are available from the Owner for many areas of the facility.

01 43 00 Quality Assurance

1. Before the start of new construction activities a pre-construction conference shall be held with all relevant parties present.
2. Testing shall be conducted in the presence of the Capital Management Quality Assurance representative and/or the Project Manager. Testing shall include but not be limited to: window testing, roof testing, pipe pressure testing, medical gas certification, etc.

01 78 36 Warranties

1. Where appropriate, warranty periods for mechanical equipment that are greater than the one year warranty specified in Division 1 of the Owner standard specifications. Extended warranties shall be required for:
 - a) Variable frequency drives (2 years).
 - b) Pumps (2 years).
 - c) Air handling units over 5,000 cfm (2 years).
 - d) Sheet metal flashings for roofs and wall systems (10 years).
2. Minimum roof system warranties shall be as follows:
 - a) 15-year, no-dollar-limit, non-prorated, total system, labor and material warranty from the primary roof membrane manufacturer. Warranty shall include membrane, membrane flashings, roof membrane adhesion, membrane flashing adhesion, roof insulation and coverboard, roof insulation and coverboard attachment, and all accessories supplied by the membrane manufacturer.
 - i. Review with UIHC Project Manager if special warranty provisions are required for wind uplift, hail resistance, or incidental puncture resistance, and negotiate with the roof membrane manufacturer during the schematic design phase. Refer to Roof Membrane Selection Guidelines Matrix (Appendix F) for related information.
 - b) 20-year warranty for Kynar 500/Hylar 5000 paint finish for sheet metal flashings.
3. The Design Professional shall review with the Owner any other items that may merit extended warranties.
4. Warranties shall start upon the Owner's final acceptance of the project or substantial use.

4.2 Division 02 – Existing Conditions

02 42 00 Selective Demolition

1. Demolition of Lead Shielding: The material must be removed intact and shall not be damaged (torn, drilled, sanded or abraded). If the lead is not separable from the regular construction waste, Health Protection Office must be notified. Review the information contained in the Lead Safety Awareness training section of the following link:

<http://www.uiowa.edu/~hpo/training/trainingpage.htm>

2. Demolition of Carpet: Carpet removed from spaces during remodeling shall be recycled if the manufacturer offers that option.
3. Capital Management will be responsible for asbestos testing, by using Steve Henneberry at the University of Iowa Environmental Services (319-335-6477).

4.3 Division 03- Concrete

Lightweight structural concrete shall not be specified for roof decks or other roof system substrates. Excessive moisture held in this type of structural deck system is not conducive to proper roof system installation and long-term roof performance.

Roof slope shall be provided by the structural roof deck, in lieu of installing level framing and using tapered insulation, unless vertical building expansion could occur in the future. Consult with the Owner's Project Manager during the Schematic Design Phase.

03 45 00 Plant-Pre-cast Architectural Concrete

The Mix Design for the exterior Pre-Cast at UIHC shall be per the following table. The Design Professional shall request sample approval in the submittal process for Owner approval.

T1W-T3G-.40-5%				
POUNDS	ONE CUBIC YARD S. S. D.	CU. VOL		SP. GR.
1645#	1/2" FORT DODGE LIMESTONE	9.95		2.65
1330#	#8 PLATTE RIVER SAND	8.14		2.62
513#	LEHIGH T-1 WHITE	2.61		3.15
145#	ASH GROVE T-3 GRAY 22%	0.74		3.15
263#	WATER .40 W/C 31.6 GAL.	4.22		1
4 OZ	DARAVAIR PER YARD 5%	1.35		
20 OZ	WRDA-82 PER YARD 3OZ/CWT.			
66 OZ	DARACEM-19 PER YARD 10 OZ./CWT			
2985 GRAMS	# 43 STRAW PER YARD [DCS] 1% DOSE			
	MEDIUM SANDBLAST			
	144.3 # @ 5%			

4.4 Division 04 - Masonry

Consider roof system thicknesses when designing elevation of transitions between exposed masonry and roof membrane base flashing substrates. Provide a constant level transition a minimum of 12" above the high point of the roofing system, whenever possible.

Provide soldered, stainless steel flashings within adjacent constructions (i.e. masonry, siding, windows, doors, louvers, etc.) with watertight end dams and weeps to separate walls from roofs and prevent moisture infiltration into walls.

4.5 Division 05 – Metals

Roof slope shall be provided by the structural roof framing, in lieu of installing level framing and using tapered insulation, unless vertical building expansion could occur in the future. Consult with the Owner's Project Manager during the Schematic Design Phase.

05 31 23 Steel Roof Decking

Steel roof decking to be galvanized 20-gauge minimum. Steel deck spans and securement shall meet the more stringent of the Building Code (based on ASCE/SEI 7-10 wind design) or FM Global wind uplift pressures, and shall be closely coordinated with the roofing system approval. Perimeter and Corner Enhancements shall be used for steel deck attachment, per FM Global standards.

05 50 00 Metal Fabrications

All rooftop steel equipment frames to have round legs to facilitate flashings. A minimum of 36" clearance shall be provided between roof surfaces and bottom elevation of horizontal framing members. Uninterrupted 12" flashing height shall be provided between top elevation of roof and any leg bracing or clip angles.

05 51 14 Prefabricated Metal Roof Access Ladders

Roof access ladders shall not penetrate the roof membrane or flashings, and shall be fully supported off the adjacent walls. Exterior ladders to be either aluminum or painted galvanized steel.

4.6 Division 06 – Wood and Plastics

06 10 00 Rough Carpentry: All wood blocking shall be fire retardant treated

06 10 10 Roof System-Related Rough Carpentry: Wood nailers to be treated construction grade lumber. Fastening shall follow FM Global requirements as listed in Loss Prevention Data Sheet 1-49. Minimum nailing size for perimeter wood blocking shall be nominal 2" x 6". Fastener spacing shall be reduced by a factor of two in exterior corner zones of the roof. All fasteners shall be FM Global approved screws (not nails), with each wood member fastened individually. At perimeter wood blocking, the bottom nailing shall be fastened to the structure through 5/8" diameter fender washers, with fasteners countersunk. Subsequent nailing fasteners shall not require 5/8" diameter washers.

Plywood shall be used for base flashings substrates at perimeter walls in lieu of gypsum sheathing wherever allowed by the building code. Use treated plywood. Fastening shall be with FM Global approved screws (not nails) 18" x 18" o.c. grid pattern maximum, or 6" o.c. along all framing members.

06 20 00 Finish Carpentry

1. Casework surfaces: Wood casework shall be used only with Owner approval. Plastic laminate casework shall be used in most areas.
2. Faces of millwork cabinets shall not be produced with ridges to make them more cleanable.
3. Casework panels shall adhere to AWI Architectural Woodwork Standards at a level no higher than Custom.
4. Panels at integrated glove dispensers shall be a thermofoil finish.
5. Wood casework shall not contain knots.
6. Plastic laminates: Shall meet AWI Standards.
7. Either pressure treated solid lumber or solid surface materials shall be used for casework bases instead of water wicking or permeable materials.
8. Provide $\frac{1}{4}$ " high nylon glides under the base of sink vanities to create a gap to prevent water wicking.
9. Casework hardware
 - a) Hinges: Hafele 327.21.500 or approved EQUIV concealed hinge where doors are against walls, hinges to have 90° stops.
 - b) Drawer Guides: Drawers with less than 1 cubic foot of volume – Hafele Accuride 50 lbs. If larger than 1 cubic foot of volume – Hafele, Accuride 75 and 100 lbs.
 - c) Shelf Standards and Brackets: K & V 255 and 256.
 - d) Cabinet Locks
 - i. Doors: Olympus 700 SC, 7/8" or 1 3/8" or KABA Simplex 9600.
 - ii. Drawers: Olympus 800 SC, 7/8" or 1 3/8" or KABA Simplex 9600.
 - iii. Narcotics/Medicine Drawers: Olympus 725 RL with Hospital Standard Core .
 - e) Folding Shelf Brackets: Stanley 794.
 - f) Plastic Grommets: Doug Mockett.
 - g) Fixed Panels: KEKU push in fittings.
 - h) Pulls: Berenson BE 9398.
 - i) PPE Pull: HAF ELE 9.2.01.250.
 - j) PPE Cabinet soft close hinge: Hettich Intermat 9944, Fast-assembly hinge, Opening angle 125° with Hettich Soft Close.

06 60 00 Solid Surfaces

1. In wet areas solid surfaces shall be used.
2. Sinks in solid surface counters shall be integral solid surface construction.
3. Solid surfaces shall be used in window sills.
4. Drip edges shall be used on all sides of patient room sinks.
5. Solid surface countertops to have integral back splashes. In patient care areas, solid surface back and side splashes to extend to the underside of the cabinet.
6. Solid surface counters at workstations to have Kaufe edge.
7. Any exposed surfaces under counter shall be painted.

07 21 29 Spray Foam Insulation

1. Product to meet Flame Spread and Smoke Developed Rating: ASTM E 84, class A.
2. Closed-cell spray foam providing an R-value of 6.5 per inch.

4.7 Division 07 – Thermal and Moisture Protection**07 13 52 Below Grade Waterproofing: Modified bitumen membrane**

1. HPR Torchable Base Sheet.
2. Finished Membrane Stressply IV Mineral.

07 20 00 Building Insulation

1. Batt insulation to be installed in all interior walls for increased sound absorption. Insulation to be unfaced, fiberglass batt, formaldehyde free.

07 22 16 Roof Board Insulation

Specify by thickness (not R-value), with the thickness ensuring sufficient R-value to meet the energy code. Consider R-value in addition to the energy code where appropriate (review with the UIHC Project Manager).

Polyisocyanurate insulation (20 psi minimum) shall be used for thermal insulation. Use 2014 LTTR value for polyisocyanurate R-value. In applications without vapor retarders, mechanically fasten to steel decks with 3" Galvalume plates and fasteners, and adhere to concrete decks using low rise polyurethane foam adhesive.

A high density 1/2" minimum cover board shall be used over the thermal insulation to increase hail, puncture, and wind uplift resistance. The preferred method of application is to adhere using low rise polyurethane foam adhesive, however the assembly must meet FM Global RoofNav assembly requirements. Gypsum or high density polyisocyanurate coverboards are approved. Gypsum coverboards are preferred for adhered applications, with either gypsum or high density polyisocyanurate coverboard allowed for mechanically fastened applications. Perlite, wood fiberboard, or fiberglass shall not be used for coverboards.

If a vapor retarder is required over a steel deck, an appropriate gypsum roof substrate board shall first be mechanically fastened to provide a substrate for the vapor retarder. After the vapor retarder is installed, subsequent insulation and coverboard shall be adhered to the vapor retarder. If a vapor retarder is required over a concrete deck, the vapor retarder shall be adhered to the concrete, followed by adhered insulation and coverboard.

Perimeter and corner enhancements to insulation system attachments shall be specified by the Design Professional as required to meet FM Global and ASCE/SEI 7-10 standards, whichever is more stringent.

07 26 00 Vapor Retarders

Walls shall be designed to minimize moisture wicking and growth of mold. Use of organic materials shall be avoided. The Design Professional shall demonstrate the appropriate use of vapor barriers. The Design Professional shall evaluate the need for a vapor retarder within the new roof assembly, by considering the interior and exterior temperatures, anticipated interior relative humidity, interior occupancies and processes, and location of dew point within the roof assembly during anticipated January temperatures. Where applicable, a vapor retarder with continuous functional flashing systems, shall be designed on the warm side of the roof assembly, with sufficient insulation specified to

maintain the vapor retarder above the dew point temperature and prevent condensation. Vapor retarder systems shall not be penetrated by roof system fasteners.

07 27 00 Air Barriers

Air barriers shall be used in roof systems, and shall be continuous with adjacent wall system air barriers, where/as required to meet the building code.

07 50 00 - Membrane Roofing

Membrane selection requires evaluation by the Design Professional UIHC Design Team, Engineering Services, and review and approval by the UIHC Project Manager.

In addition, the roof system must meet the criteria listed in Part I. General Requirements. It shall also be the Design Professional's responsibility to follow the FM Global Roof Design Process described in Paragraph 2.1.5 of this standard.

The Design Professional shall not assume that just because a roof assembly has an FM Global RoofNav Assembly Number, that the roof assembly is appropriate for the project, meets the membrane Manufacturer's requirements, or is eligible for UIHC's required warranty type. The Design Professional shall verify these items with the Manufacturer's Technical Representatives and design the roof system to meet all applicable standards.

Peel stops shall be considered at the perimeters of adhered single-ply membrane systems. Peel stops shall be carefully designed if a vapor retarder is required, to prevent breaches where fasteners penetrate the roof system.

Walkways shall be provided at traffic paths and around rooftop equipment requiring maintenance. Follow the shortest distance between points - right angles discourage use. Consider window washing operations, where required, when designing walkway layouts. Consider additional walkways for roof systems that have a low slip-resistance rating.

Base flashing terminations shall be detailed with termination bars and positive seals, independent of sheet metal flashings. Locate terminations below through-wall flashings and weep systems where present. Install secondary metal counterflashings over terminations.

Solvent-based adhesives shall be specified, to allow widest application temperature windows and maximum flexibility in construction scheduling during cold weather.

Penetration flashing details shall be accomplished without the use of pitch pans. Pipe chases with sheet metal covers shall be used at utility penetrations associated with mechanical, electrical, and communication systems.

Wood blocking shall not be used to support mechanical, electrical, or communication piping, conduits, raceways, cable trays, lines, etc. See Division 23 for required types and manufacturers of supports. Set supports over roof membrane manufacturer's recommended walkway material.

Approved Roof Membrane Manufacturers are as listed below, and substitutions shall not be specified unless first approved in writing by the UIHC Project Manager.

07 52 23.04 Adhered EPDM Elastomeric Membrane Roofing

1. Firestone Building Products.
2. Carlisle SynTec Incorporated.

Non-reinforced black EPDM to be used. Membrane thickness shall be 60 or 90-mils as appropriate (see Appendix F). EPDM seams to be 3" seam tape with 5" self-adhering EPDM cover strip.

07 54 19.02 Adhered PVC Thermoplastic Membrane Roofing (Preferred option)

1. Sika Sarnafil Inc.

S327 Membrane to be used in lieu of G410 for adhered roofs at UIHC. All T-laps to be patched. Membrane thickness shall be 80-mils as appropriate.

07 54 20.02 Adhered KEE Thermoplastic Membrane Roofing

1. Seaman Corporation (FiberTite).

FiberTite 50-mil XT or 90-mil XTreme membrane to be used, as appropriate (see Appendix F). All T-laps to be patched.

07 52 01.07 Adhesive-Applied Modified Bitumen Membrane Roofing

Modified bitumen 2-ply field membrane and 2-ply flashings, with fiberglass and/or polyester reinforcements. Field membrane and flashings are to be applied with cold process adhesives with all side and end laps in all plies hot air welded and rolled. Bottom ply shall be sanded and smooth surfaced. Top ply shall be sanded on backside and granule surfaced on top side, with granule color as selected by Owner. Surfacing must be carefully selected if a LEED point for roof reflectivity is required; all Manufacturers may not be able to meet this requirement. No open flame torch application methods shall be allowed at UIHC.

07 62 00 Sheet Metal Flashing and Trim

Edge metal and copings to follow ANSI/SPRI ES-1 standards as required to meet the building code, and FM Global standards to meet insurance requirements.

Gutter and downspout design shall strictly adhere to FM Global LPDS 1-49 standards for strapping and attachment.

Kynar500/Hylar 5000 prefinished steel shall be used for exposed roof-related sheet metal, whenever possible. Owner shall have the option of selecting from standard color finishes. If soldering is required, such as for scupper inserts or scupper flanges, 24 gauge minimum, G90 galvanized steel or stainless steel shall be used, depending on the roof's design life and presence of corrosive substances on the roof.

PVC-coated, 24 gauge, G90 galvanized steel to be used for edge metal, scuppers inserts, vertical flashing terminations, and other miscellaneous applications in conjunction with PVC or KEE roof systems. Owner shall have option of selecting from standard membrane-clad metal colors. If a PVC or KEE roof system is specified, and roof edge aesthetics are critical, a membrane manufacturer-supplied prefabricated fascia system with Kynar prefinished cover plate and extruded aluminum anchor bar shall be used.

All fasteners shall be FM Global approved, stainless steel with EPDM washers. Nailing of metal flanges shall be hot dip galvanized or stainless steel, ring shank nails.

All parapet walls, expansion/control joint curbs, and curb-to-ductwork flashings shall be waterproofed with seamed single-ply membrane, prior to installing sheet metal coping caps or covers.

Include sealants and required accessories for sealing sheet metal flashing in this section. Silyl-Terminated Polyether sealant and manufacturer-recommended sealant primer shall be used for all sheet metal joints. Sonolastic 150 VLM and Primer 733 by BASF Building Systems shall be the basis for design.

Minimum gauge thicknesses for roof-related sheet metal flashing and trim:

1. Edge Metal: 24 gauge.
2. Counterflashings: 24 gauge.
3. Coping Caps: 22 gauge.
4. Expansion/Control Joint Covers: 22 gauge.
5. Suppers: 24 gauge.
6. Conductor Heads: 22 gauge.
7. Gutters: 22 gauge.
8. Downspouts: 22 gauge.

07 72 33 Roof Hatches

Roof access hatches shall be as manufactured by The Bilco Company, with mill finish aluminum construction. Prime painted steel construction shall only be used where painting of the roof hatch will occur for aesthetic reasons.

07 81 00 Fireproofing

Fire proofing shall be cementitious.

07 84 00 Firestopping:

1. SCOPE/ APPLICATION

Project Architect or Design Professional shall specify firestopping requirements on drawings and project specifications which shall:

- a) Provide installed firestop products that limit the spread of fire, heat, smoke, and gasses through otherwise unprotected openings in rated assemblies, including walls, partitions, floors, roof/ceilings, and similar locations, restoring the integrity of the fire rated construction to its original fire rating.
 - b) Provide fire resistive systems listed for construction gaps per the specific combination of fire-rated construction type, configuration, gap dimensions, and fire rating.
 - c) Provide systems manufactured by 3M or HILTI that are listed by Underwriters
i. Laboratories Inc. (UL), in "Fire Resistance Directory".
2. All Specifications Shall Meet the Following Requirements:
 - a. Install in strict accordance with manufacturer's detailed installation instructions and procedures. Penetrations shall be sealed from both sides of the penetration, when accessible.
 - b. Use only products specifically listed for use in listed systems.
 - c. Firestopping materials must meet and be acceptable for use by all building codes and NFPA codes.
 3. Other Requirements:

- a) Where firestop systems not listed by any listing agency are required due to project conditions, submit a substitution proposal with evidence specified, to be reviewed for owner approval.
- b) Do not conceal firestopping installations until the Owner's inspection agency or authorities having jurisdiction have examined each installation. Owner, Design Professional and Installing Contractor will conduct and document a comprehensive inspection of all installed firestopping.
- c) Installer Qualifications: Firm must be qualified by having experienced staff who are properly trained to install the specified products, by completing the manufacturer's certified product installation training. Contractor must provide certificate of qualification.
- d) At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.
- e) Provide copy of all engineering judgments to owner.

4.8 Division 08 – Openings

NOTES:

- **Hardware substitutions are not permissible unless approved by chief architect**
- **Design Professional will provide a door schedule electronically in an Excel spreadsheet**
- **Door security designations will follow the Design Standard designations found in this Standard, section 4.20**
- **Consider roof system thicknesses when designing flashing substrates and setting elevations of doors, windows, and louvers adjacent to roofs**
- **Provide 12" minimum flashing height above insulation at all base flashing substrates, including below doors, windows, and louvers.**
- **Provide soldered, stainless steel flashings within adjacent constructions (i.e. masonry, siding, windows, doors, louvers, etc.) with watertight end dams and weeps to separate walls and wall penetrations from roofs and prevent moisture infiltration into walls.**
- **All doors in Patient and Public Access areas shall be 42" wide, minimum.**

08 12 00 Steel Door Frames

1. 14ga. on exterior doors and interior doors over 4'-0" wide.
2. Doors greater than 3' wide require 4 hinges.
3. 16ga. on all other interior doors.
4. Corner joints shall be mitered, interlocked, welded and ground smooth.
5. Frames shall be template reinforced for hardware 7ga. on hinges, 12 ga. everywhere else.
6. Acceptable manufacturers: Ceco, Curries, Steelcraft, or Owner approved equal.
7. Use 4" Hospital Stops on inpatient areas, treatment, procedure and any other areas where integral cove bases are required.
8. All frames to be grouted full.

08 13 00 Hollow Metal Flush Doors

1. All doors fire rated at 90 minutes or higher shall be hollow metal and be UL fire rated and meet NFPA 80 standard.
2. Doors greater than 3' wide require 4 hinges.
3. Painted hollow metal doors shall be used in cross-corridor and double egress situations.
4. Exterior: SDI-100 Grade III, 16ga. galvanized faces, seamless edges, R-10, polyurethane core.

5. Interior: SDI-100 Grade II, 18ga. faces, seamless edges with 20ga. stiffeners and sound insulation core.
6. Doors shall be template reinforced for hardware 7ga. on hinges, 12ga. everywhere else.
7. Acceptable manufacturers: Ceco, Curries, Steelcraft, or Owner approved equal.

08 14 00 Flush Wood Doors

1. All doors fire rated to less than 90 minutes shall be flush wood door and be UL fire rated and meet NFPA 80 standard.
2. Doors greater than 3' wide require 4 hinges.
3. In high cart traffic areas, doors shall have stainless steel kickplates.
4. Doors shall be solid core particle board, premium grade, plain sliced, red oak (or approved finish material), book-matched, 5 ply, AWI 1300. Optional use of eiDoor Vinyl Clad Interior doors by Eggers, VT Industries, Algoma, or approved MFR is permissible and approved by owner.
5. Finished doors shall not contain knots.
6. Lead lined doors shall be seven ply, solid particle core with hardwood cross bands and lead glued to the core. Lead lined door size and lead thickness is dependent on the level of radiation protection required. Lead lined frames and doors shall be installed according to manufacturer's specifications.
7. Doors shall be premachined for hardware and prefitted to net size.
8. Acceptable manufacturers: Graham, Marshfield, Algoma, Eggers, VT Industries, or Owner approved equal.
9. Mineral core doors are not accepted.

08 31 00 Fire Rated Access Doors

16ga. frame with 20ga. galvanized bonderized steel panels, UL fire rated, meet NFPA 80 standard and must be self-closing and positive latching. Frame to be trimless, with flush door.

– Cesco, JL Industries, Milcor, or Owner approved equal.

08 33 23 Rolling Fire Doors

22ga. SS or galvanized steel, interlocking slats, prime painted with automatic closing activated by smoke detection system, UL fire rated and must meet NFPA 80 and local fire codes. – Cookson FD-5 or Owner approved equal. Tube motors are preferred.

08 51 13 Aluminum Windows

1. Interior
 - a) Interior aluminum windows shall match existing.
 - b) Acceptable manufacturers: Wausau, EFCO, Moduline or Owner approved equal.
2. Exterior
 - a) No windows shall use integral blinds.
 - b) No pivot-type windows shall be used.
 - c) Extruded aluminum, prime billet 6063 alloy T5 temper.
 - d) Anodic finish shall be Architectural Class I, electrolytically deposited minimum thickness 0.7 mil.
 - e) Color shall match existing; refer to section 1.7.

- f) Windows, factory glazing, thermal barrier and related materials shall have a 10 year guarantee.
- g) Thermal break shall be Insulbar, nylon impregnated fiberglass. Polyurethane thermal breaks are prohibited.
- h) Acceptable manufacturers: Wausau 4250iV Insulbar, EFCO, Visuline Series or Owner approved equal.
- i) All new exterior aluminum windows shall pass the following field tests (testing agency shall be procured by the Owner) in the presence of UIHC Quality Assurance personnel, UIHC Project Manager, General Contractor, and window manufacturer representative.
 - i. ASTM E 783-02, Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 - ii. ASTM E 1105-00, *Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform of Cyclic Static Air Pressure Difference.*
 - iii. AAMA 501.2-03, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing.

08 51 23 Vision Panels

1. 18ga. cold rolled steel, mitered, welded corners with countersunk mounting holes.
2. Anemostat Door Products BFL 123 or Owner approved equal.

08 71 00 Door Hardware

1. Finish: United States Standard US 26D satin chrome for interior doors, SS for exterior doors.
2. Hinges: Full mortised, square cornered, 5 knuckled, ball bearing, template, polished and plated- Hager, McKinney, Stanley.
3. Pivots: Heavy Duty Rixon.
4. Swing Clear Hinges: McKinney.
5. Locks, latches and deadbolts: Sargent 8200 mortise, LW1-L, L escutcheon, L lever, curved lip strike, 7 pin cylinder SFIC.
6. All doors shall be positive latching; roller latches are prohibited.
7. Strikes: SS Dustproof with curved lip.
8. Edge guard: marker EG308 with "adjust-a-screw."
9. SS Piano Hinges: Assa Abloy marker HG305 with "adjust-a-screw."
10. Panic Devices: Von Duprin.

NOTE: All panic devices used on fire rated openings must be UL fire rated.

- a) Single Doors: Von Duprin series 99L 9975 Mortise x 996 trim with standard O6 lever or 9475.
- b) Double Doors: Both leaves 9447 (Impact) concealed vertical rod only.
- c) High Traffic areas, such as corridors, must be used on metal doors only: Von Duprin 94 series.
11. Coordinator and Carry Bar for double doors: Trimco 3092 series; use open back strike when possible. Can eliminate by using both concealed vertical rod.
12. Door Closers: LCN Super Smoothee Series 4041XP, Aluminum.
13. Life Safety Closures:
 - a) Doors with swings less than 105° - LCN Sentronic Series 4040 SE, 120v, Aluminum or LCN Super Smoothee series 4041XP aluminum with wall mounted magnetic door hold open LCN 7800 series 120V. Wall mounted magnet is preferred.
 - b) Doors with swings greater than 105° – LCN Sentronic Series 4410 ME push-side, 4310 ME on pull-side, 120v, Aluminum. Wall mounted magnet is preferred.

14. Handicapped, barrier-free door controls – Horton 4100 Series.
15. Keying: Final shall be Medeco X4, which is owner supplied.
16. Magnetic Holders: LCN 7800 Series 120v flush mount. Reinforced backing is required behind Holder.
17. In high traffic areas door edge guards shall be used.
18. Overhead stops: Surface mounted only: Glynn Johnson; Concealed stops shall not be used.
19. Automatic Flush Bolt: Glynn Johnson. Prefer constant latch (self latching).
20. Automatic Door Bottoms: Zero 360, Reese 521.
21. Smoke Seal Assemblies: Reese 897B, National Guard.
22. Wall Bumper: Ives 401, 402, 403. Reinforced backing is required behind Bumper.
23. Thresholds: Zero 564B.
24. Astragals: Zero 183 DUR. Astragals shall be avoided, if at all possible.
25. Door Silencers: Ives.
26. Door Stop: Ives.
27. Extension Flush Bolt: Ives358.
28. Self Latching Flush Bolts: Ives 356, 357.
29. Electric Strikes: HES 1006 with Smart Pak and typically KM faceplate option. Confirm faceplate option. HES 9500 surface with Smart Pak.
30. Power Supply for electric strike: Locknetics 505 or 510 – strikes; Von Duprin PS 914 – for EL99 or CX99.
31. Power transfer: McKinney EL-EPT-SC.
32. Electric Lockset: Sargent Harmony Mortise Lockset 8271 – Trim and Finish to match typical hardware (24VDC with RX switch).
33. Electric Interlock for failsafe operation: Kam-Lock 3020.
34. Combination Locks: Kaba 5000 series.
35. Push/Pull Hospital Latch for Patient Rooms: Sargent 7800 series.
36. Card reader Locksets for patient guest rooms (such as Rossi Guest House): ILCO series 700 (Hotel-Motel).
37. On-call room doors: Sargent 8271 lock with deadbolt and RX switch (card reader only unlocks handle).

08 74 00 Access Control Hardware

1. Single Door: Von Duprin, delayed egress Chexit Controlled exit device, CX9975.
2. Double Doors: Leaf #1 - Von Duprin, delayed egress Chexit Controlled exit device, CX9975; Leaf #2 - Von Duprin CX9947 concealed vertical rod.
3. Hes Innovations, HES 1006 Series Heavy duty electric strike and Smart Pak with appropriate faceplate option Power supply provided by Access Control Provider.
4. Von Duprin, DC 2004 Desk Console (if required).
5. CCTV Camera, Bosche or Sanyo 24 v, color camera (IP DOE style).
6. Door position switch, magnet top jamb type: George Risk Industries (GRI) models 8080-TWG-B, 7623-TWG-G or 200-26, depending on application.
7. Power transfer-McKinney EL-EPT-SC.
8. Von Duprin power supply PS-914.

08 80 00 Glass and Glazing

1. Clear tempered $\frac{1}{4}$ " thick float glass.
2. Bronze tint tempered $\frac{1}{4}$ " thick float glass for exterior windows.

3. Insulating glass 1" thick composed of $\frac{1}{4}$ " reflective, heat strengthened bronze tint float glass, $\frac{1}{2}$ " air space and interior lite of $\frac{1}{4}$ " clear float glass.
4. 5/8" clear laminated heat strengthened float glass.
5. Acceptable manufacturers: PPG, Ford Glass, Viracon; Wireglass manufacturers: Central Glass, Ashai Glass, HJ Martin & Son.
6. Fire rated glass: TGP "Firelite."

4.9 Division 09 – Finishes

NOTE: Substitute low or zero volatile organic compound (VOC) paints, stains, adhesives, sealants and other construction materials, where practical.

09 22 16 Non-Load Bearing Partition Framing

1. Steel stud partitions shall be 20 gauge minimum for interior partitions. Taller walls may require heavier gauge studs.

09 29 00 Gypsum Wallboard

1. To avoid moisture wicking, undercut outer layer of gypsum wallboard by $\frac{1}{4}$ " at base and caulk with moisture resistant caulk that meets fire rating for wall. All gypsum wall board to go to deck or structure above.
2. In wet areas and areas near sinks and ice machines non-moisture wicking wallboard shall be specified; USG FIBEROCK Brand Aqua-Tough Interior Panels or Owner approved equal.
3. O.R.'s and high abuse areas to relieve impact resistant gypsum board.

09 50 00 Acoustical Ceilings

1. Standard tile is 24" x 24" Armstrong Ultima Health Zone, 9/16" Tegular Edge (1936) with 9/16" Suprafine grid or approved equivalent.

09 65 00 Resilient Flooring

1. Resilient flooring to be Nora or approved equal. Nora Plan Envirocare in patient care areas. Inpatient rooms, procedure areas, cleanrooms and other places where required to have a 6" integral cove terminated with a cold weld against the wall. Provide (1) #1 Nora Pad for every 10,000 square feet of Envirocare installed.

Nora Norament Grano tiles to be used in main public corridors.

2. Any patterns must be water jet cut.
3. All seams to be hot welded.
4. Acrylic adhesive to be used as a standard. For OR's and areas with heavy rolling loads, Dryfix is recommended.

09 65 16 Resilient Sheet Flooring

1. Telecommunications closets shall have VCT floors.

09 68 16 Rolled Carpet

1. Carpet to be 100% solution dyed nylon. 6' wide Tandus Powerbond or approved equivalent.

09 72 50 Epoxy Quartz Flooring

2. Flooring and Base: Aggregate of coated quartz, embedded in clear epoxy and applied to a total thickness of 1/16" to 1/8", as recommended by the manufacturer. Apply two (2) coats of manufacturer's sealer topcoat to reduce texture. Verify texture with users after initial topcoat application.

09 90 00 Painting and Coating

1. Metal Doors and Frames
 - a) 1 Coat S-W Pro Industrial Pro-Cryl, B66-310 Series.
 - i. Alternate: Interior and Exterior; Ferrous and Non Ferrous Metals (very smooth and/or Kynar like surfaces).
 - ii. Bonding Primer: 1 Coat S-W DTM Bonding Primer, B66A50.
 - b) Finish: 1-2 Coats S-W Pro Industrial Acrylic, B66-600 Series available in Gloss, Semi-Gloss, and Egg-Shell.
 - c) Doors and frames to be painted the same color on both sides.
2. Wood Doors
 - a) New wood doors shall be prepped and stained or painted offsite.
 - b) When painting over existing wood lacquered doors, doors shall be removed and prepared offsite. The following shall also be specified:
 - iii. Prior to painting, doors shall be power sanded smooth to remove the existing stain.
 - iv. Primer shall be one coat of XIM Advanced Technology UMA brand Bonder.
 - v. Finish: 1-2 Coats S-W Pro Industrial Acrylic, B66-600 Series available in Gloss, Semi-Gloss, and Egg-Shell.
3. Fire and Smoke Wall Markings
 - a) Provide permanent marking of all fire (1 hour, 2 hour, etc.) and smoke rated partitions.
 - b) Marking shall be an 8 inch diameter fluorescent orange painted circle applied 6-12 inches above the finished ceiling with a 4 inch black numeral or letters stenciled over the orange circle.
 - c) The markings shall be on both sides of all rated partitions and in every adjacent room.
 - d) The spacing shall not be over 8 feet on center.

09 96 56 Epoxy Paint

1. Epoxy paint shall be specified for operating and procedure rooms where surfaces need to be scrubbable.
2. Sherwin Williams "Pro Industrial – Zero VOC Waterborn Catalyzed Epoxy - #B73-360 Series Eg-Shel."

4.10 Division 10 – Specialties

10 14 00 Signage

1. The preferred plaque for LEED accredited facilities is the “Polished Water Jet Cut Aluminum - Clear Coated” plaque.

10 21 13 Toilet Compartments

2. Toilet compartments shall be stainless steel or solid surface and ceiling hung.
3. Hardware for toilet compartments shall have a safety release latch that allows the door to be opened from the outside in the case of an emergency

10 21 23 Cubicles

10 21 23.13 Cubicle Curtains: Comply with NFPA 13. Mesh extensions of 18" required on top of curtain. Get Owner approval for chosen design.

10 21 23.16 Cubicle Track and IV Track: Surface mounted track and carrier assemblies: “On the Right Track,” General Cubicle or Owner approved equal.

10 22 00 Fire Rated Folding Partition

1. Horizontal Sliding partition, 1-hour fire rated, STC 50. Won Door Fireguard Model 20.
2. Closing systems shall be automatic composed of a microprocessor control box, key switch module, motor drive unit and leading edge obstruction detector
3. The microprocessor control box and key switch module shall be accessible whether the door is open or closed.

10 22 26 Operable Partitions

1. Manual or electric, accordion, STC 39, Modernfold Soundmaster 8 or Skyfold.

10 26 00 Corner Guards

1. Corner guards to be Koroseal GS25, 2 ½" Stainless Steel. The corner guards should sit at top of resilient base. The resilient base is not to run across the corner guard. The top of the corner guard should be 1/4" below suspended grid ceiling.

10 26 33 Kickplates: Screwed on, stainless steel, US 26D.

10 28 00 Toilet and Bath Accessories

1. Manufacturers: Bobrick, Bradley or American Specialties. Units listed below are based on Bobrick. Other manufacturer's models must be equal to the listed Bobrick models.
 - a) Soap dispensers – Softcare Soap Dispenser, Model #05613 – 4.5”w x 7.5” h x 4.25”d.

- b) Grab bars – B6806 Series; 1 ½" diameter which conform with ADA regulations.
 - c) Towel bar – B674.
 - d) Mirror – B290 Series.
 - e) Towel hook – B6717.
 - f) Robe hooks – B671.
 - g) Mop holders – B233.
 - h) Stainless steel shelf – B295.
 - i. Foot operated surgical soap dispenser – B119.
2. Paper Towel Dispensers
- a) Public & Staff Bathrooms
 - i. Silhouette Wave'n Dry Electronic Touch-Free, Model #80000, color: Black Translucent – 12" w x 15 7/8" h x 10 3/8" d, 8.1 lbs.
 - ii. OptiServ Mechanical Hands-Free – 11 11/16" w x 16 11/16" h x 9 7/16" d, 6.6 lbs.
 - Black Translucent, Model #86500
 - Red Translucent, Model #86530
 - Green Translucent, Model #86540
 - Blue Translucent, Model #86550
 - White Translucent, Model #86560
 - iii. When space does not allow for the options above, with Owner's approval, the following dispensers can be used:
 - Full size stainless steel multi-fold paper towel dispenser – 11" w x 17" h x 4.25" d.
 - Half size stainless steel multi-fold paper towel dispenser – 11" w x 8" h x 4" d.
 - b) Exam Rooms & Patient Rooms: Utilize the stainless steel multi-fold towel dispensers of the dimensions shown below.
 - Full size stainless steel multi-fold paper towel dispenser – 11" w x 17" h x 4.25" d.
 - Half size stainless steel multi-fold paper towel dispenser – 11" w x 8" h x 4" d.
3. Bath Tissue Dispensers
- a) Staff Bathrooms: Dubl-Serv OptiCore Side-by-Side Dispenser – 11 1/16" w x 8 13/16" h x 7 3/16" d, 2.1 lbs.
 - Black Translucent, Model #80200
 - Red Translucent, Model #80230
 - Green Translucent, Model #80240
 - Blue Translucent, Model #80250
 - White Translucent, Model #80260
 - b) Public Bathrooms: Revolution OptiCore 3-Roll Dispenser – 14 1/8" w x 14 9/16" h x 5 5/16" d, 3.4 lbs.
 - Black Translucent, Model #80300
 - Red Translucent, Model #80330
 - Green Translucent, Model #80340
 - Blue Translucent, Model #80350
 - White Translucent, Model #80360

4. Toilet Seat Cover Dispenser: Silhouette Toilet Seat Cover Dispenser, Model #19510, color: Black Translucent – 16 1/8”w x 11 7/8”h x 3 1/8”d, 1lb.
5. Infant Changing Station: Koala Bear Care baby 10829, horizontal design or Owner approved equal.
6. Shower seat folding: Hewi 950.51.21090.
7. Integral wall hung trashcans shall not be used.
8. Include a bedpan washing system in all inpatient water closets.

10 44 00 Fire Extinguisher Cabinets

1. Fire Extinguisher Cabinets to be Larsen 2720-R, Clear Tempered Glass, Vertical Duo Style, vertical Red Lettering , Stainless Steel, with Flat Fully Recessed trim. Larsen or approved equiv.

10 51 00 Lockers

2. Two person duplex lockers, 15” wide, mortise and tenon door frames, finished end panels, sloping tops, “Z” type closed bases, friction catch latch for use with padlocks. Soundproof, “Quiet” lockers. No combination locks.
3. Manufacturers: Penco, Lyon, Republic Steel.

10 90 00 Miscellaneous Specialties

1. Alcohol-Based Gel Dispenser Installation:
 - a) Gel dispensers shall not be installed in corridors that are less than 6 feet wide.
 - b) At least 4 feet of space must be kept between dispensers.
 - c) Dispensers shall not be hung within 6 inches of or directly above adjacent ignition sources (including outlets and switches), measuring out from the center of the dispenser.
 - d) The dispensers shall be hung 42-48 inches above the finished floor.
2. Television Brackets: Model to fit TV specified by HCIS.
3. FSR boxes are to be used behind public TV's. Specific models and locations to be coordinated with HCIS.
4. Custodial Closet Specialties
 - a) Johnson Wax Solutions Center Dispenser, Model #928225 .
 - i. Dimensions: 17”w x 20.75”h x 4.25”d.
 - ii. Installed next to slop sink to access water supply.
 - iii. Base of unit shall be installed 4' above finished floor.
 - b) Shelving: Wooden set on metal standards and brackets.
 - i. Dimensions: 12”d x 0.75”t; cut to fit the designated area.
 - ii. Coordinate with Environmental Services during design to determine the number of shelves required. Typically, it will be 2-4 shelves.
 - c) Grip-All mop handle holders, minimum 1, installed 78” above finished floor.
 - d) Three coat hooks. Coordinate locations with Environmental Services.
 - e) A minimum of one double locker set: 15”w x 76”h x 18”d.

4.11 Division 11 – Equipment for Roof Standards Update

11 24 23 Window Washing Systems

1. Tie-off anchors shall be designed and installed on all new roofs per ANSI/IWCA I-14.1.
2. A minimum of 10% of the tie-off anchors shall be tested on site using load cell apparatus in accordance with manufacturer's recommendations. Tests shall be conducted by an independent agency, and test reports shall be sent to the Owner.
3. All anchors relying upon chemical adhesive fasteners are to be 100% tested on site using load cell apparatus in accordance with manufacturer's recommendations. Tests shall be conducted by an independent agency, and test reports shall be sent to the Owner.

11 47 00 Ice Machines: Scottsman with dual filter system.

11 52 00 Audio-Visual Equipment

1. Projectors: Contact Owner to discuss projectors and other related AV equipment.
2. The designer shall utilize equipment racks for AV equipment.

11 52 13 Projection Screens: Manual screens shall be specified. Owner approval required for motorized.

1. Manual with controlled screen return (CSR): Da-Lite Advantage or Draper.
2. Tensioned concealed (recessed) ceiling mounted, motorized:
 - a) Da-Lite Tensioned Advantage Electrol or Tensioned Avantage Deluxe Electrol.
 - b) Draper Tensioned Access/Series V.
 - c) Stuart – for high resolution and specialized viewing applications.

11 70 00 Healthcare Equipment

1. Blanket Warming Cabinets: Coordinate selection with Owner.

4.12 Division 12 – Furnishings

12 24 13 Roller Shades

1. Shades to be Mecho/5 or Slimline. Coordinate shade and fascia color with UIHC Design team.

12 30 00 Stainless Steel Casework / Storage Cabinets: CMP Continental Metal Products

12 35 53 Metal Casework Including Fume Hoods: Hamilton Industries or Owner approved equal

12 36 23 Solid Surface Countertops

2. In wet areas solid surfaces shall be used.
3. Sinks in solid surface counters shall be integral solid surface construction.
4. Drip edges shall be used on all sides of patient room sinks.

4.13 Division 13 – Special Construction

13 49 00 Radiation Protection

1. Design shall be submitted to the University of Iowa Health Protection Office for review and approval – <http://www.uiowa.edu/~hpo/>.
2. Laser radiation protection designs shall be submitted to the UIHC Laser Safety Panel for review and approval. Class 3b or Class 4 laser use rooms shall be provided with an entryway control system. The safety control design shall also include the following:
 - a. Lighted signage.
 - b. Area control.
 - c. Barriers.
 - d. Emergency ingress/ egress.
 - e. Some other considerations: local fume exhaust, general exhaust, water supply, drains, electrical supply, non-reflective surfaces, windows, hazardous material storage, electrical shielding, and electrical isolation systems.

4.14 Division 14 – Conveying Equipment

14 21 00 Elevators

1. Coordinate with Telecommunications for the type of hands-free phone to be installed in the elevator cab.
2. For areas where access is to be controlled, proximity card readers shall be utilized.

14 92 00 Pneumatic Tube Systems – System shall be by Swisslog. Programming of the system shall be by Swisslog. Refer to Appendix G for full specification section.

1. Existing system is a 4 x 7 inch oval system maintained by Pevco Systems International.
2. New construction shall use 6 inch round system by Swisslog as design basis.

4.15 Division 21 – Fire Suppression

21 05 00 Common Work Results for Fire Suppression

1. During the design phase and prior to submittal of Construction Documents, coordinate all fire protection systems and equipment involving pre-action systems, Inergen systems, standpipes, fire pumps, fire pump controllers, and cross-ties with the Owner. With the Owner's Rep.'s authorization, conduct an interim design review meeting with personnel from the Safety and Security Department.
2. The Design Professional shall provide a fire/safety plan for the project phases. The "fire plan" shall include but not be limited to:
 - a. Codes/Standards used.
 - b. Occupancy – Designation and number of occupants .
 - c. Infection/Life Safety Manual.
 - d. Fire/Smoke wall rating .
 - e. Fire/Smoke marking.
 - f. Sprinkler hazard level (density).
 - g. Fire zones.
 - h. Extinguishment system(s).
3. During the design phase, discuss with the Owner the condition of the existing fire protection piping, Microbiological Induced Corrosion (MIC) has been a problem at some points within the existing fire protection piping system. Replacement of some sections of the existing fire protection piping grid may be required as a part of specific projects.
4. Drawings for all fire protection systems shall be submitted to the State Fire Marshall and Factory Mutual for their review and approval in writing. A courtesy copy shall be sent to UIHC Safety and security for information and review. Where the project schedule permits, the comments from the State Fire Marshall shall be integrated into the bid documents prior to the printing of the final bid document. (Turn-around times vary for State Fire Marshall review but frequently the turn-around time is 45 days.)
5. The bid documents shall include a note that sprinkler line draining can only be scheduled for Tuesdays, Wednesdays, and Thursdays.

21 05 53 Identification for Fire Suppression Piping and Equipment

1. Provide equipment identification on all equipment furnished under this division. Where practical, provide plastic laminate tags indicating the equipment identification number in a clearly visible spot. Where no appropriate flat surface exists for a plastic laminate tag, provide brass tags on chains attached to the equipment. These equipment tags are distinct from the Preventive Maintenance numbers that the Owner's personnel install after the construction phase.
2. Coordinate all equipment identification numbers with the Owner. It is the Owner's intent to assign, during the design phase, plan marks to all equipment items.

21 11 00 Facility Fire Suppression Water-Service Piping

1. Standpipes
 - a. Standpipes shall be installed in the corner of stairwells while allowing the code- required clearance to remain.

- b. Provide each standpipe take-off with a 2-1/2" x 1-1/2" cap on a chain.
- 2. Fire Pump Controllers
 - a. Fire pump controllers shall be manufactured by Master Control Systems unless the Owner authorizes otherwise.
 - b. Fire pump controllers shall be the primary reactor type with an automatic transfer switch for transfer of the load to an auxiliary generator. Fire pump controllers shall be the across-the-line type for combined manual and automatic transfer.
 - c. Fire pump controllers shall be housed in NEMA 12 enclosures.
 - d. Fire pump controllers shall be interconnected to the existing fire alarm central processing unit.
 - e. Fire pump controllers shall be installed on concrete housekeeping pads to avoid water from entering the base of the enclosure. Install each controller with adequate clearance for service.
- 3. Jockey Pumps
 - a. Jockey pumps shall be of the same manufacturer as the associated main fire pump.

21 11 19 Fire Department Connections

- 1. Hose threads shall conform to the standards for the Iowa City Fire Department.
- 2. All fire department connections shall be Croker or Potter-Roemer unless the Owner authorizes otherwise.

21 12 26 Fire Suppression Valve and Hose Cabinets

- 1. Zone Valve Cabinets
 - a. Zone valve cabinets shall be installed to allow zone control of wet sprinklers for all zones within an addition. Zone valve cabinets shall be dedicated to a specific area on a single floor of the facility.
 - b. Zone valve cabinets shall be installed in corridors.
 - c. Zone valve cabinets shall be manufactured by Larsen, Samson or Potter-Roemer.
 - d. Zone valve cabinets shall be 32" wide, 34" high and 8" deep with solid cover (no glass). Design basis shall be Larsen Model HC3234-R for recessed units and Larsen Model HC-3234-SM for surface-mounted units.
 - e. Zone valve cabinets shall, per the direction of the Owner, be either white or painted to match the adjacent area.
 - f. Zone valve cabinets shall be provided with the manufacturer's standard cylinder lock with flexible cam. Coordinate keying with the Owner.
- 2. Fire Hose Cabinets (For Fire Department Connection and Extinguishers)
 - a. Install fire hose cabinets only at locations where required by code. Coordinate locations with Safety & Security during design.
 - b. Fire hose cabinets shall be manufactured by Larsen, Samson, or Potter-Roemer. Design basis shall be Larsen Model HC-2434-R for recessed units (typical) and Larsen Model 2434-SM, for surface- mounted units (Mechanical Rooms).
 - c. Recessed fire hose cabinets shall be stainless steel, vertical duo clear tempered safety glass, with red vertical lettering and 1/4" flat trim, when recessed.
 - d. Where fire hose cabinets are installed, furnish with: one carbon dioxide fire extinguisher (five pound) and a 2.5 gallon water extinguisher.
 - e. All extinguishers shall be manufactured by Amerex, Ansul, or Owner approved equal. Design basis shall be Amerex 320 for the carbon dioxide fire extinguisher. Fire extinguisher cabinets shall be fully recessed, stainless steel with view panel and red lettering.
 - f. In large mechanical spaces, one 75 foot long, 1-1/2" fire hose (Imperial 70RR515 or equal).
 - g. During remodels, all existing fire hose cabinets shall be left active for as long as possible.

21 13 00 Fire Suppression Sprinkler Systems

21 13 13 Wet-Pipe Automatic Sprinkler Systems

1. The standard head for light hazard installation within this facility shall be an FM- approved, quick response, semi-recessed head.
2. Quick response concealed heads shall only be used where authorized by the Owner.
3. For lay-in and metal pan ceilings, center all sprinkler heads in their respective ceiling tile.
For radiant panel ceilings, avoid installing sprinkler heads in active radiant panels. Where spacing requirements dictate that a sprinkler head must be installed in a location occupied by a radiant panel, locate the head such that it does not conflict with the radiant piping attached to the top of the panel.
4. Design all sprinkler heads to fully comply with the NFPA 13 requirements for spacing, while taking into account soffits, ceiling-mounted medical equipment, cabinetry and other obstructions within a specific room or area.
5. All sprinkler piping shall be concealed above ceiling, unless authorized by the Owner.
6. Install a tamper-proof ball valve (with a zone addressable module) and a $\frac{1}{2}$ " drain leg in each electrical room or closet.
7. Install upright heads with protective cages in all telecommunications rooms, electrical closets and main electrical rooms.
8. Sprinkler piping shall be ASTM A53, Schedule 40, Black.

21 13 19 PreAction (Dry) Sprinkler Systems

1. Pre-action systems shall be cross-zoned, double interlocked, self-resetting systems. Pre- action systems shall be complete, prefabricated assemblies and shall be manufactured by Reliable, or Viking "Total Pac" unless the Owner authorizes otherwise.
2. Pre-action systems shall be installed in main elevator equipment rooms, surgical suites and other Owner authorized areas. In the past, many areas with computer equipment or medical equipment with higher replacement costs have received pre-action systems.

21 22 00 Clean-Agent Fire-Extinguishing Systems

1. Inergen systems shall be installed in conjunction with back-up pre-action systems in those areas where the Owner deems any water damage to equipment would be extremely expensive or disruptive to ongoing Hospital operations. Consult with Owner for applications where Inergen may be installed below raised floors.

21 30 00 Fire Pumps

1. Fire pumps shall be manufactured by ITT A-C Pump, Aurora Pump, Peerless, or Owner approved equal.
2. All fire pumps shall be electric, horizontal split case fire pumps with OSHA acceptable coupling guards. The fire pump and motor shall be mounted on a one-piece steel frame.
3. All drain points on the piping to and from each fire pump shall be extended to a floor drain or trench drain capable of handling the normally expected drainage from that system.

4.16 Division 22 – Plumbing

22 05 00 Common Work Results for Plumbing

1. For both new construction and renovation work, install all waste pipes as high as possible to maximize clearance height.
2. Routings of plumbing pipes shall be, in general, horizontal or perpendicular to building lines
3. Pipes shall not be routed over electrical equipment rooms, telecom closets, elevator equipment rooms, elevator shafts and major medical equipment.
4. For plumbing risers that span more than two floors, install those risers inside of chases.
5. Coordinate installation on piping to ensure that it does not interfere with access to pneumatic transport tube diverter and HVAC systems
6. Install labels on all types of insulated plumbing systems at appropriate intervals.
7. Install tags on all valves unless valves are $\frac{3}{4}$ " diameter or less and adjacent to equipment served. Valve tags shall include the valve number and the project number. Coordinate the specific numbering sequence with the Owner's Rep. during the construction phase of each project.
8. Install dielectric connections in the plumbing systems where any dissimilar metals are in contact.
9. Pressure testing is required on all piping systems. All pressure tests shall be witnessed and/or signed off on by the Owner. The Contractor shall provide seven days advance notice of all pressure testing.
10. The Design Professional shall require and review the utility co-ordination drawings before construction commences.
11. The Design Professional shall pursue and address the risk of pipes that might freeze due to exposure to the elements during construction. If this is the case, a note shall be added requiring the Contractor to protect the pipes during construction activities.

22 05 53 Identification for Plumbing Piping and Equipment

1. Provide equipment identification on all equipment furnished under this division. Where practical, provide plastic laminate tags indicating the equipment identification number in a clearly visible spot. Where no appropriate flat surface exists for a plastic laminate tag, provide brass tags on chains attached to the equipment. These equipment tags are distinct from the Preventive Maintenance numbers that the Owner's personnel install after the construction phase.
2. Coordinate all equipment identification numbers with the Owner. It is the Owner's intent to assign, during the design phase, plan marks to all equipment items.

22 11 16 Domestic Water Piping

1. Materials
 - a. All above-ground domestic water pipes up to 4" diameter shall be ASTM B88 Type L copper unless the Owner authorizes otherwise. All joints for copper piping up to and including 4" diameter shall be soldered.
 - b. All above-ground domestic water pipes 4" diameter and above shall be either ASTM B88 Type L copper or, where authorized by the Owner, ductile iron (ASTM A377). All joints for copper piping over 4" diameter shall be sill-brazed.
 - c. All above-ground piping systems above 2" diameter shall, unless authorized by the Owner, have flanged fittings on all valves, strainers, and any other equipment that could require maintenance.
2. Routings

- a. Install horizontal sections of domestic water mains above-ceiling in corridors.
 - b. Piping “dead ends” shall be avoided to prevent water stagnation and contamination.
 - c. All above-ceiling sections of branch lines shall be at least $\frac{3}{4}$ ” diameter to allow for future capacity reductions due to possible scaling. Terminal runs in walls and to fixtures may, at the design consultant’s options be less than $\frac{3}{4}$ ” diameter.
 - d. Provide isolation valves on all major branch lines. Ball valves shall be installed on all lines 2” diameter and less. Ball valves shall be specified to be chemical resistant due to the chemical treatment now in use in several buildings.
 - e. Manual air vents shall be installed at the top of each riser.
3. Pressure Reducing Valve (PRV) assemblies
 - a. PRVs shall be either:
 - i. For sizes above 2” diameter, Watts U5B-Z3 (epoxy-coated with stainless steel and Viton upgrades) or Owner approved equal. (Carefully review the proposed size. Proper sizing of these PRVs typically require a PRV smaller than the line size.) For sizes up to 3”, no low flow/bypass regulators are required.
 - ii. For sizes up to and including 2”, Watts 25AUB, equal by Wilkins or Owner approved equal. No low flow/bypass regulators are required.
 - b. PRVs shall be specified to be chemical resistant due to the chemical treatment now in use in several buildings.
 - c. Install PRVs at locations that provide full access for maintenance. To ensure that full access is provided, the Engineer shall:
 - i. Graphically show the reserved access space around all PRVs on the bid documents for each project.
 - ii. Require, via the bid documents, that the Contractor shall prepare and submit coordination drawings that show the access space for each PRV.
 - d. For all PRVs without integral unions, install flanges on both ends. For all PRVs with an integral union on one end, install a flange on the other end.
 - e. Provide two $\frac{1}{2}$ ” ports on each main downstream of the PRV to allow for future remote sensing of the water pressure and temperature. Review with the Owner whether the actual sensing will be included within a given project.
 - f. All PRV assemblies shall be provided with:
 - i. A valved bypass line, equal to line size but with a 2” diameter maximum.
 - ii. A dial type pressure gauge with a ball valve shut-off.
4. Backflow prevention
 - a. For protection of entire additions or wings, install a reduced pressure backflow preventer, such as Watts 909 (with integral gate valves) or Owner approved equal.
 - b. For protection of pipe branches above 2”, install a Watts 709 unless the Owner authorizes otherwise.
 - c. For protection of pipe branches up to and including 2”, install a Watts 909 QT-S unless the Owner authorizes otherwise.
 - d. All backflow preventers shall be fully accessible on both sides and on its bottom.
 - e. The backflow preventer shall be field tested and certified prior to use. Certification tags are available through the UIHC Plumbing shop.
 5. Water hammer control
 - a. Install only water hammer arrestors certified by the Plumbing Drainage Institute.
 - b. Field-built air chambers are not acceptable.

- c. Install all water hammer arrestors in an upright position.
6. Valves
- a. All valves 3" diameter and less shall be quarter-turn, two-piece ball valves with bronze full-port body with sweat connections and valve extensions for application of insulation.
 - b. For valves above 3", typically Watts series G4000-FDA or equivalent flanged valves shall be installed. For valves above 3" where space limitations dictate a more compact valve and where approved by the Owner, install AMRI Isoria 16 butterfly valves with lug style body, ductile iron body material, 420 stainless steel shaft, 316 stainless steel disc, with a chemical resistant liner of Viton, and NR 165 aluminum handles.
 - c. All valves shall be tagged. Coordinate the specific numbering sequence with the Owner's Rep. during the construction phase.
7. Other
- a. Coordinate all pre-startup chlorination with the U of I Water Department.
 - b. Insulate all domestic cold water systems. For typical cold water systems use fiberglass insulation with all-service jacketing. Install additional jacketing at locations where physical protection is required.
 - c. Install drain valves at the bottom of all risers.
 - d. All lavatory supply stops shall be 1/2" fip x 3/8" compression, 1/4 turn ball valve style. Sweat or compression stops are not acceptable. Lavatory supply stops shall be Keeney models 2048pc, 2058pc or equal.
8. Domestic Hot Water Systems
- a. Install the hot water recirculating lines for all plumbing fixtures such that they are no more than ten feet from the end of an individual branch run. For locations where sensor-operated faucets are approved by the Owner:
 - i. Install the hot water recirculating lines such that they are no more than six inches from the supply stop for that fixture.
 - ii. Install an isolation valve above ceiling for the hot water recirculating line.
 - b. Mixing valves shall have check valves downstream of its shut-off valves.
 - c. Install combination balancing/flow measurement valves on the hot water recirculating piping:
 - i. At each horizontal main where it attaches to its riser.
 - ii. At other points where required.
 - iii. The location of these combination balancing/flow valves shall be accurately shown on all as-built drawings. Any mixing valve installed in conjunction with an electronic faucet shall be piped with flexible stainless steel supplies and stops; rigid piped supplies are not acceptable.
 - d. All hot water and hot water recirculating branches shall parallel the cold water: the hot water recirculating piping shall be designed as a reverse return system.
 - e. All hot water and hot water recirculating systems shall have their design velocities limited to 4 feet per second to prevent erosion-corrosion.

22 13 00 Facility Sanitary Sewerage

22 13 16 Sanitary Waste and Vent Piping Systems

1. Materials

- a. For typical sanitary waste and vent systems of 3" diameter and above, install service weight cast iron (no-hub or bell-and-spigot) pipes.
 - b. For typical sanitary waste and vent systems below 3" diameter, install copper (ASTM B88, Type L) pipe with wrought sanitary fittings throughout; use of cast iron piping is allowed only if authorized by the Owner.
 - c. For typical below-ground waste and vent systems, install standard weight cast iron (bell-and-spigot) pipes.
 - d. All flanges on water closets shall be 3" and the floor sealed appropriately. Waste lines may be increased to 4" at the next fitting closest to the water closet.
2. Routings
 - a. Horizontal lengths of all branch sanitary runs (as measured to either the building main or a sewage ejector) shall not exceed 80 linear feet.
 - b. Cleanouts shall not be installed over 60 linear feet apart. Typical cleanouts shall be installed on the next level up, either in a floor or wall configuration. Cleanouts shall be located in soiled utility rooms, housekeeping rooms, etc. Do not locate cleanouts in finished spaces.
 - c. Plumbing vents-thru-roof shall not be installed any closer than twenty-five feet to the nearest outside air intake or operable window.
 - d. Sanitary tees, crosses or double combinations shall not be installed.
 3. Sewage ejectors
 - a. Owner approval is required for installation of sewage ejectors.
 - b. If installed, all sewage ejectors shall have heavy duty self-priming duplex pumps of the self-priming type or, when authorized by the Owner, the submersible type. Sewage ejectors shall be provided with automatic alternators to distribute operation to both pumps on each successive cycle and to operate both pumps when one pump cannot handle the load. Sewage ejectors shall be Hydromatic model MPC, equivalent by Metropolitan or Owner authorized equal.
 - c. Provide twin level alarms. The first alarm shall be an audible local alarm and the second alarm shall be wired back to the Building Automation and Control System (BACS).
 - d. Overhead lifting hooks shall be provided to aid in motor and/or pump replacement.
 - e. All sewage basins shall be poured concrete, precast concrete, or fiberglass, or Owner approved equal and shall have a minimum diameter of 36". Covers for sewage basins shall be airtight.

22 13 19 Sanitary Waste Piping Specialties

1. Grease interceptors
 - a. All grease interceptors shall be the bacteria-driven type in order to minimize cleaning requirements.
2. Oil interceptors
 - a. Provide with cathodic protection.
 - b. Provide with explosion proof level switch with local light and audible alarm to indicate high oil level. The alarm shall also be wired back to the BACS.
3. Traps
 - a. Factory P-traps shall not be installed on floor-mounted fixtures such as janitor's closets, or floor drains. These fixtures shall be installed with either a P-trap with cleanout plug or a running trap.
 - b. Factory P-traps are acceptable at other locations.

22 14 00 Facility Storm Drainage

22 14 13 Storm Sewer Piping Systems

1. Materials
 - a. For typical storm sewer systems of 3" diameter and above, install cast iron (no-hub or bell-and-spigot) pipes. Tie all joints above 4" diameter to avoid blown apart joints.
 - b. For typical storm sewer systems below 3" diameter, install copper (ASTM B88, Type L) pipe.
 - c. Install 1" fiberglass insulation, with all-service jacketing, on all:
 - i. The initial interior section of piping from the roof drain to the first horizontal run of storm piping.
 - ii. All horizontal runs of storm piping.
 - iii. All exposed sections of storm piping.
 - iv. Sections of storm piping in noise-sensitive areas, if such routing cannot be avoided.
2. Routings
 - a. Cleanouts shall be provided at the first bend below the roof, at the base of all risers and at points where the system changes from horizontal to vertical or from vertical to horizontal.

22 14 23 Storm Drainage Piping Specialties

1. Cleanouts shall be line-size for storm mains up to 4" diameter. For storm mains above 4" Diameter, provide 4" clean-outs.

22 14 26 Facility Storm Drains

22 14 26.13 Roof Drains

1. Primary roof drains shall be of the beehive (dome) type, with drain bowls, clamping rings, under deck clamps, extension flanges, and domes being cast iron in composition. Clamping rings shall have four bolts. Drains with three bolts are not approved. Drain rims shall be elevated above the roof decking by setting the primary roof drain casting at deck level and installing a gasketed, threaded, adjustable extension flange with secondary clamping collar. Clamping collar elevation shall be lower than the roof surface elevation, but shall not result in steep roof transitions at roof drains. Roof system shall not be required to slope more than 1" per foot around drains.
2. Secondary drainage systems shall be installed through the use of secondary roof overflow drains with the top of the internal water dam set two inches higher than the primary roof drains. Overflow drain composition and method of setting shall be similar to that described for primary roof drains. However, overflow drain secondary clamping collar shall be set with elevation to be flush with the field of roof so as to prevent the need to sump the roof around overflow drains. Design overflow drains and coordinate with the roof system design, so as to prevent ponding of water around the overflow drains.
3. Primary roof drains shall be located at least 12" from adjacent perimeter parapet walls or roof penetrations requiring flashing.
4. Secondary roof drains shall be located at least 24" from adjacent primary roof drain and at least 12" from adjacent perimeter parapet walls or roof penetrations requiring flashing.
5. Approved Manufacturers:
 - Zurn
 - Josam
 - Wade
 - Jay R. Smith

- Watts (four bolt model only)

22 14 26.16 Areaway Drainage

1. Review with Owner the specific types of areaway drains to be provided.

22 14 29 Sump Pumps

1. All sump pumps shall be the heavy duty submersible duplex pump type with automatic alternators (with stainless steel ball floats) to distribute operation to both pumps on each successive cycle and to operate both pumps when one pump cannot handle the load.
2. Provide twin level alarms. The first alarm shall be local and the second alarm shall be wired back to the Building Automation and Control Systems (BACS).
3. Overhead lifting hooks shall be provided to aid in motor and/or pump replacement.
4. All sump pump basins shall be poured concrete, precast concrete, fiberglass, or Owner approved equal and shall have a minimum diameter of 36".

22 15 00 Non-Medical Gas Compressed Air Systems

1. All non-medical air compressed air systems shall be Quincy or Owner approved equal.
2. All non-medical air compressors shall have duplex pumps.

22 30 00 Plumbing Equipment

22 31 16 Commercial Domestic Water Softeners

1. All softening systems shall be by Culligan unless the Owner authorizes otherwise.
2. Coordinate all water softening equipment selections with the University of Iowa Water Department.

22 34 13 Instantaneous, Tankless, Gas Domestic Water Heaters

1. Install steam-fired instantaneous hot water heaters for all domestic water heating, unless the Owner authorizes otherwise. (Instantaneous hot water heaters are less susceptible to Legionella colonization. Instantaneous hot water heaters also take up less floor space.)
2. All instantaneous hot water heaters shall be by Ajax, Reco or Owner approved equal.
Install pneumatic control valves on these units to allow for faster and more cost-effective replacement of the control valves as needed.

22 40 00 Plumbing Fixtures

1. Plumbing trim shall be Chicago Faucet unless Owner authorizes otherwise. Faucets shall be supplied with ceramic cartridges.
2. Flush valves shall be Sloan unless Owner authorizes otherwise. All automatic flush valves shall be either the battery type or the plug-in type; no hard-wired automatic flush valves shall be permitted.

3. For typical vitreous china and cast iron plumbing fixtures, all units shall be by Kohler, Zurn, or American Standard. ADA toilets shall be by Zurn or Eljer.
4. For Bariatric toilets, floor mounted units of Kohler or Right Width Elongated Right Height Flush Valve Toilet by American Standard shall be used. All Bariatric toilets require independent clean out access. All Bariatric toilets shall be equipped with Big John toilet seats, 1200 lbs capacity.
5. Water Closets
 - a. All water closets in patient areas shall be floor-mounted, with rear or bottom discharges as conditions dictate. The floor penetration of the piping and flange shall be sealed with concrete. American Standard Huron Universal Bowl with Everclean, Model 3313.001.
 - b. In public areas, such as entry lobbies, water closets shall be wall-hung. The water closets shall be installed on a concealed wall-carrier system with suitable support structure to keep water closet stable.
 - c. Each public restroom shall include a floor mounted water closet in the handicap stall, with rear or bottom discharges as conditions dictate. The floor penetration of the piping and flange for all water closets shall be sealed with concrete.
6. For typical stainless steel plumbing fixtures, all units shall be by Elkay or Bradley.
7. All shower bodies shall be acrylic (not gelcoat) unless the Owner authorizes otherwise. All shower valves shall be pressure and temperature compensating by Symmons or Owner approved equal.
8. Shower heads shall not use loop-type tubing.
9. Electric water coolers shall be Halsey-Taylor, Elkay, or Owner approved equal.
10. All wall hydrants shall be Woodford or Owner approved equal.
11. Floor drains may be installed in toilets rooms where authorized by the Owner.
12. Faucets for clinic and inpatient handwashing shall be a rigid/swing gooseneck with 317 stainless steel wrist blades and a laminar flow device in the spout, no aerators. Chicago Faucet 895-317 (with a GN2AE3JKCP spout) or Owner approved equal. Sensor- operated faucets are not acceptable unless authorized by the Owner. Sink drain stop shall be a Zurn Z8743-PC.
13. Mixing valves for individual faucets shall be thermostatic water mixing valves Safety Mix by Symmons or Owner approved equal.
14. Mixing valves for shower shall be temperature/pressure mixing valves by Powers. The approved models are Powers e480-00 or e480-01 installed with unions or Owner approved equal.

22 45 19 Eye Wash

1. Eye Wash to be a deck mounted device, operated with one hand similar to Acorn S0650, Bradley S19-280W, or Guardian 1848 with a Guardian G3600LF, thermostatic mixing valve.

22 60 00 Gas and Vacuum Systems for Laboratory and Healthcare Facilities

1. General
 - a. During the Design Phase, the Design Professional shall coordinate all medical gas systems with the Owner, including the project's User group, Respiratory Therapy, Anesthesia (if required), and the Owner's Rep. All Design Professionals shall also fully familiarize themselves with the applicable NFPA codes.
 - b. All medical gas systems within the Hospital shall be Level 1 medical gas systems.
 - c. For all medical gas system components except for medical air compressors and medical vacuum pumps, BeaconMedaes or Amico are the approved manufacturers.
 - d. As-built drawings of all medical gas additions and revisions shall be created as required by NFPA.

2. Medical Gas Outlets

- a. Coordinate the type of medical gas outlet required at each location. (DISS outlets are installed in a majority of areas. Quick connect outlets are required in some rooms where speed is a consideration but heavy usage is not expected.)
- b. Coordinate the particular generation of the required medical gas outlets during the Design Phase.
- c. Specification shall provide for an extra five percent, no less than one nor greater than 10 percent, of each type of medical gas outlet to be furnished within each project to allow change outs of the medical gas outlet type where the Owner may request so at the completion of construction. All remaining unused medical gas outlets shall be turned over to the Owner.

3. Medical Gas Valves

- a. Medical gas zone valves shall be installed at locations per NFPA guidelines. Where there are questions at non-standard locations, review the specifics with Respiratory Therapy.
- b. Lockable valve boxes shall be supplied where so requested by the Owner.

4. Medical Gas Piping

Note: Abandoned gas piping must be removed back to a shut off valve.

- a. Medical gas piping may be either Type K or Type L, ASTM B819. The minimum size of medical gas piping installed above-ceiling shall be $\frac{1}{2}$ " diameter. The maximum length of run for $\frac{1}{2}$ " diameter medical gas piping shall be 30 feet. The Design Professional shall give consideration to possible future additions to the medical gas distribution system for a specific project. (Installation of piping sizes larger than $\frac{1}{2}$ " diameter is often a cost-effective means to accommodate future expansion or revisions.)
- b. Isolation valves for each horizontal take-offs from medical gas risers shall be installed and in accessible locations.
- c. Label all medical gas piping every 20 feet and at least one in every room and on either side of the walls to rooms. Label medical gas pipes according to the following schedule:
 - i. Oxygen: white lettering with green background.
 - ii. Medical vacuum: black lettering with white background.
 - iii. Nitrous oxide: white lettering with blue background.
 - iv. Medical air: black lettering with yellow background.
 - v. Nitrogen: white lettering with black background.
 - vi. W.A.G.D.: white lettering with black background.
 - vii. Laboratory air: black lettering with yellow background.

5. Area Alarm Panels

- a. Coordinate the location of all area alarm panels with the Users. Locate area alarm panels adjacent to medical zone valve boxes.
- b. The specifications shall require that the Contractor set and adjust all timing and sequencing of alarms per the directions of Capital Management and Maintenance Engineering during the Construction Phase. This is work that is done via internal settings at each area alarm panel.

6. Zone Valve Box

- a. Amico VBU-P with secondary sensor part

22 61 00 Compressed-Air Systems for Laboratory and Healthcare Facilities**1. Medical Air Compressors**

- a. Install duplex medical air compressors for each new addition or where medical air capacity expansion is required.
- b. All compressors shall meet current NFPA guidelines for medical air compressors.
- c. Medical air compressors shall be manufactured by Kolbelco, Ingersoll-Rand or Quincy.

- d. All medical air compressors shall be of the liquid-cooled rotary screw type with internal sound dampening on its enclosure.
- e. Do not locate any medical air compressors immediately above, below or near any noise sensitive areas.
- f. Install all medical air compressors and their controls on emergency power which is fed via automatic transfer switches. The compressors shall be fed from separate electrical load centers.
- g. Install dual source cooling to each water-cooled air compressor. The primary source shall be the building-wide chilled water system and the back-up source shall be the domestic cold water system.
- h. Install cross-tie piping to other existing medical air compressors to create additional redundancy.
- i. Install the outside air intakes for medical air compressors from either the roof or other location approved by NFPA 99.
- j. Install dessicant dryers for all medical air compressors, unless authorized otherwise by the Owner.
- k. Interconnect the signal from the pressure sensor on the common medical air discharge main into 1) a master alarm system that is anticipated to be installed in one of the maintenance shop areas of General Hospital in 2005, and 2) the main Telecom alarm center.

22 62 00 Vacuum Systems for Laboratory and Healthcare Facilities

- 1. Medical Vacuum Pumps
 - a. Install duplex medical vacuum pumps for each new addition or where medical vacuum capacity expansion is required.
 - b. Medical vacuum pumps shall be manufactured by Quincy, Ingersoll-Rand or Sullair.
 - c. Air-cooled vacuum pumps are acceptable only at sizes below 20 hp. Water-cooled vacuum pumps are acceptable at all sizes. All water-cooled vacuum pumps shall be installed with a primary and a back-up source of cooling water.
 - d. Install all medical vacuum pumps on emergency power which is fed via automatic transfer switches.
 - e. Install cross-tie piping to other existing medical vacuum pumps to create additional redundancy.
 - f. Interconnect the signal from the pressure sensor on the common medical vacuum intake main into 1) a master alarm system that is anticipated to be installed in one of the maintenance shop areas of General Hospital in 2005, and 2) the main Telecom alarm center.

22 63 00 Gas Systems for Laboratory and Healthcare Facilities

- 1. Back-up Cylinder Rooms For Oxygen and Medical Air
 - a. Back-up cylinder systems shall be manual systems by Western.
 - b. Rooms shall be designed per NFPA 99 including appropriate wall construction and ventilation.
 - c. Medical gas cylinders shall be properly secured per NFPA 99.
 - d. Design of room shall be coordinated with Owner, Respiratory Therapy, and relevant User group.
 - e. Shut-off valves on the incoming building supplies shall be no higher than 5'-6" above floor.
 - f. Medical gas cylinders for back-up cylinder rooms will be Owner furnished.
 - g. The following is a schematic and photographs of the recommended layout of valving and piping for back-up cylinder rooms for Oxygen and Medical Air.

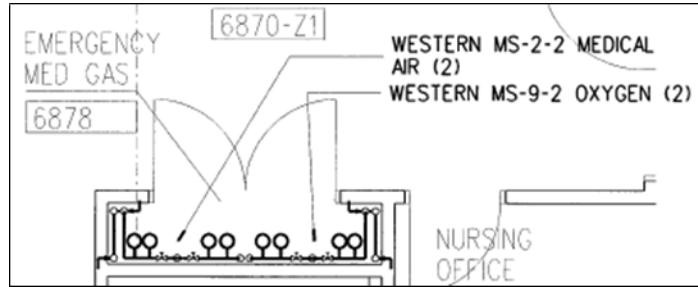


Figure 1: Typical drawing of reserve cylinder room.



Figure 2: Existing reserve cylinder room at UIHC

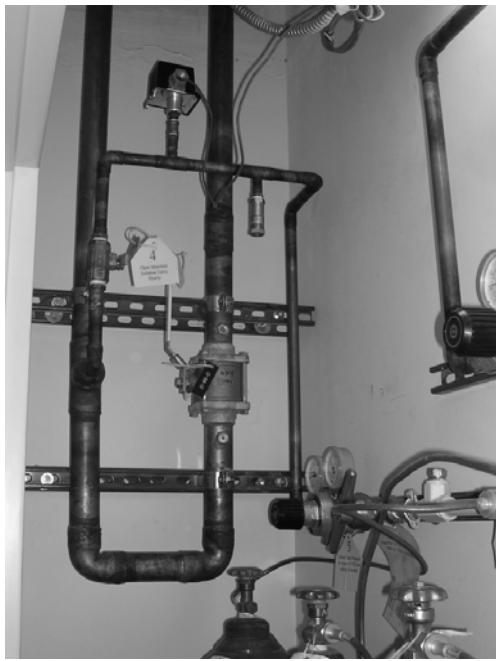


Figure 3: Existing reserve cylinder room at UIHC

2. Oxygen Distribution

- a. The Design Professional shall determine the adequacy of capacity of any existing oxygen main which under consideration for supplying oxygen to a specific project. (A bulk oxygen tank east of the Hospital supplies the majority of oxygen used at the facility. The main distribution system extends through the Lower Level and has risers at multiple points.)

22 66 00 Chemical-Waste Systems for Laboratory and Healthcare Facilities

1. For acid waste and vent systems handling waste discharges at or below 105 degrees F, install either polyvinylidene fluoride (Kynar, Hylar or equal) or polypropylene piping. For acid waste and vent systems handling waste discharges above 105 degrees F, install glass borosilicate piping with stainless steel clamps.
2. No PVC waste or vent systems shall be installed without the Owner's permission.

22 67 00 Processed Water Systems for Laboratory and Healthcare Facilities

1. All purification systems shall, in general, be by Liquitech unless the Owner authorizes otherwise. In Colloton Pavilion, an existing chlorine dioxide system is in place; no Liquitech system shall be added to that distribution grid until or unless the chlorine dioxide system is removed.
2. Review the specifics of the proposed installation for each of the following other types of domestic water systems:
 - a. Distillation.
 - b. Deionization.
 - c. Reverse osmosis.
 - d. Filtration.

4.17 Division 23 – Heating, Ventilation, and Air-Conditioning (HVAC)

Use prefabricated, enclosed, internally insulated, galvanized steel curbs, wherever possible for mechanical penetrations and utility chases. Curb heights shall be coordinated with the roof system design to provide 12" minimum roof base flashing height above the finish roof surface elevation. Non-canted bases shall be used at all curbs.

Use insulated pipe chases with sheet metal covers for pipe penetrations. Pitch pan-style roof flashing details are not allowed.

Use non-penetrating pipe supports for rooftop piping and gas lines. Wood blocking supports shall not be used. Approved manufacturers shall be Portable Pipe Hangers, Inc. or Miro Industries, Inc., with manufacturer-recommended support types used. Utilize support manufacturer-provided design assistance as necessary. Set supports over roof membrane manufacturer's recommended walkway material (coordinate with roof system design).

23 05 00 Common Work Results for HVAC

1. For both new construction and renovation work, the Contractor shall install all air handling units with enough clearance space around the units to provide both access space for maintenance, coil pull, filter replacement and fan replacement. All design documents shall show these clearance spaces.
2. The Contractor shall install labels on all air handling units. Coordinate numbering with the Owner's Rep. during the construction phase.
3. The air handling unit manufacturer shall be required to provide a minimum of four hours of training for the Owner's personnel on each new air handling unit above 2000 cfm.

23 05 53 Identification for HVAC Piping and Equipment

1. Provide equipment identification on all equipment furnished under this division. Where practical, provide plastic laminate tags indicating the equipment identification number in a clearly visible spot. Where no appropriate flat surface exists for a plastic laminate tag, provide brass tags on chains attached to the equipment. These equipment tags are distinct from the Preventive Maintenance numbers that the Owner's personnel install after the construction phase.
2. Coordinate all equipment identification numbers with the Owner. It is the Owner's intent to assign, during the design phase, plan marks to all equipment items.
3. Install labels on all types of mechanical piping systems. Labels shall be placed at maximum intervals of 50 feet, near all branch take-offs, and on either side of the walls to patient rooms. Labels shall be color coded as follows:
 - a. Building service, potable water, cold – light blue, black letters.
 - b. Building service, potable water, hot – light blue with red band.
 - c. Hot water recirc – light blue, black letters.
 - d. Building air – black.
 - e. Carbon dioxide – gray/black or white.
 - f. Central piped detergent system – dark grey with white band.
 - g. Chilled water – dark blue (matching plastic pipe covering).
 - h. Condensate return – light grey, black letters.
 - i. Condensing water – aluminum.
 - j. Cooling tower make-up water – light blue with aluminum band.
 - k. Distilled water – blue red blue bands.
 - l. Drain and sludge lines – dark brown.
 - m. Fire lines – red.
 - n. Glycol – yellow with blue bands.
 - o. Heating hot water – medium blue, white letters.
 - p. Hospital oil-free air – black with green band.
 - q. Natural gas – vermillion with white band.
 - r. Nitrogen – black/white.
 - s. Nitrous oxide – blue/white.
 - t. Oxygen – green.
 - u. Rain leaders – dark brown, white letters.
 - v. Raw water (well water, untreated) – dark grey.
 - w. Scavenger vacuum (WAGD) – violet/white.
 - x. Steam, low pressure – orange, black letters.
 - y. Steam, high pressure – driftwood grey.
 - z. Vacuum (Cleaning) – dark brown with white band.
 - aa. Vacuum (Medical) – white/black.

23 05 93 Testing, Adjusting, and Balancing for HVAC

1. General
 - a. Contracts for testing and balancing are typically separate from the main contracts for general construction in order to better serve the interests of UIHC. However, coordinate with the UIHC project manager to confirm the Hospital's preference for a given project.

- b. The Testing and Balancing Contractor (TBC) shall have a minimum of five years' experience in testing and balancing and shall be either AABC or NEBB certified
 - c. The specifications for testing and balancing shall include:
 - i. The requirement for two season (heating season and cooling season) balancing of central air handling units.
 - ii. A warranty period requiring re-adjustment at the Owner's request of any component that is not functioning correctly for a period of 90 days following initial balance.
 - iii. The requirement for adjusting the system to accommodate comments made by the Design Professional on the balancing report.
 - iv. A minimum of five copies of the balancing report shall be submitted.
2. Pre-Construction Testing
- a. Pre-construction testing (also known as benchmarking) shall be considered where renovation or new construction shall impact airflows or hydronic flows or parts of existing mechanical systems that shall remain. Pre-construction airflow testing is beneficial where renovation or new construction, without pre-construction testing, would either:
 - i. Cause unnecessary disruption to nearby occupants due to the need to rebalance multiple downstream terminals, or
 - ii. Create additional overall costs for balancing work at the end of the project.
3. Design Phase Coordination
- a. For phased work, the Design Professional shall meet with one of the possible TBC during the design phase to give input into the requirements of the project, including the proposed locations of balancing dampers, balancing valves, and autoflow valves.
 - b. For phased work, the same TBC shall be used for all phases of the project.
 - c. The Owner may, depending upon the size and complexity of the project, retain the services of a TBC to review the 90% review documents to coordinate the optimum placement of dampers, valves, pressure taps, etc. and to minimize any balancing-related change orders.
 - d. The specifications shall require that the General Contractor and all subcontractors fully cooperate with the TBC during the construction phase and during initial occupancy.
 - e. The specifications shall also require that the TBC fully cooperate with the General Contractor and the Testing and Balancing Contractor.
4. Airflow Testing and Balancing
- a. Specialty balancing items:
 - i. All air handling units which have been retrofit with ultraviolet emitters shall be rebalanced 45 days after the emitter installation. The 45 day waiting period will allow the cooling coil to clean itself, creating a lower air pressure drop across it.
 - ii. The TBC shall coordinate the calibration of all airflow monitors, isolation rooms, and pressure-controlled rooms with the Temperature Controls Contractor.
5. Hydronic Testing and Balancing
- a. Specialty balancing items:
 - i. Branch lines for recirculating domestic hot water shall be balanced by the TBC to ensure flows.
 - ii. Note that the Mechanical Piping Section requires that HVAC pumps have:

- A single pressure gauge connected directly at the suction and discharge outlets of the pump.
 - An accurate type of flow measurement device (such as a venturi or sharp edge orifice) if testing and balancing is required at a specific pump. Triple-duty valves do not prove accurate enough flow measurements.
6. Sound Level Testing
- a. Sound level testing shall be specified only in areas where the UIHC project manager deems sound levels to be a critical issue. Selection of the areas to be tested shall be made during the design phase.
 - b. Sound level testing shall be based upon ANSI 224.3. NC curves shall be developed by the TBC for inclusion in the sound level report.

23 07 13 Duct Insulation

1. Do not install exposed duct lining on supply or return air ducts unless authorized by the Owner.
2. Double wall duct (solid outer and inner liners with insulation between) shall be specified on supply air ducts (and on return air ducts where insulation is required) within Mechanical Equipment Rooms and on risers in main chases.
3. Specify rigid insulation or insulation wrap at other locations for supply air ducts and, where deemed necessary, for return air ducts. Rigid insulation shall be installed using both adhesives and welded pins.

23 07 19 HVAC Piping Insulation

1. Insulate all mechanical piping systems per ASHRAE 90.1.
2. Jacketing:
 - a. For typical mechanical piping systems, use fiberglass insulation with all-service jacketing.
 - b. Install additional jacketing at locations where physical protection is required.
 - c. Install PVC jacketing on all piping within Mechanical Equipment Rooms.
 - d. Install aluminum jacketing for insulated piping outside the facility and at locations where maintenance access may cause damage.
 - e. Review with the Owner specific types of jacketing proposed for each installation.

23 08 00 Commissioning of HVAC

1. Include the TBC on any projects where formal commissioning is specified.
2. A Certified AABC Commissioner shall be part of any commissioning team.

23 09 00 Instrumentation and Controls for HVAC

1. General
 - a. A majority of the existing temperature control systems within the facility are currently based upon the Johnson Controls Metasys system. However, Johnson Controls, Siemens and CI3 are now approved TCCs at the Hospital. However, there are locations where the required new systems of one TCC would work better with the existing equipment than others. The Design Professional shall review such areas with the Owner's Rep.
 - b. The Design Professional shall coordinate all new temperature control work with any existing systems.
2. Temperature Control System Requirements
 - a. Electrical wiring:

- i. All 24 volt wiring shall be installed by the TCC. This wiring shall be installed either in conduit or on J hooks. In mechanical equipment rooms and in patient rooms, the use of conduit is required. Routings shall be above corridor ceilings.
 - ii. All 120 volt wiring for temperature control work (such as to control panels and for terminal air box controls) shall be installed by the TCC. This wiring shall be installed in conduit.
3. Pneumatic air piping:
 - a. Exposed locations: Hard copper tubing.
 - b. Concealed inaccessible locations: Either hard or soft copper tubing.
 - c. Concealed accessible locations: Copper tubing.
 - d. Buried in concrete: Either hard or soft copper tubing.
 - e. Inside control panels and enclosures: Polyethylene tubing.
 - f. Penetrations through fire and smoke barriers (walls and floors): Either hard or soft copper tubing.
 4. Areas requiring special control systems
 - a. Isolation rooms shall have volume matching terminal air boxes on the supply and the return or exhaust for that room. The current standard for control monitors on isolation rooms is the TSI model Pressura RPM10. The TCC shall be specified to provide both monitoring and control of all exhaust fans for isolation rooms.
 - b. Telecom rooms shall be designed with their own thermostats which shall control a terminal air box, fan coil or other cooling device.
 5. Equipment which requires standardized control or monitoring systems.
 - a. Terminal Air Boxes (TABs) shall be specified with a discharge air sensor. The TCC shall be specified to provide the reheat coil control valve, the damper actuator, the transformer, the controller and the thermostat. For each project, the specifications shall clearly identify which subcontractor is to provide the mounting of the actuators.
 - b. Fire/smoke dampers shall have end switches and actuators mounted by the damper manufacturer. Connection of the signal from all fire/smoke dampers to the fire alarm system shall be by the TCC. Actuators shall be 24V. Wiring for fire/smoke dampers shall be similar to that shown on wiring diagram attached to this document. Power to the control system itself shall be by the TCC.
 - c. Chilled water coils at main air handlers shall have pressure independent Delta P control valves. The temperature control system shall monitor entering water temperature, leaving water temperature, and valve position.
 - d. All return and exhaust fans shall be monitored. Review with the Owner those locations where pressure monitoring is also required.
 - e. VFDs shall be Toshiba or ABB. No other manufacturers shall be allowed unless authorized by the Owner. The General Contractor shall provide the VFD to better coordinate the VFD/control system compatibility.
 - f. HVAC circulating pumps shall be monitored and controlled. Monitoring by either circuit transformers or differential pressure switches are acceptable.
 - g. Sewage ejectors shall be monitored for high level alarm and pump failure status.
 - h. Sump pumps shall be monitored for high level alarm and for pump status. Clearly specify which subcontractor is to provide and install the float switch.
 - i. Emergency generators shall be monitored for run status. This monitoring is separate from the monitoring provided by the generator remote panels.

6. Design Phase Coordination

- a. The Design Professional shall, during the design phase, coordinate with the Owner in order to access the expertise and historical knowledge of systems in use at UIHC. This coordination effort shall be during a formal project meeting.
- b. Discuss with the Owner's Rep. all temperature control work that may merit a longer warranty period than is standard. Unless otherwise authorized by the Owner, all temperature control systems shall be provided with a one year warranty. For projects with multiple phases, review with the Owner, the starting point of all warranties.
- c. The Design Professional shall, for each specific project, ask the Owner whether video-taping of the temperature control system training is required.
- d. Coordinate all temperature control point names with the Owner.

7. Construction Phase Coordination

- a. Work to be specified for the General Contractor to provide under the supervision of the TCC:
 - i. Provide and install all valves, pressure taps, and connections for steam water, drain and overflow connections.
 - ii. Provide and install all piping connections required for valve position indicators, flow devices, etc.
 - iii. Provide and install any necessary access panels to allow service access to all control devices and equipment.
 - iv. Provide and install any necessary multiple section dampers and interconnecting linkages.
 - v. Install any automatic dampers and automatic control valves that are to be furnished by the TCC.
 - vi. Install any separable wells that are to be furnished by the TCC.
- b. The TCC shall be contractually required to fully coordinate with the Testing and Balancing Contractor.
- c. For each project, the number of training hours for Hospital personnel shall be clearly specified.

23 11 00 Facility Fuel Piping**23 11 13 Facility Oil Systems**

1. Review the specifics of the proposed system with the Owner.

23 11 23 Facility Natural Gas Piping Systems

1. Review the specifics of the proposed system with the Owner.

23 20 00 HVAC Piping and Pumps**1. General**

- a. For both new construction and renovation work, install all mechanical pipes as high as possible (while allowing for maintenance access) to prevent any existing or future ceilings from being forced too low.
- b. Routings of mechanical piping shall be parallel or perpendicular to building lines. All piping installed in chases shall be designed to allow future installation of additional vertical risers and, at the bottom of the chase, additional horizontal piping associated with future projects.

- c. Install horizontal sections of mechanical piping mains above-ceiling in corridors unless authorized otherwise by the Owner.
- d. All above-ceiling sections of branch lines shall be at least $\frac{3}{4}$ " diameter to allow for future capacity additions. Terminal runs in walls and to fixtures may be less than $\frac{3}{4}$ " diameter.
- e. Provide isolation valves on all branch lines and on all equipment. The Design Professional shall specify, and then field verify, that all new valves are accessible.
- f. Pipes shall not be routed over electrical equipment rooms and Telecom closets unless authorized otherwise by the Owner.
- g. Where mechanical piping risers span more than two floors, those risers shall be installed inside of fire-rated chases.
- h. Do not install mechanical piping:
 - i. Within 18" inches horizontally of any pneumatic transport tube diverter.
 - ii. Below any pneumatic transport tube diverter.
 - iii. Within 18" horizontally of any terminal air box.
 - iv. In the door swing space of any duct access door.
 - v. Within 12" of the front of any electrical junction box.
 - vi. Within 12" of any roof perimeter or penetration requiring roof flashing.
 - vii. Within 4" of the new roof surface elevation.
- i. Install dielectric connections in the mechanical piping systems where any dissimilar metals are in contact.
- j. All valves shall be tagged unless valves are $\frac{3}{4}$ " in diameter and adjacent to equipment served. Valve tags shall include the valve number and project number. Coordinate the specific numbering sequence with the Owner's Rep. during the construction phase of each project.
- k. All types of mechanical piping risers, except cooling coil condensate and refrigerant piping, shall have drain valves at their bottom as well as isolation valves on their horizontal supply and return branches where they connect to their risers.
- l. Pressure Testing
 - i. Pressure testing is required on all piping systems.
 - ii. All pressure tests shall be witnessed and/or signed off by the Owner.
 - iii. The Contractor shall provide seven days advance notice of all pressure testing.
 - iv. The Contractor shall provide new valves as required to perform pressure testing of segments of new piping.

23 21 00 Hydronic Piping and Pumps

Chilled Water Piping Systems

- 1. UIHC Chilled water design criteria
 - a. Cooling coil selection shall be based upon 14 degrees temperature difference between the entering chilled water and the leaving chilled water, unless authorized otherwise by the Owner. (High humidity removal conditions could dictate a lower delta T be used as the design basis.)
 - b. The cooling coil control valve shall be an industrial quality, pressure independent valve with 100 to 1 rangeability and an electronic actuator.
 - c. Cooling coil control valves shall be Delta P valves by Flow Control Industries, unless otherwise authorized by the Owner's Rep.
 - d. Information system points
 - i. Service entrances (from the U of I campus chilled water system) shall include points for supply temperature, return temperature, supply pressure, and return temperature.

- ii. The main building distribution system shall include points for supply temperature (one per building), return temperature, supply pressure, return pressure, flow into the building system, and pressure at the hydraulically most remote point in the building.
 - e. Each cooling coil shall include points for valve position feedback (for Delta P valves) and return temperature.
 - f. Designs that make modifications to the interface for building chilled water shall be coordinated with U of I Chilled Water Plant.
2. Materials
- a. For interior chilled water piping above 2 inch diameter, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with welded or mechanically coupled joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
 - b. For interior chilled water piping 2 inch diameter or less, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with screwed or welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
3. Chilled water pumps
- a. The Design Professional shall not specify the installation of additional chilled water pumps without Owner approval.
 - b. All necessary floor-mounted chilled water pumps shall be installed on concrete housekeeping pads.
 - c. Install a single oil-filled pressure gauge directly at the suction and discharge outlets of each pump.
4. Air separators
- a. Clean all integral strainers at the end of each construction project that connects to a given chilled water grid.
5. Insulation and jacketing
- a. Install vapor barriers on all piping insulation for chilled water systems.
6. Other
- a. Install manual air vents at accessible locations
 - i. At the top of all risers.
 - ii. At all high points in the piping system.
 - iii. But not in patient rooms.
 - b. Install plate heat exchangers where higher quality chilled water is required for protection of sensitive equipment.

Heating Hot Water Piping Systems

1. Materials
- a. For interior heating hot water piping above 2 inch diameter, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
 - b. For interior heating hot water piping 2 inch diameter or less, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with screwed or welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
 - c. Mechanically coupled piping shall not be used.
2. Heating hot water pumps
- a. All floor-mounted heating hot water pumps shall be installed on concrete housekeeping pads.
 - b. Install a single oil-filled pressure gauge directly connected to the suction and discharge outlets of each pump.

3. Other

- a. Install manual air vents at accessible locations
 - i. At the top of all risers.
 - ii. At all high points in the piping system.
 - iii. But not in patient rooms.

23 21 14 Hydronic Specialties

Mechanical Piping Specialties

1. Balancing valves shall be provided with multiple stops. Ball valves are not acceptable for balancing.
2. For strainers above 2" diameter, provide with ball valve flush assembly. All strainers shall be cleaned at the end of any construction phase. The Contractor shall submit an end-of-construction report certifying that all strainers have been cleaned.
3. All relief valves shall be piped to a floor drain. Route all relief piping through areas such that no blockages of traffic paths are created.
4. Griswold space-saver type control valves shall not be used. The following shall be the standard: Hammond ball valves and strainers, and Bell & Gossett circuit balancing valves.

Glycol Piping Systems

1. Materials

- a. For interior glycol piping above 2 inch diameter, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with welded joints. Where threaded joints must be used due to equipment connections, install with Teflon tape. The Design Professional shall specify all Teflon tape, gaskets, and other sealants that are totally compatible with the glycol and inhibitor to be used in the system.
 - ii. Type L ASTM B88 copper with wrought fittings. Screwed fittings shall not be used.
- b. For interior glycol piping 2 inch diameter or less, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.

2. Other

- a. Install manual air vents at accessible locations
 - i. At the top of all risers.
 - ii. At all high points in the piping system.
 - iii. But not in patient rooms.
- b. Install low pressure alarms on glycol piping systems to sense any leakage from the system. The low pressure alarm signal shall be monitored by the building automation system. Do not install automatic make-up water connections to glycol piping grids due to the danger of dilution of the glycol/water mixture (and hence potential freezing).

Cooling Coil Condensate Piping Systems

1. Materials
 - a. Install Type L ASTM B88 copper with wrought fittings.
2. Routings
 - a. The cooling coil or air handling system shall be installed as high as necessary to avoid having to construct a trap that would extend through the floor into a level below. If a condensate trap assembly is unavoidable, completely seal against water leaks through the floor penetration.
 - b. Minimize the lengths of condensate pipes installed on the floors of Mechanical
 - c. Equipment Rooms.
3. Insulation
 - a. Insulate all condensate lines that extend through occupied spaces or the above-ceiling areas over occupied spaces.

23 21 23 Hydronic Pumps

1. Circulating Pumps
 - a. Install all floor-mounted circulating pumps on concrete housekeeping pads.
 - b. Include means to manually balance each circulating pump. Triple-duty valves shall not be used for balancing.
 - c. Include pressure taps directly at the suction and discharge ports of each pump for accurate measurement of pressures.
 - d. Parallel pumps with unequal heads shall not be specified.

23 22 00 Steam and Condensate Piping and Pumps

1. UIHC Steam Design Criteria
 - a. Designs that make modifications to the building steam system shall be coordinated with U of I Physical Plant.
 - b. Information system points
 - i. On steam mains downstream of each service entrance (from the U of I campus steam distribution system) monitoring points shall include points for steam pressure and temperature, both upstream and downstream of the PRV.
 - ii. Monitoring of the condensate pump status and level alarms.
 - iii. Monitoring of the end sections of major steam grids is desirable.
 - iv. The Design Professional shall include all of the required information system points in any upgrade or new work associated with the identified portions of the steam piping system.
2. Materials
 - a. For interior steam and condensate piping with pressures (below 75 psig), and above 2 inch diameter, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
 - b. For interior steam and condensate piping with pressures below 75 psig, and 2 inch diameter or less, install either:
 - i. Schedule 40 ASTM A53 seamless black steel with screwed or welded joints.
 - ii. Type L ASTM B88 copper with wrought fittings.
 - c. For interior steam and condensate piping with pressures 75 psig and higher, and above 2 inch diameter, install Schedule 80 ASTM A106 GrB seamless black steel with threaded forged steel 2000# Class fittings.

- d. For interior steam and condensate piping with pressures below 75 psig, and 2 inch diameter or less, install Schedule 40 ASTM A106 GrB seamless black steel with standard butt welded fittings.
3. Condensate Pumps
 - a. Only duplex condensate pumps shall be installed.
 - b. Any condensate receiver which is not recessed nor on elevated legs shall be installed on a concrete housekeeping pad.
 - c. Design basis shall be electric condensate pumps. Review with the Owner the importance of installing steam-powered condensate return pumps wherever such are proposed for new construction.
4. Pressure Reducing Valve (PRV) Assemblies
 - a. Pressure Reducing Valves (PRVs) at service entrances shall be eccentric plug control valves by Cashco Ranger. These valves shall have either steel or ductile iron bodies. Coordinate with the University FSG for the specification and purchase of these valves. FSG maintains, and where necessary, rebuilds the PRVs at service entrances.
 - b. Any PRVs downstream of the service entrance PRVs are owned and maintained by UIHC.
 - c. All PRV assemblies shall be provided with:
 - i. A three-valved bypass assembly.
 - ii. Dial type pressure gauges on both the upstream and downstream sides.
5. Valves
 - a. All gate valves shall be 300 # class.
 - b. For steam and steam condensate valves above 2 inch diameter, all gate valves shall be butt welded. Flanged valves are not acceptable.
 - c. For steam and steam condensate valves 2" diameter and less, all gate valves shall be screwed bronze.
6. Other
 - a. Drain valves shall be installed at the bottom of all risers and at all steam main isolation valves.
 - b. Air bleed valves shall be installed at high points of steam condensate lines.

23 23 00 Refrigerant Piping Systems

1. System Design
 - a. The Design Professional shall provide in the construction documents a detailed piping layout of all field-built refrigerant piping systems. These layouts shall include all required pipe sizes, traps, double risers, and refrigerant accessories.
2. Insulation And Jacketing
 - a. A weather-resistant covering or field-applied paint shall be applied on all exterior pipe insulation.
 - b. Vapor barriers shall be applied to all return line insulation.

23 25 00 HVAC Water Treatment Systems

1. All chilled water is chemically treated by the University of Iowa chilled water system.
Review the proposed chemical treatment program with the Owner to determine compatibility with the on-going chemical treatments.
2. For all other hydronic mechanical piping systems, pressure test, chemically treat, flush and drain all new systems.

23 30 00 HVAC Air Distribution

1. Isolation Rooms
 - a. Label the exhaust air duct from isolation rooms at intervals of 50 feet. Also label each isolation room exhaust fan, motor controls and any VFDs as such.
 - b. Arrange the duct systems for isolation rooms to include flow tracking (for pressurization control) via the use of TABs on both the incoming supply air and the leaving exhaust or return air ducts.
 - c. Isolation rooms shall have direct drive exhaust fans.
 - d. The return or exhaust intakes from isolation rooms shall be installed at floor level.
 - e. The room pressure controller for isolation rooms shall be a TSI model 8630 with a non-flashing display.
 - f. Isolation rooms shall have either neutral/negative switching or neutral/positive switching; negative/positive switching is prohibited.
 - g. Ceiling diffusers with integral HEPA filters (in lieu of installing above-ceiling in-line HEPA filters) shall be used for positive pressure isolation rooms.
 - h. Locate all ceiling diffusers such that they do not interfere with the wall-mounted inlet for the room pressure controller.

23 31 00 HVAC Ducts and Casings

23 31 13 Rigid Metal Duct Systems

1. Show pressure classification of all duct systems on both the design documents and the ductwork shop drawings.
2. Seal all duct joints and seams to minimize duct leakage.
3. Specify the acceptable leakage criteria for each duct system. Specify pressure testing of all newly-installed duct mains for leakage prior to placing into service.
4. Design all duct support systems, including concrete inserts, hangers, rods, etc., to support 4 times the calculated weight of the duct section (and any adjacent fans).
5. Support all ducts directly from the structure.
6. Duct systems shall be clean/cleaned prior to acceptance by the Owner.

23 32 00 Air Plenums

1. Floor-mounted plenums shall have full-height access doors.

23 33 00 Air Duct Accessories

1. Sound Attenuators
 - a. Specify sound attenuators wherever required on main air handling and exhaust systems.
 - b. Specify sound attenuators on the downstream side of all terminal air boxes.
 - c. Air handling units shall not be installed on the same floor as or in adjacent spaces to occupied spaces without incorporating adequate sound attenuation materials into the intervening duct and wall construction.

23 33 13 Dampers

1. Fire/Smoke Dampers
 - a. F/S dampers shall be provided with end switches.
 - b. Coordinate all control system voltages and smoke damper operator voltages.
Typically fire/smoke dampers are provided with 24 volt actuators.
 - c. F/S dampers shall be installed in a manner that is accessible for testing and inspection.
2. Fire Dampers

- a. Fire dampers shall be Style B construction with the damper blades out of the air stream unless otherwise authorized by Owner.
 - b. Fusible links shall separate at 160 F with adj
 - c. Fire dampers shall be installed in a manner that is accessible for testing and inspection. The access door should be as large as possible to get both arms in the duct to replace a fusible link.
3. Balancing Dampers
- a. Primary volume dampers shall be provided in the duct branch that serves the diffuser or register. Provide individual volume dampers at each diffuser or register for minor adjustments.
 - b. The Design Professional shall, during the design phase, meet with the anticipated Testing and Balancing Contractor, and review the adequacy of the location and number of balancing dampers for each duct system.

23 33 46 Flexible Ducts

- 1. Flexible duct sections shall have a maximum length of five feet.

23 34 00 HVAC Fans

- 1. Return Fans
 - a. Return fans shall have variable speed controllers wherever supply fans are controlled by VFDs.
 - b. For ganged return fans, provide tight-sealing isolation dampers to completely block airflows during maintenance and backdraft dampers for normal operation periods.
- 2. General Exhaust Fans
 - a. Status monitoring shall be provided for all exhaust fans.
 - b. Internal sound attenuation lining up to 40 feet upstream of the fan inlet is acceptable.

23 36 00 Air Terminal Units

- 1. Terminal Air Boxes (TABs) shall have electronic actuators.
- 2. TABs shall have direct digital controls, including discharge supply air temperature, damper position, reheat coil valve position, and air volume.
- 3. TABs which require heating shall have two row heating coils.
- 4. All TABs shall be provided with variable air volume capability, even if the specific unit is designed for constant volume airflow.

23 37 00 Air Outlets and Inlets

23 37 13 Diffusers, Registers and Grilles

- 1. Carefully review locations of each diffuser and register to avoid drafts on patients in each patient room.
- 2. Supply and Return diffusers shall be white Model SPD Square Plaque Diffuser.

23 38 16 Fume Hood Exhaust Fans

- 1. Provide durable, weatherproof flexible connections at inlets.

23 70 00 Central HVAC Equipment

- 1. General
 - a. All air handling units shall be the draw-thru type unless a heating hot water coil is installed downstream of the chilled water coil. Blow-thru units shall be avoided because of the potential for moisture carry over and condensation on the filter media.

- b. Specify extra capacity on all components within the air handling unit to provide future flexibility for the spaces to be served. Review with the Owner the magnitude of the extra capacity to be specified on each project.
 - c. For air handling units not located on slab on grade, locate all units to eliminate the need to extend condensate traps through the floor.
2. Housings
- a. Specify Type 304 stainless steel liners throughout the entire unit.
 - b. Specify all interior air handling units on a concrete housekeeping pad, at least 4 inches high.
3. Fans
- a. Dual fans (primary and backup fans) shall be specified on all units serving patient rooms or other critical areas.
 - b. All supply fans above 2000 cfm shall be furnished with variable frequency drives (VFDs). Only Toshiba and ABB are acceptable unless authorized otherwise by the Owner.
 - c. At project completion, the Contractor shall turn over a set of normal replacement parts for each fan, including belts.
 - d. Vortex dampers shall not be used at the fan inlet.
4. Cooling Coils
- a. Cooling coil selection shall be based upon 14 degrees temperature difference between the entering chilled water and the leaving chilled water, unless authorized otherwise by the Owner.
 - b. Stainless steel drip pans shall be employed for all air conditioning condensate. Condensate pans and/or air handling units shall not be installed so low as to require the trap in the condensate line to penetrate the floor level.
 - c. Delta P control valves shall be specified. Refer to the Mechanical Piping Section of this standard.
 - d. Position of control valves shall be monitored. Refer to the Temperature Controls Section of this standard.
 - e. Dual drainage lines shall be specified from all condensate drip pans to the nearest discharge point (usually this will be a floor drain).
5. Steam Heating Coils
- a. Steam heating coils shall have integral face and bypass dampers.
 - b. Steam heating coils shall be capable of a 80 degree F air temperature rise (-25 degrees F to 55 degrees F).
6. Heating Hot Water Coils
- a. Heating hot water coils are acceptable for heating coils installed downstream of the steam heating coil. Heating hot water coils shall not be used for primary heating in air handling.
7. Pre-Filter Sections
- a. Filters shall be of the preformed, pleated type.
 - b. All filter racks shall be gasketed.
 - c. Typically pre-filters are 30% efficient minimum.
 - d. Filter access doors shall be specified on both sides of the filter section.
 - e. Roll filters are not acceptable for pre-filters.
 - f. At project completion, the Contractor shall replace all filters.

8. Final Filter Sections

- a. All filter racks shall be gasketed.
- b. Final filters shall be 95% efficient, unless HEPA filters are required for the spaces being served.
- c. Filter access doors shall be specified on both sides of the filter section.
- d. Bag filters shall not be used for final filters.
- e. Design phase selection of coil velocity shall be checked to ensure that moisture does not carry over into the filter section.
- f. At project completion, the Contractor shall replace all filters.

9. Blender Sections

- a. Specify blender sections for the mixing of return air and outside air within each air handling unit if space is available.
- b. Arrange duct systems for head-on mixing of the outside air and return air streams.
Also align the control dampers in the outside and return air streams for maximum mixing.

10. Mist Eliminators

- a. Mist eliminators shall be specified where there is potential moisture carryover and in all air handling systems where the design velocity across the cooling coil is over 500 fpm.

11. Anti-Microbial Ultraviolet Emitters for HVAC Ducts and Equipment

- a. Provide an automatic switch to de-energize the emitters whenever an access door immediately on either side of the cooling coil is opened.
- b. A service switch shall be included to manually de-energize the emitters.
- c. A radiometer shall be specified to measure the relative output of each system. The radiometer shall be set to 100% as soon as the emitters are operational.
- d. The lamps shall have a separate power source so that the lamps are always energized regardless of the operation of the air handling unit.
- e. The primary set of lamps shall not be installed until after the air handling unit has been completed and cleaned.
- f. At project completion, the Contractor shall provide a complete set of replacement lamps.

12. Humidifiers

- a. Steam-to-steam humidifier(s) shall be included for each air handling unit. Refer to AIA Guidelines for suggested humidity levels.
- b. Domestic hot water shall be used for the humidifier make-up, except in Colloton and Carver Pavilions where special water treatment generates chlorine dioxide or copper and silver ions in the water streams.
- c. Two humidistats shall be used to control the humidifier. One humidistat shall be located in the return air duct and one high limit humidistat shall be located in the supply air duct. Note that there are special care areas, such as surgery where the humidity sensor shall be located in the occupied area.

13. Miscellaneous

- a. For ganged air handling unit systems, specify tight-sealing isolation dampers to completely block airflows during maintenance, and backdraft dampers for normal operation periods.
- b. Low leakage dampers with quality seals shall be specified for the mixed air and outside air ducts.
- c. Linkages for all actuators shall be specified at an angle to allow full closure.

23 83 16 Radiant Heating

1. Radiant ceiling panel systems shall be designed for heating only.
2. In all patient rooms, install radiant heating panels at the exterior walls. The radiant panels shall be installed near each window associated with a patient room. Radiant panels may also be installed in patient toilets.
3. Valves
 - a. Use only two-way control valves for radiant heating panels. Do not use any three-way control valve schemes for temperature control of radiant panels.
4. Heating Hot Water
 - a. The heating hot water service to all radiant panels shall be maintained at or below the maximum temperature recommended by the radiant panel manufacturer.
 - b. The heating hot water service to all radiant panels shall be adjustable to allow reduced temperature heating hot water being supplied at different times of the year. Take precautions during the Design Phase to minimize noise in radiant ceiling panel systems.

4.18 Division 26 - Electrical

Use prefabricated, enclosed, internally insulated, galvanized steel curbs, wherever possible for utility chases. Curb heights shall be coordinated with the roof system design to provide 12" minimum roof base flashing height above the finish roof surface elevation. Non-canted bases shall be used at all curbs.

Use insulated pipe chases with sheet metal covers for pipe penetrations. Pitch pan-style roof flashing details are not allowed.

Use non-penetrating pipe supports for rooftop conduits, raceways, cable trays, etc. Wood blocking supports shall not be used. Approved manufacturers shall be Portable Pipe Hangers, Inc. or Miro Industries, Inc., with manufacturer-recommended support types used. Utilize support manufacturer-provided design assistance as necessary. Set supports over roof membrane manufacturer's recommended walkway material (coordinate with roof system design).

26 05 00 Common Work Results for Electrical

1. Designs that involve changes to the electrical supply that will affect utility service shall be coordinated with UI Utilities and Energy Management Department.
2. Electrical Closets
 - a. The finished flooring in electrical closets shall be concrete sealed for dust control.

26 05 13 Medium-Voltage Cables (Wire)

1. General
 - a. Minimum size wiring for power applications shall be #12.
 - b. 120/208 volt normal, 120/208 volt emergency, 277/480 volt normal, 277/480 volt emergency, communications, and Fire Alarm wiring shall not occupy the same raceway.
 - c. For high harmonic branch circuits such as those serving lighting and electronic equipment, provide a shared #10 neutral conductor for three phase conductors. For sensitive electronic and diagnostic equipment, provide a separate #12 neutral conductor for each phase conductor. For branch circuit panels serving high harmonic loads, provide double-sized neutral conductor.
 - d. Type AC (armored cable) and type MC (metal clad cable) shall not be specified.
2. Type of Wire and Connectors

- a. All wire and cable for power, lighting, control and signal circuits shall have copper conductors and shall be insulated to 600 volts. Conductor sizes #12 AWG and smaller shall be solid; conductor sizes #10 AWG and larger shall be stranded. All standard building wiring shall be THWN/THHN. Aluminum conductors are not allowed.
 - b. In-line splices and taps for conductor sizes #8 AWG and smaller, shall use vinyl insulated spring connectors. Connectors for conductors sizes #6 and larger shall be compression lug types.
 - c. Conductor identification-all circuits originating from 20 amp circuit breakers shall have the grounded conductor identified by a colored tracer of the same color as the ungrounded conductor.
 - d. Color code conductors as follows:
 - i. 120/208V, 3PH, 4W: Phase A – Black; Phase B – Red; Phase C – Blue; Neutral – White; Ground – Green.
 - ii. 277/480V, 3PH, 4W: Phase A – Brown; Phase B – Orange; Phase C – Yellow; Neutral – Grey; Ground – Green.
3. Installation
 - a. All cable for major feeders shall be continuous from origin to termination. Splices in branch circuit wires shall be made only in accessible junction boxes. Keep conductor splices to a minimum.
 - b. All power feeder cable shall be pulled with the use of approved pulling compound or powder. Pull all conductors into raceway at the same time.
 - c. Neatly arrange, label, and tie-wrap all wiring inside all cabinets, panelboards, boxes, and other enclosures.

26 05 26 Grounding and Bonding for Electrical Systems

1. General
 - a. All equipment, lighting, devices, and metallic conduit systems shall be grounded per NEC 250, NEC 517, and NFPA 99.
 - b. Maximum resistance of main service grounds shall be 3 ohms.
 - c. In new service applications, the main electrical service ground shall be connected to the incoming water service, a new grounding grid, building steel, and steel rebar in the foundations.
 - d. The grounding grid shall consist of ground rods spaced 10'-0" apart, connected with exothermic welds, in addition to conductors installed in the transformer vault walls. Coordinate main grounding with the Electrical Distribution Department.
 - e. In the older portions of the facility (Boyd Tower, General Hospital, and South Wing), a separate grounding conductor is not always present in feeders and branch circuits. In remodel projects where existing panels are reused, proper grounding of that panel shall be obtained by bonding the feeder conduit serving the panel at the panel, all pull boxes, and the source panel; or by re-pulling a new feeder with a separate grounding conductor if the panel will serve sensitive electronic or diagnostic equipment. Branch circuit wiring with no grounding conductor shall not be reused for new circuits.
 - f. Where new panels are added, the feeders to the source panel shall contain a grounding conductor. The source panel shall be properly grounded back to the main electrical service if proper grounding does not currently exist.
 - g. A grounding electrode conductor shall be extended to all step-down transformers from the main electrical service ground bar. This shall be used to ground the secondary neutral. The equipment grounding conductor is NOT the grounding electrode.
 - h. Isolated ground panels shall be used in areas with sensitive equipment such as electronics, hospital diagnostic equipment, and computer equipment. A separate isolated grounding conductor (green with a yellow

- stripe) shall be installed in the panel feeder and all branch circuits. A green grounding conductor shall also be installed to bond the panel enclosure.
- i. Sensitive electronic and imaging equipment often require a very “clean” grounding connection. Provide a dedicated grounding conductor to main electrical service grounding point and provide for monitoring of ground noise prior to connection of equipment.
 - j. Operating Rooms and similar rooms with an isolated power source (IPS) shall have isolated power systems with equi-potential grounding. This includes an isolated power panel with isolation transformer and monitoring/indication, receptacles, and low leakage conductors. Refer to NEC 517.
2. Materials
 - a. Ground rods shall be 10'-0" long x 3/4" diameter, copper or copper clad steel.
 - b. All grounding conductors, ground bars, etc. shall be copper.
 - c. Ground bars in standard electrical rooms shall be a minimum of 1/4" thick, 4" tall, and 24" long.
 - d. Ground bars in the main electrical rooms shall be a minimum of 1/4" thick, 4" tall, and 48" long.
 - e. Ground bars in telecommunications rooms shall be a minimum of 1/4" thick, 4" tall, 10" long. Refer to the Telecommunications Design Reference Manual, prepared by Communications Technology Services, for more information on grounding for telecommunications equipment.
 3. Installation
 - a. A green grounding conductor shall be installed throughout the entire new or modified portion of the electrical distribution system. Relying on the raceway for the sole source of grounding is not acceptable except in remaining panels which will be reused as noted above.
 - b. A separate grounding bar shall be installed in each electrical room and telecommunications room, connected to the main electrical room grounding bar with a #4/0 grounding conductor (in conduit).

26 05 33 Raceway and Boxes for Electrical Systems

1. Conduit
 - a. General
 - i. Minimum size conduit for power, fire alarm, sound, control, and lighting conduits shall be 3/4". Minimum size conduit for telecommunications systems, including nurse call, shall be 1" (see Communications Technology section of this standard).
 - ii. Conduits for power feeders over 2" in size shall be galvanized rigid steel or intermediate metal conduit.
 - iii. Conduits over 2" in size shall have a grounding bushing.
 - iv. Conduit fill – Branch circuit fill shall be limited to 3 grounded, 3 ungrounded and one equipment grounding conductor. Any changes shall only be permitted with written approval from both Capital Management and Engineering Services.
 - v. All conduits shall be Allied EZ-Pull True Color Electrical Metallic Tubing (EMT/Ridged) as follows: Normal power – Blue; Critical power – Yellow; Life Safety power – Green; Equipment emergency power – Orange; Fire Alarm – Red; Communications – Black; Fire doors – Brown; Building Controls – White.
 - b. Types of Conduit
- NOTE: All rigid conduit shall be identified at each connector and coupling according to 26 05 33 a iv.
- i. Electrical Metal Tubing (EMT): Use for installations in stud walls, masonry walls, above suspended ceilings and where exposed. Size limited to 2 inches and smaller for power feeders, greater than 2 inches is acceptable for communications conduits. Fittings shall be compression type, malleable iron or steel, water and concrete type. Set screw or indenter type fittings shall not be used.

- ii. Flexible Metal Conduit: Use for final connections to dry type transformer, connections from junction boxes to lighting fixtures in accessible ceiling, and for wiring within casework and millwork. Fittings shall be squeeze or screw type galvanized malleable iron or steel with nylon insulated throats. The maximum length shall be six feet. One trade size larger than standard size if used for communications infrastructure.
 - iii. Liquid-tight Flexible Metal Conduit: Use for final connections to all motor operated equipment such as unit heaters, fans, air handling units, and pumps; and equipment listed in item b located in wet areas. Fittings shall be galvanized malleable iron or steel, with watertight gaskets, "O" ring and retainer, and nylon insulated throats. The maximum length shall be six feet.
 - iv. Galvanized Rigid Steel Conduit (GRS): Use for all feeders larger than 2 inches in size. Fittings shall be threaded, galvanized malleable iron or heavy steel, water and concrete tight.
 - v. Intermediate Metal Conduit (IMC): May be used as approved by code where rigid conduit is specified, except shall not be used for conduit buried in earth fill. Fittings shall be threaded, galvanized malleable iron or heavy steel, water and concrete tight.
 - vi. Rigid Aluminum Conduit: Fittings shall be threaded aluminum alloy type.
 - vii. Rigid PVC Conduit (PVC): Heavy wall Schedule 40 PVC conduit, sunlight resistant and impact resistant.
- c. Installation
- i. All horizontal runs of branch circuit conduit shall be installed in ceiling plenum or within walls for short distances. Conduit for convenience outlets, wall mounted fixtures and other wall outlets shall be routed overhead and dropped through wall to the outlet.
 - ii. Branch circuit conduit shall not be installed in concrete floor slabs except where conditions will not permit the conduit to be installed overhead.
 - iii. Major motor or panel feeders may be installed in concrete floor slabs.
 - iv. Exposed conduit and conduit concealed in ceiling space shall be routed in lines parallel to building construction.
 - v. Do not install more than three 90 degree bends between panelboards, enclosures, junction boxes, or pull boxes.
 - vi. All junction or pull boxes shall be identified with the source feed and circuit within.
 - vii. Support conduit raceway systems in accordance with requirements as set forth in the National Electric Code. Conduit shall not be attached to ceiling support wires.
 - viii. Compression fittings shall be used. Set screw connectors are prohibited.
- d. Applications
- i. EMT conduit shall be used for all branch circuit power, lighting, fire alarm, sound, nurse call, and control conduit.
 - ii. GRS or IMC conduit shall be used in exterior above grade applications and below paving. PVC conduit may be used below grade where there is no paving.
 - iii. Aluminum conduit shall be used in all magnetic imaging facilities where non- ferrous material must be used. Do not use in other applications.

2. Electrical Boxes

a. General

- i. Pull Boxes: Pull and junction boxes shall be fabricated of heavy gauge galvanized steel with screw or hinged covers, and equipped with corrosion resistant screws and hardware. Pull and junction boxes for outdoor installation shall be rain tight.

b. Outlet Boxes:

- i. In Stud Walls: For single or double outlet, use 4 inch square by 1-1/2 inch deep box. Boxes to be provided with raised covers of depth as required for thickness of wall materials. Back-to-back or through-wall type boxes shall not be used. Boxes shall be staggered on opposite sides of sound and fire rated walls.
 - ii. In Masonry and Poured Concrete Walls: Use 3-3/4" high by 2-1/2" and/or 3-1/2" deep masonry boxes.
 - iii. Surface Mounted Wall Outlets: Use 4 "square by 1-1/2" deep box with raised cover in rough areas; Wiremold box in finished areas.
 - iv. Suspended Ceiling: Use octagon boxes, depth as required for application; securely fastened to structure.
 - v. Outlets installed outdoors or in wet locations: Use cast weatherproof aluminum outlet boxes with cast aluminum "in use" covers.
- c. Floor Boxes: Provide cast iron waterproof, fully adjustable floor boxes, with thread- conduit-entrance ends, and vertical adjusting rings, gaskets, floor plates and flush screw-on covers. Floor boxes shall be provided with barrier to separate high and low potential voltages.
 - d. Poke-through Assemblies: Provide flush mounted, fire-rated, poke-through with separate high and low potential voltages. Fire rating shall be accomplished with intumescent type material.

26 05 36 Cable Trays for Electrical Systems

1. General
 - a. Cable trays shall not be used to distribute 120/208 volt or 277/480 volt feeders or branch circuit wiring.
 - b. Utilize cable tray for horizontal and backbone pathways serving communications cabling. Only welded steel wire mesh basket type cable trays shall be specified for communications raceway. Acceptable manufacturers are Cablofil, Flextray or Owner approved equal.
 - c. Standard size of cable tray shall be 12" (w) x 4" (d).
 - d. Edges of tray shall be made smooth.
 - e. Where there are large quantities of low voltage cabling, such as for sound systems or nurse call systems, cable tray shall be used.
2. Installation
 - a. Cable tray shall be installed in the main corridors for distribution of telecommunications cabling, nurse call cabling, and sound system cabling.
 - b. Locate cable tray so there is adequate room above and to each side of it for access.
Do not install cable tray more than 24" above an acoustical tile ceiling.
 - c. Cable tray shall have a minimum of 12" of headroom above the tray and 18" available on the side of the tray for access.
 - d. Stop cable tray at fire-rated walls and install conduit sleeves through wall.
 - e. Ground and bond cable tray so it is electrically continuous.

26 10 00 Medium Voltage Electrical Distribution

1. General
 - a. Refer to The University of Iowa Design and Construction Services Design Reference Manual for medium voltage distribution guidelines.

- b. The University of Iowa Facilities Management Electrical Distribution Department will provide and install all 15KV switches, electrical metering, main substation transformers, secondary service protectors, to and including load side cable connectors, and the 15KV cable.
 - c. The following shall be installed as part of the construction contract and shall be designed by the project engineer: All 15KV underground ductbank, 15KV raceway within the facility, transformer vault grounding system, and concrete housekeeping pads for the electrical equipment supplied by the Electrical Distribution Department.
2. Raceway Installation
- a. Refer to The University of Iowa Design and Construction Services Design Reference Manual for more information.
 - b. Exterior ductbank shall consist of 5" polyvinylchloride (PVC) ducts encased in concrete. Red dye shall be added to the top of the ductbank. Utilize plastic spacers and tie down conduits. Install a #10 solid copper "fish" line in all ducts and conduits. All conduits shall terminate 2" inside walls with end bells in all primary manholes. All conduits shall be evenly spaced and aligned with each other.
 - c. Encasement shall be poured complete and continuous from one manhole to another and from manholes to buildings. No construction joints in ductbank shall be permitted between manholes. In case unusual conditions require a construction joint, furnish and install steel conduit for a minimum of 5 feet on either side of the joint. A civil or structural engineer shall observe all construction joints.
 - d. Generally, the top of the concrete encasement shall be a minimum of 24" below final grade.
 - e. Galvanized rigid steel conduits shall be used within the facility. Use large sweeps in primary ducts and conduits, where primary lines are not straight.
 - f. In ductbank, steel conduits are required out of all manholes and buildings for a distance of approximately 10 feet, at all construction joints if concrete pours are interrupted, and under all city streets.

26 20 00 Low-Voltage Electrical Transmission

26 22 00 Low-Voltage Transformers

- 1. Step-down Dry-type Transformers:
 - a. Transformers shall be factory-assembled, general-purpose, air-cooled, dry-type distribution transformers of sizes, characteristics, and rate capacities indicated. Primary windings shall have 6 taps; two 2 ½% increments above full-rated voltage and four 2 ½% increments below full-rated voltage. Insulation shall be rated at 220 degrees. Temperature rise shall be rated at 80 degrees. Windings shall be aluminum. Transformers shall have fully-enclosed sheet steel enclosures, NEMA 1 rated for standard interior installations. Provide NEMA 3R enclosure with weather shields for wet location installations.
 - b. K-rated transformers for high harmonic load applications shall have an electrostatic shield, additional coil capacity and double size neutral terminals.
- 2. Bus Duct:
 - a. Bus duct shall be 3 phase, low impedance, copper bus, with insulated ground bus and full size neutral (where a neutral is required).
 - b. Joints shall be single bolt type with silver plated contact surface.
- 3. Installation:
 - a. Switchboards, motor control centers, and transformers shall be installed on concrete pads.
 - b. Provide nameplates for all distribution equipment.

- c. Disconnect switches used with motor-driven appliances, and motors and controllers shall be installed within sight of controller position.
 - d. Where installed on the load side of a VFD, the disconnect switch shall be labeled stating the location of the VFD, or it shall contain a normally open interlock which is connected to the VFD. This interlock wiring must be in a separate raceway. The interlock engages before the phase conductors are disconnected and the VFD knows to shut down before the motor is disconnected from it.
 - e. Transformers shall be installed on vibration mounts and connected with liquid-tight flexible conduit (24" minimum length).
 - f. Provide grounding connections to assure permanent and effective ground for transformers.
4. Applications:
- a. Perform voltage drop calculations on all feeders. Increase conductor sizes where necessary.
 - b. Perform short circuit calculations on the new or modified portions of the electrical distribution system.
 - c. Circuit breakers in new panelboards and switchboards shall not take up more than 75% of the available bus space (25% shall be for future use).
 - d. Utilize surface mounted panelboards in dedicated electrical rooms. Where flush branch circuit panels are used in finished spaces, stub five $\frac{3}{4}$ " and one $1\frac{1}{4}$ " empty conduit out of panel to above an accessible ceiling area.
 - e. Use K-rated transformers where they serve high harmonic loads such as computer rooms.
 - f. Utilize expansion fittings on bus ducts, conduits, and cable trays where they cross building expansion joints.

26 24 00 Switchboards and Panelboards

26 24 13 Switchboards

- 1. Switchboards shall be factory assembled, dead-front, metal enclosed with copper bussing and copper ground bar. Provisions for additional circuit breakers shall be such that field addition of connectors or mounting hardware will not be required to add circuit breakers to the switchboard.
- 2. Utilize Square D Power Logic to match the existing monitoring system.
- 3. Switchboards shall be listed for service entrance where applicable.
- 4. The basis of design shall be Square D I-Line Series.

26 24 16 Panelboards

- 1. Distribution Panelboards
 - a. Distribution panelboards shall be factory assembled, dead-front, metal enclosed with copper bussing and copper ground bar. Provisions for additional circuit breakers shall be such that field addition to connectors or mounting hardware will not be required to add circuit breakers to the panelboards. Fronts shall include hinged doors and have flush, stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls.
 - b. The basis of design shall be Square D I-Line Series.
- 2. Isolation Panels
 - a. In patient care areas determined by the Owner to be "wet locations" during times when patients are present, Isolated Power Panels shall be provided. Inside the room a line isolation monitor (LIM) shall be provided. These panels supply uninterrupted power in the event of a line-to-ground fault, while eliminating the danger of electrical shock.

- b. The basis of design shall be Square D.
- 3. Lighting and Appliance Panelboards
 - a. Lighting and Appliance panelboards shall be factory assembled, dead-front, metal enclosed with copper bussing and copper ground bar. Provisions for additional circuit breakers shall be such that field addition to connectors or mounting hardware will not be required to add circuit breakers to the panelboards. Fronts shall include hinged doors and have flush, stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. All panelboard locks shall be keyed alike. A circuitry directory frame and card with a clear plastic covering shall be provided on the inside of the door.
 - b. All multi-section panels shall be the same dimensions.
 - c. Provide panelboards with 200 percent rated neutral and 200 percent rated neutral conductor where they serve high harmonic loads such as computer rooms.
 - d. Loadcenters are not allowed.
 - e. The basis of design shall be Square D I-Line Series (277/480 volt) and Square D NQOD Series (120/208 volt).

26 24 19 Motor-Control Centers

- 1. Motor Control Centers
 - a. Motor control center shall be dead-front multi-unit type, consisting of an assembly of vertical stacks with each stack containing cubicles to provide equipment, including space. Horizontal copper 600 amp minimum bussing across top and 300 amp minimum vertical copper bussing down each stack. Include copper ground bus entire length. Vertical sections designed so matching sections can be added later. Starters shall be per the Motor Starter section.
- 2. Motor Starters
 - a. Magnetic Starters: Starters shall have thermal overload relays of the melting alloy type sized per manufacturer's recommendations for protection of the motor; electrical interlocks as required for the control sequences, control transformer within each enclosure where required to provide control voltage, manual reset, off-auto selector switch, and pilot lights (green for stopped and red for running). The Building Automation System usually controls HVAC motors.
 - b. Combination Starters: Starter shall have same features as magnetic starters. Operating handle for fusible disconnect switch mechanism shall indicate and control switch position with enclosure door open or closed; capable of being locked in the off position and mechanically interlocked to prevent opening unless switch within the enclosure is open.
 - c. AC Fractional HP Manual Starters: Starters shall have thermal overload relay of the melting alloy type for protection of 120 VAC motors of 1/2 HP and less, quick-make quick-break trip free toggle mechanisms, pilot light, and toggle operated handle with handle lock-off.
 - d. Solid-State Reduced Voltage Starters: Starters shall utilize silicon controlled rectifiers (SCRs). Each starter shall have a circuit breaker, closed-loop feedback system to maintain motor acceleration at constant rate, and shorting contactor to bypass SCR's at 100% output.
 - e. Two-speed motor starters shall not be used. Utilize standard motor with VFD.

26 27 00 Electrical Distribution Equipment

1. General:
 - a. Manufacturer for all of the electrical distribution equipment shall be Square D.
 - b. Series rating of switchboard and panelboard circuit breakers is not allowed.
 - c. All multi-pole circuit breakers shall be single-operating handle, common trip type. Handle-ties shall not be used.
 - d. Enclosure types in electrical rooms with wet sprinklers shall be NEMA 3R.
 - e. All circuit breakers shall be plug-on type. Bolt-on type shall not be used.

26 27 26 Wiring Devices

1. Switches and Receptacles
 - a. All switches shall be industrial grade, side and back wired. All receptacles shall be hospital grade in patient areas. Verify switch types with Owner's Rep. in other areas for each project.
 - b. Color of switches and receptacles shall be white or ivory.
 - c. Wall switches shall be as follows:
 - i. All standard toggle light switches - 20 amp, 120-277 volt rated.
 - ii. All switches serving emergency circuits shall have "red" handles.
 - d. Receptacles shall be as follows:
 - i. Duplex Receptacles: 2 pole, 3 wire grounding type, back and side wired, 20 amp, 125 volt rated, NEMA 5-20R configuration.
 - ii. iGFI receptacles shall be duplex receptacles with integral test and reset button.
 - iii. All receptacles connected to emergency circuits shall have "red" bodies.
 - iv. 120/208 volt receptacles shall be similar in construction to NEMA 5-20R except shall be simplex type (one receptacle per mounting strap) and shall have NEMA configuration to match the plug.
 - v. Tamper resistant receptacles should be installed in any area accessible to the public, including, but not limited to: exam rooms, waiting rooms, procedure rooms, play rooms, inpatient rooms, corridors, etc.
 - e. Housekeeping outlets shall be spaced 30-40 feet apart in all corridors. Outlets shall be 110 volt duplex with a 110 volt single labeled for Floor Machine on a separate 20 amp breaker.
 - f. Cover Plates: Stainless steel, smooth metal, Type 302. Plate types for different utilities (dimmers, switches, receptacles, voice/data, etc.) shall match.
2. Dimming Switches
 - a. Incandescent Dimmers: Solid-state dimmer capable of controlling 120 VAC incandescent and quartz halogen lighting intensity over complete range from zero to full light intensity. Unit shall contain filter to eliminate noise and RFI. Dimmer shall have an integral on/off switch.
 - b. Low Voltage Dimmers: Similar to incandescent but specifically made for low voltage lamps.
 - c. Fluorescent Dimmers: Single-pole, semi-conductor modular type AC dimmers for fluorescent fixtures with 60 hertz, wattage and voltage as indicated, and with electromagnetic filters to reduce noise and interference to minimum. They shall be constructed with continuously adjustable trim potentiometer for adjustment of low end dimming; and with anodized heat sinks. Dimmer shall have an integral on/off switch.
 - d. Dimming fluorescent lamps shall be avoided and only used where approved by Owner.

3. Installation

- a. In masonry walls, switches and receptacle heights shall be adjusted as required so outlets are at nearest mortar joint to specified height.
- b. Dimmers shall be installed such that derating is not required. No fins shall be removed when dimmers are ganged together.
- c. A separate neutral shall be installed for all circuits which supply lighting controlled by dimmers.
- d. Receptacles shall be installed so the ground prong is up.
- e. Feeding of receptacles down stream of GFI receptacles for protection in lieu of providing multiple GFI receptacles shall not be done.
- f. GFI type receptacles shall be specified in damp or wet locations, near any source of water, above counter tops that also have a sink, kitchens, restrooms, and other locations per NEC.
- g. Utilize integral tamper resistant receptacles in all Pediatric and Psychiatric care units.
Receptacle covers shall not be used.

26 28 00 Low-Voltage Circuit Protective Devices

26 28 13 Fuses

1. Main Feeders and Branch Circuit Equipment Feeders: For switch rating over 600 amperes, use Hi-Cap, Type KRP0-C with interrupting rating of 200,000 amperes RMS. For switch rating 600 amperes or less, use Low peak current limiting fuses, Type LPN(S)-R, with interrupting rating of 200,000 amperes RMS. Verify the use of fuses versus circuit breakers for main services or feeders with the Owner for each project.
2. Motors Above One (1) Horsepower: For fuse rating 600 amperes or less, dual element time delay, Type FRN(S)-R, with interrupting rating of 200,000 amperes RMS. Size fuses per Article 430 of the NEC.

26 28 16 Enclosed Switches and Circuit Breakers

1. Circuit Breakers

- a. Lighting and Appliance Panelboards: Circuit breakers shall be plug-on type toggle action with quick-make, quick-break mechanism, with visi-trip. Single pole 15 and 20 ampere circuit breakers shall be UL listed as switching breakers at 120/277 volt AC and carry the SWD marking. Tandem or "piggyback" breakers providing two circuits from one pole space are prohibited.
- b. Distribution Panelboards or Switchboards: Circuit breakers shall have overcenter, trip-free toggle-type operating mechanisms with quick-make, quick-break action and positive handle indication. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Operating handles shall assume a center position when tripped. Breakers rated 250 amps and above shall be solid state type, and breakers rated below 250 amps shall be thermal-magnetic.
- c. All circuit breakers shall be labeled with nameplates or as part of a typewritten panel directory. Each panelboard directory shall be typewritten to identify the load fed by each circuit. Spare breakers and circuits to be left blank with circuit breaker in off position.

2. Disconnect Switches

- a. All disconnect switches shall be heavy duty type and shall be fused.
- b. Disconnect switches for fractional horsepower motors, ½ horsepower and smaller, and less than 125 volts shall be Bussman SSY type or Owner approved equal.

- c. Disconnect switches for fractional horsepower motors larger than $\frac{1}{2}$ horsepower, for integral horsepower motors, and for equipment of similar capacity shall break all ungrounded conductors and shall be quick-make, quick-break with interlocking covers. Units shall be capable of being locked in the off position.
- d. Disconnect switches installed indoors shall have NEMA 1 enclosures. Disconnect switches installed outdoors or in wet locations shall have raintight NEMA 3R enclosures, however, NEMA 4X stainless steel type shall be considered for each project based on the environment.

26 41 00 Facility Lightning Protection

- 1. General
 - a. Lightning protection systems shall conform to NFPA 780 and UL 96A for Lightning Protection.
 - b. The system shall be installed by, or under the direct supervision of a firm actively engaged in the installation of UL approved Master Labeled Lightning Protection systems. The firm shall be listed by UL.
 - c. Any new structure shall have a lightning risk assessment done per NFPA 780
 - d. Appendix H to determine the risk of damage due to lightning.
 - e. All new large additions similar to the existing four to eight story pavilions shall have a lightning protection system. Smaller additions, structures, or buildings shall have a lightning protection system if so determined by the lightning risk assessment.
- 2. Materials
 - a. Air terminals shall be $\frac{1}{2}$ " x 24" solid round, nickel-plated copper points to extend to at least 10" above the roof or parapet with heavy duty bronze cases.
 - b. Ground terminals shall be copper clad steel or copper ground rods, $\frac{3}{4}$ " in diameter driven vertically into the earth to a depth of at least 10 feet. The ground rods shall be connected to the conductor by heavy duty, 2-bolt bronze clamps.
 - c. Roof and down conductors shall be stranded copper cable with 28 strands of 14 gauge wire, and weigh at least 375 pounds per 1,000 feet.
- 3. Installation
 - a. Down conductors shall be completely concealed and protected with PVC conduit.
 - b. One down lead shall be interconnected to the water pipe system.
 - c. All down conductors shall be directly connected to the ground rods.
 - d. Conductors shall be interconnected to provide at least two electric paths to ground.
 - e. Upward direction for lateral conductors interconnecting air terminals shall be avoided.
 - f. Conductor bends shall have a radius of at least 8" at an angle not less than 90 degrees.
 - g. Bond metal components of the building into the lightning protection system.
 - h. Structural steel shall be grounded with 25 feet of #2/0 bare copper conductor 2" below the bottom of each column footing pad.
 - i. Systems shall be tested so there are no loose connections.

26 50 00 Lighting

1. General
 - a. Lighting fixtures shall be manufactured by one of the following manufacturers unless noted otherwise in this standards document or approved by the owner: Day Bright, Cooper (Halo), Hubble (Columbia), Lithonia or Metulux.
 - b. Lamp types shall be limited to the following unless noted otherwise in this standards document or approved by the Owner: linearT8, linear T5, 26 watt – T4 for CFL. Interior lighting shall be fluorescent and shall utilize four foot long T-8 lamps with low harmonic electronic ballasts. Four foot long T-5 high output lamps may be used in indirect or indirect/direct fixtures where increased lumen output or a smaller fixture profile is required. Eight foot long lamps, linear bi-ax, and U shaped lamps shall not be used.
 - c. Incandescent lighting shall not be used for general area lighting. Incandescent lighting shall be used only for special applications or where approved by the Owner.
 - d. Dimming fluorescent fixtures shall be avoided and only used where approved by the Owner. Utilize multi-level switching instead where lower light levels are desired.
 - e. High Intensity Discharge lighting shall only be used in exterior applications except where approved by the Owner.
 - f. In General Hospital and South Wing, 120 volt lighting is the most commonly used voltage for both normal power and all of the emergency branches lighting. In the remainder of the facility, 277 volt lighting is typically available and shall be utilized for both normal power and all of the emergency branch lighting. Verify the voltage for each project.
 - g. At the project acceptance by the Owner, and prior to occupancy, the Contractor shall replace all lamps with new lamps.
 - h. Low voltage lighting, such as 50w halogen pendant lighting, shall be specified to be hung at heights that are out of reach of staff and patients.

26 51 00 Interior Lighting

1. Incandescent Lamps
 - a. Line Voltage lamps shall be 130 volt rated.
 - b. Low Voltage lamps shall be 12 volt rated and powered off transformers integral with the light fixtures.
2. Fluorescent Ballasts and Lamps
 - a. Ballasts shall be low harmonic (<10%), electronic, sound rated A or better, minimum 0.95 power factor, minimum 0.85 ballast factor, maximum 1.7 crest factor, operating at >20k Hz, with a written five year warranty. Ballasts shall be by Advance, , Lutron, Robertson, General Electric (Magnatek) or Universal.
 - b. Dimming ballasts shall be low harmonic (<10%), electronic, sound rated A or better, minimum power factor of 0.95 (full on) and 0.85 (low dimmed), minimum 0.85 ballast factor, maximum 1.7 crest factor, operating at >20k Hz, with a written 5 year warranty. Ballasts shall be capable of dimming the lamps from 100% down to 1% -20% (verify with Owner for each application). Dimmers and ballasts shall be by the same manufacturer, or the compatibility shall be verified by both manufacturers. Ballasts shall be by Advance or Lutron.
 - c. Lamps shall be T-8 type, 4100K color temperature, minimum 75 color rendering index (CRI). Only two and four foot lamps shall be used except by approval of the Owner. U shaped lamps shall not be used. For 2' x 2' light fixtures, use two foot long lamps in lieu of U shaped lamps. Lamps shall be by Osram-Sylvania, General Electric, or Philips.
3. Compact Fluorescent Ballasts and Lamps

- a. Ballasts shall be low harmonic (<10%), electronic, sound rated A or better, minimum 0.90 power factor, minimum 0.85 ballast factor, maximum 1.7 crest factor, operating at >20k Hz, with a written five year warranty. Ballasts shall be by Advance or Magnatek.
 - b. Dimming ballasts shall be low harmonic (<10%), electronic, sound rated A or better, minimum power factor of 0.90 (full on) and 0.80 (low dimmed), minimum 0.85 ballast factor, maximum 1.7 crest factor, operating at >20k Hz, with a written 5 year warranty. Ballasts shall be capable of dimming the lamps from 100% down to 1-10% (verify with Owner for each application). Ballasts shall be by Advance or Lutron.
 - c. Lamps shall be T-4 type, 4100K color temperature, minimum 82 CRI. Only 26 watt quad tube 4-pin lamps shall be used. Lamps shall be by Osram-Sylvania, General Electric, or Philips.
4. High Intensity Discharge Ballasts and Lamps
- a. Ballasts shall be core and coil type with a written five year warranty. Ballasts shall be by Advance or General Electric (Magnatek).
 - b. Lamps shall be by Osram-Sylvania, General Electric, Philips, or Venture.
5. Energy Controls
- a. Occupancy sensors shall be ceiling mounted, dual-technology type in areas over 150 square feet. Utilize wall mounted type in areas smaller than 150 square feet or for remodel projects where existing light switches can be replaced.
 - b. Photo sensors shall be ceiling mounted type. They shall be used to switch on/off standard ballasts, not adjust dimming ballasts, unless approved by the Owner.
 - c. Controls shall be compatible with the facility Building Automation System.
Coordinate with the project mechanical engineer since occupancy sensors often also control the VAV boxes, terminal air boxes, fan coil units, and/or exhaust fans in the space.
 - d. In large, open areas, utilize a low voltage control system with a timer to over-ride the light switches.
 - e. Low voltage control wiring for the energy control systems shall be installed in conduit.
 - f. Where the lighting is connected to the Building Automation System, relays and contactors shall be provided to switch the light fixtures.
 - g. Rapid start ballasts shall be used in light fixtures controlled by occupancy sensors.
6. Construction of Standard Light Fixtures
- a. Typical Fluorescent Fixtures (troffers, wraparounds, strips, etc.): In recessed troffers, lenses and louvers shall be standard size so replacements are readily available.
 - b. Suspended Linear Direct/Indirect Fluorescent Fixtures: Housings shall be of steel or aluminum construction with endcaps. Fixtures shall be suspended with adjustable aircraft cable and fed with white coiled cords.
 - c. Recessed Downlights: Rough-in kits shall have steel bar hangers with steel junction boxes. Reflectors shall be low iridescence Alzak type. Incandescent fixtures shall be thermally protected.
 - d. Exit Signs: Light source shall be LED only **without** battery backup unless required by code. Exit signs shall be Lithonia Lighting model EDGR, brushed aluminum, letter color red.
7. Installation of Light Fixtures
- a. Recessed fixtures in removable ceilings shall be connected to the branch circuit with flexible conduit and branch circuit wire from an accessible junction box. Length shall be a maximum of six feet.
 - b. Recessed fixtures in non-removable, fire-rated ceilings shall be enclosed in a fire- rated enclosure. A fixture that is able to remove the heat it produces in this situation must be used.
 - c. Where fluorescent fixture housings are connected together, use 90 degree C wire for branch circuit feed through fixture channels.
 - d. Fixtures recessed in furred ceiling shall be installed so that they can be removed from below the ceiling.
 - e. Fixtures installed in plastered or acoustical tile shall not be supported directly on the ceiling material.
Support fixtures with metal bar hangers or strut channels attached to the ceiling support system.

- f. Ceiling types shall be verified with the ceiling plan.
 - g. Suspended fixtures shall be supported to the building structure.
8. Applications
- a. Emergency powered light fixtures connected to the critical branch shall be provided in mechanical rooms, electrical rooms, elevator equipment rooms, telecommunications closets, medicine rooms, pharmacies, ICU's, operating rooms, and larger waiting rooms. Refer to NEC 517 for requirements.
 - b. Incandescent fixtures shall only be used where approved by the Owner. If possible, instead substitute with compact fluorescent type lamps. Where incandescent lamps are used (either line voltage or low voltage), discuss with Owner whether to provide dimming for these lamps.
 - c. Fixtures shall be placed at heights and locations to allow for easy access for maintenance and re-lamping.
 - d. General Guide for Lighting for Areas of the Facility
 - i. Where 2' x 4' troffers are used, they shall be 3-lamp or 4-lamp type to minimize the quantity of fixtures. 2-lamp fixtures are acceptable in corridors, storage rooms, or other areas where lower light levels are desired.
 - ii. Offices and Work Areas: Utilize 2' x 4' recessed fluorescent troffers with 1 ½" x 1 ½" x ¾" aluminum parabolic louver. The use of occupancy sensors, daylight sensors (where there are exterior windows), and two-level switching should be considered.
 - iii. Conference Rooms: Utilize two-level switched fluorescent lighting. Where incandescent lighting is desired, it shall not be the only source of lighting. Provide under counter fixtures where there are countertops with cabinets above.
 - iv. Corridors: In patient areas, use indirect fixtures utilizing four foot fluorescent lamps. In non-patient areas, use indirect, wall-mounted, or recessed fluorescent fixtures utilizing four foot fluorescent lamps. In the older areas of the facility (Boyd Tower, General Hospital, and South Wing), the lower ceiling height will not allow for indirect wall mounted light fixtures. Low voltage track lighting shall be used to highlight artwork or other features, and shall be controlled separately with a dimmer. All lighting except the emergency egress lighting shall be interfaced with the Building Automation System.
 - v. Waiting Rooms and Elevator Lobbies: Utilize a fluorescent or compact fluorescent light source. All lighting except the emergency egress lighting shall be interfaced with the Building Automation System.
 - vi. Mechanical, Electrical, and Telecommunications Rooms: Utilize 4 foot industrial strip fixtures with wireguards.
 - vii. Exam Rooms: Utilize 2' x 4' lensed troffers.
 - viii. Operating Rooms: Utilize 2' x 4' lensed surgical troffers. One shall contain an emergency battery pack.
 - ix. Patient Rooms: Utilize a combination of fixtures to accomplish lighting for the varying tasks in the room. Fixtures above the bed shall be compatible with patient bed controls. Nightlights shall be recessed in wall with an LED light source. Provide under counter fixtures where there are countertops with cabinets above.
 - x. Restrooms: Utilize wall mounted over-vanity fixtures with multiple linear T-8 lamps. Fixtures by Keen or Alkco.
 - xi. Specialty: Utilize fixtures constructed specifically for special types of rooms (example: non-ferrous fixtures in MRI rooms).
 - xii. Task Lighting: Fixtures shall utilize T8 or T5 fluorescent lamps, shall be 120 volt, shall have an internal switch, and shall have an opaque task lens. Utilize task lighting where appropriate.

- Examples are offices, labs, patient rooms, treatment rooms, exam rooms, work rooms, nurse stations, and conference rooms.
- xiii. Signage and Art Lighting: Utilize low voltage track lighting by Halo or Capris with MR3516 lamps. These fixtures shall be controlled separately with a dimmer. Track and heads shall be selected by the Design Professional to compliment the surrounding architecture.

26 60 00 Emergency Power

1. General
 - a. All emergency power system work shall be reviewed with Maintenance and Engineering (319-356-2582).
 - b. Existing loading of the generator and each emergency branch shall be obtained and figured with the proposed new loads in sizing calculations.
 - c. Emergency power distribution shall be segregated into Life Safety branch, Critical branch, and Equipment branch. The Equipment branch may have separate transfer switches for automatic and non-automatic transfers. Lighting equipment and devices shall be placed on the different branches according to NEC 517.
 - d. In general, the Life Safety branch serves exit lighting, emergency path of egress lighting, alarm systems, communications systems, lighting at the generator location, elevator cab and control equipment (not the motor), and automatic doors. The Critical branch serves task illumination, equipment, and power receptacles in critical care areas, patient care areas, and additional areas needed for effective hospital operation. The Equipment branch (delayed automatic) serves equipment such as central suction systems, sump pumps, compress air systems, smoke control systems, and kitchen hood exhaust. The Equipment branch (delayed automatic or non- automatic) serves heating equipment for critical care or patient care areas, jockey pump, elevators, and HVAC in some critical care areas. Refer to NEC 517 for complete list and discuss with Owner's Rep. and Maintenance and Engineering any other items that need to be put on one of the emergency power branches.
 - e. Where it is determined that a department in the facility needs emergency power back- up for safe operation during a power outage, separate transfer switch(es) shall be installed specifically for this department. An example of this is in the Radiology Department in Colloton Pavilion.
 - f. Sprinkler system fire pumps shall have their own transfer switch. The normal source shall come from the main electrical service panel and the main generator distribution switchboard. Refer to NEC 695 and 700.
 - g. Each bank of elevators shall be served from a separate transfer switch and a separate elevator distribution panel. Upon a loss of power, the elevators shall return to the designated floor and stop. One elevator shall remain operational for emergency use.
 - h. An emergency power generator shall feed a generator distribution switchboard. This switchboard is used to distribute power to the transfer switches for all the branches of emergency power, fire pumps, and remote generator radiator fans. Each branch of emergency power shall have a main distribution panel on the load side of the transfer switch for distribution to the separate emergency branch panels located on each floor.
 - i. No area of the facility shall be served by 100% normal power or 100% emergency power.
 - j. Emergency generators and the main distribution of emergency power shall be at 277/480 volt power. This power shall be stepped down to 120/208 volt on each floor with local step down transformers.
 - k. Any new generators shall have their generator distribution switchboard tied together with the two nearest separate generator distribution switchboards.
 - l. A DNR permit and modeling is required for generators. A DNR permit is required for diesel fuel tanks. Coordinate with the University of Iowa Facilities Management Environmental Compliance Department.

2. Materials
 - a. Refer to the UIHC Emergency Generator Specifications in Appendix H.
 - b. Generators shall be diesel, 277/480 volt, 3 phase, 4 wire with a remote multi-fan radiator, critical silencer, engine control panel, and remote annunciator. Approved manufacturers shall be coordinated with Maintenance and Engineering for each project.
 - c. Generator distribution switchboards shall have a main-tie-main configuration for redundant connection to other generator distribution switchboards. Solid state metering and controls shall be provided in a separate metering section.
 - d. Automatic transfer switches shall be open transition, bypass-isolation type, ASCO 7000-7A series. Approved manufacturers shall be ASCO and Zenith.
 - e. Non-automatic transfer switches shall be open transition type, ASCO 7000-7N series. Approved manufacturers shall be ASCO and Zenith.
3. Installation
 - a. Each branch of the emergency power system shall be installed in raceway separate from the other branches, normal power, and any other system wiring.
 - b. Generators and main emergency distribution equipment shall be installed in rooms separate from other equipment.
 - c. Testing shall be in compliance with the UIHC Emergency Generator Specifications and shall include both factory and on-site testing.

4.19 Division 27 – Communications

See Appendix N.

4.20 Division 28 – Electronic Safety and Security

28 05 00 Common Work Results for Electronic Safety and Security

1. General
 - a. Security systems in the facility include closed circuit television (CCTV), video monitoring, and access control.
 - b. The Safety and Security Department (319-356-4607) shall be consulted during the early design stages to discuss types and locations of all security devices for the different security systems.
2. Door Security Levels

NOTE:

- **Doors equipped with a security function such as an electric strike or a magnetic lock is to be equipped with a closer and be positive latching.**
- **Hardware substitutions are not permissible unless approved by chief architect.**
- **Design Professional will provide a door schedule electronically in an Excel spreadsheet**
- **Door security designations will follow the Design Standard designations found in this Standard**
- **Typical hardware, typical responsible party for hardware supply and door rough-in drawings by security levels are found in Appendix L**

- a. Level 0 Door – No Security.
- b. Level 1 Door – Local alarm, request to exit device, door position switch, Secure Core.
Examples: Exterior and stairwell entry doors.

- c. Level 2 Door – Local alarm, request to exit device, door position switch, door locking device (either a magnetic lock or an electric strike depending on application), Secure Core.
Examples: Clinic entrances for electronic unlocking during business hours
- d. Level 3 Door – Local alarm, request to exit device, door position switch, door locking device (either a magnetic lock or an electric strike depending on application), proximity card reader, Secure Core.
Examples: Clinic main entrances for after hours proximity card access, Telecom closets, sensitive areas, and exterior staff access.
- e. Level 4 Door – Local alarm, request to exit device, door position switch, door locking device (either a magnetic lock or an electric strike depending on application), proximity card reader, Secure Core.
Level 4 doors also require a fixed color, day/night CCTV camera and wire to an Owner provided phone.
Examples: Entrance doors from building exterior to permit remote or card access.

28 13 00 Access Control System

- 1. Access Control system usually consists of card readers and door lock/unlock mechanisms as requested by Safety and Security and/or the user group. Any new systems shall be tied into the existing Software House C*Cure 800 system. Programming and final connections shall be provided by UIHC vendor.
- 2. Closely coordinate device locations and voltages with the door hardware designer and access control vendor. Electric strikes, automatic door operators, door position switches, magnetic locks, and any power supplies shall be coordinated for who provides each device (door hardware supplier or access control system installer) and what voltage each device must be.
- 3. Door access control devices and hardware must be coordinated with the emergency paths of egress to maintain life safety.
- 4. The following are the typical system components.
 - a. Control Panel: Software House C*Cure iStar controller 16 door.
 - b. Card Reader: HID 5455 proximity card reader.
 - c. DSM: Door status monitor, GRI 180/184/8080T series.
 - d. REX: t.Rex-Lt2.
 - e. Electric Strike: HES 1006.
 - f. Mag Lock: Locknetics 390+ 24 volt DC.
 - g. Single door: Mortice lock Sargent 8200 LW1-L with Storeroom function.
 - h. Cables: Types and sizes per the manufacturer's recommendations with labeled jacket.
- 5. Provide one extra device for each five devices on the project (minimum one per device).
- 6. All panel locations, including in Telecommunication rooms, shall be access controlled.
- 7. Installation
 - a. All cabling shall be installed in conduit, cable tray or J-hooks. Cabling shall not lay on ceiling grid.
 - b. Cable tray shall be installed in the main corridors with conduit stubs extended from the devices to the cable tray.

28 20 00 Electronic Surveillance

28 23 00 Video Surveillance

- 1. Video monitoring usually consists of cameras in common areas and other areas as requested by Safety and Security and/or the User group.

2. The following are the typical system components (Bosche unless noted otherwise). Since model numbers occasionally change, coordinate with the manufacturer the exact model numbers for each project.
 - a. Cameras: Model #LTC 0455.
 - b. Lens Guide: Model #TC9902, #TC9908, or #TC9958 (depending on focal length, zoom capabilities, and iris range). Exact types shall be coordinated with Safety and Security.
 - c. Camera Ceiling Housing: #TC9369.
 - d. Camera Corner Wall/Ceiling Housing: #TC2075 or #TC2073.
 - e. Camera Wall/Ceiling Housing for Secure Area: #TC9305.
 - f. Camera Domed Housing: #TC9345MT7.
 - g. Camera Mounts: #TC9211 or #TC9216 (16").
 - h. Camera Weatherproof Housing: #TC9340-1 with #SS4500 sunshield and #LK4500 lock kit.
 - i. Indoor/Outdoor Scanner: Model #TC6230S-115 .
 - j. Receiver/Driver: Model #TC8560-1.
 - k. Digital Video Recorder (DVR): American Dynamics Intellex #D6003D-048R. Intellex, 16 channel, Deluxe, #480GB, rack mounted.
 - l. Network Video Technologies #NV-1662R and #NV-213A active hub and transceivers.
 - m. Cables: Dukane or West Penn. Types and sizes per the manufacturer's recommendations.

28 31 00 Fire Detection and Alarm

1. General
 - a. The existing fire alarm system consists primarily of addressable Simplex panels with some non-addressable panels in the older areas of the facility.
 - b. The Safety and Security Department (319-356-0840 or 319-356-4607) shall be consulted during the early design stages for all fire alarm work to help determine where new fire alarm panels will be located and/or which existing panels will be utilized for connection of new devices. The local Simplex-Grinnell office (319-364-0447) shall also be consulted for every project.
 - c. For remodeling projects in Boyd Tower, General Hospital, South Wing, Carver Pavilion, and Colloton Pavilion, existing devices may be currently connected to an older non-addressable system. These devices shall be removed and returned to Safety and Security. All new devices shall be connected to the nearest addressable panel per the direction of Safety and Security. This may require the Class A addressable loop to be extended to and from the remodel area. Under no circumstances shall any devices, new or reused, be connected back to the non-addressable panels.
 - d. Safety and Security has generated a standard fire alarm specification and standard wiring details for use with all construction projects. This information can be found in Appendix I of this standard.
 - e. All new fire alarm panels shall be sized to accept 25% additional mapnet addresses and 25% additional audio/visual devices, in addition to any planned future building expansions.
 - f. For remodeling projects, it is likely that temporary connections will need to be made to continue service to remaining areas of the facility during construction.
 - g. Close coordination with the Sprinkler System designer, HVAC designer, and door hardware designer is required for connection of all sprinkler switches, building automation panels (for air handling unit and smoke damper shutdown), and release of magnetic door hold-opens.
 - h. For each new Simplex 4100U panel installed, request the following extra materials: 1 mapnet card, 1 signal card, 1 power supply, and 5% of all types of devices (no less than one, no greater than 10).
2. Materials

- a. The following are the typical system components for any new addressable devices (Simplex unless noted otherwise):
 - i. Network Display Unit with Voice and Fire Fighter Command Center: NDU for the 4120 series fire alarm network panel.
 - ii. Fire Alarm Control Panel (network nodes): 4100U series.
 - iii. Preaction System Panel: 4020 series.
 - iv. Local Annunciator (LCD type): 4603 series.
 - v. Manual Station: 2099 series.
 - vi. Area Photoelectric Smoke Detector (analog): 4098 series.
 - vii. Remote Alarm Indicator for Smoke Detector: 2098 series.
 - viii. Area Heat Detector: 4098 series.
 - ix. Duct Mounted Smoke Detector: 4098 series with remote test switch.
 - x. Beam type Photoelectric Smoke Detector: 2098 series with remote test switch.
 - xi. Individual Addressable Module (IAM): 2190 series.
 - xii. Zone Addressable Module (ZAM): 2190 series.
 - xiii. Cut-out Relays: MR-101/201 series.
 - xiv. Speaker/Visual Unit: 2902/4903 series (wall mounted).
 - xv. Visual Unit: 4904 series (wall mounted).
 - xvi. Fire Fighter's Jack: 2084 series.
 - xvii. Fire Fighter Telephone: 2084 series.
 - xviii. Cable: James Monroe or Windy City Wire. Types and sizes per the manufacturer's recommendations; shall be red jacketed.
 - xix. Conventional Wiring: Solid THHN type.

3. Installation

- a. All cabling shall be installed in conduit and painted to identify contents. All detection and audio/visual wiring and devices shall be Class A with supply and return wiring running on opposite sides of the main corridors at a minimum. No t-tapping of conductors is allowed.
- b. Junction boxes shall be painted red and labeled.
- c. Wiring for 24 volt and 120 volt fire alarm wiring shall be in separate conduits.
- d. All wiring shall be color coded and sized throughout in accordance with the UIHC fire alarm color code schedule found in Appendix I. Coordinate with Safety and Security specifications.
- e. Spare wiring shall not be installed in Fire Alarm conduits.
- f. Smoke detectors shall be located at least 36" away from supply or return grilles.
- g. Per ADA requirements, both audible and visual alarms shall be provided in restrooms, conference rooms, cafeterias, filing and photocopy rooms, break rooms, dressing rooms, exam rooms, and treatment rooms.
- h. All peripheral devices shall be installed/spaced per NFPA 72 or UIHC standards, whichever is most stringent.

4.21 Division 32 – Exterior Improvements

32 80 00 Irrigation Systems

1. Coordinate all irrigation systems with the Hospital Landscape Architect (319-356-3310).
2. All irrigation equipment shall have Toro as the design basis unless the Owner authorizes otherwise.

4.22 Division 41 – Material Processing & Holding Equipment

41 22 23 Hoists

1. Patient Lifts shall be by ARJO; lifts are Owner supplied and Owner installed. Coordinate with Owner during design to include lift accommodations.

Appendix A

Schematic Design: Required Deliverables Checklist

SCHEMATIC DESIGN: Required Deliverables Checklist (25%)

Project #: _____

Design Professional: _____

Date: _____

Project Title: _____

The Schematic Design documents illustrate the general scope of the project and the relationships of the major project components. They are typically conceptual in nature and are generally presented as a single-line type drawing showing the type of construction, materials and provide a visual organization of the overall project.

<u>ITEM</u>	<u>COMMENTS</u>
Narrative	
Code Analysis (Exiting, Toilet Facilities, Occupancy Load, Occupancy Type)	
Space Program Signed Off By Dept	
Preliminary Cost Estimate (Including FFE)	
Preliminary LEED Review (If Applicable)	
Design Schedule	
Architectural Schematic Design Drawings	
Mechanical Survey	
Electrical Survey	
Telecom Survey	

Appendix B

Design Development: Required Deliverables Checklist

DESIGN DEVELOPMENT: Required Deliverables Checklist Design (50%)

Project #: _____

Professional: _____

Date: _____

Project Title: _____

The Design Development documents should develop and refine the schematic design documents giving more detail and information. The A/E shall provide documents that fix and describe the size and character of the entire project.

<u>ITEM</u>	<u>COMMENTS</u>
Updated Basis of Design Document with Summary	
Updated Code Analysis with Summary	
Updated Space Program	
Specification Arch & MEP	
Interior Finish Color / Material Presentation Boards	
Cutsheets for all proposed M/E/P fixtures	
Cutsheets for all proposed equipment/ furniture	
Completed Room Data Sheets	
LEED Application and Preliminary Review Response (If Applicable)	
Updated Construction Cost Estimate	
Updated Project Schedule with anticipated Construction Duration	
Architectural Design Development Drawings	
Mechanical Design Development Drawings	
Electrical Design Development Drawings	
Communication Design Development Drawings	
All Rooms Have UIHC Assigned Room Numbers	

Appendix C

Construction Documents: Required Deliverables Checklist

CONSTRUCTION DOCUMENTS: Required Deliverables Checklist (90%)

Project #: _____

Design Professional: _____

Date: _____

Project Title: _____

The Construction Document should be a refinement of the Design Development documents. No new items are to be included at this stage but all portions of documents should be fully detailed and all elements that relate to constructability defined.

Final Basis of Design Document (If Changes have Occurred)	
Final Code Analysis (If Changes have Occurred)	
Final Space Program (If Changes have Occurred)	
Complete Specification with UIHC Front End Documents	
Final Interior Finish Color Boards	
Statement of Coordination for Above Ceiling Utilities	
Final Construction Cost Estimate	
Updated Project Schedule with Construction Durations	
Approval to Bid From the State Fire Marshal's Office	
Copy of the Energy Code Statement of Review (If Applicable)	
Draft Advertisement for Bid	
LEED Final Review (If Applicable)	
Architectural CD Drawings	
Mechanical CD Drawings per Section	
Electrical CD Drawings	
Communication CD Drawings	

Appendix D

UIHC Preferred Products for Electro/Mechanical Systems

APPENDIX D
UNIVERSITY OF IOWA HOSPITALS AND CLINICS
PREFERRED PRODUCTS FOR ELECTRO/MECHANICAL SYSTEMS

This document is intended to represent products preferred, due to the proven performance, quality, cost, availability of parts and service. These products are currently installed and in use at the University of Iowa Healthcare. Updating of new products and deletion of discontinued products from this list will be performed on a regular basis.

This list is to be used by the Facility – Maintenance and Engineering department and by engineering consultants providing technical services for the University of Iowa Healthcare.

Systems	Manufacturer(s)	Model/Comment
➤ Air Compressors	Quincy-Medical Air/Control Air Champion-Control Air	Depending on application Depending on application
➤ Air Dryers	Pall Hankinson	Depending on application Depending on application
➤ Air Handling Units > 5000 CFM	McQuay Trane	Depending on application Depending on application
➤ Chillers	Trane York	Depending on application Depending on application
➤ Distribution Switch Boards	Square D	I-Line Style
➤ Distribution Panel	Square D	NGOD and I-Line Style
➤ Pumps > 30 HP	Aurore Fairbanks	Depending on application
➤ Elevators	Montgomery Kimble O'Keefe	Depending on application Depending on application Depending on application
➤ Fire Alarms	Simplex	Depending on application
➤ Fire Protection	Simplex Protects Reliable Star Viking Omega	Depending on application Depending on application Depending on application

Systems	Manufacturer(s)	Model/Comment
➤ Generators	CAT Waukesha Detroit Diesel	Depending on application Depending on application Depending on application
➤ Heat Exchangers	B & G	Depending on application
➤ Humidifiers (Dry Steam Type)	Dry Steam	Depending on application
➤ Ice Maker	Scotsman	Depending on application
➤ Motors > 15 HP	Toshiba 3 Phase GE 3 Phase	Energy efficient and depending on application Energy efficient and depending on application
➤ Motor Control Center	Square D Cutler Hammer	Depending on application Depending on application
➤ Nurse Call	Dukane	Pro Care 6000
➤ Pumps (Water Circulating)	B & G Grundfos	Depending on application Depending on application
➤ Pumps (Vacuum)	Quincy Sullair	Depending on application Depending on application
➤ Refrigerators (Under Counter)	Marvel	Depending on application
➤ Steam Pressure Regulators	CashCo	Depending on application
➤ Transfer Switches	Asco	Depending on application
➤ Transformers	Square D	Depending on application
➤ Variable Speed Drives	Toshiba ABB	Depending on application Depending on application
➤ Water Purification	Liquitech	Depending on application
➤ Water Softener	Culligan	Depending on application
➤ Water Heater (Flash type, Steam on Demand)	Reco USA Ajax Boiler Inc.	Depending on application Depending on application
➤ X-Ray Boxes	Picker GE	Depending on application Depending on application
➤ BAS (Building Automation Systems)	Johnson Controls Metasys	Depending on application
➤ Computer Room Air Conditioners	Liebert Airflow	Depending on application Depending on application
➤ Door Closers	LCN	

Systems	Manufacturer(s)	Model/Comment
➤ Fan Coil Units	Trane McQuay	Depending on application Depending on application
➤ Fans (Exhaust)	Green Heck Jenn Air	Depending on application Depending on application
➤ Fans (In-Line)	Trane	Depending on application
➤ Fire/Smoke Dampers		Resettable Pneumatic
➤ Isolated Power Supply	Square D	Depending on application
➤ Panic Hardware	Von Duprin	Depending on application
➤ Plumbing Fixtures ➤ Faucets ➤ Sink (Stainless Steel) ➤ Toilets (Floor Mounted) ➤ Showers ➤ Flush Valve	Chicago Elkay or Bradley Kohler, Zurn, American Standard	Acrylic Battery Style
➤ UPS (Uninterruptible Power Systems)	Liebert	Depending on application
➤ Valves (Butterfly)		100% Shut Off
➤ Bumper Guards/Hand Rail	Inpro	Depending on application

Appendix E

UIHC Infection Control Specification (Section 01515) DRAFT

SECTION 01 35 35
INTERIM INFECTION CONTROL MEASURES (IICM)

- Spec Writer:** This section required for ALL University of Iowa Hospitals & Clinics projects
- Spec Writer:** Select project classification. Coordinate and select temporary partition type. Coordinate partition type with Section 01 50 13 Construction Facilities and Temporary Controls. 01 50 13 is to be provided by the DP as needed and must be coordinated with 00 73 13 Institution Requirements and 00 74 13 Project Requirements.
- Spec Writer:** Coordinate demolition and construction activities in adjacent areas- especially where access to ceiling areas is required.
- Spec Writer:** If there is a need for Work outside of the Primary Containment Area, then denote the area(s) as Secondary Areas and proper Class on the drawings.
- Spec Writer:** The Design Professional will develop, with UIHC, an approved detailed IICM plan for the work area, including barrier placement, barrier construction, HVAC isolation details, and NAM (Negative Air Machine) requirements for inclusion in the Bid package. This IICM plan must be presented to and approved by the UIHC ICRA Committee.

PART 1- GENERAL

1.1 Quality Assurance

- Spec Writer:** **NOTE: Most projects inside UIHC Facilities will be a Class III or Class IV. Select applicable class from the following:**
- A. The owner has designated this project to require Interim Infection Control Measures- Class [I] [II] [III] [IV].
 - B. Healthcare-associated infections of immuno-compromised patients, staff and visitors may be caused by exposure to airborne contaminate.
 1. Construction, renovation and repair activities may generate suspended fungal spores and/or bacterial contaminants from dust, debris and earthwork excavation dust.
 2. Fungal spores can be carried by air currents to remote locations within a facility.
 3. Control of airborne contaminate in smoke, construction dust, debris and excavation dust as required by this Section is imperative.
 - C. Interim Infection Control Measures (IICM) shall provide an appropriate level of safety when there are conditions that increase the risk of healthcare-associated infections
 - D. The owner may provide baseline particle counts and conduct periodic air sampling of protection areas during construction to monitor effectiveness of IICM.

- E. The Constructor shall comply with applicable codes and use installation procedures and methods that satisfy applicable code requirements and procedures.
- F. The Constructor shall verify the maintenance of negative air pressure in containment area relative to protection areas on a continual basis by use of differential pressure monitors.
- G. If the Constructor fails to maintain infection control procedures:
 - 1. The Owner may issue written warning, Non-conformance Notice, and/or citation.
 - 2. The Constructor shall correct non-conformance immediately.
 - 3. If situation is not corrected within eight (8) hours of receipt of warning or Non-conformance Notice, the Owner will have cause to stop Work as provided in Contract Documents at no additional cost to the Owner.
 - 4. Failure of the Constructor to correct deficiencies may result in corrective action taken by the Owner and deducting all cost associated with the Contract Amount.
- H. If mold or asbestos are discovered during construction operations, the Constructor shall stop work immediately in the area and notify the Owner's Representative.
- I. The Owner's Representative shall be notified daily (within the first hour of work) of all sick employees working on the project. Employees that are sick (such as diarrhea, upper respiratory infection and fever) and working shall wear personal protective equipment (PPE) such as a surgical mask. Those with a fever need to stay away from UIHC until fever free for 24 hours.

1.2 DEFINITIONS

- A. Airborne contaminant producing activities include, but are not limited to:
 - 1. Demolition and removal of walls, floors, ceilings, and other finish materials.
 - 2. Demolition of plumbing, mechanical and electrical systems and equipment.
 - 3. Finish operations such as sanding, painting , and application of special surface coatings
 - 4. All other construction activity that may generate dust, smoke or fumes.
 - 5. Site work operations adjacent to occupied facilities.
- B. Primary Containment Area: The largest area of project work around which temporary dust partitions are built.
- C. Secondary Containment Area: Areas of Work within the Protection Area outside of the Primary Containment Area that requires a form of dust control.
- D. Protection Areas: Interior occupied areas with facilities, which are adjacent to a Primary Containment Area, either occupied or used for passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.
- E. Preparation Area: specific area located as designated by the Owner's Representative for donning and removing protective clothing prior to entering the Containment Area.

1.3 SUBMITTALS

Spec Writer: Submittal requirements for this section shall be a line item on the submittal log

A. Project Information:

1. Submit drawings indicating Work areas and procedure for containment of airborne contaminants for the Owner's review and approval.
 - a. Indicate locations of all IICM's including temporary enclosures, barriers, isolation vestibules, negative air machines, exhaust fans, capped ductwork and differential pressure gage.
 - b. Drawings shall indicate, as a minimum, containment areas, protection areas, enclosure types, vestibules, location of negative air machines, capped ductwork.
2. Specific means and methods of achieving and maintaining control of airborne contaminants during construction for Owner's review and approval.
3. Submit daily inspection reports, noting employees that are ill, on a weekly basis to the Owner's Representative.
4. Submit copy of HEPA/ULPA vacuum DOP (Dispersed Oil Particulate) test conducted by an independent testing agency, dated within the past six (6) months.

PART 2- PRODUCTS

2.1 MATERIALS

- A. HEPA/ULPA, Ultra-Low Penetration Air vacuum cleaners:
 1. HEPA/ULPA vacuum shall trap 99.999% of particles 0.12 microns and larger. Vacuum shall have a minimum air flow of 90 cfm.
 2. Acceptable products:
 - a. ISC Sales "Minuteman Model CRV- 99.999%"
 - b. Nilfisk Advance
 - c. Pro-Team "Vacer HEPA/ULPA Vacuum"
 - d. Design Professional approved equivalent
- B. Polyethylene: 6 mil or 8 mil thick reinforced laminated polyethylene film; shall meet requirements of NFPA 701 large scale flammability test and ASTM E84 Class A.
 1. Include compatible fire retardant tape
 2. Acceptable products:
 - a. Ameri Cover "Surface Cover" (tel: 800.747.6095).
 - b. Reef Industries "Griffolyn Type 55 FR" (tel: 800.231.6074)
 - c. Design Professional approved equivalent
- C. Adhesive-Faced Contamination Control Mats (sticky walk-of mats):
 1. Size of mats shall be the width of the opening and 30" (minimum) depth.
 2. Acceptable products:
 - a. ASG "Walk-off Mats" (tel: 216.486.6163)
 - b. Controlled Environment Equipment "Cleanline Sticky Mat" (tel: 207.854.9126) or www.ceecusa.com

- c. Liberty Industries "Tacky Mat" (tel: 800.828.5656)
- d. Curtain Wall Company "CleanStep" tacky mats (tel: 800.424.8251)
- e. AmeriCover "Surface Cover" (tel: 800.747.6095)
- f. Design Professional approved equivalent

Spec Writer: ICRA committee and Project Manager should always be made aware of situations where the NAM cannot be exhausted to outside the building envelope.

- D. Negative Air Machine: A machine with a fan or blower, typically with HEPA/ULPA filters, which is able to negatively pressurize a room or area for a continuous period of time. Provide unit sized to meet room requirements. If unit does not exhaust air to the outside of the building, provide additional carbon filtering.
 - 1. Units shall include prefilters, final filters, HEPA/ULPA- filters and filter static pressure gauges.
 - 2. HEPA/ULPA filters shall be 99.997% efficient at 0.3 micron particle size.
 - 3. Acceptable manufacturers:
 - a. Abatement Technologies (tel:800.634.9091)
 - b. Phoenix (tel:800.533.7533)
 - c. Dri-Eaz (tel:800.932.3030)
 - d. Micro-Trap, Inc. (tel:877.646.8208)
 - e. Control Resource System Inc
 - f. NIKRO Industries, Inc. (tel:800.875.6457)
 - g. Design Professional approved equivalent
- E. Zipper Lock Entrance:
 - 1. Fire retardant, reinforced vinyl construction with reinforced stitching. Acceptable products:
 - a. Curtain Wall Company "Dust Door" (tel: 800.424.8251)
 - b. Pro Venture Inc. "Zip-Up" (tel: 978.744.5000)
 - c. Design Professional approved equivalent
- F. Temporary Prefabricated Enclosure Units:
 - 1. Provide the enclosure with an inspection window and pressure differential porthole.
 - 2. Acceptable products:
 - a. Fiberlock Technologies "Kontrol Kube" with frame #6640, enclosure #6442, wheel base platform #6443 and Milfish 87 cfm vacuum device and manometer.
 - b. Specialty Tool Manufacturing "MCU-Quick Wall Mobile Containment Unit"; provide with HEPA/ULPA vacuum connection (tel: 888.718.3878).
 - c. Mintie Technologies "ECU EnteRoom Envelope"
 - d. Design Professional approved equivalent
- G. Airflow Direction Indicator:

NAME OF PROJECT LINE 1
NAME OF PROJET LINE 2

PROJECT NUMBER

1. Acceptable products:
 - a. Airflow Direction Inc. "ADI-69-V-N" (tel: 888.334.4545)
 - b. Austin Ventrues "Model LN102" (tel: 909.043.8172)
 - c. Design Professional approved equivalent
- H. Dust Catching Device:
 1. Disposable, dry, electrostatic cloths or mitts for dust removal.
 2. Disposable, wet cloths, presoaked with cleaning solution, for dust removal.
 3. Acceptable products:
 - a. Proctor & Gamble "Swiffer Dry", "Swiffer Mitt" or "Swiffer Wet"
 - b. Reckitt Brenckiser "Mop & Glo"
 - c. S.C. Johnson & Sons "Pledge Grab It"
 - d. Design Professional approved equivalent
- I. Magnehelic Differential Pressure Sensor
 1. Dwyer #200-00
 - a. Range 0 - 0.25" w.c.
 - b. Minor divisions 0.005
 - c. Calibrated for vertical scale position

PART 3- EXECUTION

3.1 GENERAL

NOTE: All barriers visible to patients and/or the general public shall be hard painted barriers.

- A. The Owner's Representative will make regular visits to the project site to ensure compliance of policy. The Owner reserves the right to inspect the work at any time to verify that the Constructor is complying with these infection control requirements.
- B. Notify the Owner's Representative at least fourteen (14) calendar days prior to preparing a containment area or starting work activity outside of the containment area or in Owner occupied spaces.
- C. The Constructor's personnel shall not track dust into adjacent areas, or open windows or doors that would allow airborne contaminants into adjacent hospital areas.
- D. For exterior work, direct exhaust, dust and fumes away from building air intakes, windows and doors. Ensure that filters on building air intakes are operational and protected from airborne contaminants.
- E. Workers shall wear clean clothing and footwear.
- F. Disposable protective clothing shall be replaced if torn or dirty. Washable protective clothing shall be washed when dirty or weekly, as a minimum.
- G. Polyethylene is only allowed for use on a very limited basis. When allowed, seal to walls, floors and ceilings with "gaffers" tape. Blue painters tape is not allowed.

3.2 CLEANING- GENERAL

- A. Maintain Containment Area free of waste materials, debris and rubbish. Maintain site in clean and orderly condition.
- B. Remove debris and rubbish from pipes chases, plenums and other closed or remote spaces, prior to enclosing the space.
- C. Clean interior areas using HEPA/ULPA vacuum prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Remove waste materials, debris and rubbish from the site daily and dispose of off-site.

Spec Writer: Edit the following classes to meet project requirements. Keep in mind that the majority of projects inside the UIHC Facilities will be class III or class IV. Delete paragraphs below that are not needed.

3.3 STANDARD OPERATION PROCEDURES FOR CLASS I AREAS

- A. Operation in Class I Areas
 1. Execute work by methods to minimize raising dust from construction operations.
 2. Immediately replace ceiling tile displaced for visual inspection.
 3. Wet mop and/or HEPA/ULPA vacuum before leaving area.

3.3 STANDARD OPERATION PROCEDURES FOR CLASS II AREAS

- A. Preparation and Operation Class II Areas:
 1. Water misting of work surfaces is not permitted except for cleaning debris carts and work surfaces.
 2. To contain dust and debris, duct tape doors for demolition and/or construction activities that produce large amounts of dust or utilize "work enclosures".
 3. Block off and seal HVAC supply, return and exhaust terminal, registers, grilles, and diffusers in the rooms affected by construction.
 4. Masks are optional by the person doing the cutting.
 5. Holes cut or punctured in walls and partitions, ceilings, floors and doors cannot be left exposed longer than four (4) hours. If work cannot be completed within the four (4) hour time period, the holes shall be covered.
- B. Flooring removal in Class II Secondary Containment areas
 1. Construction materials and equipment shall be stored within designated areas.
 2. Only flooring areas of a size that can be removed, replaced and completed in one work period shall be worked on.
 3. Removal of flooring:

- a. Vacuum carpet before removal with a HEPA/ULPA vacuum.
 - b. Damp mop sheet vinyl and vinyl composition tile flooring.
 - c. Use motions and methods that minimize the dispersing of dust and debris while removing flooring .
 - d. HEPA/ULPA vacuum floor after removal of flooring, adhesive and leveling of area prior to installation of new flooring.
- C. Clean-up of Class II areas:
- 1. At the completion of the work, the following shall occur:
 - a. Clean work surfaces and debris carts with water.
 - b. Contain construction waste before transport in clean, tightly covered containers or sealed plastic bags.
 - c. Wet mop and/or vacuum with HEPA/ULPA filtered vacuum before leaving the work area.
 - d. Remove isolation of HVAC system in areas where work is being performed.

3.3 STANDARD OPERATION PROCEDURES FOR CLASS III AREAS

- A. Preparation of Class III Areas:
- 1. Refer to the drawings for location of pathways to the Containment Area. Entry and exit locations to the Containment Area shall be coordinated with the Owner's Representative.
 - 2. The Constructor shall completely install all barriers before construction begins. Dust barriers shall be set up around the specific areas of the project before the balance of the work begins.
 - a. Full height, noncombustible, fire-rated construction, with minimum $\frac{1}{2}$ inch thick fire-rated gypsum board both sides with 3-1/2 inch thick R-11 insulation or acoustical insulation to reduce noise.
 - b. Use 3 inch wide drywall tape and one coat of joint compound to tightly seal top, bottom and all seams, to prevent spread of dust to occupied areas, including above ceiling. Surfaces exposed to public view shall be painted with two (2) coats of low odor semi-gloss latex paint, color to match adjacent wall surfaces with vinyl base to match.
 - c. Doors shall be 4'-0" minimum width, fire rated, solid core wood with hollow metal frame and finish hardware, including mortise store room function lockset, door closer, four (4) heavy weight 5" x 4-1/2" ball bearing hinges, door sweep and weather-stripping to prevent flow of dust. Door and frame shall match adjacent door and frame color/finish.
 - i. Swing door into the construction area. Keep enclosure door locked at all times.
 - ii. Electronic door access shall be installed and connected to the Owner's system; the Constructor will be assigned key fobs that will be used to electronically unlock the door.

- d. Install an airflow direction indicator (magnehelic) within the temporary barrier following the manufacturer's installation procedures to indicate if improper direction airflow exists. A pressure differential meter (magnehelic) shall be installed to indicate negative pressure. Unit shall be installed adjacent to door opening.
 - e. The location and details of the enclosure construction shall be as indicated on the drawings.
 - f. Materials for enclosure shall be precut off-site to the greatest extent possible
 - g. No explosives or pneumatic driven fasters will be allowed.
 - h. Provide fire rated partitions and doors
3. Provide two adhesive faced contamination control mats at the construction entry point on the construction side of the dust barrier. Workers shall step on both mats when exiting a containment area. Carts shall be moved across both mats.
 4. Provide the necessary quantity of negative air machines to maintain each separate project work area at a negative pressure with respect to the patient care areas to control the spread of contaminants from the Containment Areas to adjacent Protection Areas. Refer to mechanical plans for additional detail.
 - a. Negative air pressure machines equipped with high efficiency particulate (HEPA/ULPA) filters shall be used in conjunction with a sealed work area to maintain a negative pressure inside the work area relative to non-work areas.
 - i. A sufficient quantity of negative pressure ventilation units equipped with filtration shall be utilized to provide one workplace air change every 15 minutes. This requirement shall apply to the removal of the dust and contaminants from the air.

Spec Writer: All of these calculations are to be done by the DP and inserted into this document prior to issuing plans for bid.

- ii. To calculate total air flow requirement:

$$\text{Total cubic feet/minute} = \frac{\text{volume of work area (in cubic feet)}}{15 \text{ Minutes}}$$

- iii. To calculate the quantity of units needed for the dust control in a specific work area:

$$\text{Quantity of Units needed} = \frac{\text{total cubic feet/minute}}{\text{Capacity of unit in cubic feet/min}}$$

- iv. The total quantity of negative air machines required is dependent upon the total quantity of simultaneous containment areas being occupied by the Constructor. Refer to the plans to calculate the construction barriers indicated on the drawing.
 - v. Change dust filter media as recommended by the manufacturer for the negative air machines.
 - b. Make-up air for the air exhausted from the spaces shall be taken from the existing HVAC system.
 - c. Negative air machines shall be connected to emergency power and run continuously.
 - d. Vent negative air machines to the outside by removing existing windows and replacing them with vented panels having fittings for exhaust holes, or as detailed by the plans and specifications.
 - e. Change filters as frequently as recommended by the manufacturer for duration of Work within the Containment Area to maintain a negative pressure of 0.1 – 0.2 IN of water gauge.
 - f. Negative air machines shall be DOP tested and certified prior to being placed in service, and when dropped, damaged or moved extensively.
 - g. Thoroughly clean each unit and replace both pre-filters and the primary filter after every job.
 - h. Encapsulate and remove each NAM after each job.
 - i. Dispose of used filters by placing in a plastic bag and sealing it first.
 - 5. Each phase of construction shall be considered a separate area.
 - 6. Duct Caps: Block off all existing return, exhaust and supply air ductwork within the Containment Area by capping ducts to withstand airflow, and so they are dust tight.
- B. Operation in Class III Areas:
- 1. The containment control mats shall be monitored and replaced as they become loaded with dirt.
 - 2. The dust partitions shall be wiped down daily with a moist cloth or dust catching device.
 - 3. Traffic between containment areas and protection areas shall be kept to a minimum.
 - 4. Keep doors into containment areas closed at all times.
 - 5. All vacuuming of area outside of the work area not within the barriers shall be done by the Constructor with HEPA/ULPA vacuums.
 - 6. All holes, pipes, conduit, punctures and exposures shall be sealed appropriately.
 - 7. Removal of debris from the project work areas shall be as follows:
 - a. If debris is removed from the project site through an occupied Patient Care Area (Protection Area), the following procedure shall be followed:
 - i. Removal of debris shall be done by the Constructor.
 - ii. The Constructor shall notify the Owner's Representative when there is debris to be removed. Debris shall be removed on an "as needed" daily basis.

- iii. Transport removed material in tightly sealed, rubber tired containers provided by the Constructor to protect Protection Areas.
 - iv. The Owner's Representative will review the type of cart and condition of the carts proposed for use.
 - v. Containers shall be fitted with clean, tight fitting covers, completely sealed at perimeters by taping.
 - vi. Before leaving the Containment Area all containers shall be wiped or HEPA/ULPA vacuumed clean to prevent tracking of dust. The cart shall be rolled over the adhesive faced contamination control mats inside the entrances.
- b. Place covers over debris boxes (roll-offs), truck beds etc., between periods when they are being filled.
8. Supplies and tools shall be brought into the Containment Area in accordance with the following procedure:
- a. For tools and supplies moved to the Containment Area the following procedures shall apply:
 - i. Tools and supplies shall be wiped clean or wrapped in plastic sheeting and moved by Constructor provided rubber tired carts/containers, from a staging area to the containment area (construction site).
 - ii. The containers shall be vacuumed with HEPA/ULPA vacuum cleaners by the Constructor prior to moving through the occupied space to the Containment Area.
 - iii. The Constructor shall notify the Owner's Representative of the need to move these containers through Protection Areas prior to entering the Containment Area.
 - b. Tool and supply removal from the Containment Area shall follow the same procedure specified for debris removal from the Containment Area.

Spec Writer:

Delete the following two paragraphs if not required.

- 9. The following procedure shall be implemented when construction personnel are required to pass through a Protection Area to enter a Containment Area:
 - a. Personnel shall don protective clothing required by the Owner's Representative within the Preparation Area before passing through Protection Areas.
 - b. Protective clothing shall be removed upon entering the Containment Area and shall be stored in plastic bags.
- 10. The following procedures shall be implemented when construction personnel are required to pass from a Containment Area through a Protection Area:
 - a. Construction workers shall vacuum themselves with the HEPA/ULPA filtered vacuum cleaners. After being vacuumed, the workers shall re-don protective clothing before re-entering the Protection Area.

- b. Personnel shall remove the protective clothing in the Preparation Area.
 - c. All dust and debris tracked outside the Containment Area shall be vacuumed up immediately by the Constructor.
- C. Miscellaneous work activities which are required within existing ceiling spaces in a Protection Area which can be confined shall be performed as follows:
- 1. Scheduled in advance and notify the Owner's Representative at least seven (7) calendar days prior to commencing work in ceiling or interstitial spaces above Protection Areas to allow the Owner to relocate or protect occupants.
 - 2. Inform the Owner's Representative so that doors to Protection spaces near ceiling work can be kept closed while Work is in progress.
 - 3. Cover all horizontal surfaces, except flooring, to protect from dust and debris.
 - 4. HEPA/ULPA vacuum the top of the ceiling system to be removed, and surrounding affected area, to remove dust prior to removal.
 - 5. Acoustical ceiling panels or ceiling access panels opened for investigation outside of the containment area shall be closed when unattended.
 - 6. Whenever acoustical ceiling panels or access panels are opened in Protection Areas, provide a portable enclosure that encloses the ladder and seals off opening. Fit enclosure tight to ceiling.
 - 7. Exercise caution when handling fluids within ceiling or interstitial spaces.
 - 8. When working with fluids provide a watertight barrier beneath the work area to catch and retain all spillage before it reaches the ceiling below.
 - 9. Vacuum and clean surfaces free of dust before their removal.
- D. Cleaning Class III Areas:
- 1. Clean up and disposal
 - a. Barriers may not be removed from work areas until the completed project is inspected by the Owner's Representative and thoroughly cleaned by the Constructor.
 - b. Remove all debris, extra materials and equipment from the Containment Area before beginning final cleaning.
 - c. Work areas shall be vacuumed with HEPA/ULPA filtered vacuums and/or wet mopped by the Constructor.
 - d. When construction is complete, the temporary partitions (both sides) shall be wiped down using a moist cloth or dust catching device before removal.
 - e. Clean the blockage of air vents, diffusers and registers before their removal. Then remove them.

3.3 STANDARD OPERATION PROCEDURES FOR CLASS IV AREAS

A. Preparation of Class IV Areas:

1. Refer to the drawings for location of pathways to the Containment Area. Entry and exit locations to the Containment Area shall be coordinated with the Owner's Representative.
2. The Constructor shall completely install all barriers before construction begins. Dust barriers shall be set up around the specific areas of the project before the balance of the work begins.
 - a. Full height, noncombustible, fire-rated construction, with minimum $\frac{1}{2}$ inch thick fire-rated gypsum board both sides with 3-1/2 inch thick R-11 insulation or acoustical insulation to reduce noise.
 - b. Use 3 inch wide drywall tape and one coat of joint compound to tightly seal top, bottom and all seams, to prevent spread of dust to occupied areas, including above ceiling. Surfaces exposed to public view shall be painted with two (2) coats of low odor semi-gloss latex paint, color to match adjacent wall surfaces with vinyl base to match.
 - c. Doors shall be 4'-0" minimum width, fire rated, solid core wood with hollow metal frame and finish hardware, including mortise store room function lockset, door closer, four (4) heavy weight 5" x 4-1/2" ball bearing hinges, door sweep and weather-stripping to prevent flow of dust. Door and frame shall match adjacent door and frame color/finish.
 - i. Swing door into the construction area. Keep enclosure door locked at all times.
 - ii. Electronic door access shall be installed and connected to the Owner's system; the Constructor will be assigned key fobs that will be used to electronically unlock the door.
 - d. Install an airflow direction indicator (magnehelic) within the temporary barrier following the manufacturer's installation procedures to indicate if improper direction airflow exists. A pressure differential meter (magnehelic) shall be installed to indicate negative pressure. Unit shall be installed adjacent to door opening.
 - e. The location and details of the enclosure construction shall be as indicated on the drawings.
 - f. Materials for enclosure shall be precut off-site to the greatest extent possible

- g. No explosives or pneumatic driven fasters will be allowed.
- h. Provide fire rated partitions and doors
- 3. Provide two adhesive faced contamination control mats at the construction entry point on the construction side of the dust barrier. Workers shall step on both mats when exiting a containment area. Carts shall be moved across both mats.
- 4. Provide the necessary quantity of negative air machines to maintain each separate project work area at a negative pressure with respect to the patient care areas to control the spread of contaminants from the Containment Areas to adjacent Protection Areas. Refer to mechanical plans for additional detail.
 - a. Negative air pressure machines equipped with high efficiency particulate (HEPA/ULPA) filters shall be used in conjunction with a sealed work area to maintain a negative pressure inside the work area relative to non-work areas.
 - i. A sufficient quantity of negative pressure ventilation machines equipped with filtration shall be utilized to provide one workplace air change every 15 minutes. This requirement shall apply to the removal of the dust and contaminants from the air.

Spec Writer: All of these calculations are to be done by the DP and inserted into this document prior to issuing plans for bid.

- ii. To calculate total air flow requirement:

$$\text{Total cubic feet/minute} = \frac{\text{volume of work area (in cubic feet)}}{15 \text{ Minutes}}$$

- iii. To calculate the quantity of units needed for the dust control in a specific work area:

$$\text{Quantity of Units needed} = \frac{\text{total cubic feet/minute}}{\text{Capacity of unit in cubic feet/min}}$$

- iv. The total quantity of negative air machines required is dependent upon the total quantity of simultaneous containment areas being occupied by the Constructor. Refer to the plans to calculate the construction barriers indicated on the drawing.

- v. Change dust filter media as recommended by the manufacturer for the negative air machines.

- b. Make-up air for the air exhausted from the spaces shall be taken from the existing HVAC system.

- c. Negative air machines shall be connected to emergency power and run continuously.
 - d. Vent negative air machines to the outside by removing existing windows and replacing them with vented panels having fittings for exhaust holes, or as detailed by the plans and specifications.
 - e. Change filters as frequently as recommended by the manufacturer for duration of Work within the Containment Area to maintain a negative pressure of 0.1 – 0.2 IN of water gauge.
 - f. Negative air machines shall be DOP tested and certified prior to being placed in service, and when dropped, damaged or moved extensively.
 - g. Thoroughly clean each unit and replace both pre-filters and the primary filter after every job.
 - h. Encapsulate and remove each NAM after each job.
 - i. Dispose of used filters by placing in a plastic bag and sealing it first.
 - 5. Each phase of construction shall be considered a separate area.
 - 6. Duct Caps: Block off all existing return, exhaust and supply air ductwork within the Containment Area by capping ducts to withstand airflow, and so they are dust tight.
- B. Operation in Class IV Areas:
- 1. The containment control mats shall be monitored and replaced before they become loaded with dirt.
 - 2. The dust partitions shall be wiped down daily with a moist cloth or dust catching device.
 - 3. Traffic between containment areas and protection areas shall be kept to a minimum.
 - 4. Keep doors into containment areas closed at all times.
 - 5. All vacuuming of area outside of the work area not within the barriers shall be done by the Constructor with HEPA/ULPA vacuums.
 - 6. All holes, pipes, conduit, punctures and exposures shall be sealed appropriately.
 - 7. Removal of debris from the project work areas shall be as follows:
 - a. If debris is removed from the project site through an occupied Patient Care Area (Protection Area), the following procedure shall be followed:
 - i. Removal of debris shall be done by the Constructor.
 - ii. The Constructor shall notify the Owner's Representative when there is debris to be removed. Debris shall be removed on an "as needed" daily basis.
 - iii. Transport removed material in tightly sealed, rubber-tired containers provided by the Constructor to protect Protection Areas.
 - iv. The Owner's Representative will review the type of cart and condition of the carts proposed for use.
 - v. Containers shall be fitted with clean, tight fitting covers, completely sealed at perimeters by taping.
 - vi. Before leaving the Containment Area all containers shall be wiped or HEPA/ULPA vacuumed clean to prevent tracking of dust. The cart shall be

- rolled over the adhesive faced contamination control mats inside the entrances.
- b. Place covers over debris boxes (roll-offs), truck beds etc., between periods when they are being filled.
8. Supplies and tools shall be brought into the Containment Area in accordance with the following procedure:
- a. For tools and supplies moved to the Containment Area the following procedures shall apply:
- i. Tools and supplies shall be wiped clean or wrapped in plastic sheeting and moved by Constructor provided rubber tired carts/containers, from a staging area to the containment area (construction site).
- ii. The containers shall be vacuumed with HEPA/ULPA vacuum cleaners by the Constructor prior to moving through the occupied space to the Containment Area.
- iii. The Constructor shall notify the Owner's Representative of the need to move these containers through Protection Areas prior to entering the Containment Area.
- b. Tool and supply removal from the Containment Area shall follow the same procedure specified for debris removal from the Containment Area.
9. The following procedure shall be implemented when construction personnel are required to pass through a Protection Area to enter a containment area:
- a. Personnel shall don protective clothing required by the Owner's Representative within the Preparation Area before passing through Protection Areas.
- b. The constructor shall provide an anteroom within the dustproof enclosure.
- c. Protective clothing shall be removed in the anteroom prior to entering the Containment Area.
10. The following procedure shall be implemented when construction personnel are required to pass from a containment area through a protection area:
- a. Prior to leaving the containment area, construction workers shall vacuum themselves with the HEPA/ULPA filtered vacuum cleaners. After being vacuumed, the workers may leave the containment area (construction site) into the anteroom.
- b. Personnel shall re-don protective clothing in the anteroom before re-entering the protection area.
- c. Personnel shall remove the protective clothing in the Preparation Area.
- d. All dust and debris tracked outside the construction area shall be vacuumed up immediately by the Constructor.
11. Supplies and tools shall be brought into the Containment Area in accordance with the following procedure:
- a. For tools and supplies moved into the Containment Area the following procedures shall apply:

- i. Tools and supplies shall be wiped clean or wrapped in plastic sheeting and moved by Constructor provided rubber tired carts/containers, from a staging area to the containment area (construction site).
 - ii. The containers shall be vacuumed with HEPA/ULPA vacuum cleaners by the Constructor prior to moving through the occupied space to the Containment Area. The Constructor shall notify the Owner's Representative of the need to move these containers through Protection Areas prior to entering the Containment Area.
 - b. Tool and supply removal from the Containment Area shall follow the procedure specified for debris removal from the Containment Area.
 - c. The following procedure shall be implemented when construction personnel are required to pass through a Protection Area to enter a containment area:
 - i. Personnel shall don protective clothing required by the Owner's Representative within the Preparation Area before passing through Protection Areas.
 - ii. The Constructor shall provide an anteroom within the dustproof enclosure.
 - iii. Protective clothing shall be removed in the anteroom prior to entering the containment area.
 - d. The following procedure shall be implemented when construction personnel are required to pass from a containment area through a protection area:
 - i. Construction workers shall vacuum themselves with the HEPA/ULPA filtered vacuum cleaners. After being vacuumed, the workers may leave the Containment Area (construction site) into the anteroom.
 - ii. Personnel shall re-don protective clothing in the anteroom before entering the protection area.
 - iii. Personnel shall remove the protective clothing in the staging area.
 - iv. All dust and debris tracked outside the construction area shall be vacuumed up immediately by the Constructor.
- B. Flooring Removal in Class IV Secondary Containment areas:
1. Construction materials and equipment shall be stored within designated areas.
 2. Only flooring area of a size that can be removed, replaced, and completed in one work period shall be worked on.
 3. Removal of flooring:
 - a. Vacuum carpet prior to removal with a HEPA/ULPA vacuum.
 - b. Damp mop sheet vinyl and vinyl composition tile flooring.
 - c. Use motions and methods that minimize the dispersing of dust and debris while removing flooring.
 - d. HEPA/ULPA vacuum floor after removal of flooring, adhesive and leveling of area prior to installation of new flooring.

C. Clean-up of Class IV areas:

1. Removal of debris from the project work areas shall be as follows:
 - a. If debris shall be removed from the project site through an occupied Patient Care Area, the following procedure shall be followed:
 - i. Removal of debris shall be done by the Constructor. The Constructor shall advise the Owner's Representative when there is debris to be removed. Debris shall be removed on an "as needed" basis. Transport removed material in tightly sealed, rubber-tired containers provided by the Constructor to protect hospital areas. The Owner's Representative and Epidemiology Representative shall review the type of cart and condition of the carts proposed for use. Containers shall be fitted with clean, tight fitting plastic cover or polyethylene covers, completely sealed at perimeters by taping. Before leaving the Containment Area all containers shall be wiped or HEPA/ULPA vacuumed clean to prevent tracking of dust. The cart shall be rolled over the adhesive faced contamination control mats inside and outside the entrances. Place dust mats inside and outside of the construction site entrances and keep them cleaned.
 - ii. Place covers over debris boxes between periods when they are being filled.
 - b. Cleaning Class IV Areas:
 - a. Barriers may not be removed from work areas until the completed project is inspected by the Owner's Representative and thoroughly cleaned by the Constructor.
 - b. Remove all debris, extra materials and equipment from the Containment Area before beginning final cleaning.
 - c. Work areas shall be vacuumed with HEPA/ULPA filtered vacuums and/or wet mopped by the Constructor.
 - d. When construction is complete, the temporary partitions shall be wiped down using a moist cloth or dust catching device before removal. The partitions shall be removed without creating additional dust in the area.
 - e. Clean blockage of air vents, diffusers and registers, before removal. Then remove.

3.4 WORK ENCLOSURE OUTSIDE OF THE PRIMARY CONTAINMENT AREA (SECONDARY CONTAINMENT)

- A. Whenever work is necessary outside of the containment area:
1. Work shall be scheduled in advance with the Owner's Representative.
 2. Contain work within a full height portable enclosure. Constructors may use prefabricated enclosure unit.
 3. Seal opening upon entering or leaving enclosure
 4. At no time shall construction equipment or material be stored outside of the enclosure.
 5. Dust tracked outside of construction area shall be cleaned up immediately.

6. The Constructor shall have necessary manpower and equipment (HEPA/ULPA filtered vacuum, dust and wet ops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all times.

3.5 WORK CONFINED TO INDIVIDUAL ROOMS

- A. Work activities which are required within a protection area which can be confined to individual rooms may be permitted as follows:
1. Scheduled in advance and notify the Owner's Representative at least seven (7) calendar days prior to commencing work in the room to allow the Owner to relocate or protect occupants.
 2. The room shall be treated as a containment area.
 3. Keep the door to such areas closed and sealed while work is being performed.
 4. Cap HVAC ductwork or seal air supply diffusers and return grills.
 5. Provide negative pressure in the room by use of negative air machine.
 6. Traffic between the room and adjacent areas shall be kept to a minimum.
 7. Transport materials and waste into and from the room through adjacent areas by transporting in tightly covered and sealed containers or carts.
 8. At no time shall construction equipment or materials be stored outside the room.
 9. All dust tracked outside of the room shall be cleaned up immediately.
 10. Vacuum and clean surfaces free of dust after completion of the Work.
 11. Have necessary work force and equipment (HEPA/ULPA filtered vacuum, walk off mats, dust and wet mops, buckets and clean wiping rags) to keep adjacent areas clean at all times.

END OF SECTION 01 35 33

NAME OF PROJECT LINE 1
NAME OF PROJET LINE 2

PROJECT NUMBER

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Appendix F

Modified Bitumen Membrane Roofing (SBS) Specification (Section 07550)

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Modified Bitumen Sheet Roofing (SBS).
- B. Membrane Flashings.
- C. Other accessories as required.
- D. Membrane Manufacturer's Warranty.

1.02 REFERENCES

- A. ASTM D 41 Specification for Asphalt Primer Used In Roofing and Waterproofing
- B. ASTM D 312 Specification for Asphalt Used in Roofing.
- C. ASTM D 451 Method for Sieve Analysis of Granular Material Surfacing for Asphalt Roofing Products.
- D. ASTM D 4586 Specification for Non-Asbestos Asphalt Roof Cement.
- E. ASTM D 4601 Specification for Asphalt Impregnated and Coated Glass Felt Base Sheet.
- F. ASTM D6162 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
- G. AASTM D6163 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
- H. ASTM D 5147-91 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
- I. ANSI/UL 790 Tests for Fire Resistance of Roof Covering Materials.
- J. CGSB 37-GP-56M Standard for: Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- K. FM 1-49 Factory Mutual Loss Prevention Data-Perimeter Flashing
- L. NRCA NRCA Roofing and Waterproofing Manual.
- M. NRCA Bulletin #2-91, Equiviscous Temperature (EVT)
- N. FM 1-28 Factory Mutual Loss Prevention Data Sheet 1-28

SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)

O. FM 1-29 Factory Mutual Loss Prevention Data Sheet 1-29

1.03 SYSTEM DESCRIPTION

A. UL or ASTM Class "A" Rating

It is the intent of this specification to provide a roof system with a UL or ASTM Class "A" Rating and complete system approval for an FM I-90 wind uplift rating. The descriptions given below are general descriptions.

SBS (Styrene-Butadiene-Styrene) modified bitumen sheet roofing reinforced with a fiberglass mat meeting the requirements of Canadian General Standards Board (CGSB) Standard 37-GP-56M and Underwriters Laboratories or ASTM Class A Fire Resistance Rating for the installed slope. Surface membrane shall have factory applied mineral granules. Sheet materials shall be applied with a roofing torch.

1.04 SUBMITTALS

A. Submit under provisions of Section 01330 - Submittals.

B. All submittals shall be subject to the Owner's review and approval.

C. Manufacturer's Product Data:

1. Most recent copy of manufacturer's literature applicable to products and specifications to be used, including material characteristics, test data, installation recommendations, material safety data sheet (MSDS), and complete flashing details of system. MSDS sheets shall be submitted directly to the Owner.
 2. Specimen copy of manufacturer's warranty.

D. Manufacturer's Installation Instructions:

1. Most recent copy of manufacturer's installation instructions for applicators detailing products and specifications to be used, including procedures for installation of membrane and flashing.

E. Manufacturer's Certificates:

1. Copy of completed contractor's application form for manufacturer's warranty to be submitted to the Architect/Engineer at the same time as original is submitted to the membrane manufacturer.
 2. Copy of the contractor-submitted manufacturer's warranty form approved by the manufacturer. Note: The Contractor will not be permitted to start work until the approved warranty form is submitted to the Architect/Engineer.

F. Shop Drawings:

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

1. Roof Plan and Details: By submittal of a bid for this project, the Contractor certifies that the project plans and specifications have been reviewed, and that the proposed roof system will be installed in accordance with these plans and specifications. If, after award of contract and upon review of existing field conditions, the Contractor wishes to modify the roof plans and/or details, the proposed change shall be submitted as a shop drawing for review by the Architect/Engineer.
2. Roof Insulation: Reference Section 07220 - Roof and Deck Insulation for requirements.
3. Sheet Metal Fabrication: Reference Section 07620 - Sheet Metal Flashing and Trim for requirements.

G. Samples:

1. Provide samples listed below, if specifically requested by the Architect/Engineer.
 - a. Surface membrane.
 - b. Base ply membrane.
 - c. Flashing membrane.
 - d. Mineral granules.
 - e. Other membranes specified.

H. Manufacturer's Field Services and Reports:

1. Reference Section 01450 - Quality Control for requirements.

1.05

QUALITY ASSURANCE

- A. Applicator shall be certified by manufacturer to install specified products.
- B. The entire installation of roofing, insulation, flashing and sheet metal work shall be of the quality required for acceptance by the membrane manufacturer to obtain the warranty specified in this section.
- C. Comply with the requirements of the regulatory agencies as specified herein.
- D. As an approved applicator, all items required by the membrane manufacturer in the installation of the manufacturer's system will be included in the work.
- E. The roofing contractor shall assure that all roofing materials (i.e., membrane, insulation, fasteners, asphalt, adhesives, sealants, etc.) are compatible with each other and the substrates which they will be in contact with.

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

1.06 QUALIFICATIONS

- A. Applicator:
1. Company specializing in performing the work of this section with a minimum of five (5) years documented experience.
 2. Company certified by the membrane manufacturer for a minimum of three (3) years as an approved applicator of the products specified in this section.
 3. Company having workmen trained by the membrane manufacturer. These trained workmen shall perform the work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store materials under provisions of Section 01610.
- B. Deliver materials in sufficient quantity to allow continuity of work.
- C. Coordinate delivery of materials with Owner so that minimal interruption of Owner's operations occurs.
- D. Materials shall be stored in their original, tightly sealed containers or unopened packages, and shall be clearly labeled with the manufacturer's brand name and such identifying reference numbers as are appropriate. Deliver materials to job site on pallets. Do not stack pallets.
- E. Materials shall be stored in a neat, safe manner, so as not to exceed allowable live load of the storage area. Contractor shall not load pallets of material onto the roof deck without approval from the Architect/Engineer prior to loading. Disperse materials on roof deck to avoid concentrated loading.
- F. Store materials in dry, protected areas in an upright position. Control temperature of storage areas in accordance with manufacturer's instruction. Protect materials from freezing.
- G. Follow manufacturer's guidelines for required temperatures of material prior to application.
- H. Any materials damaged in handling or storage are not to be used.
- I. The Contractor shall assume full responsibility for the protection and safekeeping of materials stored on Owner's premises.
- J. Store roll goods on ends only. Discard rolls which have been flattened, creased, or otherwise damaged.
- K. Remove wet material from project site.
- L. Comply with fire and safety regulations.

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

1.08 JOB CONDITIONS

- A. Apply roofing in dry weather.
- B. If the newly constructed roof or existing insulation becomes wet due to rainstorms, faulty water cutoffs, or other reasons, the Contractor shall remove and dispose of all wet materials, dry the affected roof area, and reconstruct the roof in accordance with these specifications at no cost to the Owner.
- C. Coal tar base, oil base, or plastic roof cements are not to be used in direct contact with steam or steam source.
- D. All bonding, splicing and sealing surfaces must be free of dirt, moisture and any other contaminants.
- E. The roof surface shall be free of ponded water, ice, snow, or algae prior to installing the new roof system.
- F. Do not apply roofing unless correct asphalt application temperatures can be maintained to obtain good embedment and adhesion. Follow manufacturer's and NRCA's guidelines for bitumen application temperatures. Maintain proper Equiviscous Temperature (EVT) at point of application.
- G. Ensure roof deck is structurally sound to support construction traffic. Notify Owner or Architect/Engineer immediately of any conditions that are not structurally sound.

1.09 WARRANTY

- A. Provide warranty and guarantee under provisions of Section 01780.
- B. On new roofing systems provide to the Owner the membrane manufacturer's 20 year no-dollar limit material and workmanship warranty the date of final acceptance by the Owner.
Warranties shall cover, but not be limited to, the following:
 - 1. Deterioration of the roofing membrane or flashing system resulting from ordinary wear and tear by the elements.
 - 2. Workmanship on the part of the approved roofing contractor in the application of the High-Performance Roofing System.
 - 3. Splits or breaks in the High-Performance Membrane not caused by structural movement or failure or movement of any material underlying the roofing membrane or base flashing.
 - 4. Blisters, wrinkles, ridges, fishmouths or open laps in the High-Performance Membrane.
 - 5. Slippage of the High-Performance Membrane or base flashing.

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

- C. The Contractor shall provide to the Owner a notarized written warranty assuring that all roofing work including caulking, flashing, and sheet metal to be watertight for a period of two years from the date of final acceptance of the work. Warranty shall include all materials and workmanship required to repair any leaks that develop as a result of the work.

PART 2 PRODUCTS

2.01 MODIFIED BITUMEN SHEET ROOFING

- A. SBS Modified Bitumen Roofing and Flashing Membranes

1. Acceptable Manufacturers and Products

a. The Garland Company, Inc.

- 1) Base Sheet: HPR Torchable Base Sheet
- 2) Finish Ply Sheet: StressPly IV Mineral
- 3) Stripping Ply/Base Flashing: HPR Torchable Base Sheet
- 4) Flashing Membrane: StressPly IV Mineral

b. Siplast, Inc.

- 1) Base Sheet: Paradiene 20 HT TG
- 2) Finish Ply Sheet: Parapdiene 30 HT FR TG
- 3) Stripping Ply/Base Flashing: Paradine 20 TG
- 4) Flashing Membrane: Veral Aluminum

c. Product Performance Minimums: Roof systems must equal or exceed all performance minimums and maximums listed for all products and performance characteristics.

- 1) Base Sheet (Base Ply)

<i>Application Method</i>	<i>Torch Applied</i>
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<i>Nominal thickness</i>	<i>110 mil (3.0 mm)</i>
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<i>Net Coverage</i>	<i>100 sq/ft (9.29 m²)</i>
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<i>Compound</i>	<i>SBS Modified Asphalt</i>
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<i>Reinforcement</i>	<i>Fibrous Glass Mat or Scrim</i>
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<i>Top Surface</i>	<i>Fine Sand</i>
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<i>Bottom Surface</i>	<i>Polypropylene or</i>
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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)

*Polyolefin Burn Off
Film*

<i>Tensile Strength @ 73.4 " 36EF, 2 in/min</i>	<i>MD: 80 lbf/inch. (14.1kN/m)</i>
<i>Elongation @ 73.4 " 36EF, 2 in/min</i>	<i>MD: 3.0%</i>
<i>(ASTM D-5147)</i>	<i>CMD: 3.0%</i>
<i>Tear Strength @ 73.4 " 36EF, 2 in/min</i>	<i>MD: 100 lb</i>
<i>Low Temperature Flexibility</i>	<i>-10°F</i>

2) Finished Finished Ply Sheet

<i>Application Method</i>	<i>Torch Applied</i>
<i>Nominal thickness</i>	<i>130 mil</i>
<i>Net Coverage</i>	<i>100 sq/ft (9.29 m²)</i>
<i>Compound</i>	<i>SBS Modified Asphalt</i>
<i>Reinforcement</i>	<i>Fibrous Glass Mat or Scrim</i>
<i>Top Surface</i>	<i>Mineral Surface (white)</i>
<i>Bottom Surface</i>	<i>Polypropylene or Polyolefin Burn Off Film</i>
<i>Tensile Strength @ 73.4 " 36EF, 2 in/min</i>	<i>MD: 80 lbf/inch. (14.1kN/m)</i>
<i>(ASTM D-5147)</i>	<i>CMD: 90 lb (15.8 kN/cm)</i>
<i>Elongation @ 73.4 " 36EF, 2 in/min</i>	<i>MD: 3.0%</i>
<i>(ASTM D-5147)</i>	<i>CMD: 3.0%</i>
<i>Tear Strength *(ASTM D5147) 2 in/min @ 73.4 ± 3.6°F</i>	<i>MD 100 lbf</i>
<i>Low Temperature Flex. *(ASTM D 5147)</i>	<i>-10°F</i>

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

2. Requirements

- a. Roof system is classified by Underwriters Laboratories to meet the requirements of Class "A" Fire Resistance.
- b. Roofing system is classified by Factory Mutual to meet the requirements of FRMRC Windstorm Resistance Classification 1-90 minimum.

3. Materials and Properties

- a. Membrane shall be a reinforced styrene-butadiene - styrene polymer meeting the minimum requirements of CGSB 37-GP-56M.
- b. Membrane sheet shall be granulated with white mineral aggregate. Granule embedment loss shall be less than two grams per square foot.
- c. Base ply shall be a modified asphalt base sheet and compatible with the surface membrane sheet.

B. Related Materials

1. Asphalt primer: Shall meet requirements of ASTM D 41. Primer shall be as recommended by the membrane manufacturer.
2. Flashing membrane: Shall be modified bituminous material as recommended and furnished by the membrane manufacturer.
3. Roof insulation: Reference Section 07220 - Roof and Deck Insulation for requirements.
4. Roof Insulation Fasteners: Reference Section 07220 - Roof and Deck Insulation for requirements.
5. Roof cement: Shall meet requirements of ASTM D 4586 (asbestos-free) and be recommended by the membrane manufacturer.
6. Loose roofing granules: Shall meet requirements of ASTM D 451 and be recommended by the membrane manufacturer. Color shall match color of granulated membrane sheet. Size shall match size of granules on the membrane.
7. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type or penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than 1-inch diameter. Metal discs may be omitted when one-piece composite nails or fasteners with heads not less than 1-inch diameter are used.

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8. Wood Nailers: Roofing nails for wood nailers shall be 11 gauge, barbed, zinc-coated nails with 7/16 to 5/8-inch diameter heads. Nails shall be long enough to penetrate into the wood nailers at least 5/8 inch.
9. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than 28 gauge and not less than 1-inch in diameter. Discs shall be formed to prevent dishing. Bell or cup-shaped caps are not acceptable.
10. Walk-way pads: As recommended and furnished by the membrane manufacturer.
11. Elastomeric Coating: As recommended and furnished by the membrane manufacturer.

PART 3 EXECUTION

3.01 PRE-INSTALLATION CONFERENCE

- A. Prior to the start of roofing work, a meeting will be held at the job site for the purpose of reviewing materials, methods and procedures to facilitate proper and timely construction of the roofing system. Reference Section 01310 - Project Management and Coordination for requirements.

3.02 REFERENCE

- A. The current product specification guide published by the membrane manufacturer shall be considered part of this specification and shall be referred to for more specific application procedures regarding roofing insulation, membrane and base flashing. When a difference between this specification and the manufacturer's product specification guide is encountered, the provision which is more stringent shall govern.

3.03 INSPECTION OF SURFACES

- A. Examine surfaces for adequate anchorage, foreign materials, moisture, and other conditions which would adversely affect the roofing application and performance.
- B. The roofing contractor shall be responsible for preparing adequate surfaces to receive insulation, roofing, and flashing.

3.04 APPLICATION - GENERAL

- A. Install in accordance with the accepted roofing manufacturer's written specifications and recommended details now on file in the Architect/Engineer's office.
- B. Protect building wall area with tarpaulins or other durable materials at staging areas.
- C. Roof surfaces shall be thoroughly dry before application of roofing.
- D. Inspection of the roofing shall be made by a responsible representative of the roofing manufacturer during application and after completion. Reference Section 01450 - Quality Control for requirements.

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

- E. Roofing insulation shall be dry when installed and shall be protected from the weather during installation. All materials which become wet shall be removed and replaced with new dry materials.
- F. Membrane shall be installed over membrane manufacturer approved insulation. Install recovery board as required by the membrane manufacturer although details on the plan may not show it.
- G. When application of roofing is begun, the total roofing system in that area shall be completed before the end of the day and before being wet by the elements. Phase construction may be done as approved by the manufacturer. Written approval from the membrane manufacturer is required for phase construction.
- H. Install temporary water cutoffs at the completion of each day's work and remove upon resumption of the work. Any leaks and damage due to insufficient water cut-offs shall be repaired by the Contractor at no cost to the Owner.
- I. Precautions shall be taken to protect the membrane from puncture.
- J. If materials are stored on the roof, the materials will be protected from the existing roof.
- K. Special care will be taken to prevent distress on the building structure when handling materials for the project.
- L. Apply loose roofing granules in asphalt bleedout at side and end laps in accordance with membrane manufacturer's recommendations.

3.05 SEQUENCING/SCHEUDLING

- A. Notify the Owner and Architect/Engineer 48 hours before the first day of construction.
- B. Install all base flashing and/or fascia system fasteners and metal work, at least throughout the anticipated working area, as soon as possible after roofing application.
- C. Complete all specified carpentry and wood component installations, at least throughout the anticipated working area, as soon as possible after any roofing application.
- D. Surfacing and installation of loose granules shall be completed within the time period as recommended by the membrane manufacturer.

3.06 PREPARATION

- A. Priming of Surfaces.
 - 1. Prime flanges of metal gravel stops, edging strips, flashing collars and accessories as recommended by manufacturer prior to stripping into the roofing system.
- B. Prime concrete and gypsum decks, and masonry walls with primer for adherence of asphalt bitumen. Follow manufacturer's recommendations for application.

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

3.07 APPLICATION OF MODIFIED BITUMEN SHEET (REROOFING)

- A. Apply base ply over substrate as recommended by the membrane manufacturer. Reference Section 07220 - Roof and Deck Insulation for installation requirements of roof insulation. Apply bitumen at the coverage rate and temperature as recommended by the manufacturer.
- B. Phased application is not permitted. All plies shall be completed each day.
- C. Application of base ply should result in a smooth even substrate in order to firmly bond membrane onto.
- D. Align base plies so manufacturer's minimum specified end and side laps are maintained.
- E. When base ply has laying lines, the lines shall be used to position the subsequent plies for compliance with nominal lap requirement. For products without laying lines, conform to manufacturer's lap requirement.
- F. Should misalignment of the sheet occur during application causing a variation from minimum lap requirements, the sheet should be cut and realigned to satisfy minimum lap requirements.
- G. Clean and prepare base-ply for application of finish-ply membrane.
- H. Apply finish-ply membrane over base-ply as recommended by the membrane manufacturer.
- I. All layers of roofing shall be laid free of wrinkles, creases or fishmouths and shall be laid at right angles to the slope of the deck so the direction of flow of water is over and not against the laps.
- J. Sheets shall be laid directly behind the torch applicator.
- K. Sufficient pressure shall be exerted as recommended by the membrane manufacturer on the roll during application to ensure prevention of air pockets, and proper embedment.
- L. Lap base ply and surface membrane the minimum distance as recommended by the membrane manufacturer.
- M. Stagger laps between the plies so the base-ply lap is not within two inches of the finish-ply membrane lap.
- N. During inspection if there is insufficient lap width, a membrane strip no narrower than twice that of the required lap shall be installed over the deficient lap using the appropriate attachment method.
- O. Torching
 - 1. Follow the owners requirements for fire safety and permitting system. See Section 00441.

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MODIFIED BITUMEN MEMBRANE ROOFING (SBS)

2. Torch-apply to substrate by heating bitumen by heating membrane in accordance with manufacturer's recommendations. Applications between membrane plies shall be such as to produce voidless coverage. Embed plies in the bitumen.
3. Do not walk on plies on plies while the bitumen is still fluid.
4. Asphalt flow of a minimum $\frac{1}{4}$ inch beyond lap line shall result during application. Apply loose granules in asphalt flow immediately to ensure proper embedment. Roll lap with a 20# steel roller. Roller shall not be more than 5 feet behind torch during welding process.
5. The completed roof system shall be free of voids or blisters.
6. Defects in the application such as voids, fishmouths, physical damage, loose or dry laps, non-approved materials, etc. shall be repaired by the Contractor as recommended by the membrane manufacturer at no cost to the Owner.

3.08 APPLICATION OF MODIFIED BITUMEN FLASHING MEMBRANE (REROOFING)

- A. Provide modified bitumen flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes and other vertical surfaces, and where necessary to make the work watertight. Modified bitumen flashings are as recommended and provided by the membrane manufacturer.
- B. Apply one-ply of modified bitumen base-ply and one ply of modified bitumen finish-ply membrane at all flashing locations. Apply in accordance with manufacturer's installation instructions. Apply flashing by method (torch applied) as recommended by the membrane manufacturer.
- C. Install flashing in accordance with the details shown on the plans or with the manufacturer's published standards whichever is more stringent.
- D. All perimeter flashings shall conform to Factory Mutual (FM) Loss Prevention Data Sheet 1-49.
- E. Side and end laps shall be overlapped a minimum of 4". All flashings shall extend a minimum of 6" onto the field of the roof. Selvage edge of membrane shall not be exposed.
- F. Flashing membrane should not be stretched when applied.
- G. All curbs and walls shall have cants.
- H. Curb and parapet flashings shall be fastened at top at 6" oc. with 1" diameter cap nails.
- I. All flashing materials shall be 100% bonded to walls, curbs, edges, and other surfaces being flashed.
- J. All raised flashings shall be a minimum of eight (8) inches above the surface of the finished roof surface.

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

- K. All raised flashings shall have a counterflashing.
- L. All metal, masonry, and concrete in contact with flashing shall be primed and allowed to dry. No metal flashing shall be set in hot bitumen.
- M. A layer of roof cement shall be used to separate any membrane from contact with sheet metal flashing elements.
- N. Bed set-on accessories in a thick coating of roof cement extending under entire metal flange of each accessory item.
- O. Roof Drains:

These specifications apply for installation of cast iron drains only. For all other drain types follow membrane manufacturer's recommendations.

1. Roofing contractor shall be responsible for modifying existing drain assemblies for new roof installation, including, but not limited to, lowering drain assembly, modifying leaders, etc. so that there is positive drainage of water around drain.
2. Remove existing flashings (including lead flashings if applicable), roofing material, and cement in preparation for new membrane flashing.
3. Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.
4. Membrane plies, metal flashings, and flash-in plies shall extend under clamping ring.
5. Install new lead flashing, see Section 07620. Prime lead as required.
6. Install flashing membrane plies as recommended by membrane manufacturer. Flashing plies shall extend a minimum of 4" beyond edge of lead flashing, but not beyond edge of sump.
7. Install the roof drain clamping ring and clamping bolts. Tighten the clamping bolts to achieve constant and uniform compression. Replace any damaged, broken, or missing clamping rings or with new to match existing drain design. Replace all clamping ring bolts with new. New bolts shall be brass or stainless steel. Drill and tap broken drain bolts as required for installation or replacement bolts.
8. Replace any damaged, broken, or missing drain grates with new. New grates shall be metal.
9. Seal between the membrane and the drain base shall be watertight.
10. Prevent bitumen drippage into drain leader.
11. Roof drain is to be checked and made operational at the conclusion of the roof construction activities.

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

P. Wall and Curb Flashing Detail:

1. Attach cant using flashing cement, insulation adhesive or mechanical fasteners.
2. Run specified roofing plies minimum of 2" above cant and adhere to wall.
3. Embed SBS flashing by torching from top of wood nailing to a point at least 4" beyond termination of roofing plies. Maintain a minimum 3" side lap and a minimum specified flow of bitumen beyond all edges.
4. Nail plies 1" below top edge, maximum 6" oc. using minimum 1" diameter cap nails.
5. Requires counterflashing.

3.09 PROTECTION OF APPLIED ROOFING:

A. Protection Against Moisture Absorption: When precipitation is imminent and at the end of each day's work, provide protection as follows:

1. **Water Cutoffs:**
 - a. Water cut-offs shall be installed to prevent water from flowing beneath the roof system during inclement weather.
 - b. When the application of the insulation and roofing system is resumed, cut the strips of felt along the vertical edges of the insulation, exposing the edges of the insulation, and remove the cutoff felts and materials.
2. **Temporary Flashing:**
 - a. Provide temporary flashing at drains, curbs, walls, and other penetrations and terminations of roofing felts until the roofing membrane is complete and permanent flashings are applied. Material for temporary flashing shall be by roofing manufacturer specified.
 - b. Remove temporary flashing before applying permanent flashing.

B. Temporary Walkways, Runways and Platforms.

1. Do not permit storing, walking, wheeling, or trucking directly on applied materials.
2. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to indicated live load limits of roof construction.
3. Use rubber-tired equipment for roofing work.

C. Damaged Work.

**SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)**

1. Restore work damaged during construction to original condition or replace with new materials.

3.10 SHEET METAL WORK (REFERENCE SECTION 07620)

- A. Counterflashings, copings and other perimeter or penetration metal work shall be properly fastened and sealed by the roofing contractor or others, and it shall be their responsibility to maintain this work in a watertight condition. Care should be taken to assure the membrane is not in contact with sharp edges and is not unsupported in an area greater than 1/4-inch.

3.11 MANUFACTURER'S WARRANTY INSPECTIONS

- A. Inspections shall be as noted below.
 - B. Manufacturer's shall include three full days of construction observation during the construction process.
 1. Written reports of these visits shall be provided to the Architect/Engineer and the Owner.
 2. The A/E shall be notified a minimum of 48 hours in advance of such visits.
 - C. After the work has started and within the first five working days, an inspection shall be made by a field technical representative of the membrane manufacturer. The representative shall review materials, methods, and procedure to facilitate proper and timely construction of the roofing system. Upon completion of the inspection the Contractor shall submit the Engineer/Architect a written report of the field technical representative's findings.
 - D. At approximately 50% completion of construction, an inspection shall be made by a field technical representative of the membrane manufacturer. The representative shall review materials, methods, and procedure to facilitate proper and timely construction of the roofing system. Upon completion of the inspection the Contractor shall submit the Engineer/Architect a written report of the field technical representative's findings.
 - E. Upon completion of the installation, an inspection shall be made by a field technical representative of the membrane manufacturer to ascertain that the roofing system has been installed according to the manufacturer's current published specifications. Upon completion of the inspection, the Contractor shall submit to an Architect/Engineer a written report of the field technical representative's findings.

ROOF MAINTENANCE WARRANTY

November 1, 2016

PROJECT: 206104-0 UIHC Project No. 205-039

This agreement between _____, hereinafter referred to as OWNER, and _____, hereinafter referred to as CONTRACTOR, is entered into to provide maintenance on the roof of _____, located at _____, _____, Iowa, for ____ years beginning _____, 20____ and ending _____, 20____.

For the purpose of this agreement, maintenance is defined as the repair of roof membrane and flashing defects, and the replacement of roof membrane and flashing components that threaten the viability of the roof system to keep the building free from externally caused leakage through the roof. Warranty shall include all materials and workmanship required to repair any defects that develop during the warranty period at no expense to the OWNER.

Specifically excluded from the responsibility of the CONTRACTOR under the terms of this agreement are any and all damages to said roof, the building or contents caused by the acts or omissions of other trades or contractors; lightning, winds in excess of a strong gale as defined by the Beaufort scale, hailstorm, flood, earthquake or other unusual phenomena of the elements.

The component parts of this agreement are:

1. A yearly comprehensive inspection of the roof during which time all defects that need to be repaired and all components that need to be replaced will be identified by the inspector.
2. Should defects be found during inspection that are not covered by this agreement, the CONTRACTOR will notify the OWNER in writing as to the cause (who or what was responsible), and the estimate of the cost to return the roof to its condition before the problem occurred. Written approval to proceed with the work must be granted by the OWNER.
3. Completion of all repairs and replacement in a manner consistent with the highest standards of the roofing industry. Work shall be in compliance with the membrane manufacturer's written specifications and warranty, so as not to void warranty.
4. A follow-up inspection of the completed maintenance work.
5. Response within 24 hours of all requests for repair of leaks or other emergencies that are part of this agreement.
6. This maintenance warranty covers CAULKING for the listed project and shall be included along with the roofing warranty. The undersigned CONTRACTOR will repair or replace defective caulking work and other work damaged thereby during the warranty period at no expense to the OWNER. The following type of failures are considered defects: Leakage, hardening, cracking, crumbling, melting, shrinkage, running or staining adjacent work.
7. This maintenance warranty covers FLASHING for the listed project and shall be included along with the roofing warranty.
8. This maintenance warranty covers SHEETMETAL for the listed project and shall be included along with the roofing warranty.

OWNER:

Name _____

Title _____

CONTRACTOR:

Name _____

Title _____

ROOF MEMBRANE WARRANTY

SUBMIT COMPLETED FORM WITH BID.

Upon submission of a Warranty Request and all necessary accompanying documents, the roof membrane manufacturer (_____) will provide the following warranty:

1. A 20-year no-dollar-limit material and labor warranty that the roof membrane will provide a watertight weatherseal for a period of 20 years from the date of acceptance by the Owner.

by (Signature) _____
Roofing Manufacturer
(Name) _____
(Title) _____

November 1, 2016

SECTION 07550
MODIFIED BITUMEN MEMBRANE ROOFING (SBS)

END OF SECTION

Appendix G

UIHC Pneumatic Tube System (Section 14 92 00)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
1. Extension of existing Swisslog CTS 630 Computerized Pneumatic Tube System (Computer controlled, single tube system with six-inch round carriers) with a new branch (zone) to the [station location and type here], the University of Iowa Hospitals and Clinics.
 2. Pneumatic tube station (equipment number 14 92 00) in the following locations:
 - a. [Insert location(s) here]

1.2 APPROVAL

- A. Submit three copies of the manufacturer's proposed system extension layout and functioning description by 2 weeks prior to bid date for approval by the Hospital's representative, Mr. Merle Hagie, prior to submitting pneumatic tube extension quotation to the Bidders.

1.3 SYSTEM RESPONSIBILITY AND TESTING

- A. System responsibility as follows:
1. It is intended that the existing pneumatic tube system shall be extended with a new branch / zone to the [insert location here] by SWISSLOG HEALTHCARE SOLUTIONS (800-821-3483; ext. 206) or Owner approved equal.
 2. Contractor will be responsible for all coordination necessary for SWISSLOG HEALTHCARE SOLUTIONS to provide the computer programming for additions to the existing system.
- B. The existing pneumatic tube system shall be maintained in full operation. All required switchgear down-time for the existing system shall be scheduled with the Hospital for being done after normal working hours at no additional cost to the Owner.
- C. All wall penetrations for pneumatic tube system will be responsibility of this Section. Fire walls shall have required rating firestopping packed in penetrations and all exposed surfaces properly sealed and finished.
- D. The complete extended system including the portion currently installed, shall be tested by the manufacturer's installer for seven consecutive days in continuous operation with not more than one failure per 1,000 transactions prior to Owner acceptance. This shall include all failures or defects of all kind except those due to user error and system misuse. Non-compliance with these specifications and system malfunctions shall be corrected per manufacturer's instructions to operate per these specifications and manufacturer's printed product information.

1.4 SUBMITTALS

- A. Shop Drawings shall indicate routing of tubing; space required for tubing, transfer units, storage units, stations and other pertinent components; location, capacity, horsepower and space requirements of blowers, descriptions and space requirements of central control center; detailed drawings of accessory components of system; diagrams of completed wire system; and epidemiological controls per Section 01151.

PART 2 - MATERIALS

2.1 PERFORMANCE AND QUALITY

- A. System shall be standard product of domestic manufacturer.

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THE UNIVERSITY OF IOWA HOSPITALS AND CLINICS

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HOSPITAL WIDE PNEUMATIC TUBE SYSTEM

- B. System shall be computer controlled pressure-vacuum pneumatic tube network of nominal 6" size, designed for transport of documents, x-rays, I.V. containers, laboratory samples, pharmaceuticals, and small supplies. System shall be fully automatic requiring no intermediate handling of carriers once inserted and receiving address accepted by system.
- C. Carrier transactions shall take shortest route to destination avoiding superfluous travel. Carrier shall not be required to travel to central location for destination routing.
- D. Carriers shall be dispatched from system by vacuum and pressure delivered. System shall present tubing dimensioned equipment to carrier through all travel areas within air stream - from dispatch to delivery. Expanded bends, Y-branches are not permitted. Impact operated devices are not desirable.
- E. System characteristics shall ensure carrier is handled in gentle, controlled manner so sensitive materials and laboratory samples can be transported without damage.
- F. System shall be computer controlled and supervised. A master interface panel shall be provided to permit convenient communications with system for maintenance and management.
- G. Transfer from one operational section of system to another shall be through above-ceiling mounted transfer units in minimal time periods.
- H. System shall be based on eleven thousand carrier transactions per 24 hour day with peak system performance of 1,650 carrier transactions per hour for two hours each twenty-four hour day when future expansion is completed. System Supplier shall take into account selective station slowdown if capability is available. Selective station slowdown transactions will represent approximately twenty percent of total daily transactions. Transaction capacity and system configuration upon completion of ultimate expansion will be determined as specified in paragraph 1.2 A.

2.2 SYSTEM CONTROL

- A. System control shall be by mini-computer system controlling and supervising transactions from dispatch addressing to delivery at receiving station with provision of fault location, maintenance diagnosis and data output for management control. System control shall include the following:
 - 1. Supervise and control all sending and receiving transactions and provide selective monitoring, on demand, of each dispatch through entire transaction route.
 - 2. Provide fault alarm in event of malfunction and visually display fault location and nature of fault.
 - 3. Standard commercial Mini-computer, magnetic core memory, software programmable or compatible with existing system computer.
 - 4. Computer-operated Interface Panel which provides the following inter-action capability:
 - a. Display module to verify address of each system device and confirm nature and location of system faults.
 - b. Keyboard for addressing and exercising all devices within system. Supplier shall provide description of keyboard with bid submittal.
 - c. Monitoring of each dispatch through entire transaction route and memory function to re-trace route in event of delivery failure.
 - d. Carrier dispatch backlog indicator on master control.
 - e. System transaction counter and resettable individual branch counter.
 - f. Individual branch on/off switch.
 - g. Plug-in circuit boards.
 - h. CRT add-on capabilities.
 - i. System voltage level display on Master Control.
 - j. Blower mode indicator.
 - k. Disabling key switch for keyboard operation (off-operate-exercise) on Master Control.

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5. Operational or process programs shall control and supervise transactions and operations of all system devices. No sending transactions will be permitted unless transaction route and receive station check clear. Carrier shall return to sending station if unable to transact route to addressed station.
6. Supplier shall describe in detail, the intra-system communications with submittal.
7. Expansion of system computer shall require minimum or no hardware addition or modification. If modification is required, Supplier shall delineate.
8. Printed circuit boards within system shall be standardized to minimize inventory needs. Supplier shall describe fault locating diagnostic procedure with submittal.
9. Station and diverter control logic shall incorporate semi-conductors to minimize power consumption and reduce noise.

2.3 STATIONS

- A. Stations shall be designed for up send only. Operating mechanisms shall be fully accessible for servicing from front.
- B. Station fronts shall be free of sharp edges and corners and fabricated from materials not easily abraded through extended use and cleaning.
- C. Stations shall be completely insertable or removable as a unit into recessed frame. Station control boards shall have the following features:
 1. Lighted display to validate selected address and clear route before executing of send instruction by operator.
 2. Indicator light for carrier arrival, full sender, station on, carrier enroute and flashing light and audible signal for full receiver.
- D. Stations shall include optional RFID reader.
- E. Supplier shall specify and describe all modifications and alterations to station controls to accommodate system expansion. Stations shall have plug-in terminations for power and communications cabling.
- F. Stations shall have printed circuit board design.
- G. Positioning or carrier present sensors shall be described with submittal.
- H. Stations shall be capable of holding one carrier in send magazine, addressed and ready for dispatch under computer supervision without further operator intervention.
- I. Supplier shall describe power supply and distribution into system.
- J. Stations shall be capable of accepting system expansion with minimal modifications and alteration of installed controls and equipment. Modification and alteration shall be described.
- K. Touch pad style station sign-off shall be provided.
- L. Optional colors for finish shall be provided.
- M. Automatic empty carrier return shall be provided.

2.4 DIVERTERS

- A. Supplier shall describe in detail complete operation and operating characteristics of diverters with submittal.

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SECTION 14 92 00

HOSPITAL WIDE PNEUMATIC TUBE SYSTEM

- B. Supplier shall submit diverter specifications, which include dimensions, weight, maintenance program, whether unit can be in-house repaired (assuming worst likely problem), and any other pertinent data with submittal.
- C. Diverter controls shall be incorporated in single printed circuit board with provisions for present and future power and signal terminations.
- D. Diverters shall utilize a chain drive mechanism if possible rather than cable drive mechanism.

2.5 CARRIERS

- A. Six Eco-Seal carriers shall be furnished for each station. Eco-Seal carrier inserts shall be provided as follows and in quantities determined by the Owner:
 - 1. Container for transporting filled vacutainers. Construction shall be described. Insert shall accommodate supplier specified number of vacutainers.
 - 2. Universal type for transporting miscellaneous medications and fragile items. Construction shall be described by Supplier, split, and readily installed and removed from carrier. Inserts shall have capacity to accommodate minimum load of 500 milliliter I.V. container.
 - 3. I.V. type for transporting one thousand milliliter plastic I.V. containers. Construction shall be described by Supplier, split and readily installed and removed from carrier.
 - 4. X-Ray type for transporting fourteen inch by seventeen inch films without folds and damage. Inserts shall be padded on both sides to prevent scratching of films. Describe with submittal.
 - 5. Carrier volume shall be minimum 230 cubic inches.
- B. Carriers shall have the following characteristics:
 - 1. Clear construction, Eco-Seal type
 - 2. Not acceptable in system unless positively closed.
 - 3. Bi-directional.
 - 4. Cannot open in transit.
 - 5. Riding rings which are easily replaceable in house.
 - 6. Durable construction.
 - 7. Contain RFID chips.

2.6 INTER-BRANCH TRANSFER

- A. Carriers shall be transferred between branches through interaction of diverters and exhausters under computer control and supervision.
- B. Describe inter-branch transfer equipment space requirements.
- C. Installation frames shall be provided for inter-branch diverters to avoid installation of operating equipment during construction phases.
- D. Inter-branch transfer system shall have ability to transfer more than one carrier among branches simultaneously. As additional branches are added to the system, capability of simultaneous transfer of multiple carriers between branches shall increase.

2.7 LINE MATERIAL

- A. Tubing shall be minimum sixteen gage electrical welded steel, galvanized and specifically fabricated for pneumatic tube applications. Bends shall be same material formed on center line radius of minimum 48".
- B. Hangers and supports shall be spaced on no more than 10'-0" centers and within 1 foot of offsets (joints). Ceiling hung type shall be from concrete decks only. Bends and straight runs and rises shall be hung or supported to minimize noise and deflection in system from normal carrier passing.

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SECTION 14 92 00

HOSPITAL WIDE PNEUMATIC TUBE SYSTEM

- C. Tube ends shall be joined by either drive sleeves or a bolted coupling. Bolted sleeves shall be used at joint to major components.
- D. All tubing runs through areas determined to be noise sensitive shall be insulated with sound insulating glass fiber at least 1½" one pound density type with Aluminum foil backing.

2.8 POWER SUPPLY AND DISTRIBUTION

- A. Power, control wiring and conduit required shall be provided by pneumatic tube manufacturer, except primary power source for main control and blowers only.
- B. Power and control wiring shall be installed in steel conduit.
 - 1. 1" conduit for 50 conductor com cable,
 - 2. ¾" conduit for power cable 1 red, 1 black, 10 gauge cable,
 - 3. ¾" conduit for critical care system (4 twisted pair).
- C. System power shall be turned on and off and distributed and monitored by master control unit.
- D. System design shall facilitate connection of emergency power at minimum number of locations to provide continuous operation of entire system on emergency power. System supplier shall list connections to emergency power and describe in detail.

2.9 BLOWER PACKAGE

- A. One exhauster package shall be installed for each branch. It shall provide motivating force to transport carrier within transmission tubing.
 - 1. Package shall be capable of delivering either vacuum or pressured air to transmission tubing. It shall be automatically controlled from Master Control.
 - 2. Exhauster unit shall be complete with air sensing devices and valves for controlling air flow and solid state control logic for interfacing with Master Control Unit.
 - 3. Unit shall have sufficient capability (minimum 550 cfm) to move loaded carrier minimum twenty and maximum twenty-five per second through designed length of system except when selective slowdown is in operation. Deviation of supplier's system from this shall be described; and qualitative and quantitative information shall be given to substantiate deviation with submittal.
 - 4. Exhauster shall automatically shut down during periods of low activity and shall re-start automatically when sending instruction is executed at station.
- B. The blower noise shall not exceed 85 decibels.
- C. Blower shall be 10 horsepower Swisslog provided regenerative blower.
- D. Submit a complete and detailed description of blower package.

2.10 TRAINING

- A. Maintenance and operating personnel shall be instructed in-house on use, maintenance and operation of system during final seven days of installation.

2.11 INSTRUCTION MANUALS

- A. Upon completion of installation of system, Contractor shall furnish three copies of Instruction Manual and Maintenance Manual including the following:
 - 1. Complete operating, trouble-shooting and preventive maintenance routines.
 - 2. Detailed spare parts list.

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3. Electrical schematics.
4. Mechanical riser diagram and electrical wiring diagram.
5. The computer program documentation.

2.12 ADDITIONAL FEATURES

- A. Features shall be designed to permit incorporation into system with minimum alteration or modification to existing equipment or controls.
 1. Each station shall accept two or more carriers, addressed and available for automatic dispatch under computer control without further operation intervention.
 2. System control shall be equipped for CRT Terminal which is complete with system programs that provide maintenance diagnostic routines and management reports for systems maintenance and management purposes.
 3. System controls shall incorporate carrier speed control capability that upon command from sending station, automatically transports selective carriers through entire transit route at pre-determined (12'-0" to 15'-0" per second) reduced rate of speed. Balance of system shall continue to operate at normal speed. Selected transit route shall return to normal speed upon completion of reduced velocity transaction. Pneumatic tube system shall be pre-set to designated transit routes to meet specific requirements of the Owner. This feature will include in selective speed control network those stations designated by the Owner.
 4. Optical sensors for computer and diverters.
 5. Single touch addressing for high use stations.
 6. L.E.D.'s on printed circuit boards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of system shall be in accordance with manufacturer's written instructions.
- B. Station operating mechanism shall not be installed until system is ready for check-out to insure latest equipment models. Should improvements have been made on system components bid on, the Owner shall negotiate price differentials, if any, upon submission by manufacturer of complete description of improvements.
- C. Provide protection for system components against damage.
- D. Position diverters in ceiling spaces or shaft areas. Divertors shall be positioned so that at least 6" of clear space is above diverter components; at least 24" of clear un-obstructed space is available on the side of the diverter (full length) with the electrical panel; at least 6" of clear space is available in front of the diverter motor assembly; and at least 6" of clear space is available under the diverter motor assembly. In addition - un-obstructed access space in ceiling is required for maintenance access from below the ceiling to work on the diverter components..
- E. After award of contract and prior to commencement of field work, manufacturer shall submit to the Owner a complete traffic flow analysis.
- F. Installation of the pneumatic tube system shall be coordinated with other utilities installed above the ceilings. This section shall assist the Contractor in the preparation of the coordination drawings by providing the Contractor with drawings and equipment cuts of the pneumatic tube system.

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3.2 GUARANTEE

- A. Pneumatic tube manufacturer shall guarantee in writing that at no charge during the twelve months after the Owner acceptance, manufacturer shall repair or replace system components causing system malfunction not due to ordinary wear and tear.
- B. A twelve month preventive maintenance service agreement shall be available on a year to year contract basis. Supplier shall describe standard maintenance service agreement in submittal.
- C. Service personnel for entire system and components, except computer, shall be full time employees of manufacturer, specifically trained for both routine and emergency servicing. Service response time shall be sufficient to insure reasonable system availability and reliability.
- D. Service personnel for computer shall be employed by system manufacturer, specifically trained in maintenance, repair and programming of computer hardware and software, on emergency and routine basis. Service response time shall be sufficient to insure reasonable system availability and reliability.

END OF SECTION 14700

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UIHC #20X-XXX

THE UNIVERSITY OF IOWA HOSPITALS AND CLINICS

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Appendix H

UI Emergency Generator Specifications

APPENDIX H

University of Iowa

Emergency Generator Specifications

The intent of these specifications is to establish a level of quality and desired function of the equipment specified that can be met by various suppliers. The equipment includes a single 1200 rpm or 1800 rpm diesel engine-generator set having a capacity of not less than 965 kW, associated remote radiators for cooling purposes, control panel and electrical distribution switchboard.

These specifications include furnishing a continuously rated, for standby use, diesel engine-generator set delivered to the site (University of Iowa Hospitals & Clinics (UIHC), Iowa City, IA) complete with all necessary accessories as may be hereinafter set forth. The term "continuously rated for standby use" shall mean that the set will be for standby service but once started shall be capable of carrying a full load on a continuous basis for an indefinite period of time. Unloading and setting of the set shall be part of a separate contract.

UIHC reserves the right to reject any or all bids where in their opinion the equipment offered does not meet the functional requirements of this installation. The University reserves the right to accept any bid where, in their opinion, the equipment offered meets the functional requirements of this installation, whether or not the equipment offered meets the technical specifications. UIHC shall be the sole judge in making this determination.

The equipment as specified shall be included in a proposal as a lump sum amount and shall be known as Base Bid. Where items are indicated as Alternates to the Base Bid, separate prices shall be indicated on the proposal as additions to or deductions from the Base Bid amount.

A. Engine-Generator

The engine-generator set shall be the product of a United States of American manufacturer, regularly engaged in the manufacture of generator plants. The set and controls shall be built and tested by the engine manufacturer precluding divided responsibility. The set shall be tested by the manufacturer of the set, as hereinafter specified in paragraph 4. Certified test reports of the complete assembly shall be available from the engine manufacturer showing the plant's power rating, voltage and frequency regulation, and other pertinent data.

1. Rating

The continuously rated for standby use output of the set shall mean the set's full continuous derated output under the climatic conditions shown below.

The single diesel engine shall be derated for the following ambient conditions:

- Altitude: 750 feet above sea level

- Engine Room Temperature: 120° F

Detailed capacity requirements shall be as set forth in paragraph 5.

2. Diesel Engine – Generator Set and Associated Apparatus

a. Engine Features

The diesel engine shall be heavy duty, compression ignition, water cooled, multi-cylinder, 2 stroke or 4 stroke, designed for cold quick start, capable of delivering full load output in not more than ten seconds. Speed may be either 1200 rpm or 1800 rpm.

The engine shall have replaceable cylinder liners of the wet sleeve type, and replaceable valve seat inserts. Exhaust manifolds shall be water cooled.

b. Starting System

The engine starting shall be by means of 24 volt starting motors. Crank termination switch shall be provided. Batteries of sufficient capacity for five, 15-second consecutive crank periods shall be furnished. The battery voltage shall be 24 volt DC. Batteries shall be lead-acid type. Battery charger with sufficiently high charge rate shall be furnished. 115 volt AC power shall be available for the battery charger. A battery rack shall be furnished.

As an alternate to the Base Bid, the vendor shall provide a compressed air starting system in lieu of the electric start system. The compressed air starting system shall include:

- 1) Air starting motor.
- 2) Electric driven air compressor of adequate capacity.
- 3) Two air storage tanks (one reserve), each capable of giving not less than two starting cycles.
- 4) Necessary controls to maintain the air storage tanks full and permit automatic starting.
- 5) All associated and auxiliary compressed air piping required.

c. Cooling System

The cooling system shall insure that the maximum cooling water temperature is safely within the normal working temperature range when the set is operating continuously at full load at maximum ambient temperature when the air intake temperature of the engine room may rise to 120° F. The engine outlet water temperature under such conditions shall not exceed 200° F.

Cooling shall be provided by a remotely installed radiator unit of the vertical discharge style.

d. Lubrication System

A pressure type lubricating system with gear type oil pump and a full flow filter shall be fitted to the engine.

e. Filters

Replacement elements are required.

- 1) Fuel Oil Systems – The system shall have a filter before the fuel injection pumps. This filter shall be of ample capacity to prevent passage of all particles of 10 micron size or larger.
- 2) Lubricating Oil System – this system should have full flow filters of sufficient capacity.

f. Intake and Exhaust System

Air is to be induced to the engine manifold through an air cleaner with dry-type elements.

The engine exhaust line shall be fitted with expansion bellows and a critical type silencer to give efficient silencing with maximum tolerable back pressure. The exhaust system shall be comprised of a side entry critical silencing muffler, 12 feet of horizontally routed exhaust piping with a “tee” fitting extending up and down, 20 feet of vertically routed exhaust pipe, 2 - 90° elbows back to back, 20 feet of horizontally routed exhaust pipe, a 45° fitting extending into a vertical exhaust pipe 60 feet long, 1 - 90° elbow turning out, 12 inch stub cut off at 45° angle with a stainless steel bird screen to close off exhaust pipe.

The vendor shall submit with his quotation the size of the muffler and exhaust pipe required to keep back pressure within the operating limits of the set being offered.

g. Governing System

The engine shall run steadily at any load within its rating at its rated speed, and the changes in speed at a steady load shall not exceed 0.5% when all transients have decayed.

The maximum speed variation upon applying a 50%, 0.8 power factor load change shall not exceed 5%.

The governor shall have provisions for adjustment of speed. The governor actuator shall be of the electronic type, as manufactured by Woodward or Barber Colman, used as the governor speed control mechanism.

As an alternate to the Base Bid, the vendor shall provide a hydraulic governing system in lieu of the electronic type. The vendor shall include with the alternate proposal the following information:

- 1) Make and model of hydraulic governor.
 - 2) Speed regulation characteristics obtainable.
- h. Fuel Transfer Pump

For fuel oil transfer from the day tank, an automatically controlled electric driven fuel transfer pump shall be supplied on the set. Also a suitable hand operated transfer pump shall be supplied and installed as a standby to the automatic pump; all complete with piping.

i. Safety Switches

The engine shall be equipped with automatic safety switches to stop the engine in the following cases:

- 1) Water temperature exceeds a preset safe working limit.
- 2) Lubricating oil pressure lower than a preset safe working limit.
- 3) Speeds exceeding 110%.
- 4) Overcranking.

j. Engine Instrument Panel

An engine mounted instrument panel shall be furnished including water temperature gauge, oil pressure gauge, fuel pressure gauge, and oil temperature gauge.

k. Engine-Generator Monitoring System

An engine-generator monitoring system shall be provided complete with sensors to monitor the following:

- 1) Low engine temperature.
- 2) High water temperature.
- 3) Low oil pressure.
- 4) High oil temperature.
- 5) Overcrank.
- 6) Overspeed.

- 7) Low battery voltage.
- 8) High battery voltage.
- 9) Low fuel supply.

As an alternate to the Base Bid, the vendor shall provide monitoring of the compressed air storage tanks for low air pressure in lieu of low and high battery voltage.

1. Sub-Base

The engine generator unit shall be mounted on a full sub-base fabricated of structural steel with heavy cross members suitable for lifting. Spring type vibration isolators of the type and quality recommended by the manufacturer shall be supplied. Mounting holes for the isolators shall be located in the sub-base by the engine manufacturer to insure equal distribution of weight on the isolators. Maximum vibration transmission not to exceed 6%.

All service connections, fuel, water, electric, etc. to the engine shall be through flexible connection devices. Vendor shall supply the flexible connection devices.

m. Alternator & Exciter

- 1) The alternator shall maintain continuously its specified fully derated output at 0.8 power factor under the worst conditions stated in these specifications without exceeding 130° C temperature rise over listed engine room maximum ambient temperature.
- 2) The windings of the alternator and exciter shall be insulated with Class F insulation suited for high humidity environment.
- 3) The exciter shall be brushless direct connected type with shaft mounted diodes and built-in permanent magnets eliminating field flashing.

n. Alternator

The alternator shall be a multi-pole revolving field type with rotating brushless exciter and solid state regulator. The number of poles shall be compatible with 1200 or 1800 rpm to provide a 60 Hertz output. The alternator shall be directly connected to the engine flywheel housing and driven by means of a multiple disc coupling from the flywheel. Voltage regulator shall be SCR static type with voltage adjustment rheostat and automatic subsynchronous speed protection. Voltage regulation shall be within ±1% of rated voltage, from no load to full load. The transient voltage dip shall not be greater than 25% of rated voltage when full load at rated power factor is applied to the alternator.

o. Battery Charger

A battery charger shall be furnished. The charger shall employ a transistor controlled magnetic amplifier circuit to provide continuous taper charging and shall maintain rated output voltage with an A.C. line fluctuation of $\pm 10\%$. The charger shall have:

- 1) 2 ranges – Float at 2.17 V.P.C. and equalize at 2.33 V.P.C.
- 2) Automatic A.C. line compensation.
- 3) Automatic overload protection.
- 4) Silicone diode full-wave rectifier.
- 5) Automatic surge suppressors.
- 6) D.C. ammeter and voltmeter.
- 7) Fused A.C. input and D.C. output.
- 8) Low D.C. voltage alarm relay.
- 9) High D.C. voltage alarm relay.

As an alternate to the Base Bid the vendor shall provide, should compressed air starting be selected by UIHC, a 24 volt D.C. battery and a battery charger to provide alarm and control power as follows:

- 1) Battery shall be lead acid type – heavy duty, with deep cycle characteristics.
- 2) Not less than 90 ampere hour capacity.
- 3) Battery rack.
- 4) Charger shall be solid state type to maintain battery fully charged.
- 5) Charger shall accept a 115 volt A.C. supply.
- 6) Charger shall include D.C. ammeter and voltmeter, fused A.C. input and D.C. output, and low voltage alarm relay.

p. Control Panel and Switchgear

A control panel shall be furnished, which shall be free standing and shall include (not necessarily limited to) the following:

- 1) Metering:
 - a) Ammeter – 2% of full scale accuracy.

- b) Ammeter Selector Switch, 4 position, to measure current flow in all phases.
 - c) Voltmeter – 2% of full scale accuracy.
 - d) Voltmeter Selector Switch to measure all phase voltages.
 - e) KW and KWH Meters.
 - f) Frequency Dial.
 - g) Running Time Meter.
- 2) Control:
- a) Start-Stop Control.
 - b) 3-Position Switch (Off-Auto-Test).
 - c) Engine Cool Down Timer.
 - d) Overcrank Timer.
 - e) Immediate Engine Safety Shut Down Lights and Relays for:
 - (1) Overcrank.
 - (2) Overspeed.
 - (3) Low Oil Pressure.
 - (4) High Engine Temperature.
 - f) Pre-alarm Warning Lights and Relays for:
 - (1) Low Oil Pressure.
 - (2) High Engine Temperature.
 - (3) Radiator Fan Power Failure.
 - g) Warning Light for low engine temperature.
 - h) Voltage Regulator with associated control.
 - i) Engine speed adjuster.
 - j) Running Indicator Lamp for radiator fan.
 - (1) Fan Cycle On.

- (2) Fan Cycle Off.
- 3) Switchgear:
 - a) Main Circuit Breaker:
 - (1) 1600 ampere, 480 volt, 3 phase.
 - (2) Molded Case Type – U.L. listed interrupting rating = 50,000 RMS symmetrical amperes.
 - (3) 24 volt D.C. shunt trip.
 - b) Feeder Circuit Breakers:
 - (1) Molded Case Type – U.L. listed interrupting rating = 30,000 RMS symmetrical amperes.
 - (2) One 450 amp, 3 phase; one 225 amp, 3 phase; one 125 amp, 3 phase; and space with bus for three 450 amp, 3 phase as future breakers.
- 4) Accessories:
 - a) Potential Transformers required – instrument quality.
 - b) Current Transformers required – instrument quality.
 - c) Control Switches – switchboard type.
 - d) Lamp Test Switch.
 - e) Terminal Boards for all wiring with all wires marked at both ends with markings the same as shown on the control wiring diagrams.
 - f) All wiring bundled and wrapped and secured in place with clips. Plastic wiring duct may be used at builder's option.
 - g) All panel components identified and marked in accordance with the control drawings. Markings shall be permanent type and securely fastened to or adjacent to the device.
 - h) All relays shall be of the enclosed, dust-tight and plug-in type and shall be mounted on a swing-out panel for rear access.
 - i) Motor Control circuit Relays, as needed, shall be provided to control:
 - (1) Radiator fan starter.
 - (2) Fuel pump starter.

- (3) Space ventilation equipment starters.
 - j) Audible alarm with silencing switch to alarm when any one or more of the immediate shut down or pre-alarm conditions exist.
 - k) Control system shall be protected by a circuit breaker.
- 5) Miscellaneous:
- a) Switchgear bus shall be silver plated copper.
 - b) Neutral shall be full capacity.
 - c) Switchgear bus shall be full capacity (1600 amp) to all sections.
 - d) A 24 volt D.C. panel and switchgear display light shall be provided in the event of a total power failure.
 - e) Lifting angles shall be provided running the full length of the switchgear and bolted on the top.
- q. A remote annunciator panel, powered from the batteries, shall be provided. The annunciator panel shall indicate alarm conditions of the emergency generator set as follows:
- 1) Individual Visual Lights shall indicate:
 - a) Emergency generator operating to supply power to load.
 - b) Battery Charger malfunctioning:
 - (1) Low battery voltage.
 - 2) Individual Visual Lights plus common alarm shall indicate:
 - a) Low oil pressure.
 - b) Low water temperature.
 - c) High water temperature.
 - d) Overcrank (failure to start).
 - e) Overspeed.
 - f) Low fuel supply.
 - 3) Lamp Test Switch.

r. Remote Radiator

A remote radiator, of the quiet type, shall be provided as follows:

- 1) Welded and bolted steel frame suitable for 100 mph wind load.
 - 2) Plenum Chamber.
 - 3) Fan Ring.
 - 4) Lifting Lugs.
 - 5) Core Guard.
 - 6) OSHA Fan Guard and fan drive supported from channels integral with frame.
 - 7) Horizontal core for vertical air discharge with copper plat fins solder bonded to flat brass tubes.
 - 8) Removable manifold tanks to permit access to tube ends for inspection and cleaning.
 - 9) Thermal expansion and contraction differential provision between core and frame supports.
 - 10) Core shall be pitched and have drainage connections to permit complete drainage of unit.
 - 11) Fan shall be fixed center, airfoil type, belt driven by totally enclosed fan cooled motor, 480 volt, 3 phase. Fan shall have a maximum tip speed of 11,000 feet per minute.
 - 12) Radiator shall be equipped with a surge tank.
 - 13) Radiator shall be stainless flexible connections for all piping connections.
 - 14) Radiator shall be provided with spring type vibration isolators.
 - 15) Radiator shall be sized to provide adequate engine cooling when the ambient temperature is 105° F and with the radiator located approximately 8 feet above the engine-generator set.
 - 16) Radiator shall be provided with a water temperature sensing thermostat to control and cycle the fan motor starter.
- s. Remote indicating lamp, alarm horn and silencing switch to indicate when the engine-generator set is running.

3. Torsional Analysis

It shall be certified that a mathematical torsional analysis has been made of a like combination of engine and alternator to insure that excessive torsional stresses do not exist in the system.

4. Testing

The engine and generator set shall be tested as follows:

a. Factory or Point of Assembly Test

- 1) The engine-generator set may be tested as a combined unit to at least 965 kW at 80% power factor under the time constraints as hereinafter specified.
- 2) The engine-generator set may be tested as a combined unit to at least 965 kW at unity power factor 100% load provided that the manufacturer of the generator certifies, in writing, that the generator being furnished has been tested, at the manufacturer's plant, to at least 965 kW at 80% power factor.
- 3) Testing shall be conducted under the following loading and time constraints:

 50% load – 4 hours

 60% load – 2 hours

 70% load – 2 hours

 80% load – 2 hours

 90% load – 2 hours

 100% load – 12 hours

- 4) The vendor shall supply all fuel and loading equipment.
- 5) Factory testing shall be witnessed by a representative of UIHC.

b. On-Site Testing

- 1) The assembled equipment, including control panel and switch-gear, etc. shall be tested in its final installed location to insure the proper operation of the individual components, subassemblies, and the complete assemblies, and to eliminate any electrical and mechanical defects.
- 2) The engine-generator set shall have been connected to its final radiator, exhaust, fuel and electrical systems.
- 3) Load equipment and connecting cables shall be provided by the vendor with the load connected through the main circuit breaker. Load as specified in 4.A-2.

- 4) Testing time constraints: 50% load 2 hours, 100% load 6 hours.
 - 5) Fuel required for the onsite test shall be furnished by UIHC.
 - 6) Test shall be witnessed by a representative of UIHC.
- c. General to both Factory and On-Site Testing
- 1) The following engine parameters shall be read and recorded at 15-minute intervals throughout the test:
 - a) Engine oil pressure.
 - b) Engine oil temperature.
 - c) Engine exhaust temperature at exhaust manifold.
 - d) Jacket water temperature in and out.
 - e) Engine rpm – maintain a constant 1200 rpm or 1800 rpm.
 - f) Fuel pressure.
 - g) Fuel consumption – gallons per hour.
 - h) Ambient air temperature.
 - 2) The following checks shall be included:
 - a) Functioning of the high temperature coolant circuit safety device by restricting cooling system capability.
 - b) Overspeed Shutdown Device. Record speed at which overspeed trip operates; must be set to operate at no more than 10% overspeed condition.

5. Diesel Engine Generator Set Capacity

The ratings of the engine generator set shall be not less than the following:

a. Engine:

- 1) Speed..... 1200 rpm or 1800 rpm.
- 2) Type 2 stroke or 4 stroke.
- 3) Fuel #2 Diesel.

b. Alternator:

- 1) Output – 480/277 volts wye, 3 phase, 4 wire, 60 Hz, not less than 965 kW @ 80% power factor load
- 2) Voltage Regulation – 1%

6. Shop Drawings

Shop drawings on the engine-generator set shall be submitted for examination within thirty (30) days after award of contract. Shop drawings shall include assembly drawings, equipment specifications, wiring diagrams, piping diagrams, foundation and installation data, and individual component drawings and data for such items as muffler, batteries, battery charger, radiator, water pump, etc. NOTE: The size of the muffler and exhaust pipe required to keep the back pressure within the manufacturer's operating limits shall be submitted at the time of bidding.

7. Start-Up and Instructions

Upon completion of the installation of the set, a factory representative shall perform the following: (Cost of such services shall be included with the proposal cost for the equipment.)

- a. Inspect the installation to be sure that all components are properly installed and connected.
- b. Start-up and test all components of the set for proper operation. Prior to acceptance of the equipment, the equipment shall be tested to show it is free of defects, will start automatically and be subjected to full-load tests.
- c. All tests shall be conducted at a time acceptable to the hospital and shall be conducted with one or more of the UIHC representatives present as well as representatives of the installing contractor.
- d. Perform all performance adjustments as recommended by the manufacturer including, but not limited to, valve adjustment, head bolt torquing, generator-engine alignment, engine crankcase deflection, exhaust back pressure, and adjust oil pressure.
- e. Operating and maintenance instruction books shall be supplied to hospital representatives and procedures explained to the operating personnel.

Appendix I

UIHC Standard Fire Alarm Specification and Wiring Details

Addressable Fire Alarm System Installation

All Fire Alarm installations will be per NFPA 70, 72, and other applicable codes.

Fire Alarm wiring will be a Class A style (Mapnet devices and Speaker/Strobe circuits).

Main conduit loops are to be at a minimum recommended spacing of 4 feet. When conduit and conductors are routed vertically, a spacing of at least 1 foot is recommended. All conduits are marked every 10 foot with red paint. Smoke detectors shall be no closer than **3'** from any air diffuser.

4-11/16" junction boxes shall be used for all main conduit runs. All Junction box covers shall be painted red. Mount boxes so they are accessible without removing lights, air diffusers, etc.

A **minimum** of a 6" wire loop will be in all junction boxes for future connections and additions.

All shield conductors will be taped with a **minimum** of Scotch® Super 33+™.

Record drawings will be given to UIHC Fire Safety a **minimum** of 48 hours before any testing will occur.

All wiring will metered for grounds prior to connection into the Fire Alarm System.

All conduit routes shall be planned for future expansion and coordinated with UIHC Fire Safety before starting project.

Main Mapnet conduit will be in a 1" conduit.

The main conduit will **always** contain the following color codes and wire sizes.

- 1) 1-Mapnet cable
- 2) 1-Speaker cable
- 3) 1-Annunciator cable
- 4) 1-Strobe circuit
- 5) 1-24 volt device power circuit

Mapnet cable shall be #18awg solid **Black** (-) and **White** (+) with twisted shield. Cable types listed below or equal approved cable by SimplexGrinnell.

Annunciator cable shall be #18awg solid **Black (-)** and **White (+)** and twisted shield with **Blue** tape around each end of the cable when made up in a junction box, cable types listed below or equal approved by SimplexGrinnell.

24 volt Device power and 24 volt annunciator power shall be #12awg solid THHN one **Black (-)** and one **Red (+)**. Wire size may be reduced to #14awg Solid THHN with approval of SimplexGrinnell.

Speaker Cable shall be #16awg solid **Red (+)** and **Black (-)** with twisted shield cable types listed below or approved by SimplexGrinnell.

Fire lights (strokes) shall be #12awg solid THHN, one **Yellow (+)** and one **Orange (-)**. Wire size may be reduced to #14awg solid THHN with approval of SimplexGrinnell.

Fire Phone Cable shall be #18awg **Black (-)** and **White (+)** with twisted shield, with **Brown** tape around each end of the cable when made up in a junction box, cable types listed below or equal approved by SimplexGrinnell.

Network Cable shall be #18awg solid **Black (-)** and **White (+)** and twisted shield, labeled network cable.

Audio cable shall be #16awg solid **Red (+)** and **Black (-)** with twisted shield, labeled audio cable.

Relay control wiring, Solenoids and Firing Head wiring shall be #14 awg solid THHN **Gray (-)** and **Brown (+)**.

Dampers or Doors: #12 THHN **Green, White, Black/Red/Blue***

*-Color **Black, Red, or Blue** are dependent on the breaker location in power panel. **This is 120 volt wiring and will not be in the same conduit as the 24 volt fire alarm wiring.**

Duct Detector Test Switch shall be #14awg THHN one **Purple** and one **Blue**,

The LED shall be a #14 one **Black (-)** and one **Red (+)**

Wire Manufacturer Note: Windy City Wire, General Cable, The Cable Company, Tappan Wire and Cable, or other approved manufacturer by UIHC Fire Safety.

Any Changes of these wiring standards shall have written approval of **both** Safety/Security and SimplexGrinnell.

Note: Mapnet an IDnet are installed the same way.

2/16/2009

Appendix J

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Appendix K

Architect/Engineer Compliance Disposition Form

APPENDIX K
UIHC Architectural & Engineering Design Standards
Architect/Engineer Compliance Disposition Form

Directions: This form contains a tabular listing of the design standards. It is incumbent on the Consultant to follow the standards where required, and get Owner approval for any areas where the standards are not to be followed. Fill in the table below indicating areas where the standards have not been followed. Be specific in explanations and when providing rationale. Owner approval is required for these items prior to inclusion in the drawings and specifications. Present this table to the Owner for approval of items.

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
Division 01		General Requirements				
	01 35 33	Infection Control				
	01 41 00	Regulatory Requirements				
	01 43 00	Quality Assurance				
	01 78 36	Warranties				
Division 02		Existing Conditions				
	02 42 00	Selective Demolition				
Division 03		Concrete				
	03 45 00	Plant Pre-Cast Architectural Concrete				
Division 05		Metals				
	05 50 00	Roof Tie-Off Anchors				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
Division 06		Wood and Plastics				
	06 10 00	Rough Carpentry				
	06 20 00	Finish Carpentry				
	06 60 00	Solid Surfaces				
Division 07		Thermal and Moisture Protection				
	07 13 52	Below Grade Waterproofing				
	07 26 00	Vapor Retarders				
	07 50 00	Roofing System				
	07 81 00	Fireproofing				
	07 84 00	Firestopping				
Division 08		Openings				
	08 12 00	Steel Door Frames				
	08 13 00	Hollow Metal Flush Doors				
	08 14 00	Flush Wood Doors				
	08 31 00	Fire Rated Access Doors				
	08 33 23	Rolling Fire Doors				
	08 51 13	Aluminum Windows				
	08 51 23	Vision Panels				
	08 71 00	Door Hardware				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	08 74 00	Access Control Hardware				
	08 80 00	Glass and Glazing				
Division 09		Finishes				
	09 22 16	Non-Load Bearing Partition Framing				
	09 29 00	Gypsum Wallboard				
	09 63 00	Masonry Flooring				
	09 65 16	Resilient Sheet Flooring				
	09 90 00	Painting and Coating				
	09 96 56	Epoxy Paint				
Division 10		Specialties				
	10 21 13	Toilet Compartments				
	10 21 23	Cubicles				
	10 22 00	Fire Rated Folding Partition				
	10 22 26	Operable Partitions				
	10 26 33	Kickplates				
	10 28 00	Toilet and Bath Accessories				
	10 51 00	Lockers				
	10 90 00	Miscellaneous Specialties				
Division 11		Equipment				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	11 28 13	Computers				
	11 47 00	Ice Machines				
	11 52 00	Audio-Visual Equipment				
	11 52 13	Projection Screens				
	11 70 00	Healthcare Equipment				
Division 12		Furnishings				
	12 30 00	Stainless Steel Casework / Storage Cabinets				
	12 35 53	Metal Casework Including Fume Hoods				
	12 36 23	Solid Surface Countertops				
Division 13		Special Construction				
	13 49 00	Radiation Protection				
Division 14		Conveying Equipment				
	14 21 00	Elevators				
	14 92 00	Pneumatic Tube Systems				
Division 21		Fire Suppression				
	21 05 00	Common Work Results for Fire Suppression				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	21 05 53	Identification for Fire Suppression Piping and Equipment				
	21 11 00	Facility Fire Suppression Water-Service Piping				
	21 11 19	Fire Department Connections				
	21 12 26	Fire Suppression Valve and Hose Cabinets				
	12 13 00	Fire Suppression Sprinkler Systems				
	21 13 13	Wet-Pipe Automatic Sprinkler Systems				
	21 13 19	PreAction (Dry) Sprinkler Systems				
	21 22 00	Clean-Agent Fire-Extinguishing Systems				
	21 30 00	Fire Pumps				
Division 22		Plumbing				
	22 05 00	Common Work Results for Plumbing				
	22 05 53	Identification for Plumbing Piping and Equipment				
	22 11 16	Domestic Water Piping				
	22 13 00	Facility Sanitary Sewerage				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	22 13 16	Sanitary Waste and Vent Piping				
	22 13 19	Sanitary Waste Piping Specialties				
	22 14 00	Facility Storm Drainage				
	22 14 13	Storm Sewer Piping Systems				
	22 14 23	Storm Drainage Piping Specialties				
	22 14 26	Facility Storm Drains				
	22 14 29	Sump Pumps				
	22 15 00	Non-Medical Gas Compressed Air Systems				
	22 30 00	Plumbing Equipment				
	22 31 16	Commercial Domestic Water Softeners				
	22 34 13	Instantaneous, Tankless, Gas Domestic Water Heaters				
	22 40 00	Plumbing Fixtures				
	22 60 00	Gas and Vacuum Systems for Laboratory and Healthcare Facilities				
	22 61 00	Compressed-Air Systems for Laboratory and Healthcare Facilities				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	22 62 00	Vacuum Systems for Laboratory and Healthcare Facilities				
	22 63 00	Gas Systems for Laboratory and Healthcare Facilities				
	22 66 00	Chemical-Waste Systems for Laboratory and Healthcare Facilities				
	22 67 00	Processed Water Systems for Laboratory and Healthcare Facilities				
Division 23		Heating, Ventilation, and Air-Conditioning (HVAC)				
	23 05 00	Common Work Results for HVAC				
	23 05 53	Identification for HVAC Piping and Equipment				
	23 05 93	Testing, Adjusting, and Balancing for HVAC				
	23 07 13	Duct Insulation				
	23 07 19	HVAC Piping Insulation				
	23 08 00	Commissioning of HVAC				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	23 09 00	Instrumentation and Controls for HVAC				
	23 11 00	Facility Fuel Piping				
	23 11 13	Facility Oil Systems				
	23 11 23	Facility Natural Gas Piping Systems				
	23 20 00	HVAC Piping and Pumps				
	23 21 00	Hydronic Piping and Pumps				
	23 21 14	Hydronic Specialties				
	23 21 23	Hydronic Pumps				
	23 22 00	Steam and Condensate Piping and Pumps				
	23 23 00	Refrigerant Piping Systems				
	23 25 00	HVAC Water Treatment Systems				
	23 30 00	HVAC Air Distribution				
	23 31 00	HVAC Ducts and Casings				
	23 31 13	Rigid Metal Duct Systems				
	23 32 00	Air Plenums				
	23 33 00	Air Duct Accessories				
	23 33 13	Dampers				
	23 33 46	Flexible Ducts				
	23 34 00	HVAC Fans				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	23 36 00	Air Terminal Units				
	23 37 00	Air Outlets and Inlets				
	23 37 13	Diffusers, Registers and Grilles				
	23 38 16	Fume Hood Exhaust Fans				
	23 70 00	Central HVAC Equipment				
	23 83 16	Radiant Heating				
Division 26		Electrical				
	26 05 00	Common Work Results for Electrical				
	26 05 13	Medium-Voltage Cables (Wire)				
	26 05 26	Grounding and Bonding for Electrical Systems				
	26 05 33	Raceway and Boxes for Electrical Systems				
	26 05 36	Cable Trays for Electrical Systems				
	26 10 00	Medium Voltage Electrical Distribution				
	26 20 00	Low-Voltage Electrical Transmission				
	26 22 00	Low-Voltage Transformers				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	26 24 00	Switchboards and Panelboards				
	26 24 13	Switchboards				
	26 24 16	Panelboards				
	26 24 19	Motor-Control Centers				
	26 27 00	Electrical Distribution Equipment				
	26 27 26	Wiring Devices				
	26 28 00	Low-Voltage Circuit Protective Devices				
	26 28 13	Fuses				
	26 28 16	Enclosed Switches and Circuit Breakers				
	26 41 00	Facility Lightning Protection				
	26 50 00	Lighting				
	26 51 00	Interior Lighting				
	26 60 00	Emergency Power				
Division 27		Communications				
	27 05 00	Common Work Results for Communications				
	27 11 00	Communications Equipment Room Fittings				
	27 15 00	Communications Horizontal Cabling				
	27 20 00	Data Communications				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
	27 30 00	Voice Communications				
	27 41 00	Audio-Video Systems				
	27 50 00	Distributed Communications and Monitoring Systems				
	27 51 13	Music and Overhead Paging				
	27 51 32	Televisions				
	27 52 00	Healthcare Communications and Monitoring Systems				
	27 52 23	Nurse Call				
	27 53 13	Clock Control Systems				
Division 28		Electronic Safety and Security				
	28 05 00	Common Work Results for Electronic Safety and Security				
	28 13 00	Access Control System				
	28 20 00	Electronic Surveillance				
	28 23 00	Video Surveillance				
	28 31 00	Fire Detection and Alarm				
Division 32		Exterior Improvements				
	32 80 00	Irrigation Systems				

Division	Section	Description	Standard Followed? Yes, No, N/A	Rationale (Why was standard not followed? Why was exception taken? Proposed substitution?)	Owner Approval Yes/No	Owner Approval Date
Division 41		Material Processing & Holding Equipment				
	42 22 23	Hoists				

Appendix L

Typical Door Hardware and Rough-In Drawings by Security Level

APPENDIX L**MATRIX OF RESPONSIBILITY – Typical Door Hardware/Security Installations**

The following matrix defines the responsibility of what contractor will perform the required work:

Definition of Responsibility:

- O Owner
- GC General Contractor
- EC Electrical Contractor
- SIC Security Integration contractor
- LV Low Voltage Contractor – Division 27

Device Ref	Description of Device	Provided By	Pathway, Rough In	Install By	Startup	Cabling
DSM	Door Status Monitor	SIC	EC	SIC	SIC	SIC
PIR/ALM	PIR Detector w/Audible Alarm	SIC	EC	SIC	SIC	SIC
RELAY	Door Hold Open Relay	SIC	EC	SIC	SIC	SIC
RDR	HID Proximity Reader	SIC	EC	SIC	SIC	SIC
PTE	Push To Exit Device	SIC	EC	SIC	SIC	SIC
PANEL	Software House Control Panels	SIC	EC	SIC	SIC	SIC
CAM	CCTV Cameras – Analog	SIC	EC	SIC	SIC	SIC
CAM	CCTV Cameras – IP	SIC	EC	SIC	SIC	LV
KEY	Key Override (Mag Lock)	SIC	EC	SIC	SIC	SIC
MON	Monitor Point	SIC	EC	SIC	SIC	SIC
STRIKE	Door Strike	GC	EC	GC	GC/SIC	SIC
MAGLOCK	Door Magnetic Lock	GC	EC	GC	GC/SIC	SIC
OPER	Door Auto Operator	GC	EC	GC	GC	EC
ELEC HW	Electrified Door Hardware	GC	EC	GC	GC	GC
PHONE	Door Phone – Level 4	O	EC	O	O	LV
PH	Wall Phone	O	EC	O	O	LV

	D	E	F	G	H	I	J	K	L
3	TYPICAL DOOR HARDWARE	23-May-11							
4	Door Level	Lock	DSM	Closer	ALM	Strike	Card Reader	Biometric Reader	Panic Bar
5	Level 1 - One Door	Sargent 8204	GRI 8080	LCN 4041XP	System Sensor MHW				
6	Level 2 - One Door/Strike	Sargent 8204	GRI 8080	LCN 4041XP	System Sensor MHW	HES 1006 w/Smart Pak			
7	Level 3 - One Door/Strike	Sargent 8204	GRI 8080	LCN 4041XP	System Sensor MHW	HES 1006 w/Smart Pak	HID 6125CGN0000		
8	Optional w/ Panic Hardware	Sargent 8204	GRI 8080	LCN 4041XP	System Sensor MHW	HES 1006 w/Smart Pak	HID 6125CGN0000		Von Duprin CX9975
9	Optional On Call Room	Sargent 8250	GRI 8080	LCN 4041XP	System Sensor MHW	HES 1006 w/Smart Pak and faceplate HM	HID 6125CGN0000		
10	Level 4 - One Door/Strike	Sargent 8204	GRI 8080	LCN 4041XP	System Sensor MHW	HES 1006 w/Smart Pak	HID 6125CGN0000		
12	Level 2 - One Door/Mag Lock	Sargent 8237	GRI 8080	LCN 4041XP	System Sensor MHW				
13	Level 3 - One Door/Mag Lock	Sargent 8237	GRI 8080	LCN 4041XP	System Sensor MHW		HID 6125CGN0000		
14	Level 4 - One Door/Mag Lock	Sargent 8237	GRI 8080	LCN 4041XP	System Sensor MHW		HID 6125CGN0000		
16	Level 1 - Two Door		(2)GRI 8080	LCN 4041XP	System Sensor MHW				(2)Von Duprin CX9947
17	Level 2 - Two Door/Elec Panic		(2)GRI 8080	LCN 4041XP	System Sensor MHW				(2)Von Duprin EL9447
18	Level 3 - Two Door/Elec Panic		(2)GRI 8080	LCN 4041XP	System Sensor MHW		HID 6125CGN0000		(2)Von Duprin EL9447
19	Level 4 - Two Door/Elec Panic		(2)GRI 8080	LCN 4041XP	System Sensor MHW		HID 6125CGN0000		(2)Von Duprin EL9447
21	Level 2 - Two Door/Mag Lock		(2)GRI 8080	(2)LCN 4041XP	System Sensor MHW				(2)Von Duprin EL9447
22	Level 3 - Two Door/Mag Lock		(2)GRI 8080	(2)LCN 4041XP	System Sensor MHW		HID 6125CGN0000		(2)Von Duprin EL9447
23	Level 4- Two Door/Mag Lock		(2)GRI 8080	(2)LCN 4041XP	System Sensor MHW		HID 6125CGN0000		(2)Von Duprin EL9447
25	Level 3D - Two Door Institutional/Mag Lock		(2)GRI 8080	(2)LCN 4041XP			(2)HID 6125CGN0000		
26	Level 3D - Two Door Institutional/Elec Panic		(2)GRI 8080	(2)LCN 4041XP			(2)HID 6125CGN0000		(2)Von Duprin EL9447
27									
28	Level 4D - Two Door Institutional/Mag Lock		(2)GRI 8080	(2)LCN 4041XP			(2)HID 6125CGN0000		
29	Level 4D - Two Door Institutional/Elec Panic		(2)GRI 8080	(2)LCN 4041XP			(2)HID 6125CGN0000		(2)Von Duprin EL9447
31	Single or Double Operator Door					HES 1006 w/Smart Pak			
33	Level P1 - Pharmacy Door		GRI 8080		System Sensor MHW				
34	Level P3 - Pharmacy Door/Prox Reader		GRI 8080		System Sensor MHW		HID 6125CGN0000		
35	Level P3 - Pharmacy Door/Biometric Reader		GRI 8080		System Sensor MHW			Biometric Reader	

	D	M	N	O	P	Q	R	S	T
3	TYPICAL DOOR HARDWARE								
4	Door Level	Camera	Phone	Key Switch	Mag Lock	PTE	EPT	EP	Door Operator
5	Level 1 - One Door								
6	Level 2 - One Door/Strike								
7	Level 3 - One Door/Strike								
8	Optional w/ Panic Hardware								
9	Optional On Call Room								
10	Level 4 - One Door/Strike	Bosche LTC 0455	Supplied by UIHC Telecom						
12	Level 2 - One Door/Mag Lock			Schlage 653-0404-L2	Locknetics Mag Lock 490P	ASP-2-2			
13	Level 3 - One Door/Mag Lock			Schlage 653-0404-L2	Locknetics Mag Lock 490P	ASP-2-2			
14	Level 4 - One Door/Mag Lock	Bosche LTC 0455	Supplied by UIHC Telecom	Schlage 653-0404-L2	Locknetics Mag Lock 490P	ASP-2-2			
16	Level 1 - Two Door								
17	Level 2 - Two Door/Elec Panic						(2)EPT 10	Von Duprin PS914	
18	Level 3 - Two Door/Elec Panic						(2)EPT 10	Von Duprin PS914	
19	Level 4 - Two Door/Elec Panic	Bosche LTC 0455	Supplied by UIHC Telecom				(2)EPT 10	Von Duprin PS914	
21	Level 2 - Two Door/Mag Lock			Schlage 653-0404-L2	(2)Locknetics Mag Lock 490P	ASP-2-2			
22	Level 3 - Two Door/Mag Lock			Schlage 653-0404-L2	(2)Locknetics Mag Lock 490P	ASP-2-2			
23	Level 4- Two Door/Mag Lock	Bosche LTC 0455	Supplied by UIHC Telecom	Schlage 653-0404-L2	(2)Locknetics Mag Lock 490P	ASP-2-2			
25	Level 3D - Two Door Institutional/Mag Lock			(2)Schlage 653-0404-L2	(2)Locknetics Mag Lock 490P				
26	Level 3D - Two Door Institutional/Elec Panic						(2)EPT 10	Von Duprin PS914	
27									
28	Level 4D - Two Door Institutional/Mag Lock	(2) Bosche LTC 0455	(2) Supplied by UIHC Telecom	(2)Schlage 653-0404-L2	(2)Locknetics Mag Lock 490P				
29	Level 4D - Two Door Institutional/Elec Panic	(2) Bosche LTC 0455	(2) Supplied by UIHC Telecom				(2)EPT 10	Von Duprin PS914	
31	Single or Double Operator Door								Horton 4100
33	Level P1 - Pharmacy Door			Schlage 653-0404-L2					
34	Level P3 - Pharmacy Door/Prox Reader			Schlage 653-0404-L2					
35	Level P3 - Pharmacy Door/Biometric Reader			Schlage 653-0404-L2					

	D	U	V
3	TYPICAL DOOR HARDWARE		
4	Door Level	Push Button	NOTES
5	Level 1 - One Door		
6	Level 2 - One Door/Strike		
7	Level 3 - One Door/Strike		
8	Optional w/ Panic Hardware		
9	Optional On Call Room		
10	Level 4 - One Door/Strike		
11			
12	Level 2 - One Door/Mag Lock		
13	Level 3 - One Door/Mag Lock		
14	Level 4 - One Door/Mag Lock		
15			
16	Level 1 - Two Door		
17	Level 2 - Two Door/Elec Panic		
18	Level 3 - Two Door/Elec Panic		
19	Level 4 - Two Door/Elec Panic		
20			
21	Level 2 - Two Door/Mag Lock		
22	Level 3 - Two Door/Mag Lock		
23	Level 4 - Two Door/Mag Lock		
24			
25	Level 3D - Two Door Institutional/Mag Lock		
26	Level 3D - Two Door Institutional/Elec Panic		
27			
28	Level 4D - Two Door Institutional/Mag Lock		
29	Level 4D - Two Door Institutional/Elec Panic		
30			
31	Single or Double Operator Door	(2) Provided by Security Integrator	Push buttons must be unbranded
32			
33	Level P1 - Pharmacy Door		Door will be monitored and alarmed by Software House system if forced or held open
34	Level P3 - Pharmacy Door/Prox Reader		Door will be monitored and alarmed by Software House system if forced or held open
35	Level P3 - Pharmacy Door/Biometric Reader		Door will be monitored and alarmed by Software House system if forced or held open

Drawing Number

1.1

1.2

1.3

1.4

1.5

1.6

1.7

1.8

1.9

1.10

1.11

1.12

1.13

1.14

1.15

1.16

1.17

1.18

1.19

1.20

1.21

1.22

1.23

1.24

Drawing Description

Drawing Index

Single Doors

Single Door - Level 1

Single Door - Level 2 - Strike

Single Door - Level 3 - Strike

Single Door - Level 4 - Strike

Single Door - Level 2 - Mag Lock

Single Door - Level 3 - Mag Lock

Single Door - Level 4 - Mag Lock

Double Doors

Double Door - Level 1

Double Door - Level 2 - Electrified Panics

Double Door - Level 3 - Electrified Panics

Double Door - Level 4 - Electrified Panics

Double Door - Level 2 - Mag Lock

Double Door - Level 3 - Mag Lock

Double Door - Level 4 - Mag Lock

Double Door - Level 3D - Institution Application

Double Door - Level 4D - Institution Application

Control Panel Layout

Option – Single or Double Operator Door

Software House iStar 16 Reader Access Panel

Software House iStar 2 Reader Edge Access Panel

Drawing Description - Pharmacy Systems

Pharmacy Single Door – Level P1

Pharmacy Single Door – Level P3 – Prox / Strike

Pharmacy Single Door – Level P3 – Bio / Strike

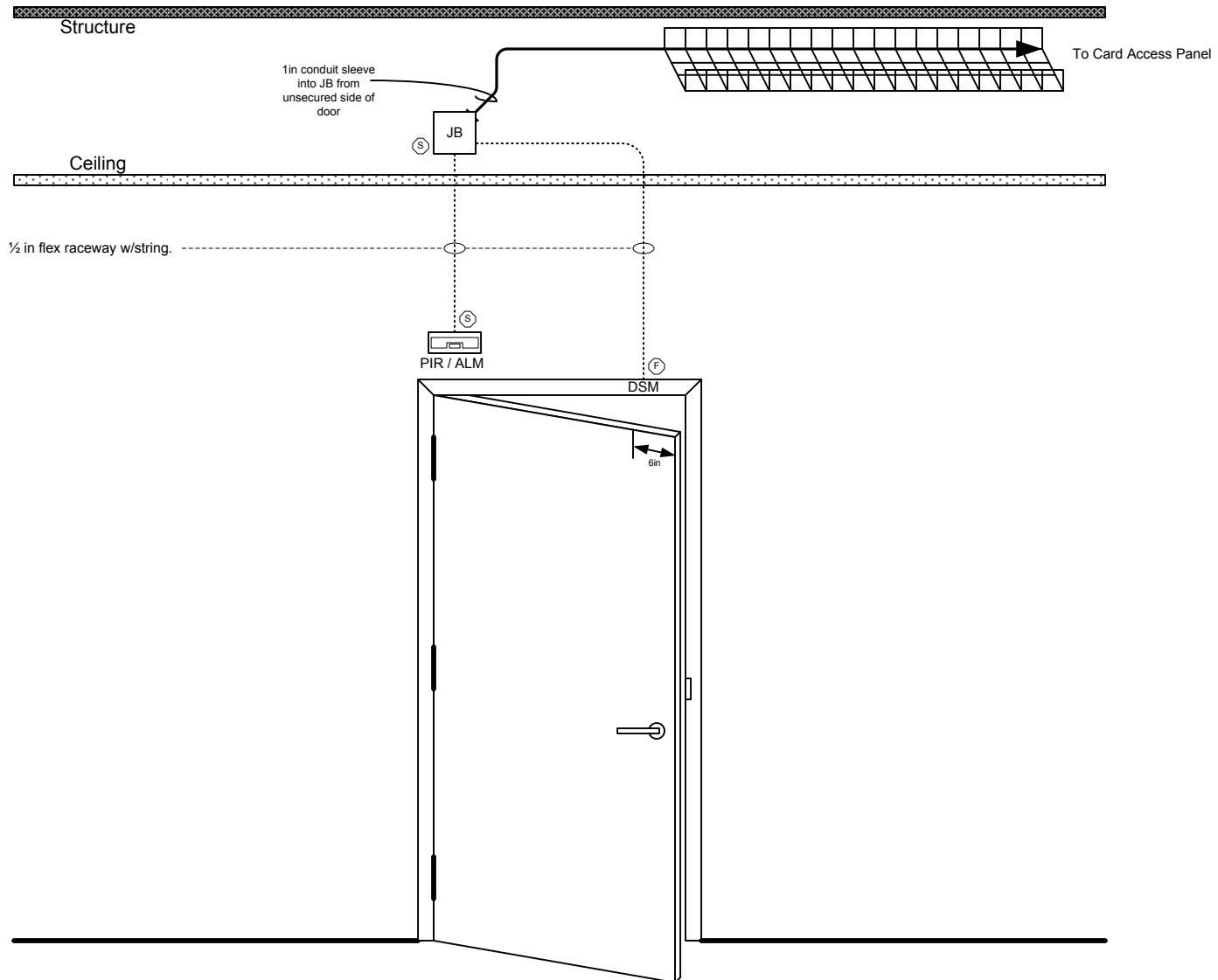
Pharmacy iStar Edge Panel Installation

Job Number					
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242				
Project Documents	Scale None Serial Number Drawn By CV Date: 4/27/2011				
UIHC Card Access Detail Index					
Drawing Type	Drawing Number Card Access Details				
	1.1				

SINGLE DOOR - LEVEL 1

November 1, 2016

Typical Applications : Monitored Door, Exit Door



Device Rough In Requirements

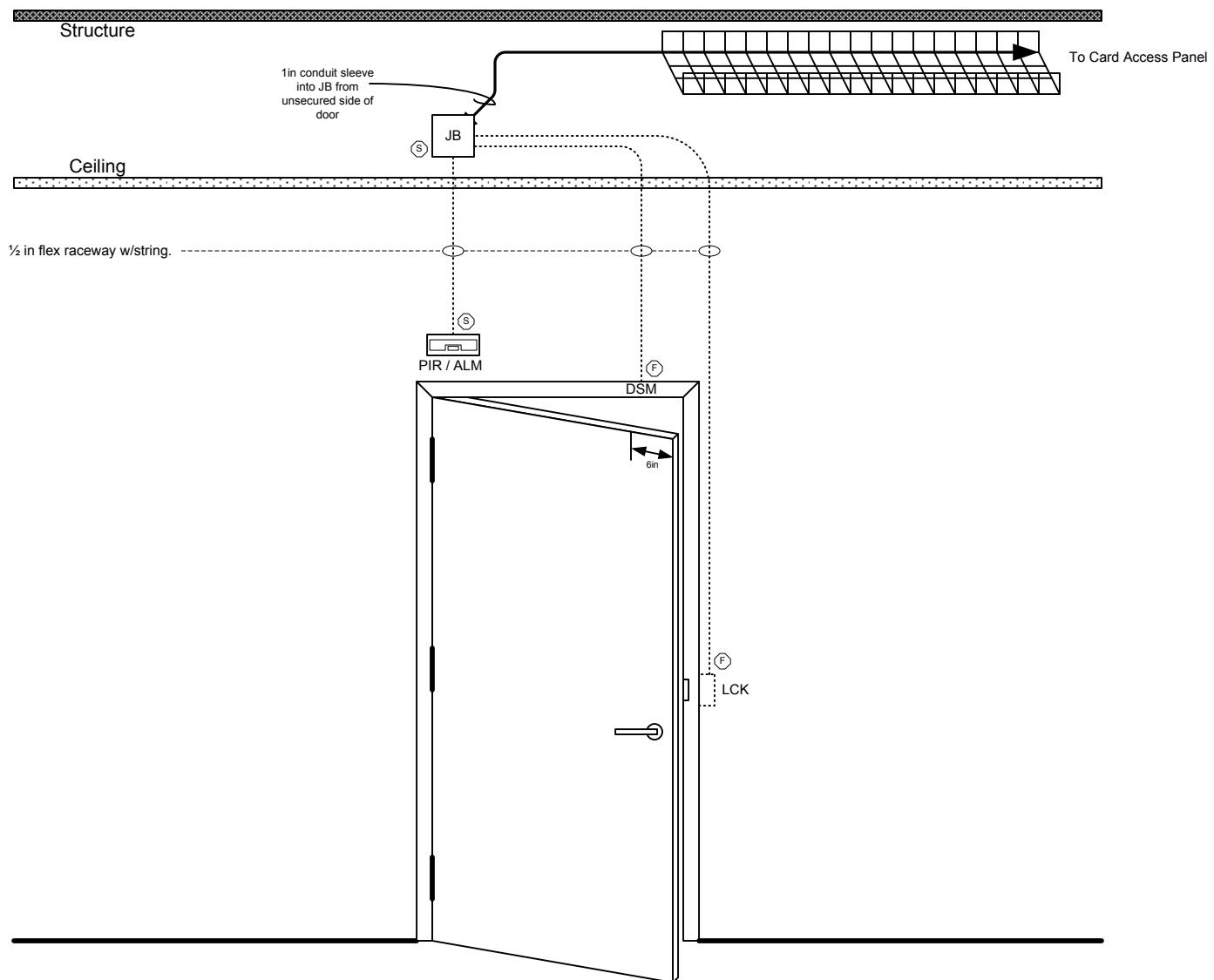
Device	Description	Opening
JB	4sq Junction Box on secure side of door. 1/2 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	1/2 flex raceway from J-Box into the wall down to a 1/2 in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Single Door - Level 1				
Drawing Type	Drawing Number			
Card Access Details		1.2		

SINGLE DOOR - LEVEL 2 - STRIKE

November 1, 2016

Typical Application : Remote Unlock / Schedule Door



Device Rough In Requirements

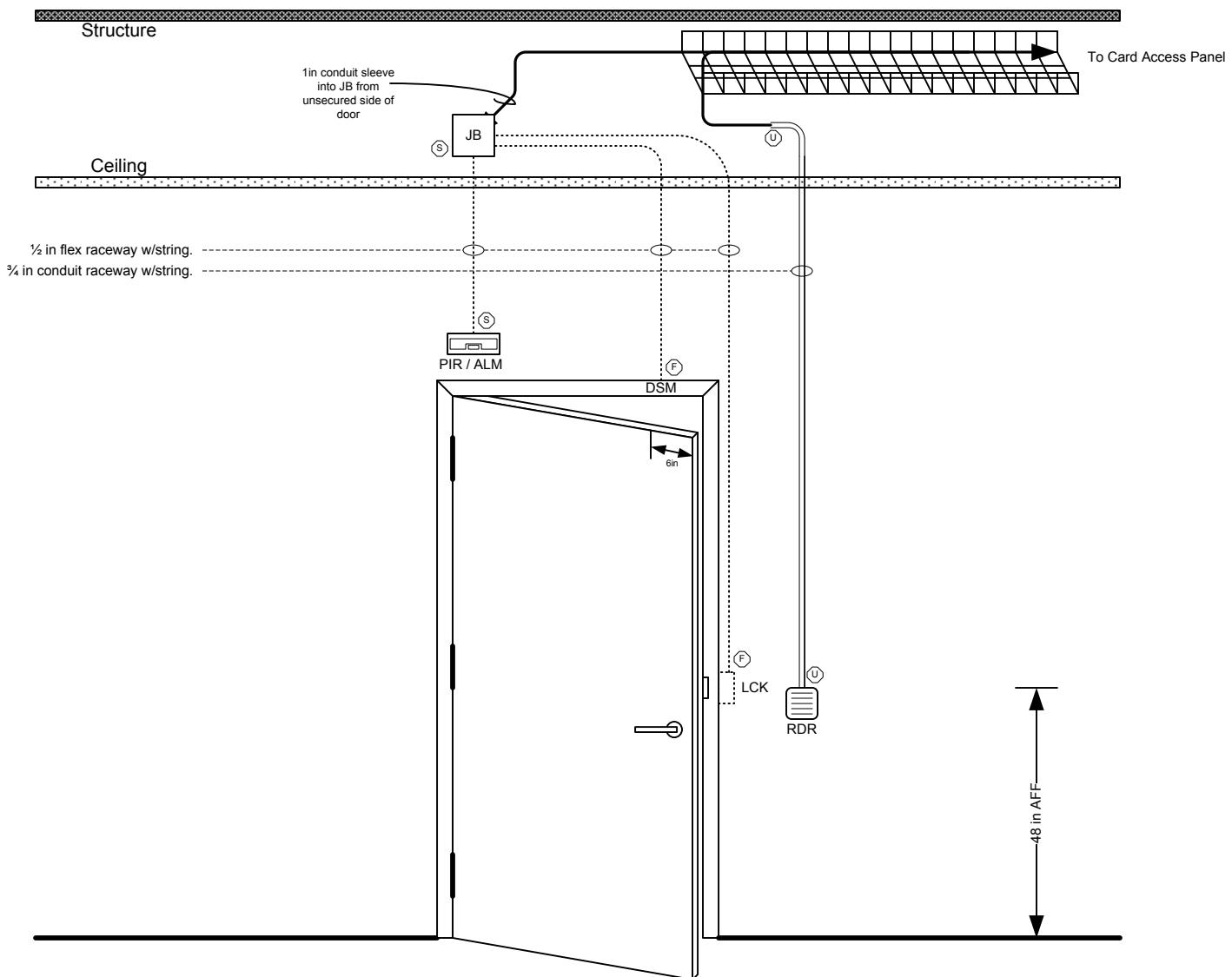
Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{1}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{4}$ flex raceway from J-Box into the wall down to a $\frac{3}{8}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{4}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G maul ring horizontal.	(S) Secured Side
LCK	$\frac{1}{4}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame

Job Number				
Revisions	UI Hospitals & Clinics			
Project Documents	Safety & Security Card Access Standards Iowa City Iowa 52242			
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Single Door - Level 2 - Strike				
Drawing Type	Drawing Number			
Card Access Details				1.3

SINGLE DOOR - LEVEL 3 - STRIKE

November 1, 2016

Typical Application : Telecom Room, Department Access, Med Rooms



Device Rough In Requirements

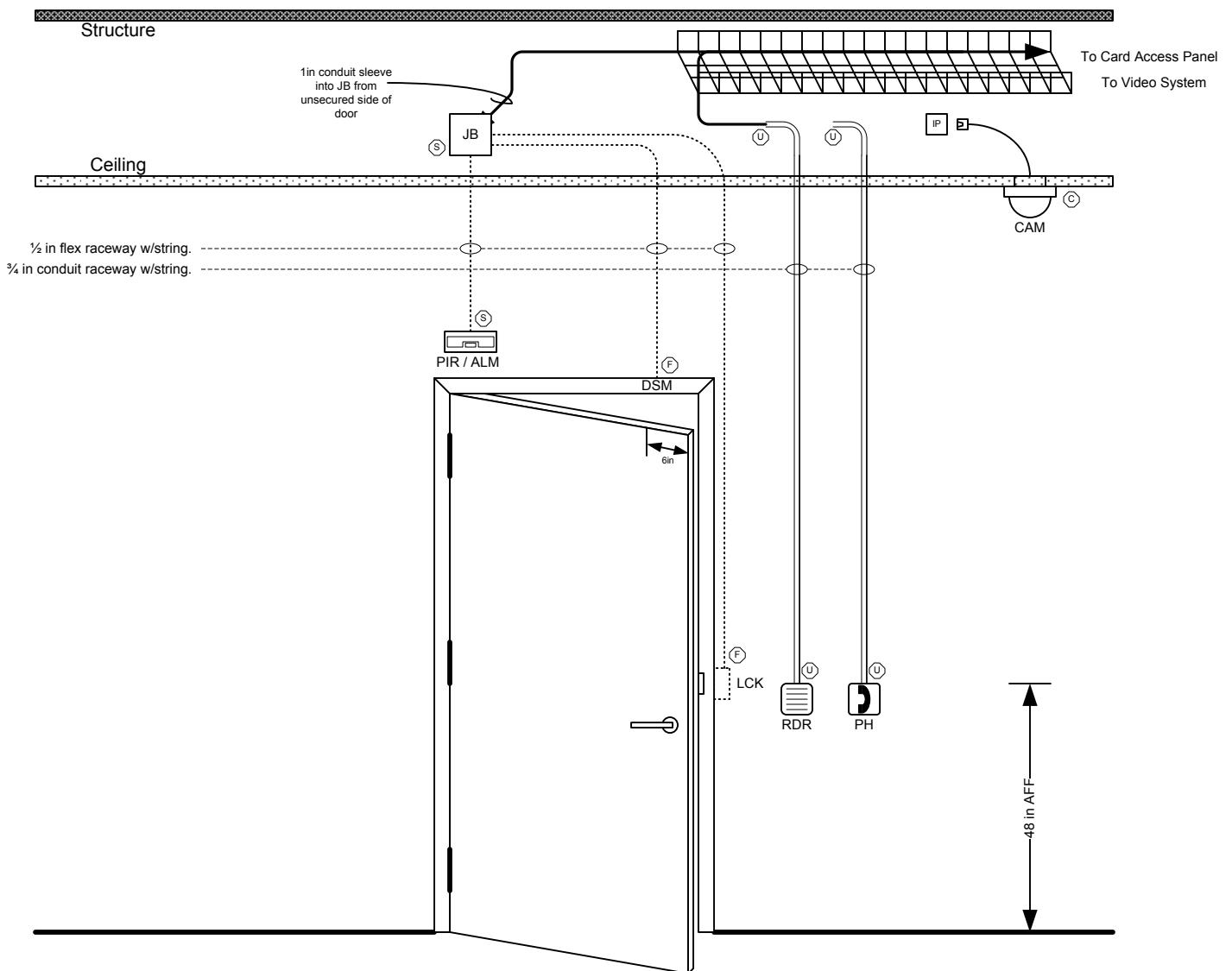
Device	Description	Opening
JB	4sq Junction Box on secure side of door. 3/4 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	1/2 flex raceway from J-Box into the wall down to a 3/4 in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	1/2 flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	3/4 conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Job Number				
Revisions	UI Hospitals & Clinics			
Project Documents	Safety & Security Card Access Standards Iowa City Iowa 52242			
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Single Door - Level 3 - Strike				
Drawing Type	Drawing Number			
Card Access Details				1.4

SINGLE DOOR - LEVEL 4 - STRIKE

November 1, 2016

Typical Application : Designated Exterior Access Doors, Restricted Access Doors



Device Rough In Requirements

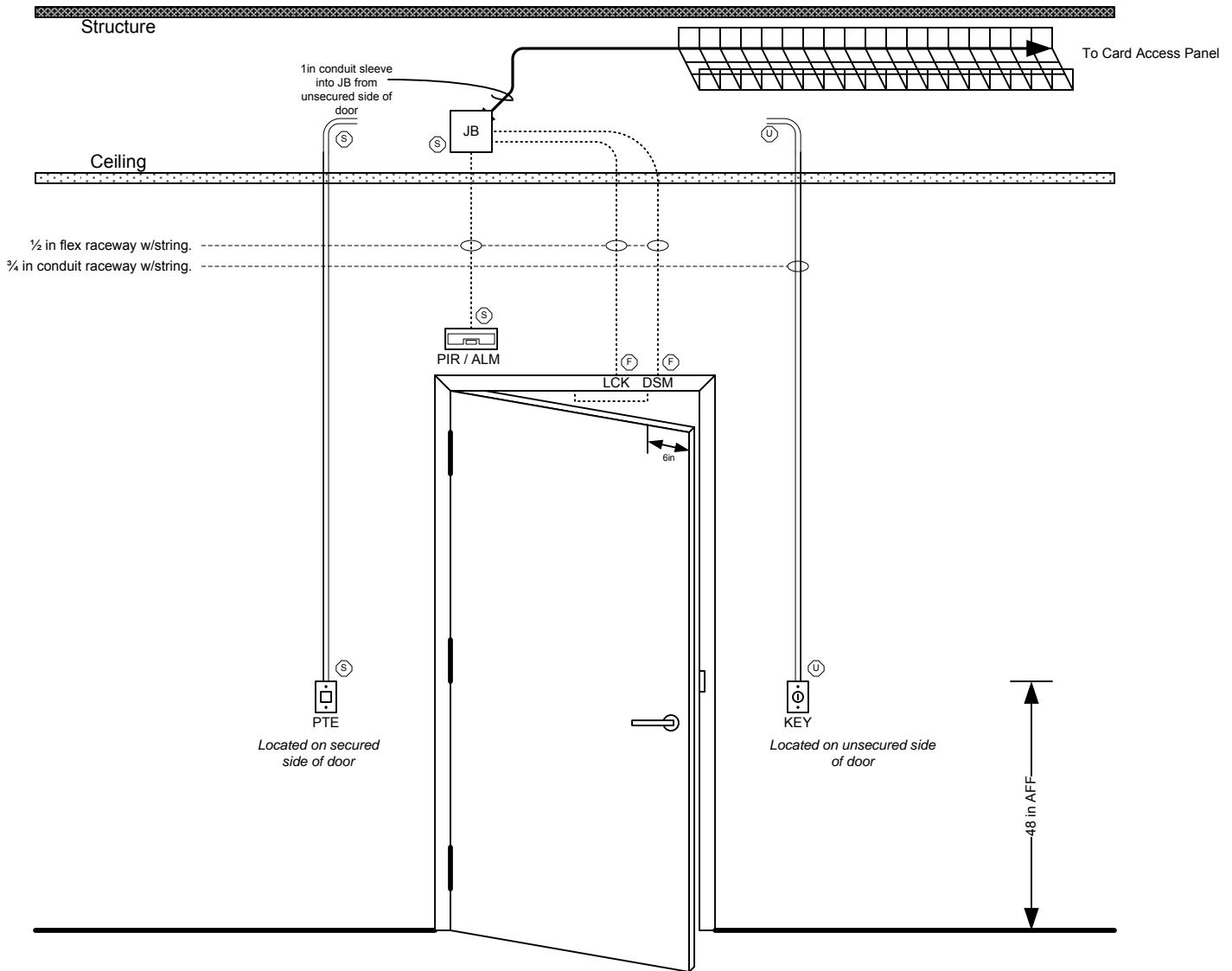
Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{2}$ flex raceway from J-Box into the wall down to a $\frac{3}{4}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
CAM	Accessible location near cable tray, no rough-in is required. In an inaccessible ceiling location or exterior location, provide a 4sq box at location with a $\frac{3}{4}$ in raceway to cable tray. Coordinate the inaccessible locations with the SSC	(C) Ceiling
PH	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the PH location. Provide 4sq box in wall with 1G mud ring vertical. Owner furnished phone. Owner Installed Phone	(U) Ceiling

Job Number					
Revisions	UI Hospitals & Clinics				
Project Documents	Safety & Security Card Access Standards Iowa City Iowa 52242				
	Scale	None	Serial Number	Drawn By	CV
	Date:	4/27/2011			
	Single Door - Level 4 - Strike				
Drawing Type	Card Access Details			Drawing Number 1.5	

SINGLE DOOR - LEVEL 2 - MAG

November 1, 2016

Typical Application : Remote Unlock / Schedule Door



Device Rough In Requirements

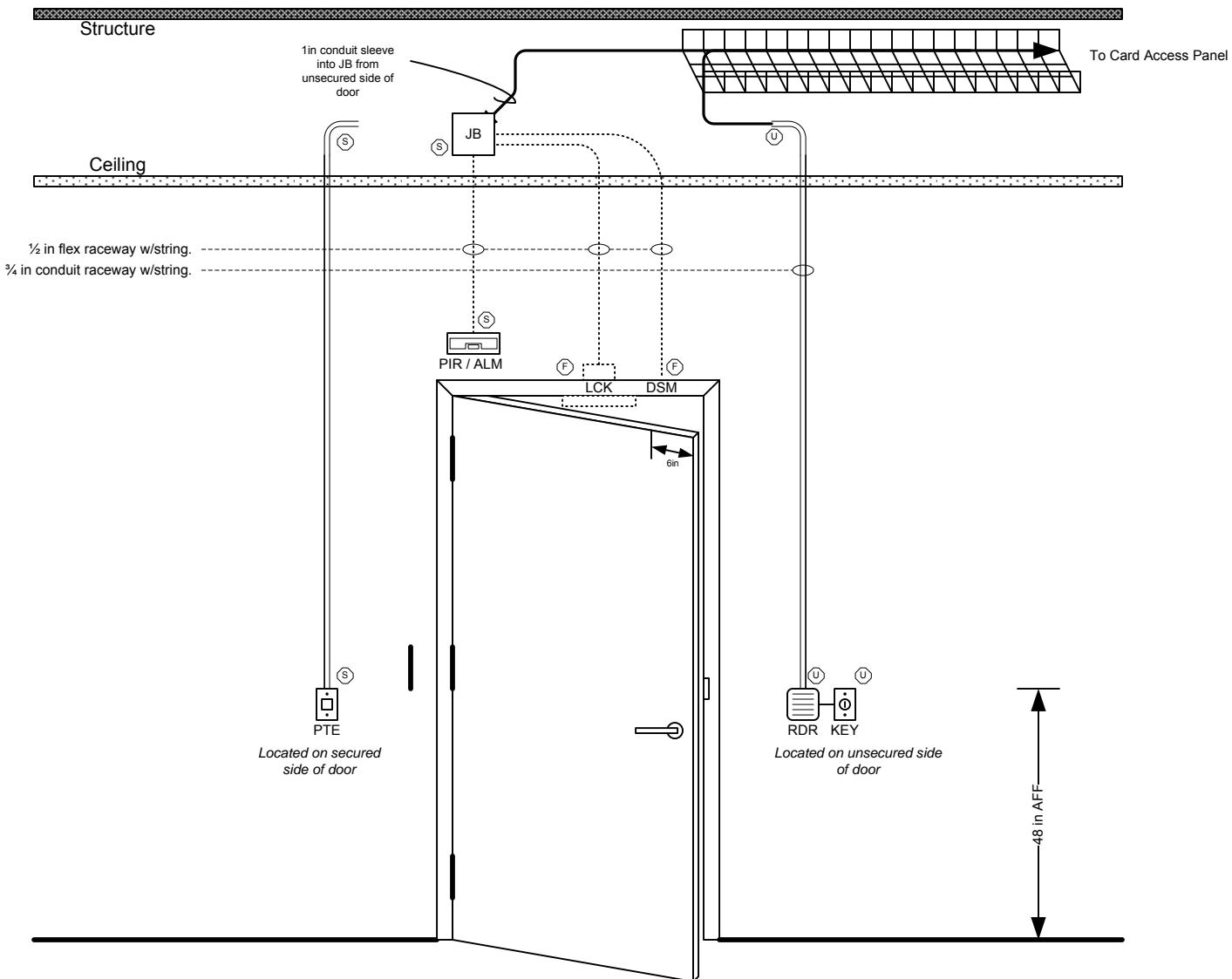
Device	Description	Opening
JB	4sq Junction Box on secure side of door. 3/4 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	1/2 flex raceway from J-Box into the wall down to a 1/2 in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	1/2 flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
KEY	3/4 conduit raceway from KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	3/4 conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side

Job Number				
	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Revisions				
	Project Documents	None	Serial Number	Drawn By
Date:	4/27/2011			CV
Single Door - Level 2 - Mag				
Drawing Type	Drawing Number			
Card Access Details	1.6			

SINGLE DOOR - LEVEL 3 - MAG

November 1, 2016

Typical applications : Stairwells (Fire Alarm Re-entry)

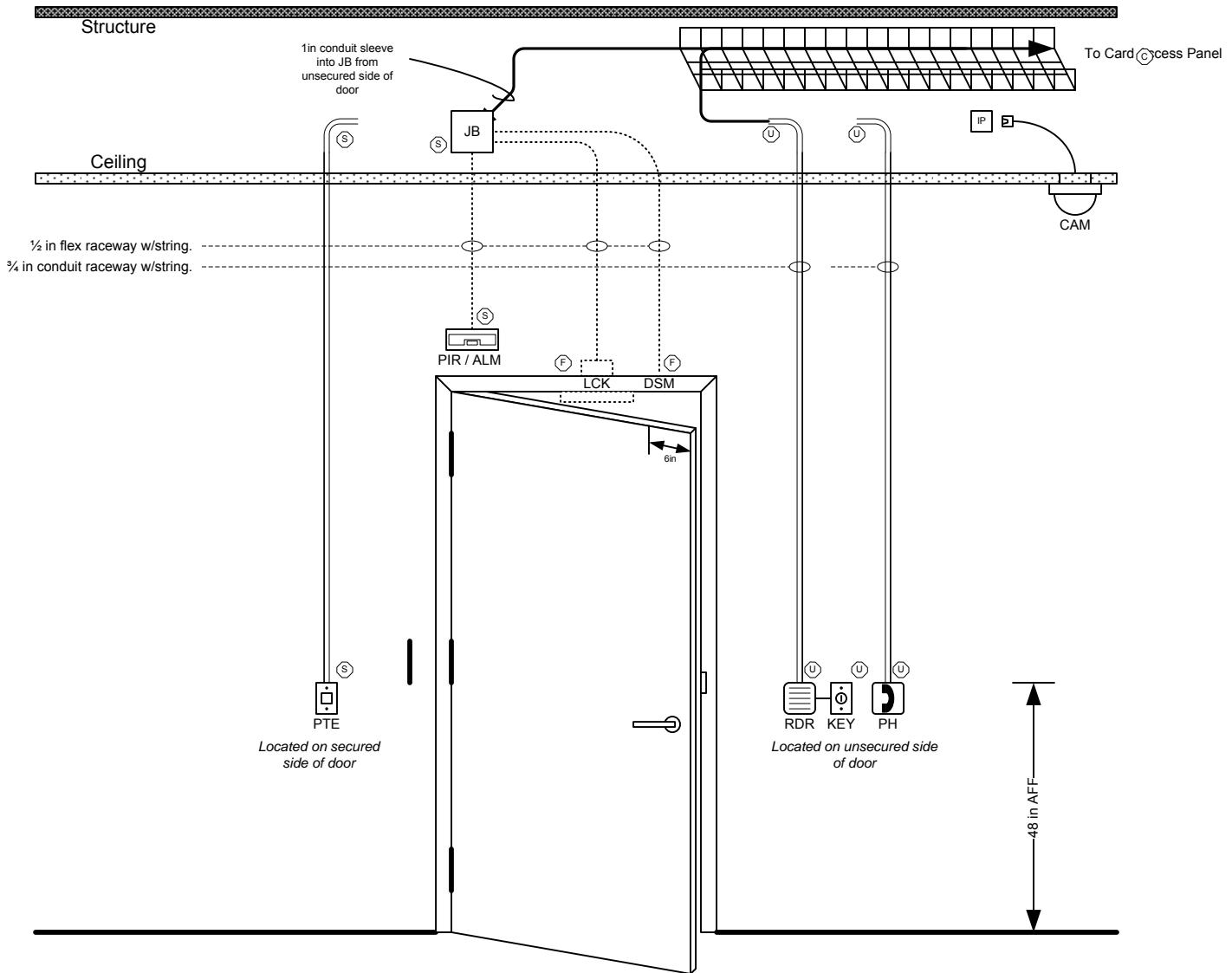


Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{2}$ flex raceway from J-Box into the wall down to a $\frac{1}{4}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
KEY	$\frac{3}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	$\frac{3}{4}$ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	Scale	None	Serial Number	Drawn By
	Date:	4/27/2011		CV
Single Door - Level 3 - Mag				
Drawing Type Card Access Details			Drawing Number 1.7	

Typical applications : Exterior Door (If not electric strike)



Device Rough In Requirements

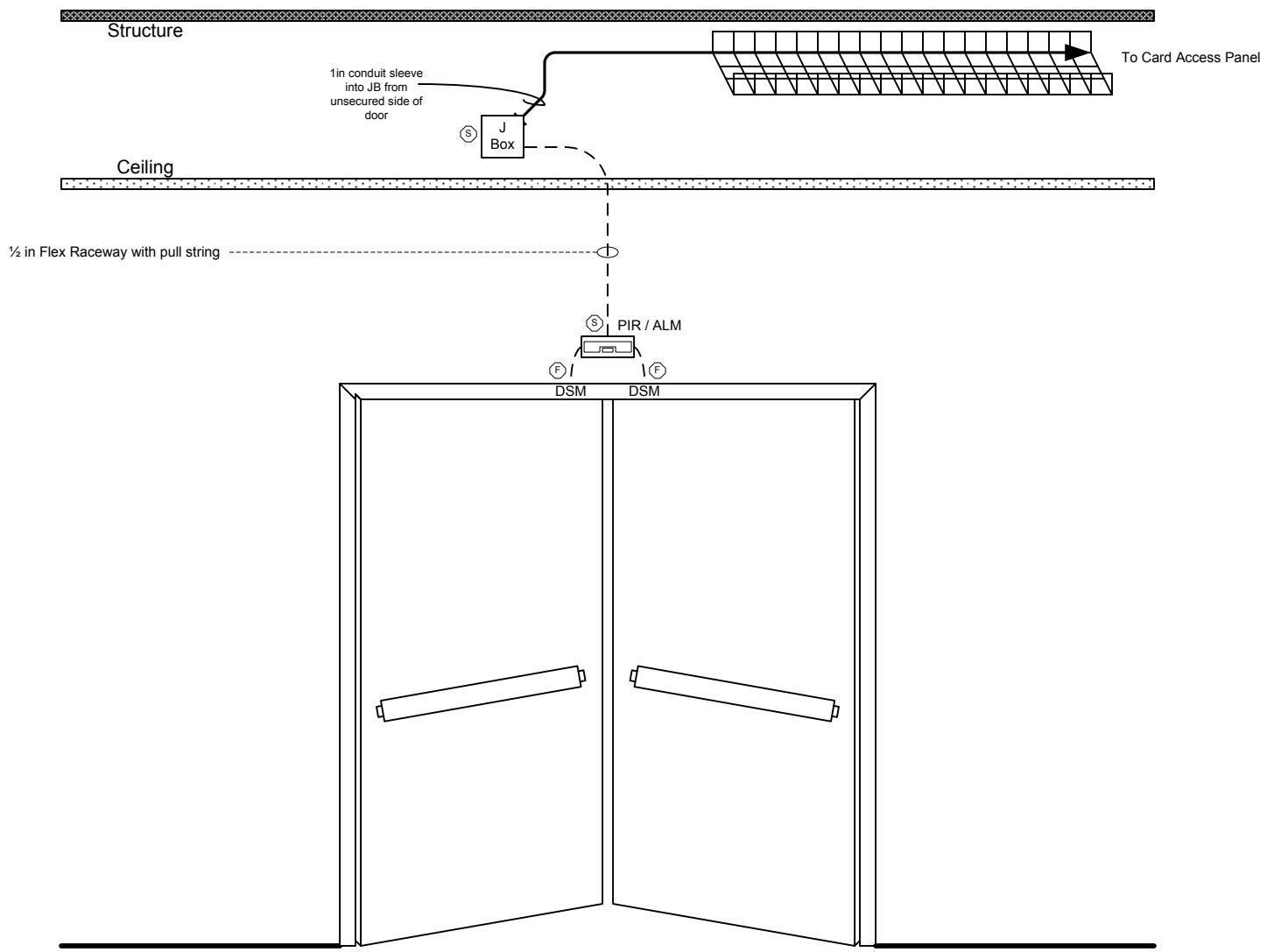
Device	Description	Opening
JB	4sq Junction Box on secure side of door. 3/4 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	1/2 flex raceway from J-Box into the wall down to a 3/4 in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	1/2 flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	3/4 conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
KEY	3/4 conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	3/4 conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side
CAM	Accessible location near cable tray, no rough-in is required. In a inaccessible ceiling location or exterior location, provide a 4sq box at location with a 3/4 in raceway to cable tray. Coordinate the inaccessible locations with the SSC	(C) Ceiling
PH	3/4 conduit raceway from un-secured ceiling into the wall down to the PH location. Provide 4sq box in wall with 1G mud ring vertical. Owner furnished phone. Owner Installed Phone	(U) Ceiling

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Single Door - Level 4 - Mag				
Drawing Type	Card Access Details			
	Drawing Number 1.8			

DOUBLE DOOR - LEVEL 1

November 1, 2016

Typical applications :



Door can be Single or Double Egress.
Coordinate with SSC and GC on Device locations

Device Rough In Requirements

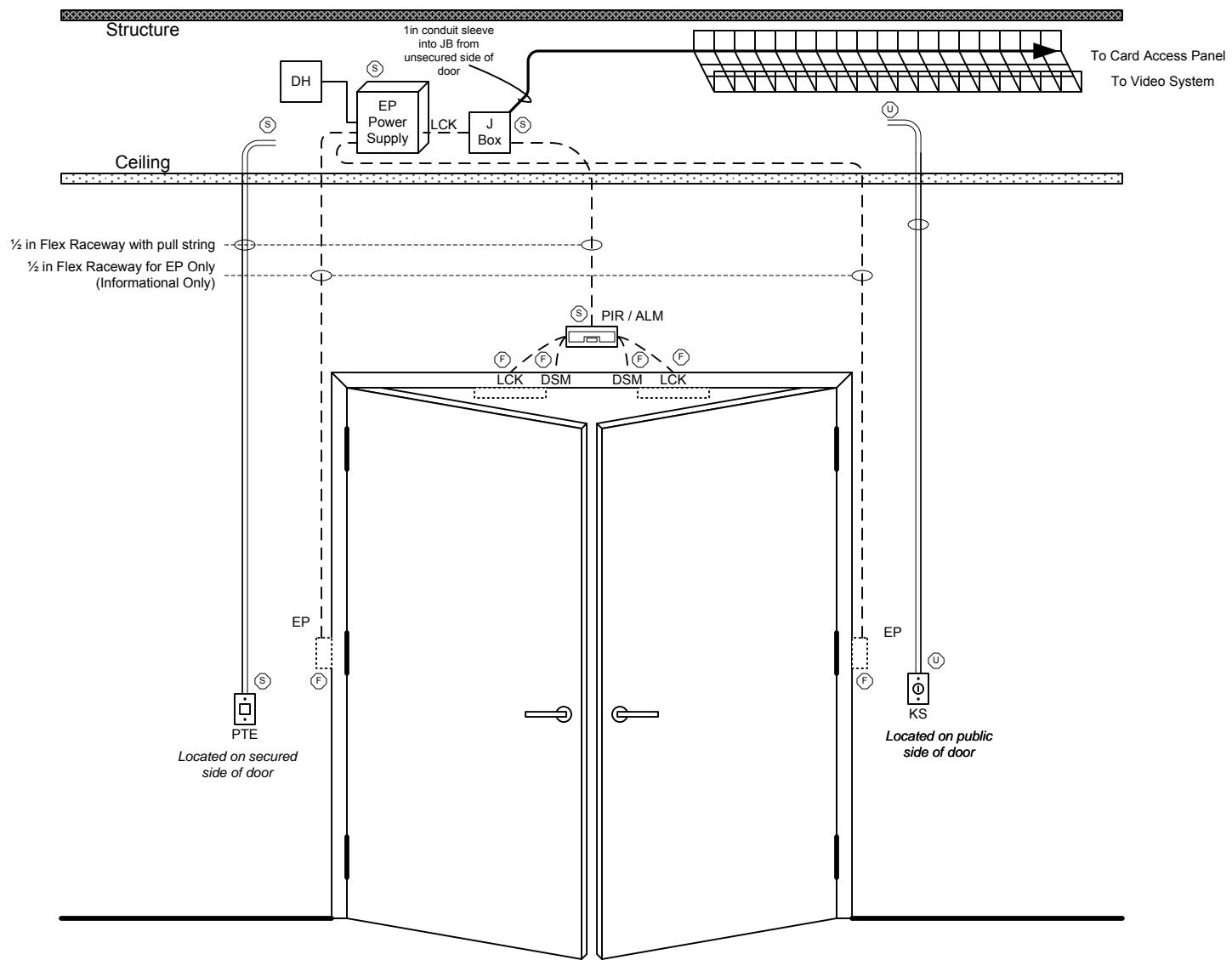
Device	Description	Opening
JB	4sq Junction Box on secure side of door. 1/2 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Double Door - Level 1				
Drawing Type	Drawing Number Card Access Details 1.9			

DOUBLE DOOR - LEVEL 2 - ELEC PANICS

November 1, 2016

Typical applications : Exit only doors



Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. ½ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	½ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
EP	½ flex raceway from power supply to each transfer hinge. This work is shown for coordination of rough ins only. Wiring related to Electrified Panics by EC	(F) Frame
DH	Door Holder Circuit is tied to the power supply. EP's normally retracted unless a fire alarm is active and door holder circuit is released. Wiring related to DH and EP by EC.	(F) Ceiling
LCK	½ flex raceway from PIR into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
PTE	¾ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side
KEY	¾ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Sequence

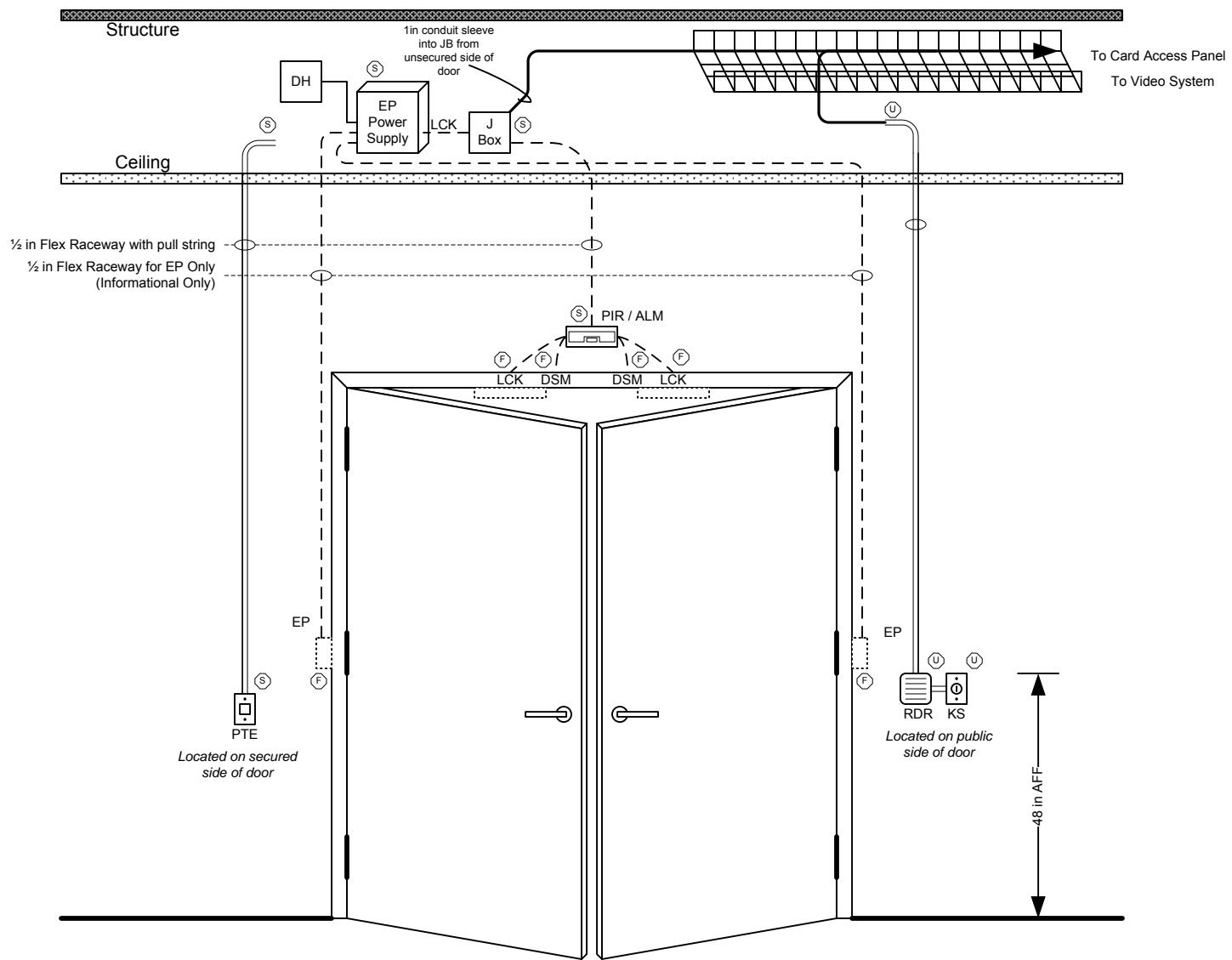
Door will be monitored and alarmed by Software House system if forced or held open.

Electrified Panics will be retracted during normal operation. Extended during fire alarm.

Mag Locks will secure the door under normal operation. Mag Locks de-energized during fire alarm and EP will extend to latch.

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Double Door - Level 2 - Elec Panics				
Drawing Type	Drawing Number Card Access Details 1.10			

Typical applications : Clinic Door (Scheduled)



Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
EP	$\frac{1}{2}$ flex raceway from power supply to each transfer hinge. This work is shown for coordination of rough ins only. Wiring related to Electrified Panics by EC	(F) Frame
DH	Door Holder Circuit is tied to the power supply. EP's normally retracted unless a fire alarm is active and door holder circuit is released. Wiring related to DH and EP by EC.	(F) Ceiling
PTE	$\frac{3}{4}$ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from PIR into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
KEY	$\frac{3}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Sequence

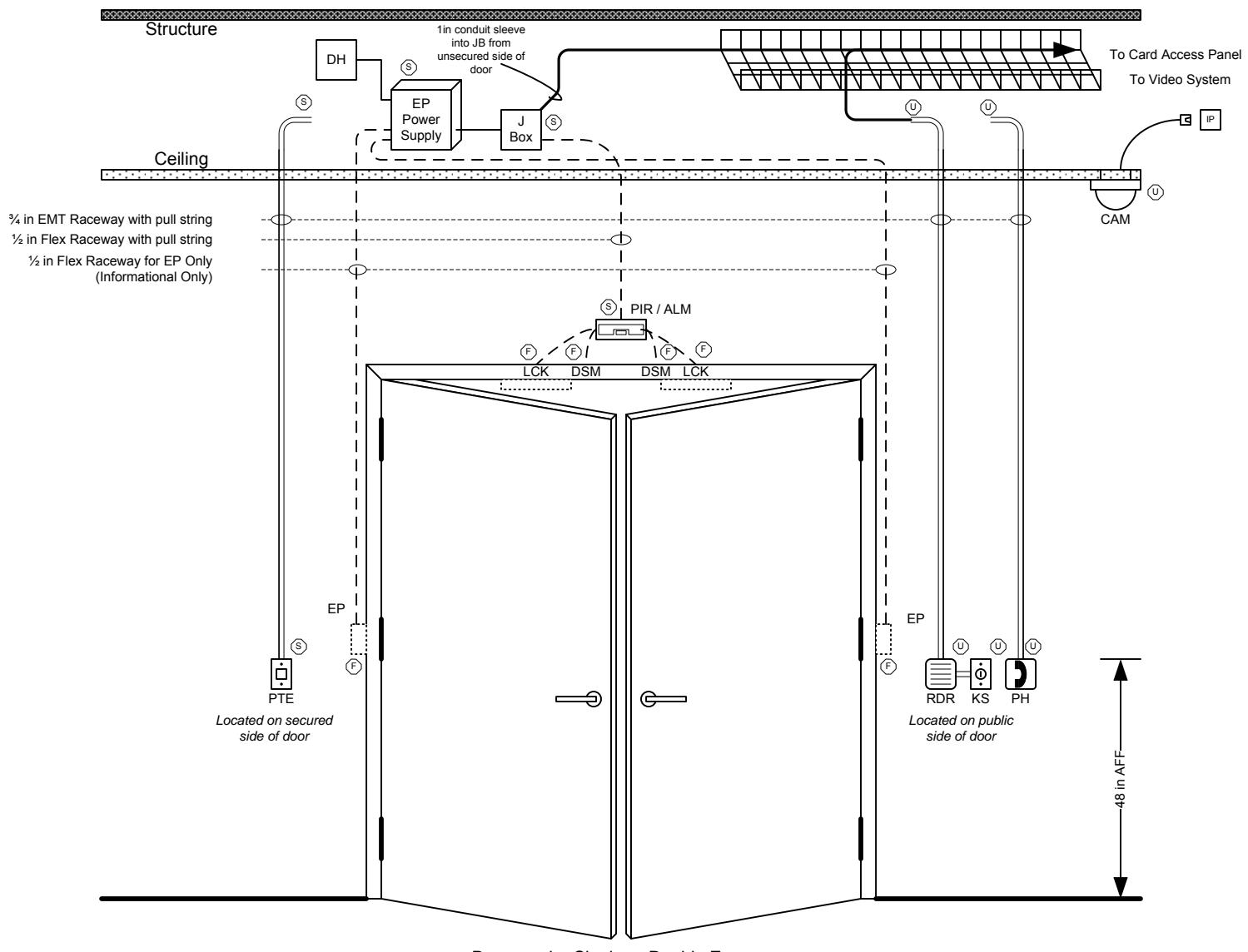
Door will be monitored and alarmed by Software House system if forced or held open.

Electrified Panics will be retracted during normal operation. Extended during fire alarm.

Mag Locks will secure the door under normal operation. Mag Locks de-energized during fire alarm and EP will extend to latch.

Job Number Revisions Project Documents				
	UI Hospitals & Clinics			
	Safety & Security Card Access Standards			
	Iowa City Iowa 52242			
Scale None Serial Number		Drawn By	CV	
Date: 4/27/2011				
Double Door - Level 3 - Elec Panics				
Drawing Type		Drawing Number		
Card Access Details		1.11		

Typical applications : Low Usage Clinic Door (Access Controls)



Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{1}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
EP	$\frac{1}{2}$ flex raceway from power supply to each transfer hinge. This work is shown for coordination of rough ins only. Wiring related to Electrified Panics by EC	(F) Frame
DH	Door Holder Circuit is tied to the power supply. EP's normally retracted unless a fire alarm is active and door holder circuit is released. Wiring related to DH and EP by EC.	(F) Ceiling
LCK	$\frac{1}{2}$ flex raceway from PIR into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
PTE	$\frac{1}{4}$ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side
RDR	$\frac{1}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
CAM	Accessible location near cable tray, no rough-in is required. In an inaccessible ceiling location or exterior location, provide a 4sq box at location with a $\frac{1}{4}$ in raceway to cable tray. Coordinate the inaccessible locations with the SSC	(C) Ceiling
PH	$\frac{1}{4}$ conduit raceway from un-secured ceiling into the wall down to the PH location. Provide 4sq box in wall with 1G mud ring vertical. Owner furnished phone. Owner Installed Phone	(U) Ceiling
KEY	$\frac{1}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Sequence

Door will be monitored and alarmed by Software House system if forced or held open.

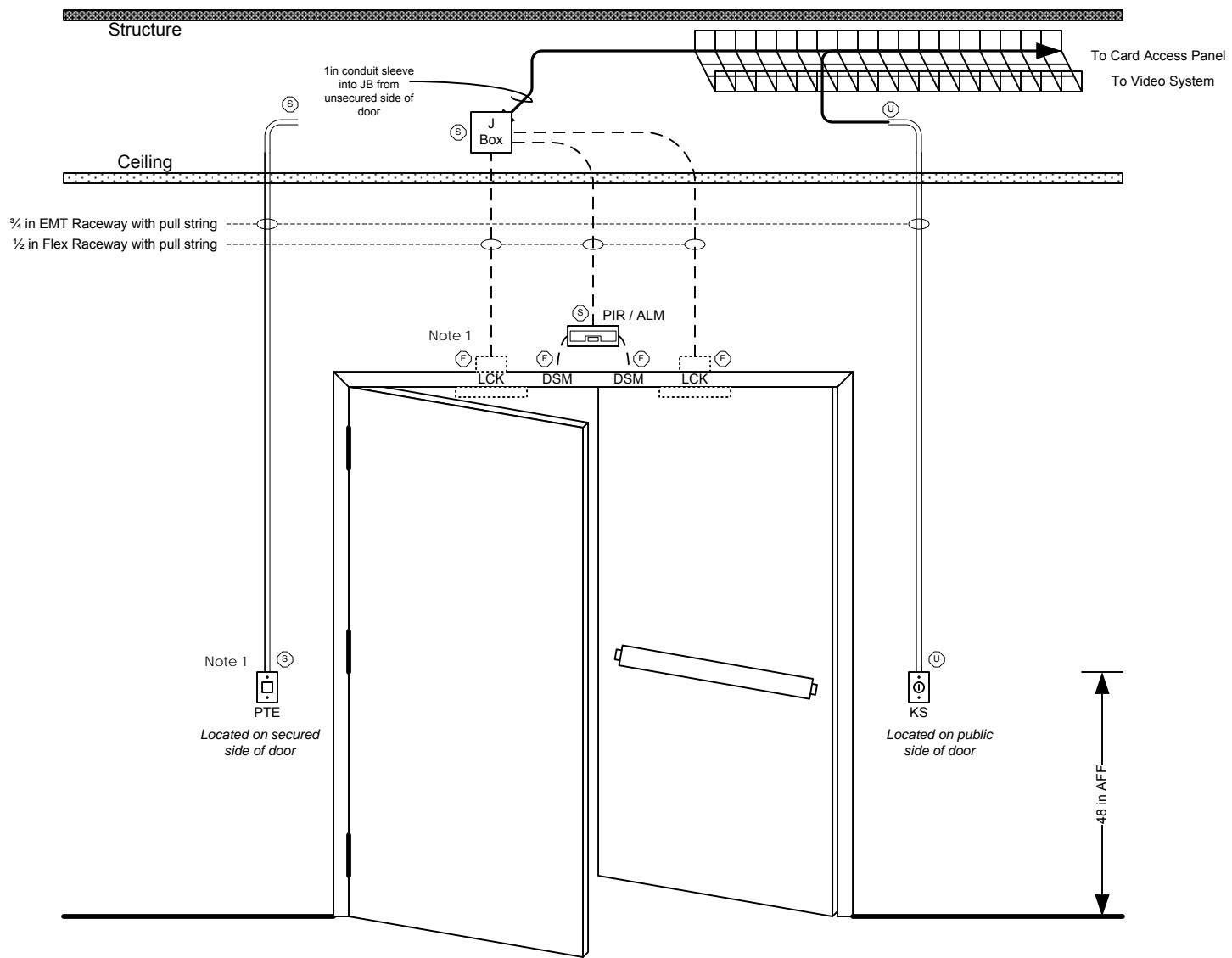
Electrified Panics will be retracted during normal operation. Extended during fire alarm.

Mag Locks will secure the door under normal operation. Mag Locks de-energized during fire alarm and EP will extend to latch.

Revisions Project Documents	Job Number			
	UI Hospitals & Clinics			
	Safety & Security Card Access Standards			
	Iowa City Iowa 52242			
	Scale: None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Double Door - Level 4 - Elec Panics				
Drawing Type	Drawing Number			
Card Access Details	1.12			

DOUBLE DOOR - LEVEL 2 - MAG LOCK

November 1, 2016



Door can be Single or Double Egress.
Coordinate with SSC and GC on Device locations.

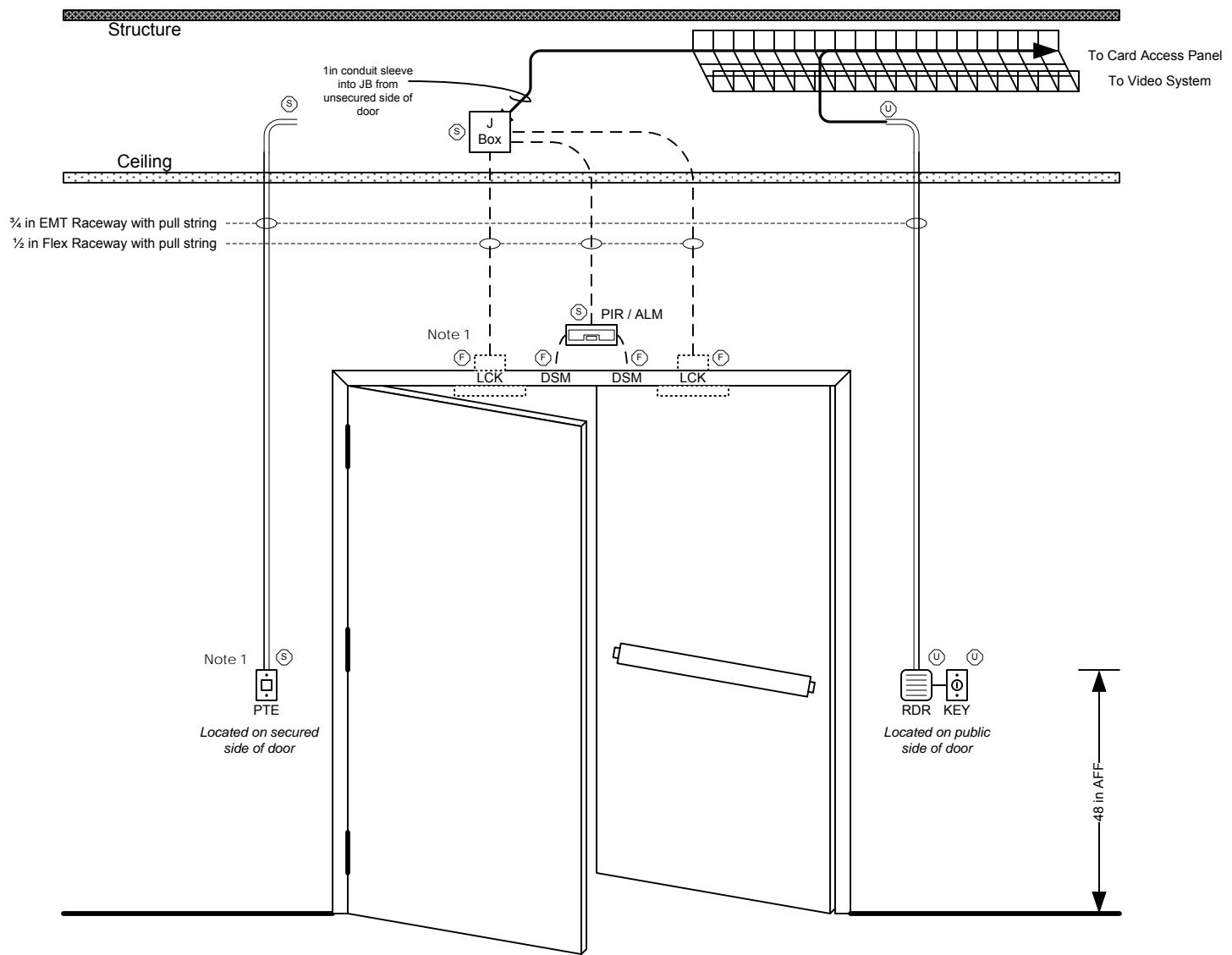
Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
KEY	$\frac{3}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	$\frac{3}{4}$ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side

Note:

- If door is double egress, the leaf exiting the secured space does not require a LCK or PTE if no pull hardware is provided.

Job Number Revisions Project Documents				
	UI Hospitals & Clinics			
	Safety & Security Card Access Standards			
	Iowa City Iowa 52242			
Scale None Serial Number		Drawn By	CV	
Date:	4/27/2011			
Double Door - Level 2 - Mag Lock				
Drawing Type	Drawing Number			
Card Access Details	1.13			

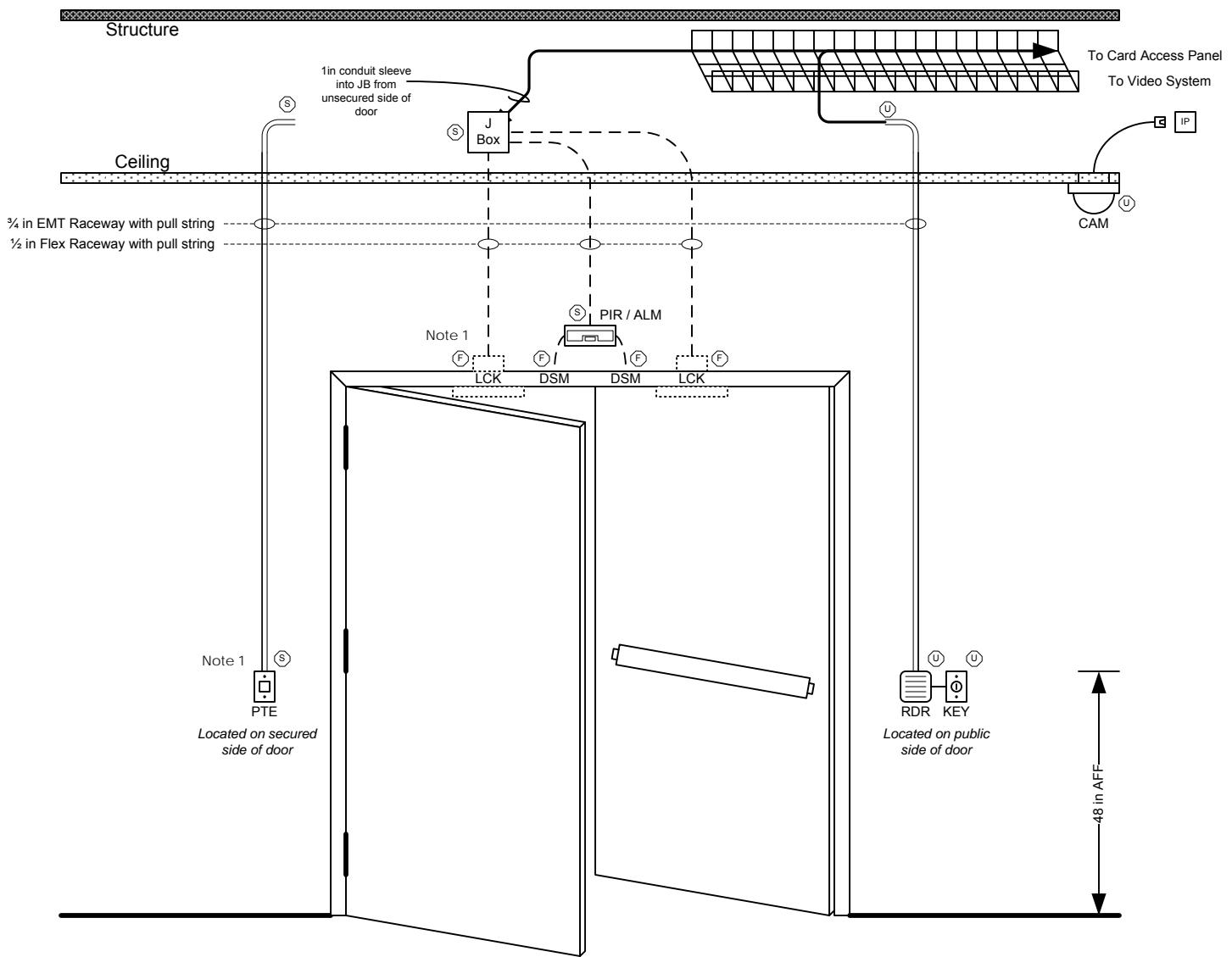
DOUBLE DOOR - LEVEL 3 - MAG LOCK**Device Rough In Requirements**

Device	Description	Opening
JB	4sq Junction Box on secure side of door. 1/2 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	1/2 flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	1/2 flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	1/2 conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
KEY	1/2 conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	1/2 conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side

Note:

- 1 If door is double egress, the leaf exiting the secured space does not require a LCK or PTE if no pull hardware is provided.

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Double Door - Level 3 - Mag Lock				
Drawing Type	Drawing Number			
Card Access Details	1.14			

DOUBLE DOOR - LEVEL 4 - MAG LOCK**Device Rough In Requirements**

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{1}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use PIR / ALM raceway to PIR / ALM Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	$\frac{1}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
CAM	Accessible location near cable tray, no rough-in is required. In an inaccessible ceiling location or exterior location, provide a 4sq box at location with a $\frac{1}{4}$ in raceway to cable tray. Coordinate the inaccessible locations with the SSC	(C) Ceiling
KEY	$\frac{1}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PTE	$\frac{1}{4}$ conduit raceway from the ceiling to the PTE location. Provide 4sq box in wall with 1G mud ring vertical.	(S) Secured Side

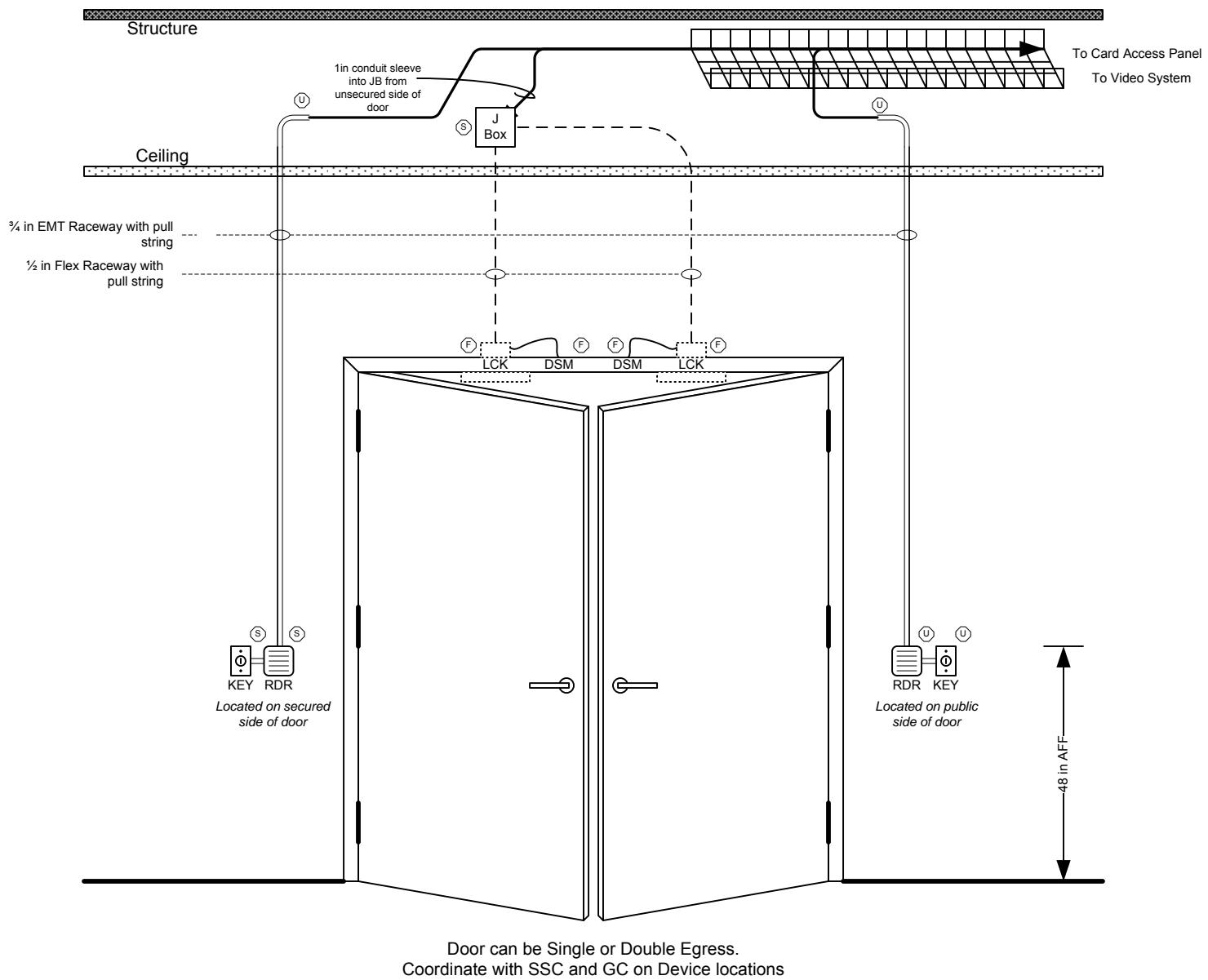
Note:

- 1 If door is single egress, the leaf exiting the secured space does not require a LCK or PTE if no pull hardware is provided.

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
	Double Door - Level 4 - Mag Lock			
Drawing Type	Card Access Details			
	Drawing Number 1.15			

DOUBLE DOOR - LEVEL 3D - INSTITUTIONAL

Typical applications for this door are institutions applications that require card in card out control



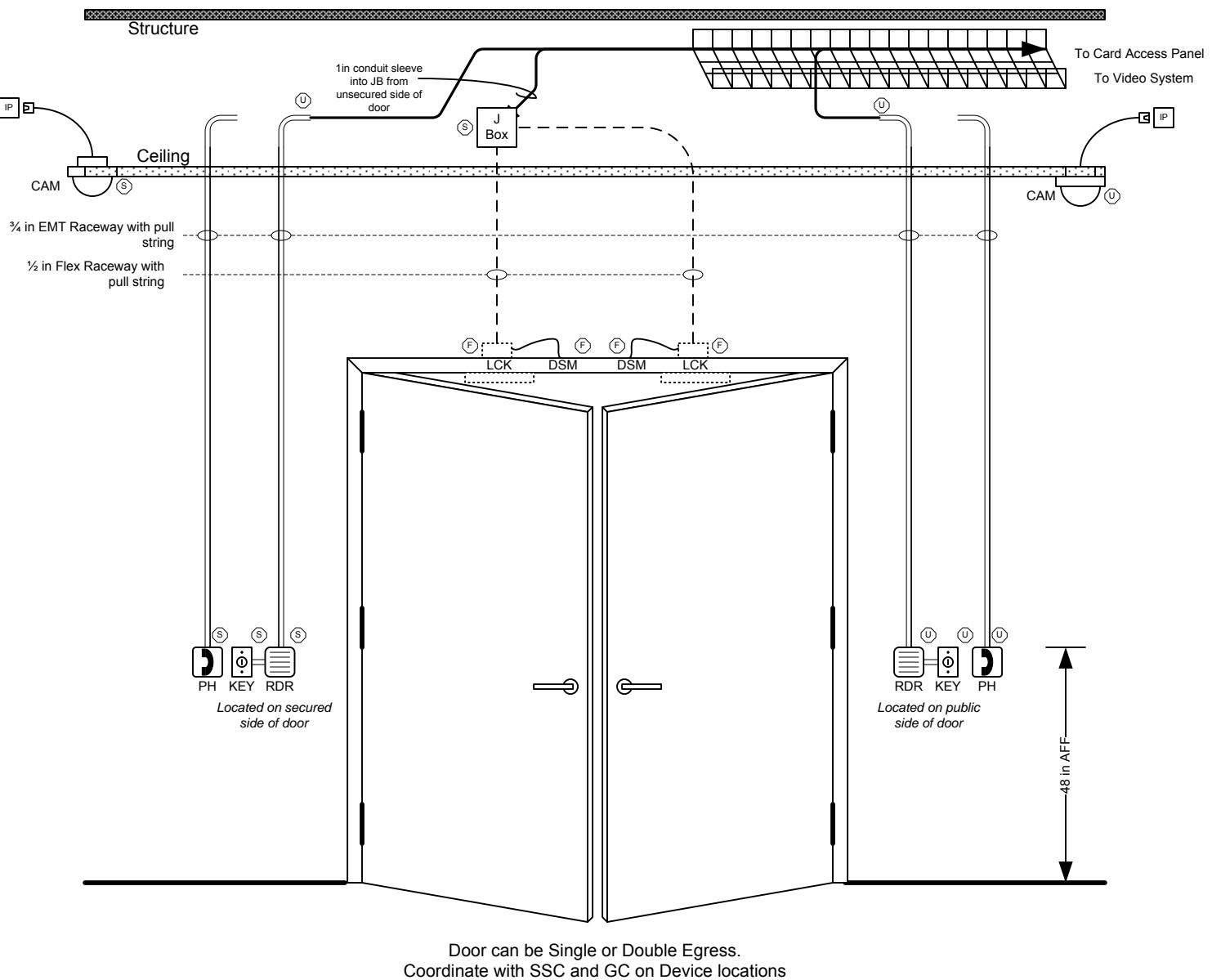
Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. 1/4 in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use LOCK raceway to LOCK Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
LCK	1/4 flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	1/4 conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
KEY	1/4 conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Double Door - Level 3D - Institutional				
Drawing Type	Drawing Number Card Access Details 1.16			

DOUBLE DOOR - LEVEL 4D - INSTITUTIONAL

Typical applications for this door are institutions applications that require card in card out control



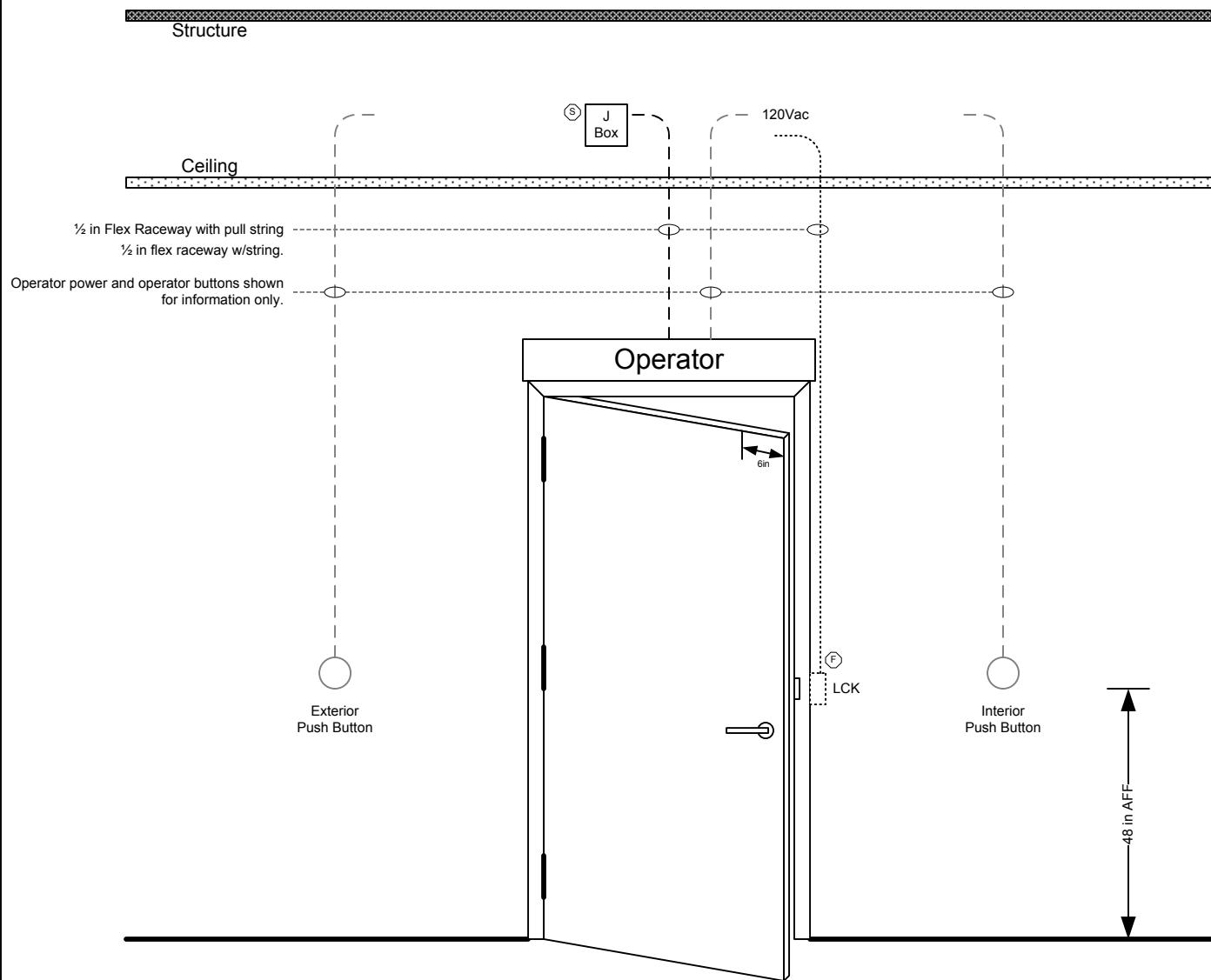
Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. ¼ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	Use LOCK raceway to LOCK Box. Provide a pull wire from this box location to each DSM switch.	(F) Frame
LCK	½ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
RDR	¼ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
CAM	Accessible location near cable tray, no rough-in is required. In an inaccessible ceiling location or exterior location, provide a 4sq box at location with a ¼ in raceway to cable tray. Coordinate the inaccessible locations with the SSC	(C) Ceiling
KEY	¼ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
PH	¼ conduit raceway from un-secured ceiling into the wall down to the PH location. Provide 4sq box in wall with 1G mud ring vertical. Owner furnished phone. Owner Installed Phone	(C) Ceiling

Note:

- 1 Remote release is required at the designated nurses station to unlock the door.

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	None	Serial Number	Drawn By	CV
	Date: 4/27/2011			
Double Door - Level 4D - Institutional				
Drawing Type	Drawing Number Card Access Details 1.17			

OPTION - SINGLE OR DOUBLE OPERATOR DOOR

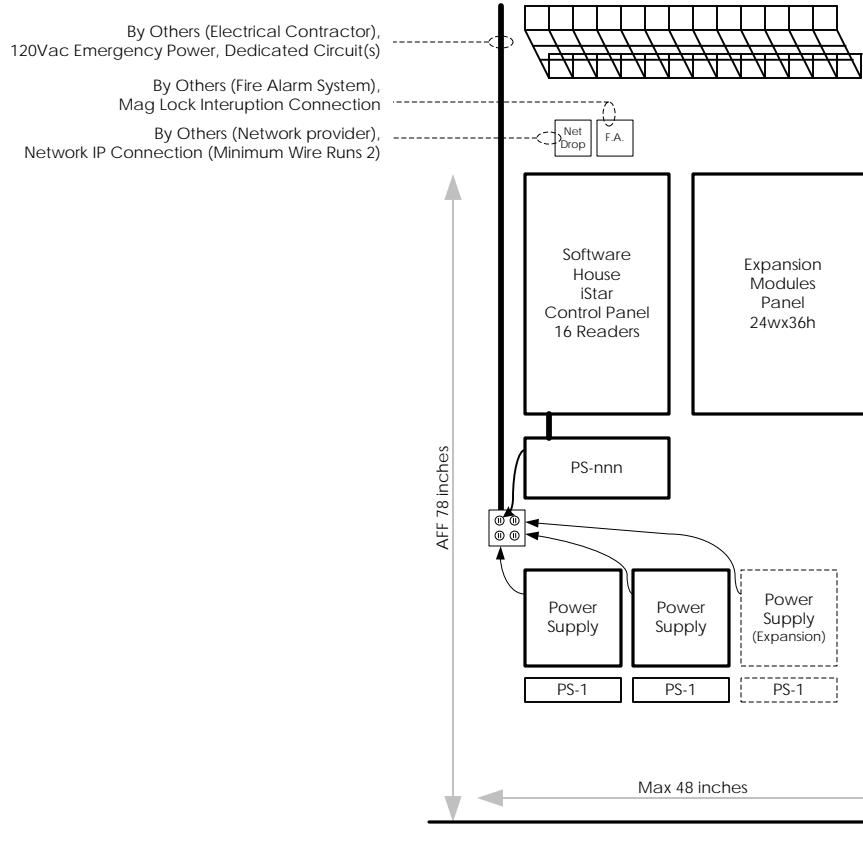
Note:

- Doors with operators shall be 100% functional before the card access system interlocks into operator controls.
- Exterior operators buttons may be removed by card access contractor to open door on valid card.

Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. 1/4 in sleeve to operator enclosure.	(S) Secured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Option - Single or Double Operator Door				
Drawing Type	Drawing Number Card Access Details			
	1.18			

SOFTWARE HOUSE iSTAR 16 READER ACCESS PANEL LAYOUT**Notes:**

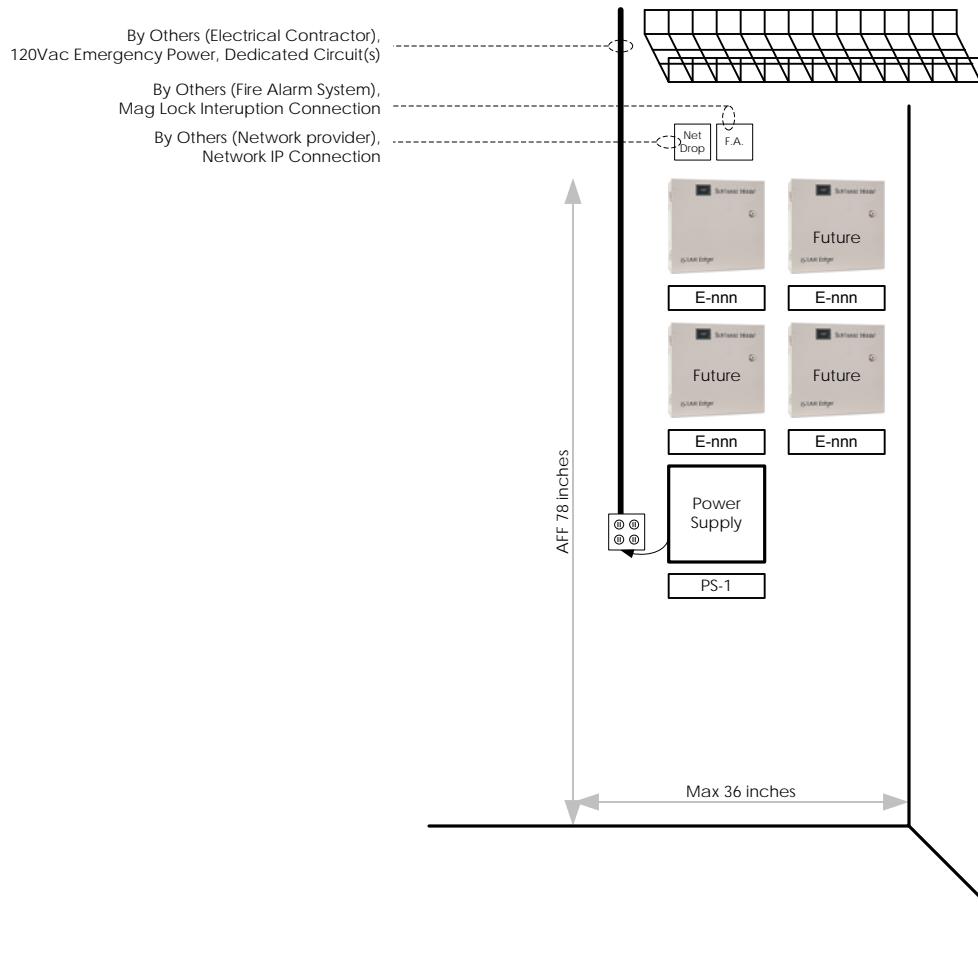
- 1 Fire Alarm contractor to test mag lock power interruption during testing

Software House Rough In Requirements

Device	Description
Network Drop	Provide Network wire run for connection to panel. 10/100 connection on SecNet
Fire Alarm	Fire Alarm contractor to provide a NC contact at the panel for the SSC contractor to connect to the lock power supplies to drop in event of a fire alarm. This will provide Magnetic Lock interruption.
120V Emergency Power	Provide 120 VAC Emergency Power dedicated to this equipment

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	None	Serial Number	Drawn By	CV
Date: 4/27/2011				
Software House iStar 16 Reader Access Panel Layout				
Drawing Type	Card Access Details			
	Drawing Number 1.19			

SOFTWARE HOUSE iSTAR 2 READER EDGE PANEL LAYOUT

**Notes:**

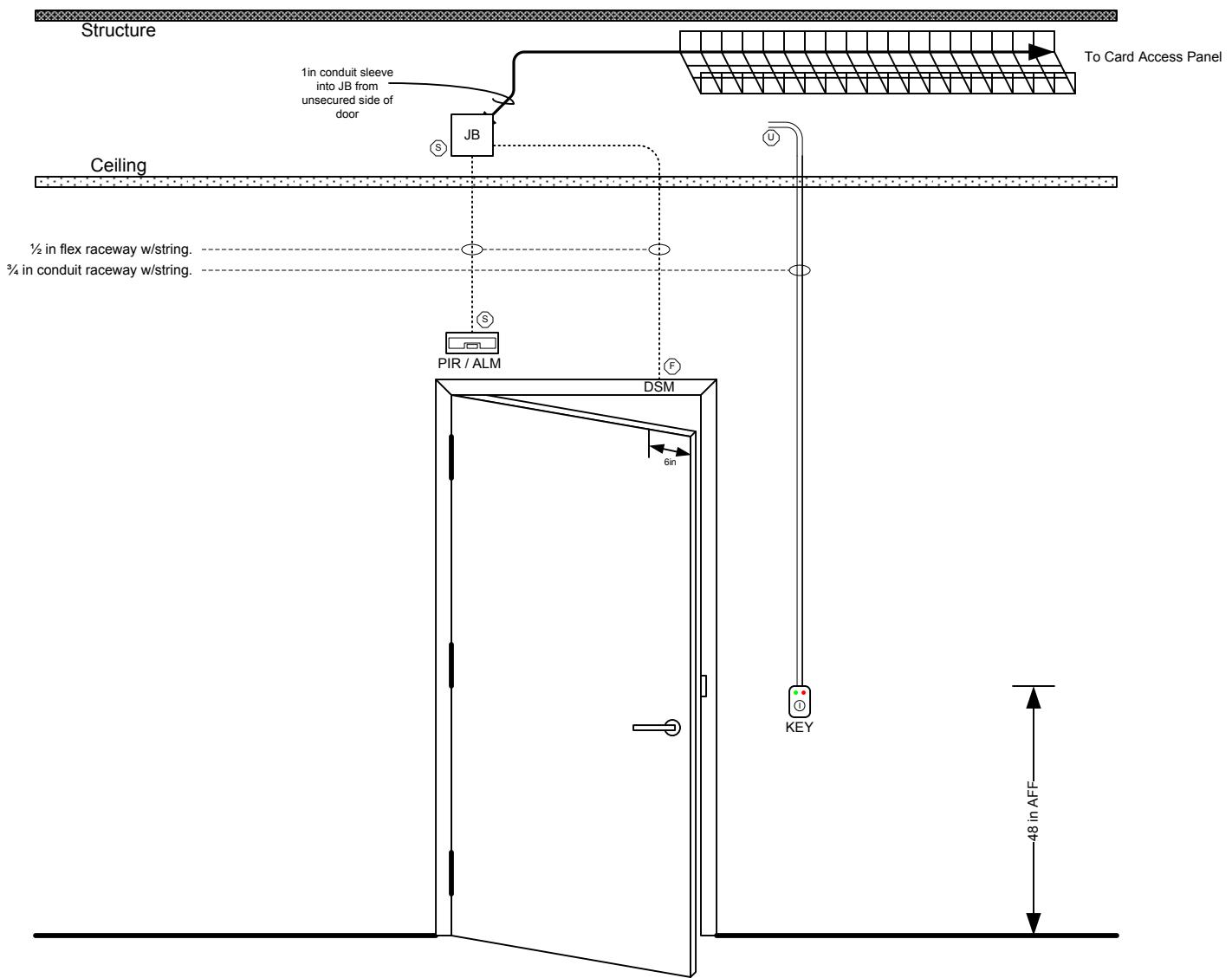
- 1 Fire Alarm contractor to test mag lock power interruption during testing

Device	Description
Network Drop	Provide Network wire run for connection to panel. 10/100 connection on SecNet
Fire Alarm	Fire Alarm contractor to provide a NC contact at the panel for the SSC contractor to connect to the lock power supplies to drop in event of a fire alarm. This will provide Magnetic Lock interruption.
120V Emergency Power	Provide 120 VAC Emergency Power dedicated to this equipment

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Software House iStar 2 Reader Edge Panel Layout				
Drawing Type	Card Access Details			
	Drawing Number 1.20			

PHARMACY SINGLE DOOR - LEVEL P1

Typical Application : Pharmacy Department Door Monitoring

**Sequence**

Door will be monitored and alarmed by Software House system if forced or held open.

Key switch will provide user arm disarm function of door to shunt alarm during occupied hours. Red Light indicates "armed" green light indicates "disarmed"

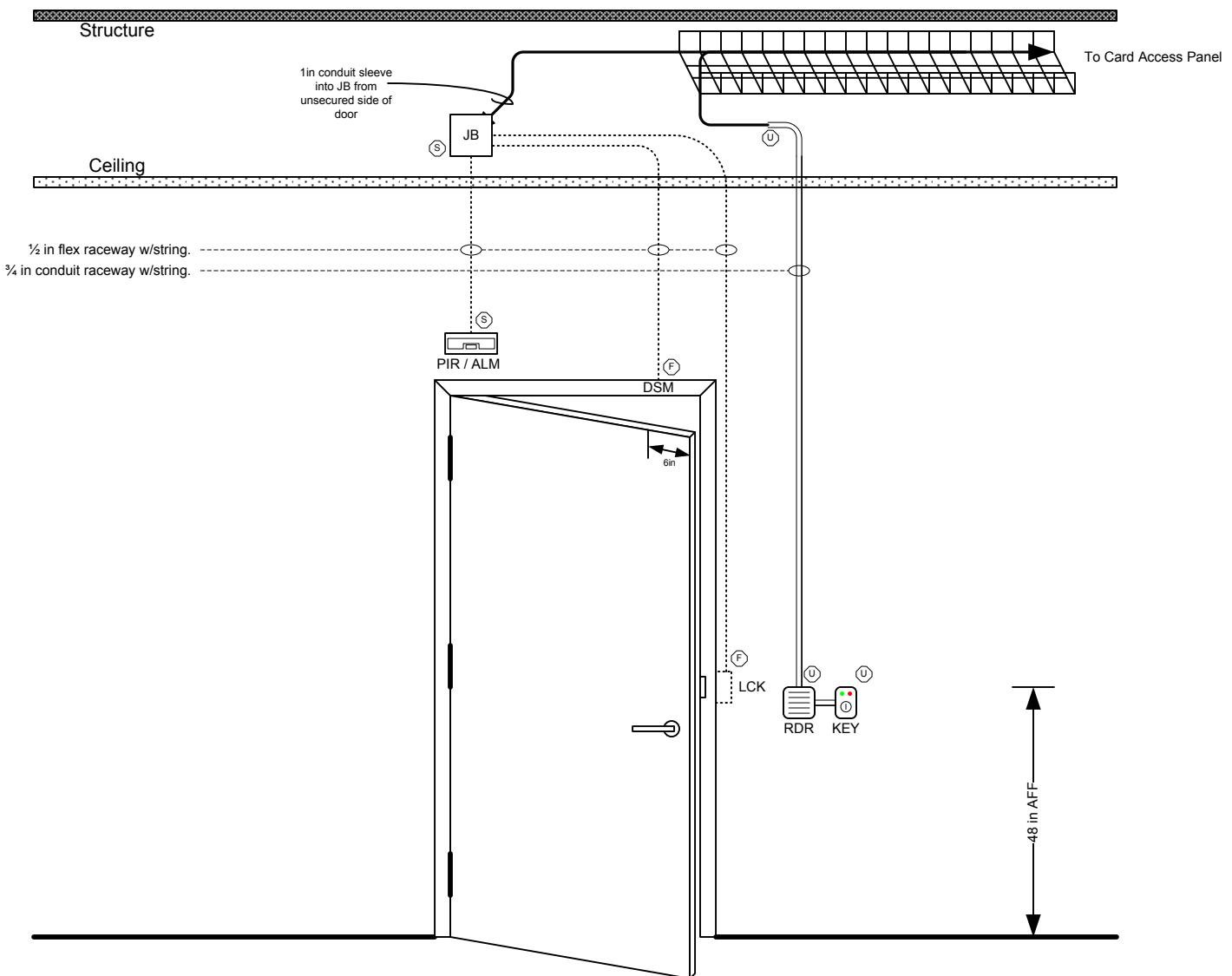
Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{2}$ flex raceway from J-Box into the wall down to a $\frac{3}{4}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
KEY	$\frac{1}{2}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Pharmacy Single Door - Level P1				
Drawing Type	Card Access Details			
	Drawing Number 1.21			

PHARMACY SINGLE DOOR - LEVEL P3 - PROX READER

Typical Application : Pharmacy Department Access Door (Non Pharmacy Areas)



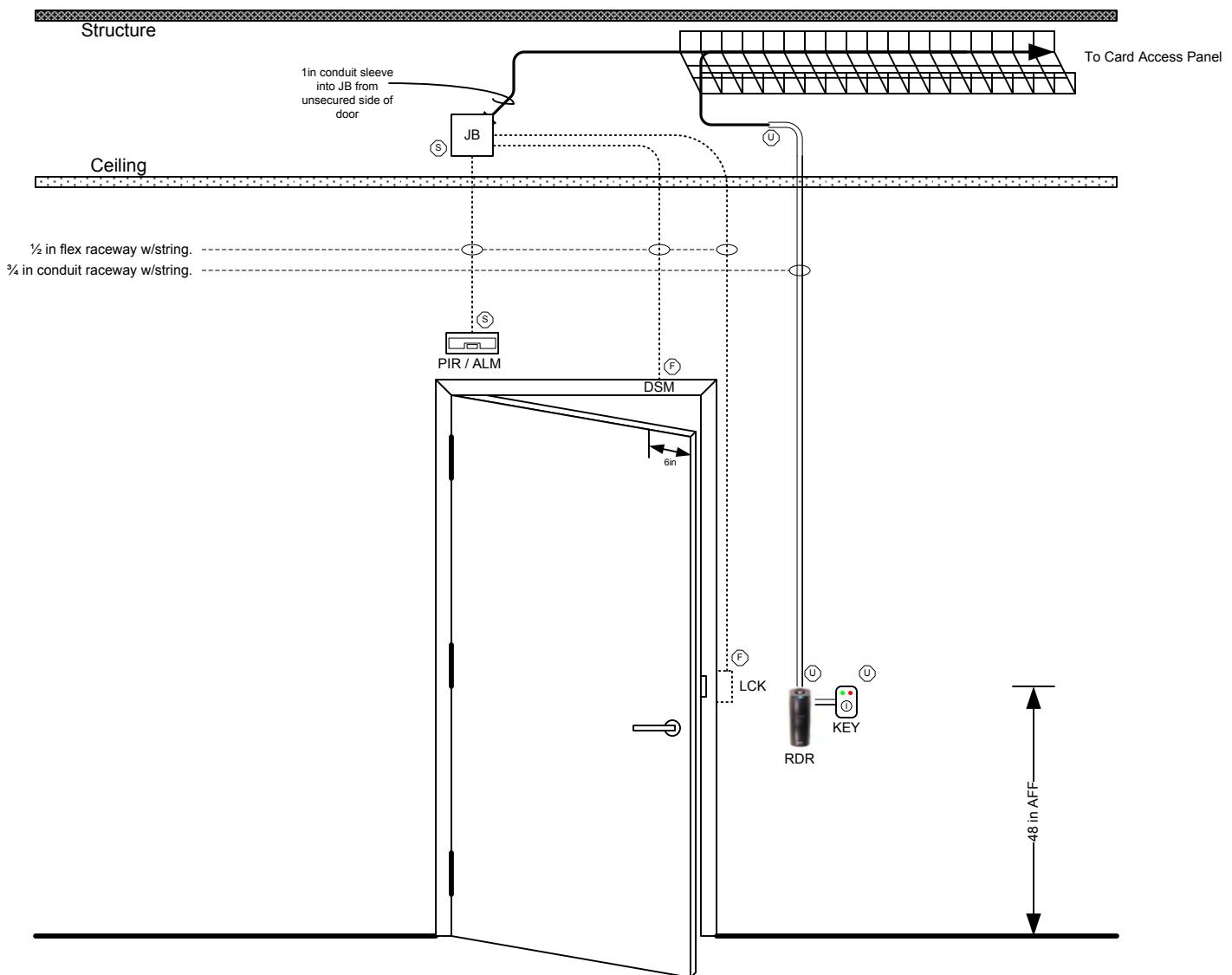
Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{2}$ flex raceway from J-Box into the wall down to a $\frac{3}{4}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
KEY	$\frac{3}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
RDR	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Job Number					
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242				
Project Documents	Scale	None	Serial Number	Drawn By	CV
	Date:	4/27/2011			
	Pharmacy Single Door - Level P3 - Prox Reader				
Drawing Type	Card Access Details			Drawing Number 1.22	

PHARMACY SINGLE DOOR - LEVEL P3 - BIOMETRICS READER

Typical Application : Pharmacy Department Access Door (Pharmacy Areas)



Door will be monitored and alarmed by Software House system if forced or held open.

Key switch will provide user arm disarm function of door to shunt alarm during occupied hours. Red Light indicates "armed" green light indicates "disarmed"

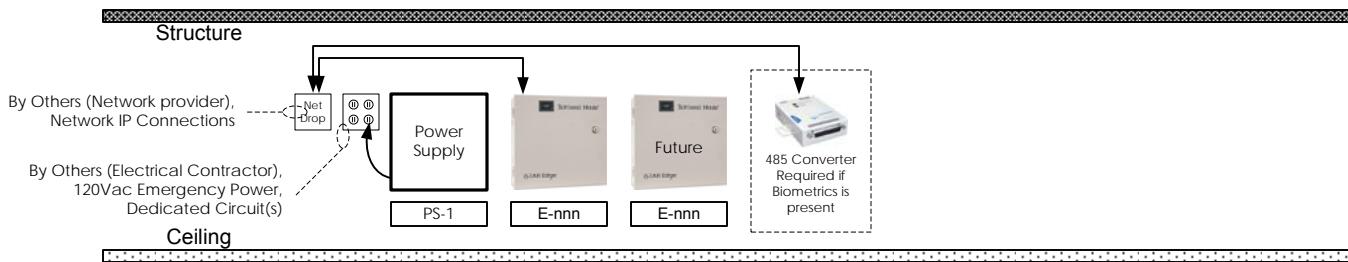
Card Reader function will be disabled if the key switch is armed.

Device Rough In Requirements

Device	Description	Opening
JB	4sq Junction Box on secure side of door. $\frac{3}{4}$ in sleeve to unsecured side of door. Cables will be routed from the cable pathway in the corridor thru this sleeve into the JB.	(S) Secured Side
DSM	$\frac{1}{2}$ flex raceway from J-Box into the wall down to a $\frac{3}{4}$ in opening in frame. 6 in from end of door. Coordinate the location on frame and drilling with the GC.	(F) Frame
PIR ALM	$\frac{1}{2}$ flex raceway from secured side of room into the wall down to the PIR/ALM location. Provide 4sq box in wall with 1G mud ring horizontal.	(S) Secured Side
LCK	$\frac{1}{2}$ flex raceway from J-Box into the wall down to the door lock location. Coordinate the location on frame with the GC.	(F) Frame
KEY	$\frac{3}{4}$ conduit raceway from the RDR to the KS. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side
RDR	$\frac{3}{4}$ conduit raceway from un-secured ceiling into the wall down to the RDR location. Provide 4sq box in wall with 1G mud ring vertical.	(U) UnSecured Side

Job Number				
Revisions	UI Hospitals & Clinics Safety & Security Card Access Standards Iowa City Iowa 52242			
Project Documents				
Scale	None	Serial Number	Drawn By	CV
Date:	4/27/2011			
Pharmacy Single Door - Level P3 - Biometrics Reader				
Drawing Type	Drawing Number			
Card Access Details				1.23

PHARMACY iSTAR EDGE PANEL INSTALLATION

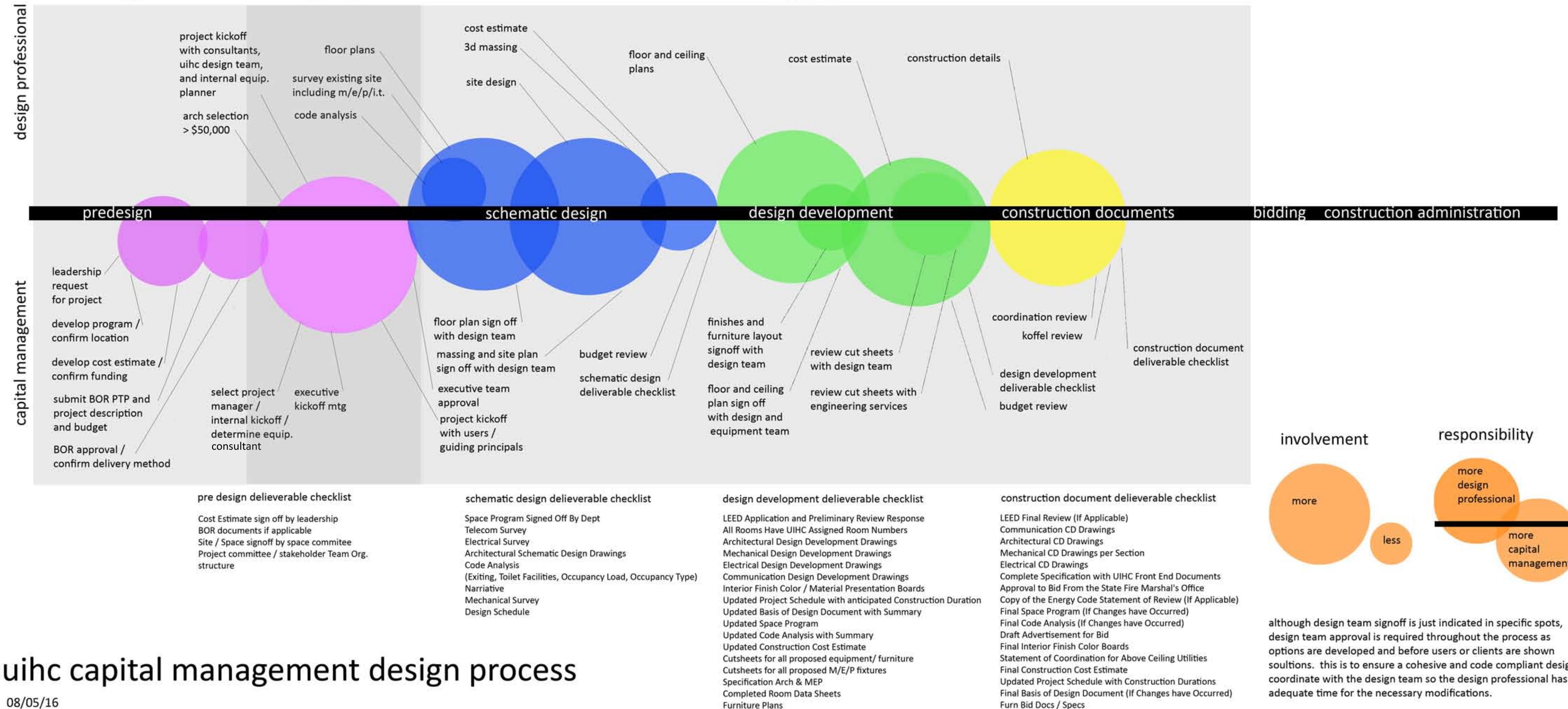


Pharmacy system is typically installed inside the primary employee entrance in the ceiling.

Job Number				
Revisions	UI Hospitals & Clinics			
Project Documents	Safety & Security Card Access Standards Iowa City Iowa 52242			
Scale	None	Serial Number	Drawn By	CV
Date: 4/27/2011				
Pharmacy iStar Edge Panel Installation				
Drawing Type	Drawing Number Card Access Details 1.24			

Appendix M

Capital Management Design Process



Appendix N

Division 27: Communications

HEALTHCARE INFORMATION SYSTEMS TECHNOLOGY DESIGN GUIDELINES

October 25, 2016



DOCUMENT REVISION HISTORY

1. Modifications

The steward of this document shall continue to keep a revision history as follows:

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OVERVIEW

1. Purpose

This document has been prepared in order to educate and assist those in a design role for the University of Iowa Hospitals and Clinics. The goal is to adequately serve and support patient care systems installed throughout our facilities utilizing this as the published standard. This document is not intended to be exhaustive however it shall be considered authoritative in all areas that it addresses. These standards shall be applied to all renovations and new construction projects as it relates to technology design.

The term 'telecommunications', as used in this guideline, shall refer to the transmission of all forms of information (e.g., voice, data, video, security, audio, industrial, building control). Telecommunications equipment used to support these wide varieties of systems rely on effective building infrastructure. This infrastructure encompasses spaces, pathways, cables, connecting hardware, and a high quality bonding and grounding system.

It is expected that this document shall be primarily used by architects, engineers, and planners.

2. Referenced Standards, Codes and Additional Guidelines

These guidelines are based on a combination of preferred methods by the Hospital in addition to well-known published standards, codes and guidelines.

- Building Industry Consultant Services International (BICSI)
 - *Telecommunications Distribution Methods Manual (TDMM)*
 - *Data Center Design and Implementation Best Practices ANSI/BICSI 002-2014*
- Electronics Industry Association/Telecommunications Industry Association (EIA/TIA)
 - *Commercial Building Telecommunications Infrastructure Standard - TIA-568*
 - *Telecommunications Pathways and Spaces - TIA-569*
 - *Administration Standard for Telecommunications Infrastructure - TIA-606*
 - *Telecommunications Bonding and Grounding - TIA-607*
 - *Telecommunications Infrastructure Standard for Data Centers - TIA-942*
- National Fire Protection Association (NFPA)
 - *National Electric Code - NFPA 70*
 - *National Fire Alarm and Signaling Code - NFPA 72*
 - *Health Care Facilities Code – NFPA 99*
 - *National Life Safety Code - NFPA 101*
- Underwriter's Laboratories (UL)
 - *Standards for Hospital Signaling and Nurse Call Equipment – UL 1069*
- Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
- Americans with Disabilities Act Accessibility Guidelines (ADAAG)

The purpose of a standard is to ensure a minimum level of performance. Codes often reference numerous safety standards to assure the minimum safety requirements of a given material or components are met. It is the intent that there shall be no published design guideline herein that shall conflict with life safety requirements.

3. Document Maintenance

Modifications and additions to this document shall be managed by TJ Ramsey and Brad Henderson.

4. Consultant Deliverables

All construction documents including but not limited to: drawings, details, schedules, legends and specifications shall be in alignment with the standards and guidelines defined herein. Any deviations from these standards shall require written authorization from the Healthcare Information Systems department.

During each milestone of design, the Healthcare Information Systems representative shall perform a project review. Comments will be delivered to the technology design consultant and will require follow up to ensure any and all conflicts, issues and/or questions are answered and rectified.

5. Departmental Contact Information

Name	Department	Systems	Tele.#
TJ Ramsey	Healthcare Information Systems	UIHC Telecommunications	319-325-3790
Brad Henderson	Healthcare Information Systems	UIHC Telecommunications	319-356-2128
Eddie Etsey	Healthcare Information Systems	UIHC IT Facilities (Power & Cooling)	319-353-7890
Jody Reinier	Healthcare Information Systems	UIHC Audio Visual Systems	319-384-6310
Scott Spinler	Healthcare Information Systems	UIHC Nurse Call	319-356-2123
Bill Hoffman	Safety and Security	UIHC Fire Detection and Alarm	319-356-7150
George Stumpf	ITS Enterprise Infrastructure	U of I Telecommunications	319-335-2814

6. Escalation Procedures

In the event of design questions, issues or conflicts please contact TJ Ramsey at the telephone number shared above to start the escalation process.

GLOSSARY OF TERMS

1. Key Terms

BACKBONE – A facility (pathway, cable, or conductors) between telecommunications rooms, or floor distribution terminals, the entrance facilities, and the equipment rooms within or between buildings.

BACKBONE CABLING – Cable and connecting hardware that provides interconnections between telecommunications rooms, equipment rooms, and entrance facilities.

BACKBONE PATHWAY – The portion of the pathway system that permits the placing of backbone cables between the entrance location and all cross-connect points within a building and between buildings.

BEND RADIUS – Maximum radius that a cable can be bent to avoid physical or electrical damage or cause adverse transmission performance.

BONDING – The permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity, the capacity to safely conduct any current likely to be imposed, and the ability to limit differences in potentials between the joined parts.

CABLE TRAY – A support mechanism used to route and support telecommunications cable. Typically equipped with sides that allow cables to be placed within the sides over its entire length.

CABLING – A combination of all copper and optical fiber telecommunications cables, equipment patch cords, and connect hardware.

CEILING DISTRIBUTION SYSTEM – A distribution system that uses the space between a suspended or false ceiling and the structural surface above the ceiling.

CODE – A systematic collection of regulations and rules intended to ensure safety during installation and use of materials, components, fixtures, systems, premises, and related subjects. Codes are typically invoked and enforced through government regulation.

CONDUIT – A rigid or flexible metallic or non-metallic raceway of circular cross-section through which cables can be pulled.

CONNECTING HARDWARE – A device, or combination of devices, used to connect two cables or cable elements.

CROSS-CONNECTION – A connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connection hardware on each end.

ELECTROMAGNETIC INTERFERENCE (EMI) – Any electrical or electromagnetic interference that causes undesirable signals on a device, equipment, or system.

GROUND – A reference point in an electrical circuit from which voltages are measured, a common return path for electric current, or a direct physical connection to the earth.

GROUNDING BUS BAR – A suitable bar, bus, terminal strip, or binding post terminal where grounding and bonding conductors can be connected.

HORIZONTAL CABLING – The cabling between and including the work area telecommunications outlet/connector and the floor distributor in the telecommunications room.

INFRASTRUCTURE – Permanently installed cable plant.

J-HOOK – A supporting device for horizontal cables that is shaped like a 'J'. It is typically attached above an accessible ceiling space or on to the building structure to manage special systems cabling.

LADDER RACK – A device similar to a cable tray but more closely resembles a single section of a ladder.

MEDIA – Wire, cable, or conductors used for telecommunications.

MODULAR JACK – A female telecommunications connector typically found at the work area outlet.

PATCH CORD – A length of cable with connectors on one or both ends used to join telecommunications circuits/links at the cross-connect.

PHYSICAL TOPOLOGY – The physical layout of a network as defined by its cabling architecture.

PULL STRING – String placed within a cable pathway, used to pull wire and cable.

SLEEVE – A short section of conduit, either metallic or non-metallic, lining an opening in the wall or floor for cables to pass through.

STANDARD – A collection of requirements that encompasses properties of components and systems that are intended to ensure an accepted degree of functionality and longevity.

TELECOMMUNICATIONS – A branch of technology concerned with the transmission, and reception of signs, signals, writing, images, and sounds or intelligence of any nature by wire, radio, optical, or other electromagnetic systems.

TELECOMMUNICATIONS ROOM (TR) – An enclosed space for housing telecommunications equipment, cable terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and horizontal cabling.

WORK AREA – A building space where the occupants interact with telecommunications terminal equipment.

WORK AREA OUTLET – A device placed at a user workstation for termination of horizontal media and for connectivity of network equipment.

2. Acronyms

AHJ – Authority Having Jurisdiction

AWG – American Wire Gauge

BICSI – Building Industry Consulting Services International

BCT – Bonding Conductor for Telecommunications

BD – Building Distributor

DMARC – The demarcation point in which the local carriers cabling and/or equipment terminates. Also the point in which the cabling transitions from "utility-owned" to "building-owned".

DPS – Door Position Switch

EF – Entrance Facility

EM – Emergency Power

ER – Equipment Room

HCIS – Healthcare Information Services

HVAC – Heating Ventilation Air Conditioning

IDF – Intermediate Distribution Frame

IT – Information Technology

JCAHO – Joint Commission on Accreditation of Healthcare Organizations

MC – Main Cross Connect Room

MDF – Main Distribution Frame

NEC – National Electric Code

NEMA – National Electrical Manufacturers Association

NFPA – National Fire Protection Association

REX – Request to Exit

TDMM – Telecommunications Distribution Methods Manual

TMGB – Telecommunications Main Ground Bus Bar

TR – Telecommunications Room

UL – Underwriter's Laboratories

UPS – Uninterruptable Power Supply

UTP – Unshielded Twisted Pair

VCT – Vinyl Composite Tile

VoIP – Voice over Internet Protocol

TELECOMMUNICATIONS DESIGN

1. Space Design: Telecommunications Room (TR)

Telecommunications Rooms are generally considered to be floor-serving spaces that provide a connection point between backbone and horizontal infrastructures. Telecommunication Rooms shall provide an environmentally suitable and **secure** area for installing communication cables, cross-connect fields, relay racks, wall-mounted hardware, and active telecommunications electronic equipment.

Because of the increased demand for desktop automation, voice and data integration, desk-to-desk information exchange, and integration of other building systems into the structured cabling system, a dedicated Telecommunications Room (TR) is necessary.

ARCHITECTURAL REQUIREMENTS:

A. Location

1. In order to minimize the horizontal cable lengths, locate the TR as close as possible to the center of, the area it is intended to serve.
2. The furthest area served with telecommunications cabling shall not exceed 295 feet (90m).
3. There shall be at least one TR per floor. TR's in a multi-floor building shall be stacked vertically.
4. There shall be a minimum of one TR per 10,000 square feet of office, clinic, and inpatient units served. If the area served by a TR is larger than 10,000 square feet, the TR shall be increased in size as necessary.
5. Locate TRs away from mechanical chases to avoid pathway congestion.
6. Rooms shall not be placed directly under bathrooms, kitchens or other water sources.
7. Each TR shall have uninterrupted access that does not interfere with normal business activities. Access to the room shall be direct from corridors and shall not be via conference rooms, break room areas, etc.

B. Size

1. Every newly constructed TR shall be a minimum of 12' x 20' with continuous floor space serving a maximum area of 20,000 square feet. In some instances, the TR may be larger in order to serve the intended area. Consult HCIS on sizing of rooms serving areas larger than 20,000 square feet.

C. Accessibility

1. A door entering a TR shall always swing outside of the room and into a common corridor so that valuable wall space can be utilized to mount special systems.
2. Doors shall be fully opening (180 degrees), lockable, equipped with card access and be at least 40" – 42" in width.

D. Ceiling Height

1. The minimum ceiling height should be 8.5 feet above finished floor. Consideration should be given to having a 10-foot height.
2. To permit maximum flexibility and accessibility of cabling pathways, suspended ceilings shall not be permitted in TR's.
3. When a ceiling distribution system is used, design TRs with adequate pathways or openings through beams and other obstructions into the accessible ceiling space.
4. The ceiling finish should minimize dust and be light colored to enhance the room lighting.

E. Wall Construction, Floor Covering, and Room Finishes

1. To avoid dust and static electricity, the TR floor shall be treated with sheet vinyl, off white or VCT.
2. All walls shall be constructed to the deck.

3. The desire is that all walls hosting EZ-Path fire rated sleeves shall host the entire bank of sleeves inside the same wall cavity. This may require special framing accommodations in order to accomplish. See the typical telecommunications room floor plan detail in the Appendix for an illustration of these sleeves.
4. All walls shall be finished and painted from the finished floor to and including decking above with Sherwin Williams #B49 W2 paint.
5. All walls shall be lined with plywood. See fire protection engineering requirements below for additional information.

ENGINEERING REQUIREMENTS:

A. Environmental Controls

1. Maintain continuous and dedicated environmental control 24 hours per day, 365 days per year.
2. Design consultant shall calculate the heat load by using equipment manufacturer's specifications for each component. Allow for 50 percent growth.
3. A thermostat shall be located within the TR and control the TR only.
4. Maintain a temperature in the following range: 64 degrees F to 75 degrees F.
5. The acceptable relative humidity range should be 30% - 55%.
6. Dissipate the heat generated by active devices.
7. Temperature shall not increase 10 degrees in 60 minutes.
8. Maintain positive pressure with a minimum of one air change per hour.
9. If an independent cooling unit is installed, the unit shall be located outside of the TR.
10. When installed air conditioning units in the rooms, provide drip pans, shields and drains for leakage and condensation.

B. Fire Protection

1. Wet sprinklers shall be provided in each TR. Provide a sprinkler zone valve in each room.
 - a. A single interlock pre-action dry sprinkler system may be necessary if IT equipment value scheduled for the room necessitates it. Inquire with HCIS prior to the design.
2. Provide a cage around each sprinkler head.
3. The room shall be equipped with appropriate fire detection and alarm sensors.
4. All walls inside the TR shall be lined with 4' x 8' fire-rated AC-grade or better plywood, 8 feet high with a minimum thickness of .75". The "A" side shall be what is exposed with the "C" side facing the wall.
5. Plywood shall be treated on all sides with at least two coats of Sherwin Williams #B49 W2 paint on all sides, leaving a fire-rated stamp visible to meet JCAHO standards.
6. The plywood shall be continuous, into the corners, and mounted with appropriately rated hardware and not standard sheetrock screws.

C. Power

1. Each TR shall be supplied with both Critical and Normal power.
2. Power requirements at the rack(s):
 - a. *UPS Rack(s)*
 - i. Provide one (1) dedicated 120VAC quad receptacle and one (1) dedicated 208VAC circuit on emergency generator power. Depending on the UPS scheduled for the rack, the 208VAC circuit may require up to 60 amps. Coordinate this requirement directly with HCIS. Any receptacle shall be mounted at the rear of the rack and attached rigidly to the cable tray above the vertical manager. The UPS circuit may require a hardwired circuit that can be provided at the base of the rack.

b. *Non-UPS Rack(s)*

- i. Provide one (1) dedicated 120VAC quad receptacle and one (1) dedicated 208VAC circuit on normal power. Receptacles shall be mounted at the rear of the rack and attached rigidly to the cable tray above the vertical manager.
- 3. Power distribution for rack mounted equipment shall be done through the use of a monitored horizontal PDU. Provide a single data connection to each individual horizontal PDU scheduled.
- 4. Wall receptacles:
 - a. Provide 120V-20A receptacles to serve the following:
 - i. Software House Access Control System – **Emergency Power**
 - ii. Lencore Sound Masking – **Normal Power**
 - iii. Distributed Antenna System – **Emergency Power**
 - iv. Primex Wireless Clock Transmitter – **Normal Power**
 - b. Provide 120V-20A circuits to serve the following:
 - i. Rauland Responder 5 Nurse Call – **Emergency Power**

D. Uninterruptable Power Supplies (UPS)

- 1. At a minimum, a standalone owner provided UPS shall be installed in each TR to support the installed equipment. A centralized UPS may be considered on a per project basis.
- 2. Depending on the UPS size, the circuits serving the device shall either be mounted rigidly to the cable tray or hardwired to the UPS at the base of the rack. Contact HCIS for specific direction.
- 3. Provide a fire detection and alarm monitor module at the UPS. A supervisory alarm signal shall be sent when line voltage is removed and UPS is running on battery power.
- 4. UPS Options that shall be accommodated:
 - a. Small – APC 3000VA (120V)
 - b. Medium – APC 6000VA (208V – Hardwired)
 - c. Large – APC 10KVA (208V - Hardwired)
- 5. Coordinate amperage requirements of the hardwired UPS with HCIS.

E. Lighting

- 1. Provide a minimum of 50 foot candles measured 3 feet above the finished floor in front and back of installed relay racks.
- 2. Provide a minimum of two (2) fluorescent or LED strip fixtures on occupancy sensors. At least one light should be on emergency power.

F. Conduit, Sleeves and Ducts

- 1. Locate sleeve systems in places where pulling and termination will be organized and accessible for future use.
- 2. Where vertical and horizontal offsets are required, consider bend radius requirements and service loops.
- 3. In stacked closet locations, install a minimum of three (3) trade size STI series 44 EZ-Path fire-rated sleeves in the floor to accommodate backbone pathways. Work with HCIS to determine location and quantity. Install per manufacturer guidelines.
- 4. A minimum of ten (10) trade size STI series 44 EZ-Path fire-rated sleeves shall be provided for horizontal/backbone cabling. They shall be in two groups of five. All sleeves shall terminate at the cable tray within the TR. Location will be determined by HCIS. Depending on the area served, additional sleeves may be necessary. All sleeves must be accessible from both sides.
- 5. Install one (1) 1" (recessed) EMT conduit and single gang outlet for a wall phone. Phone shall be located just within the entrance of the TR.

G. Racks, Cabinets and Enclosures

- 1. Racks shall be used to house termination components of the telecommunications cabling infrastructure. They shall also host data network equipment.

2. The racks shall be a standard 7' tall, 2-post with a floor mounted design. Provide with two-sided EIA hole pattern and 19" wide.
3. A minimum of 3 feet shall be given between rows of racks.
4. Install 12" vertical wire managers between adjoining racks and a 6" cable manager at each end of the row. The rack closest to the wall shall be given 6" of clearance away from the wall.
5. All racks shall be secured and anchored at the base of the rack.
6. Each rack shall be bonded with a dedicated #6 AWG copper conductor back to the TR's TGB.

H. Cable Tray

1. Basket style tray shall be provided around the perimeter of the room to serve all horizontal data cabling as well as backbone cabling. See chart below for sizing guidelines.
2. A separate 6" wide x 4" deep cable tray shall be provided and installed above the horizontal data cabling tray to serve access control and special systems cabling.
3. Provide waterfall cable management or "drop-in" kits to allow for all cabling to be managed appropriately and within the manufacturer's recommended minimum bend radius requirements.

Room Size	Basket Tray Size	# of Category 6 Cables
8' x 10'	12" x 4"	Up to 240*
10 x 15'	18" x 4"	Up to 365*
**12' x 20'	18" x 4"	Up to 365*

* Table is based on 0.25" O.D. cable and 50% fill for design purposes

** Preferred room size for new TR buildout. Other dimensions given for projects with existing constraints.

I. Cable Management

1. All racks scheduled for a telecommunications room shall host double-sided cable managers. A 6" cable manager shall be placed at the ends of the row. All other vertical managers placed between racks shall be 12" in width. Any reduction in size from 12" shall require authorization from the Health Care Information Systems department.
2. Provide horizontal cable managers inside each rack. See the rack diagram illustrations below for additional information.
3. In a telecommunications room that is scheduled to receive floor penetrations and sleeves, provide wall mounted basket tray to help manage and support cabling. The width of the tray shall cover the width of the series of floor penetrations.
4. All cabling entering the telecommunications room shall be neatly bundled utilizing Velcro straps for support. Maintain these bundles while cable enters each rack for termination. Pay attention to bundle sizes as to not exceed manufacturer's recommendations so that near-end alien crosstalk is minimized.

J. Grounding and Bonding

1. All cable trays within the TR shall be grounded and bonded to cable tray system.
2. A grounding bus bar shall be provided within every TR mounted above the cable tray system. It shall be a 12" x 4" insulated copper bus bar and grounded to the electrical service ground. See standard TR plan for location.
3. Provide a grounding/bonding connection from the telecommunications grounding bus bar to:
 - a. Each individual rack (see illustration below for additional requirements)
 - b. Each conduit penetration entering the room
 - c. Basket tray
 - d. Shield/jacket of fiber optic cable

e. Exposed structural steel

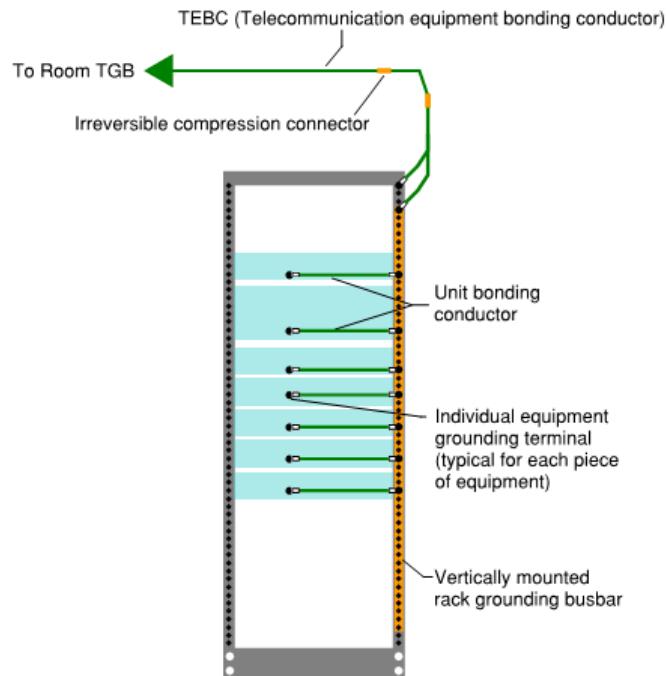


Fig. T1-1

K. Security

1. Provide access control at each TR. Architect shall specify approved electrified locking hardware. Technology design shall extend the existing campus-wide Software House system to each TR door.
2. See "Access Control" section for more detail.

L. Wall Phone

1. A wall mounted phone shall be installed at 18-24" from the door frame entering the room.

M. Rough-in Height

1. Standard work area outlets in offices, administrative areas shall match the same rough-in height as the electrical devices. Coordinate this on a per project basis.
2. Rough-in serving wall phones shall be mounted at 45" above finished floor from the center line of the box to comply with ADA Guidelines.

N. Other Building Systems, Equipment and Infrastructure Not Mentioned

1. Equipment not related to the support of the TR such as hydronic and vent piping, sanitary, roof drain lines, duct work, and electrical distribution for building power **shall not** be located or pass through the TR.
2. The TR **shall not** be shared with building or custodial services.
3. The fire alarm control panel (FACP) shall be placed in either a dedicated room outside of the telecommunications room or in a coordinated location with the Safety and Security department. The fire alarm system **shall not** reside inside any new telecommunications room.

O. Acceptable Technology Hosted Inside the Telecommunications Room

System Description	Location	Power	UPS	Generator
Structured Cabling	Rack	No	No	No
Data/Voice Electronics	Rack	Yes	Yes	Yes
Television Distribution	Wall	Yes	No	No
DAS	Wall	Yes	Yes	Yes
Video Surveillance	Rack	Yes	Yes	Yes
Access Control	Wall	Yes	No	Yes
Paging	Wall	Yes	No	No
Telemetry	Rack	Yes	Yes	Yes
Patient Monitoring	Rack	Yes	Yes	Yes
Wireless Clock	Wall	Yes	No	No
Sound Masking	Wall	Yes	No	No
Nurse Call	Wall/Rack*	Yes	Yes	Yes
Lighting Control	Wall	Yes	No	No

* This will depend entirely on where the nurse call installation will be located. New Rauland Responder systems deployed are wall mounted while existing Ascom Telligence systems are rack mounted. Coordinate the exact requirements with HCIS on a per project basis.

This table is not meant to be exhaustive for all possible systems. Coordinate these systems on a per project basis with the HCIS department.

2. System Design: Horizontal Pathway System and Rough-in Requirements

Horizontal pathways are used for distributing, supporting, and providing access to horizontal cabling between the work area outlet and the telecommunications room.

The horizontal pathway design shall take into account the scheduled quantity of cabling as well as allow for a factor of growth. Ceiling distribution is the most common distribution method and will be the only method highlighted here. See below for specific design considerations when planning a horizontal distribution system above ceiling.

A. Rough-in Requirements:

Description of location	Rough-in to be specified	Conduit Req. for Data
Typical work area outlet	4-11/16" W x 4-11/16" H x 2-1/8" D with a <u>single gang opening</u>	1" conduit to cable tray
TV (Digital Signage)	FSR Products PWB-100	1" conduit to cable tray
TV (A/V System) *	FSR Products PWB-270	1-1/4" conduit to cable tray
Omnicell/Medical Dispenser	FSR Products PWB-200	1" conduit to cable tray

* Coordinate these locations closely with the audio/visual requirements set by the owner.

B. Continuous Pathway: Basket Tray

1. Basket style tray shall be utilized in the above accessible ceiling spaces as the primary means to support and distribute the bulk of all telecommunications cabling.
2. The cable tray shall be sized so that the scheduled quantity of Category 6 cables reaches no more than 50% fill of the tray's total capacity.
3. See the table below as a loose guideline:

Tray Size	Max. # of Category 6 Cables
8" x 4"	161
12" x 4"	240
16" x 4"	324
18" x 4"	365
20" x 4"	405

Table based on .25" O.D. cable

4. The technology designer shall assist in communicating these pathway needs to the architect and mechanical engineer to ensure above ceiling space can be accommodated.
5. Provide a minimum of 3" clearance from the top of a ceiling tile to the bottom of the cable tray.
6. Provide a minimum of 12" clearance from the top of the cable tray to the bottom of structure or other obstruction.
7. Basket tray shall not be routed through rated walls. Utilize EZ-Path fire-rated sleeves to transition through all rated walls.

C. Continuous Pathway: Conduit

1. Conduit pathway sizing shall be based on 40% conduit fill. This shall not be exceeded.
2. A single continuous conduit run shall not exceed 100 feet without being provided a pull point or pull box.
3. There shall be no single conduit bend that is greater than 90 degrees or an aggregate of bends greater than 180 degrees between pull boxes/pull points.
4. See the table below for work area outlet conduit sizing and cable quantity requirements:

Conduit Size (diameter)	Max # of Category 6 Cables
1"	7
1.25"	12

Table based on .23" O.D. cable and a single 90 degree bend

5. Any penetration of conduit through rated walls shall require the use of fire stopping material. This shall be accommodated in order to continue the rating of the wall.
6. In areas that a poke-thru device or floor box is being utilized to serve power and data, provide a minimum of one (1) 1" conduit from the floor device to the above ceiling space. This may require finding a common wall or chase for the conduit to traverse above ceiling.

D. Non-Continuous Pathway: J-Hook

1. J-hooks may be utilized for small quantities of cabling in an above accessible ceiling space.
2. Category cabling shall be supported with a j-hook every 3 – 5 feet with no cabling resting on any ceiling tiles. Refer to manufacturer's recommended requirements for j-hook placement to avoid reflections in the cable's performance.
3. Provide a minimum of 3" of clearances above ceiling tile and support channels (T-bar).

3. System Design: Backbone Pathway Requirements

Depending upon location of the renovation and/or new construction specific pathway requirements shall be met in order to allow for dedicated and potentially redundant paths for University of Iowa fiber optic infrastructure. Additionally, pathways will also be required for local television and backup internet service providers. Coordinate these needs on a per project basis. Use the below table as a loose guideline:

Location	Pathway Type	Pathway Size	Location
Campus Location Renovation (Intrabuilding Infrastructure)	EZ-Path Fire Rated Sleeve	4"	Telecom Rooms and Corridors
New Clinic or Off Site Facility	HDPE Conduit	4"	Extended to nearest ITS and/or service provider hand hole

4. System Design: Backbone Distribution System

A backbone distribution system is the part of the premises distribution system that provides connection between telecommunications spaces. Typically connecting between floors and other campus buildings.

A. Backbone Fiber Optic Cabling Type and Quantity:

1. A new clinic or offsite facility may require ITS fiber optic infrastructure. Coordinate your site plan and conduit entrances with both the University of Iowa ITS department as well as HCIS.

Location	Fiber Type	Strand Count	Termination Type
Campus Location Renovation (Intrabuilding Infrastructure)	Singlemode AND Multimode (OM4)	Min. 24 of each	LC-APC and LC-UPC
New Clinic or Off Site Facility	Match incoming fiber type	Min. 24	LC-UPC

B. Backbone Copper Cabling Type and Quantity:

1. All telecommunications rooms built out within the campus shall require a backbone voice copper backbone cable. Provide a minimum 50-pair Category 3 cable from a coordinated location to the new telecommunications room. Cable shall terminate on the wall to a Category 6-rated 110 block
2. Forty-eight (48) Category 6 cables shall route from a dedicated 48-port patch panel mounted on a relay rack to a wall location in the telecommunications room adjacent to the multi-pair voice riser cabling. The Category 6 cables shall terminate to a Category 6-rated 110 block. Each pair shall be terminated. This will become an administration point and final cross-connect field from horizontal cables to the voice riser cabling.

5. System Design: Horizontal Cabling Systems

This is the portion of the cabling system that extends from the work area outlet to the horizontal cross-connect (telecommunications rooms) in the appropriate space. This includes: category 6 cabling, telecommunications outlets/connectors, mechanical terminations and patch cords. It may also include multiuser telecommunications outlet assemblies. Refer to the appendix for product specific information.

A. Category Cable Type and Quantity

1. Depending on the location, end-user, and systems scheduled, a minimum of Category 6 shall be required. See the table below for each system and the type of cabling to be utilized:

Performance Grade of Cable	System Served	# of cables
Category 6	Typical Work Area Outlet	Min. 2
Category 6A	Wireless Access Points	Min. 2
Category 6A Shielded	Telemetry	Varies
Category 6A Shielded	HDBase-T/Audio Visual Application	Varies

The majority of HVAC work typically requires mechanical systems to have ducted returns. Therefore, all cabling scheduled for these types of environments can be non-plenum (riser) rated in the above ceiling space. It shall be the responsibility of the technology designer to confirm whether or not riser rated cabling can be specified. All riser-rated cabling shall be blue. All plenum-rated cabling shall be white.

B. Routing and Termination

1. Regardless of pathway distribution method, the horizontal cabling shall be terminated in the respective telecommunications room that is on the same floor as the area it is serving.
2. Category 6 (and above) cabling shall be homerun, continuous and without splice.
3. Contractor shall utilize T-568B termination style for all data jacks.
4. Typical work area outlets shall be 4-port, thermoplastic and fog white in color. **Operating rooms and/or clean rooms may require stainless steel. This shall be reviewed on a per project basis.**
5. Any work area outlet that is scheduled to go into a patient headwall will often require oversized faceplates to sufficiently cover the rough-in opening. Coordinate this on a per project basis.
6. All jacks scheduled to serve typical data or telephony services shall be fog white in color. Utilize blank inserts for any unused data jack openings.
7. See typical details for the standard 4-port data work area outlet and labeling scheme.
8. Many ceiling and wall mounted field devices including but not limited to: video surveillance cameras, wireless access points, ELMS readers, key watchers, etc. shall be served using a patch cord as the final connection. The horizontal cabling shall be terminated in an above ceiling space to a surface mounted jack and never directly to the device. The bidding contractor shall utilize a factory terminated patch cable that matches the performance of the horizontal link.

6. Close-out Process and Expected Deliverables

It is critical that all projects have a thorough closeout process that includes documentation as well as a room readiness checklist. The consultant shall specify that the awarded contractor is responsible to provide the following documentation:

A. Telecommunications Room Readiness Checklist

1. The general contractor/construction manager shall supply a checklist to the owner that indicates that the telecommunications room is ready for equipment installation.
2. The checklist shall include at minimum, the following:
 - a. All dirty construction work has been completed. This includes drilling, hammering or any work that can create dust and debris inside the room.
 - b. Ladder rack, cable tray and racks are installed per construction documents.
 - c. EZ-Path sleeves are all installed.
 - d. Walls + Plywood are painted.
 - e. All backbone and horizontal infrastructure is pulled and terminated.
 - f. All backbone and horizontal infrastructure is tested.
 - g. All backbone and horizontal infrastructure is labeled.
 - h. Power properly installed with dedicated ground, printed labels with circuit breaker number.
 - i. Permanent lighting is installed.
 - j. Verify all electrical outlets are operational.
 - k. Telecommunications grounding and bonding system is fully installed. Submit ground test results.
 - l. Closet is cleared of all construction debris.
 - m. Floors are cleaned, sealed and mopped (if applicable).
 - n. Telecom room door is secure with card access and an automatic closer. Closer shall be properly adjusted.

- o. Room environmental controls is adequate and operating to maintain proper temperature and humidity levels.
- 3. This list shall have columns that assign responsibility to the appropriate trade, completion date and room for comments.

B. As-Builts:

- 1. Provide a hard copy floor plan print to be placed inside each telecommunications room. This shall be a clean drawing illustrating only telecommunications infrastructure with updated quantities that accurately reflect everything that was installed during the project. All labeling will be visible on this drawing to indicate locations that correlate to the patch panels inside the telecommunications room.

C. Cabling Run Excel Document:

- 1. Provide a formatted excel schedule that contains information for all copper cabling on the project. The schedule shall have the following columns with all associated information filled in:
 - a. Building Name/Number
 - b. Room Name (location of data jack)
 - c. IDF Closet #
 - d. WIRERUN (jack label)
 - e. Pairs
 - f. Termination Style (568B)
 - g. Cable Type (Category 6, 6A, 6A foil)
 - h. Function (Data, Camera, Wall Phone, ELMS Reader, RTLS, WAP)
- 2. Provide a formatted excel schedule that contains information for all fiber optic cabling on the project. The schedule shall have the following columns with all associated information filled in:
 - a. Fiber
 - b. Source Building
 - c. Source Room
 - d. Source FB (Fiber Box or Shelf)
 - e. Source FB Panel (Splice panel)
 - f. Destination Building
 - g. Destination Room
 - h. Destination FB (Fiber Box or Shelf)
 - i. Destination FB Panel (Splice panel)
 - j. Fiber Type (Singlemode, Multimode OM4)
 - k. Length
 - l. Strand Count

NURSE CALL DESIGN

1. Design Requirements Overview

This system (product, software and installation) shall be procured outside of the contract documents. It shall be the role of the technology designer to illustrate the required rough-in, pathways and power needed to support the system.

See the inserted 11 x 17 for a rough-in legend along with common symbols used and mounting heights.

NURSE CALL SYMBOL ROUGH-IN LEGEND

SYM.	DEVICE TYPE	ROUGH-IN REQUIREMENTS	CONDUIT REQUIRED	MOUNTING HEIGHT
(N) _a	PATIENT STATION - #353001	3-GANG MASONRY BOX, EQUAL TO RACO 942 BOX W/RACO 822 MUD RING. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(D)	DOME LIGHT - #352010	4-11/16" BOX WITH TWO GANG MUD RING. SUBSCRIPT "Z" IS A ZONE LIGHT. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 78" ABOVE THE FINISHED FLOOR OR IN CEILING
(N) _b	TOILET SWITCH - #354000	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 42" ABOVE THE FINISHED FLOOR OR 72" FOR SHOWER
(PAC)	DUTY DOMELESS CONTROLLER - #352021	4" SQUARE BOX WITH ONE GANG MUD RING. MOUNTED ABOVE ACCESSIBLE CEILING.	N/A	N/A
(N) _c	CONSOLE - #351200	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	FIELD VERIFY
(EQUIP)	EQUIPMENT CABINET - #NC2828	SUPPLIED BY CHA. PROVIDE 120V EMERGENCY POWER.	FIELD VERIFY	TBD ON SITE
(TV)	TV CONNECTION	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 89" ABOVE THE FINISHED FLOOR
(N) _d	TOILET SWITCH - #354000	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 42" ABOVE THE FINISHED FLOOR
(LR)	LIGHT RELAY - #NCLV120	ILLUSTRATED FOR WIRING PURPOSES ONLY.	FIELD VERIFY	FIELD VERIFY
(N) _e	STAFF TERMINAL - #351310	3-GANG MASONRY BOX, EQUAL TO RACO 697. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 54" ABOVE THE FINISHED FLOOR
(H) _f	DUTY STATION - #353100	3-GANG MASONRY BOX, EQUAL TO RACO 697. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _g	STAFF ASSIST STATION - #354012	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(PAC)	2-BUTTON STATION - #354015	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _h	37 PIN BED RECEPTACLE - #NCBEDS	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO PATIENT STATION	FIELD VERIFY
(N) _i	2-JACK STATION - #354018	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _j	CODE BLUE STATION - #354011	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _k	STAFF STATION - #353101	3-GANG MASONRY BOX, EQUAL TO RACO 697. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _l	DUAL PATIENT STATION - #353010	3-GANG MASONRY BOX, EQUAL TO RACO 942 WITH RACO 822 MUD RING. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(R)	REMOTE DIN STATION - #350300	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(N) _m	AUXILIARY INPUT - #NC4JACK	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(EM)	SMOKE DETECTOR - BY OTHERS	RELAY BASE WITH ONE (1) FORM "C" FOR CONNECTION TO NURSE CALL.	FIELD VERIFY	IN CEILING
(SHADE)	SHADE CONTROL INTERFACE	VERIFY TYPE AND LOCATION	FIELD VERIFY	FIELD VERIFY
(D) _n	MINI DOME LIGHT - #352004	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 78" ABOVE THE FINISHED FLOOR OR IN CEILING
(N) _o	REMOTE AUDIO STATION - #353200	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	TBD ON SITE
(PAC)	CANCEL STATION - #354010	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(H) _p	VANDAL PROOF CALL STATION - #CIS2/45	3-GANG MASONRY BOX, EQUAL TO RACO 697. TOTAL DEPTH 3-1/2"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR
(PAC)	HIGH SECURITY PUSHBUTTON - #PH55433	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 42" ABOVE THE FINISHED FLOOR
(D) _q	HIGH SECURITY DOME LIGHT - #CLS103	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 78" ABOVE THE FINISHED FLOOR OR IN CEILING
(N) _r	KEYSWITCH - #CKC8001-N0	4" SQUARE BOX WITH ONE GANG MUD RING. TOTAL DEPTH 2-7/8"	ONE (1) 1" CONDUIT TO ACCESSIBLE CEILING	④ 48" ABOVE THE FINISHED FLOOR

NURSE CALL SYMBOL ROUGH-IN NOTES:

- A. ALL DEVICES ARE SHOWN FOR ROUGH-IN AND PATHWAY PURPOSES ONLY. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL ROUGH-IN AS OUTLINED IN THE LEGEND ABOVE.

APPENDIX A

1. Approved Manufacturers and Products

The following list of manufacturers and products are approved for use in design. If any products listed below are found to be obsolete or discontinued, it shall be the responsibility of the technology design consultant to notify the Health Care Information Systems department. A new model/manufacturer shall be provided to the technology design consultant.

Manufacturer	Item	Part number	Color
3M	3" copper splice case	R-3	
Berk-Tek	Lanmark -1000 UTP/4pair Category 6 Reel	10032454	blue
Berk-Tek	Lanmark -1000 UTP/4pair Category 6 Box	10032455	blue
Berk-Tek	Lanmark -1000 UTP/4pair Category 6 Reel in a box	10065429	blue
Berk-Tek	Lanmark-1000 UTP/4pair Category 6 Plenum Reel	10032091	white
Berk-Tek	Lanmark-1000 UTP/4pair Category 6 Plenum Box	10032092	white
Berk-Tek	Lanmark-1000 UTP/4pair Category 6 Plenum Reel in a box	10065424	white
Berk-Tek	Armor-Tek Premise Distribution Riser 6 strand Single-Mode	PDRK006AB0707	yellow
Berk-Tek	Armor-Tek Premise Distribution Riser 24 strand Single-Mode	PDRK024-AB0504	yellow
Berk-Tek	Armor-Tek Premise Distribution Riser 48 strand Multi-Mode	PDRK12B048-CB3510/25	orange
Berk-Tek	6 strand SM fiber Pigtail 3 meter LC/APC for CATV fiber	BPDP06AMNCNM002	GREEN LC/APC
Berk-Tek	12 strand SM fiber Pigtail 3 meter LC/UPC	BPDP12ACNSNM002	BLUE LC
Brady	Laser Print labels 2" x 1.473"	LAT-33-707-1	white
Cablofil	Basket Tray 4"x10"	CF 105/300 BL	black
Cablofil	6" Basket Tray 4"x6"	CF105/150 BL	black
Cablofil	FAS U -Universal Bracket 12" horizontal wall bracket	FASU 300 BL	black
Cablofil	FAS U -Universal Bracket 6" horizontal wall bracket	FASU 150 BL	black
Cablofil	FAS P- Profile bracket 12" vertical wall bracket	FASP 300 BL	black
Cablofil	FAS P- Profile bracket 6" vertical wall bracket	FASP 150 BL	black
Cablofil	SWK - Splice Washer Kit	SWK BL	black
Cablofil	FASLOCK-Splice	FAS LOCK S* BL	black
Cablofil	RAD T 90	RAD T 90 KIT	
Cablofil	Single Hanger Suspension Bracket for 6" basket from ceiling	SAS BL	black
Cablofil	Basket Tray waterfall	CABLEXIT100 BL	black
Cablofil	Grounding Lug for basket tray	GNDSB	
Cablofil	Drop out kit	DROPOUT KIT BL	black
Cablofil	Splice Bar	ED275	
Corning	Tray for 12 single -fiber heat-shrink fusion splices- -Type 2S	M67-048	
Corning	Premium Connector Housings 1U	PCH-01U	
Corning	Premium Connector Housings 2U	PCH-02U	
Corning	Premium Connector Housings 4U	PCH-04U	
Corning	Wall mount housing for 6 SM fiber	WCH-029	black
Corning	Closest Connector Housing Panels Single Mode 24 pair LC	CCH-CCP24-A9	blue
Corning	Closest Connector Housing Panels Multi-Mode 24 pair LC	CCH-CC24-A8	beige
Corning	FIBER CONNECTOR PANEL 6 PORT LC Green /	CCH-CP06-B3	GREEN LC/APC
Corning	FIBER CONNECTOR PANEL 12 PORT LC Green / For Headend	CCH-CP12-B3	GREEN LC/APC
Corning	Closest Splice Housings	CJH-02U	
Corning	Storage Housing	CJP-02U	
Corning	Heat-Shrink Splice Protection Parts (pkg of 50; 60mm long)	2806031-01	
CPI	Adjustable QDRA 4 post Rack	15215-703	black
CPI	Evolution DBL Vert. Management	35524-703	black
CPI	Evolution Sing. Horiz. Management 2U	34551-702	black
CPI	4xSolid Mid-Panel (Width as appropriate)	35497-7XX	black
CPI	Cable distribution spools	15008-001	
CPI	Cable Distribution spacer kit	35505-001	
CPI	Standard Rack 6" D	66353-703	Black
CPI	MCS Master Cabling Section - 6"W	30095-703	black
CPI	MCS Master Cabling Section - 10"W	30096-703	black
Ortronics	Clarity6 Enhanced Category 6 TracJack	OR-TJ600	fog white
Ortronics	TrackJack blank inserts	OR-42100002	fog white
Ortronics	Single Gang Plastic TracJack Faceplate 2 ports	OR-40300548	fog white

Ortronics	Single Gang Plastic TracJack Faceplate 4 ports	OR-40300546	fog white
Ortronics	Double Gang Plastic TracJack Faceplate 8 ports	OR-40300554	fog white
Ortronics	Surface Housing for TracJack	OR-40400054	fog white
Ortronics	Furniture bezel mounts adapter plate for TracJack	OR-40700071	fog white
Ortronics	Furniture deep bezel mounts adapter plate for TracJack	OR-40700072	fog white
Ortronics	Furniture bezel Adapter plate, frontloads three TracJacks	OR-42100009	fog white
Ortronics	Clarity 6 High Density Category 6 48 port Patch Panels	OR-PHD66U48	
Ortronics	Clarity Cat 6A, High Density 48 Port Patch Panel	OR-PHD6AU48	
Ortronics	Clarity Cat 6A, High Density 24 Port Patch Panel	OR-PHD6AU24	
Ortronics	Clarity 6 High Density Category 6 48 port Patch Panels	OR-PHD66U48	
Ortronics	Cat.6 110 blocks w/legs 100 pair	OR-110ABC6100	
Ortronics	Category 6A Patch Cable (XX= footage as appropriate)	OR-MC6AXX-09	white
Ortronics	Category 6A Patch Cable (XX = footage as appropriate)	OR-MC6AXX-06	blue
Ortronics	Category 6A foil Patch Cable (XX = footage as appropriate)	OR-MCS6AXX-09	white
Ortronics	Category 6A foil Patch Cable (XX = footage as appropriate)	OR-MCS6AXX-06	blue
Quiktron	Category 6 Patch Cable (XX = footage as appropriate)	540-110-XXX PUI	blue
Siemon	C-4 clips	S110C-4	
STI	EZ-Path fire rated pathway Kit 44 series	EZDP44	orange
STI	EZ-Path fire rated pathway Multi-Gang Wall Brackets	EZP544W	
Superior Essex	25 pair category 3 copper riser cable shielded	02-097-03	
Superior Essex	50 pair category 3 copper riser cable shielded	02-100-03	
Superior Essex	200 pair category 3 copper riser cable shielded	02-108-03	
Superior Essex	100 pair category 3 copper riser cable shielded	02-110-03	
Wiremold	Poke-Thru Devices	RC9AMDTC** (** color)	
Wiremold	Raised Floor Box " box sized according to function"	AC Series	
Wiremold	Recessed Floor Box "box sized according to function"	RFB2 or RFB4 Series	

*This list is not exhaustive and other items required for a complete system may be needed. Contractor verify BOM during bid process

2. Illustrations: Example Telecommunications Room (TR)

See below for a sample buildout of an acceptable telecommunications room design. It is expected of the design consultant to produce an enlarged floor plan view, ceiling plan view, elevations and multiple telecommunications details to convey all necessary information to the bidding contractors.

Sample Floor Plan and Ceiling Plan

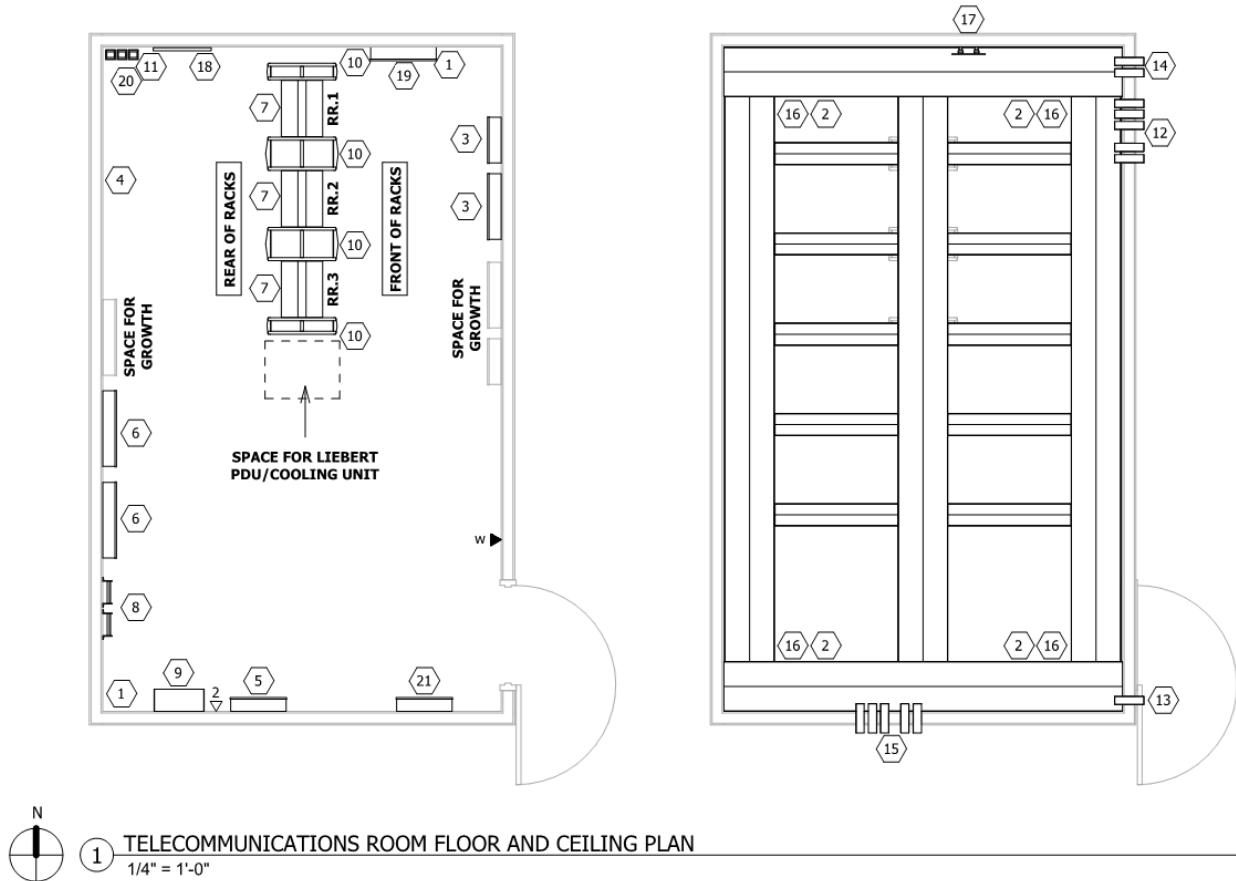
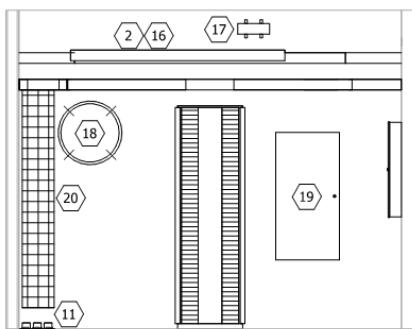
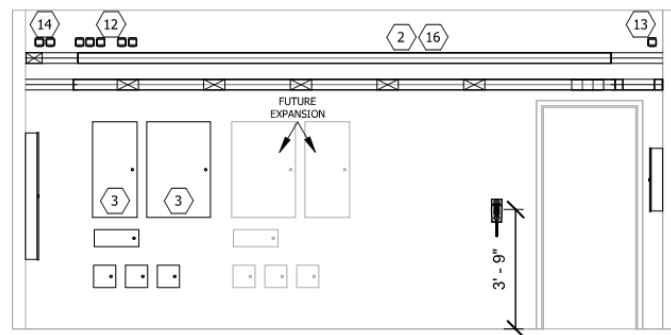


Fig. T2-1

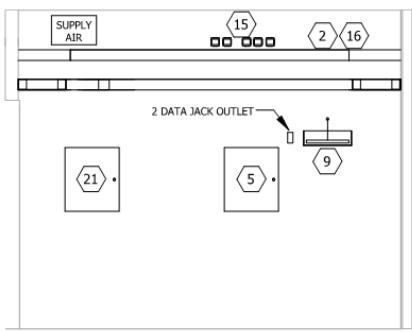
It is understood that the above buildout may not always be available for each project and that existing conditions can create certain constraints. However, a best effort must be made to obtain proper floor space for all the above scheduled equipment. Any deviations from the footprint above shall require HCIS to approve and sign off on the design before sending documents to bidding contractors.

Sample Elevations

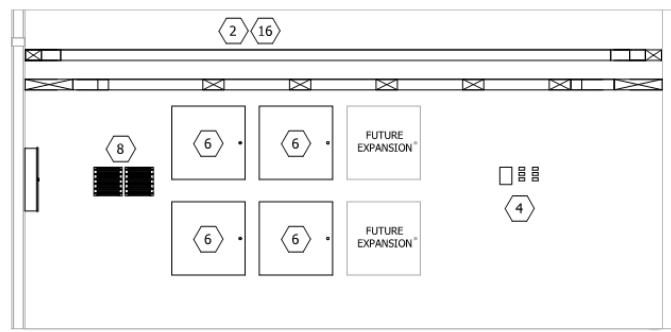
(2) TELECOMMUNICATIONS ROOM - NORTH WALL
1/4" = 1'-0"



(3) TELECOMMUNICATIONS ROOM - EAST WALL
1/4" = 1'-0"



(4) TELECOMMUNICATIONS ROOM - SOUTH WALL
1/4" = 1'-0"



(5) TELECOMMUNICATIONS ROOMS - WEST WALL
1/4" = 1'-0"

Fig. T2-2

TECHNOLOGY DETAILS GENERAL NOTES:

- A. ALL TRADES INVOLVED IN THE BUILD OUT OF THE NEW TELECOMMUNICATIONS ROOM ARE REQUIRED TO HOLD A COORDINATION MEETING PRIOR TO THE START OF ANY WORK. ALL SUBMITTALS FOR TELECOMMUNICATIONS AND SPECIAL SYSTEMS EQUIPMENT SHALL BE HELD UNTIL THE MEETING OCCURS. COORDINATE THIS MEETING THROUGH THE GENERAL CONTRACTOR.

TECHNOLOGY DETAILS KEYED NOTES:

- ① ALL WALLS SHALL BE LINED WITH 4' X 8' SHEETS OF 3/4" AC GRADE FIRE RETARDANT PLYWOOD PAINTED WHITE WITH FIRE RETARDANT PAINT. LEAVE FIRE RATED WOOD STAMP VISIBLE FOR INSPECTION. PLYWOOD SHOULD BE CONTINUOUS INTO ALL CORNERS.
- ② NEATLY BUNDLE AND MANAGE ALL CABLING AND SUPPORT WITH VELCRO STRAPS AS NECESSARY. PROVIDE APPROPRIATE ACCESSORIES AND TRANSITIONS TO MANAGE CABLING WHILE MAINTAINING MANUFACTURER RECOMMENDED BEND RADII.
- ③ DEDICATED WALL SPACE TO HOST DOOR ACCESS HEAD END COMPONENTS.
- ④ DEDICATED WALL SPACE TO HOST CATV DISTRIBUTION COMPONENTS.
- ⑤ DEDICATED WALL SPACE TO HOST SOUND MASKING SYSTEM.
- ⑥ DEDICATED WALL SPACE TO HOST OWNER PROVIDED NURSE CALL SYSTEM.
- ⑦ PROVIDE AND INSTALL A 2-POST RACK EQUAL TO CHATSWORTH PRODUCTS 66353-703. PROVIDE DOUBLE-SIDED CABLE MANAGEMENT ON BOTH SIDES OF THE RACK AS ILLUSTRATED.
- ⑧ LOCATION OF 110 BLOCK WALL FIELD FOR COPPER CROSS CONECT. STRUCTURED CABLING CONTRACTOR SHALL PROVIDE FOURTY-EIGHT (48) CATEGORY 6 CABLES FROM THE FIRST RELAY RACK TO THIS WALL FIELD.
- ⑨ LOCATION OF OWNER PROVIDED SHELF AND PRIMEX WIRELESS CLOCK TRANSMITTER.
- ⑩ PROVIDE A 6" DOUBLE-SIDED VERTICAL CABLE MANAGER AT EACH END OF THE ROW AND A 12" DOUBLE-SIDED VERTICAL CABLE MANAGER BETWEEN ADJOINING RACKS. GIVE THE RACK NEAREST THE WALL 6" OF CLEARANCE.
- ⑪ PROVIDE THREE (3) EZ-PATH SERIES 44 FIRE RATED FLOOR SLEEVES TO THE TELECOMMUNICATIONS ROOM BELOW.
- ⑫ PROVIDE FIVE (5) 4-INCH EZ-PATH SERIES 44 FIRE RATED SLEEVES. FOUR (4) SHALL SERVE ALL CATEGORY 6, 6A AND FOIL UTP CABLING AND ONE SHALL BE RESERVED FOR FIBER AND COPPER BACKBONE CABLING INFRASTRUCTURE. COORDINATE INSTALLATION WITH CORRIDOR CEILING HEIGHT AND CABLE TRAY INSTALLATION.
- ⑬ PROVIDE ONE (1) 4-INCH EZ-PATH SERIES 44 FIRE RATED SLEEVE. THIS SHALL SERVE THE DOOR ACCESS SYSTEM COMPOSITE CABLING. COORDINATE THE INSTALLATION OF THIS SLEEVE WITH THE CORRIDOR CEILING HEIGHT AS WELL AS THE 6" CABLE TRAY.
- ⑭ PROVIDE TWO (2) 4-INCH EZ-PATH SERIES 44 FIRE RATED SLEEVES. ONE SHALL SERVE THE NURSE CALL SYSTEM WHILE THE OTHER SERVES CATV CABLING. COORDINATE THE INSTALLATION OF THIS SLEEVE WITH THE CORRIDOR CEILING HEIGHT AND THE 18" CABLE TRAY.
- ⑮ PROVIDE FIVE (5) 4-INCH EZ-PATH SERIES 44 FIRE RATED SLEEVES. ALL FIVE (5) SLEEVES SHALL SERVE ALL CATEGORY 6 UTP CABLING INFRASTRUCTURE. COORDINATE INSTALLATION WITH CORRIDOR CEILING HEIGHT AND CABLE TRAY INSTALLATION.
- ⑯ DEDICATED PERIMETER BASKET STYLE CABLE TRAY SERVING ALL REQUIRED RACK INTERCONNECTIVITY. PROVIDE APPROPRIATELY SIZED BASKET TRAY FOR THE PERIMETER OF THE ROOM AS WELL AS THE RUN OF TRAY ABOVE THE 2-POST RACKS. PROVIDE 6" X 4" BASKET TRAY MOUNTED ABOVE THE PERIMETER TRAY TO HOUSE THE DOOR ACCESS CABLING.
- ⑰ PROVIDE TELECOMMUNICATIONS GROUNDBUS BAR (TGB) MOUNTED ABOVE THE BASKET TRAY. GROUND AND BOND ALL EQUIPMENT AS IDENTIFIED IN THE TELECOMMUNICATIONS GROUNDING AND BONDING DETAIL.
- ⑱ ALL NEW FIBER OPTIC CABLING SHALL HAVE A 20' SERVICE LOOP PLACED AND NEATLY MANAGED IN A COIL ABOVE OR BELOW THE TRAY.
- ⑲ LOCATION OF OWNER PROVIDED DISTRIBUTED ANTENNA SYSTEM.
- ⑳ PROVIDE BASKET STYLE CABLE TRAY MOUNTED TO THE WALL ABOVE THE VERTICAL EZ-PATH PENETRATIONS. SIZE THE BASKET TRAY WIDTH TO COVER THE VERTICAL SLEEVES.
- ㉑ LOCATION OF ELECTRICAL BRANCH PANEL SERVING POWER TO ALL CIRCUITS IN THIS ROOM. MAINTAIN 30" CLEARANCES AROUND PANEL.

Keyed Notes Fig. T2-3

RR.3

45	2U WIRE MANAGER
44	
43	48-PORT VOICE PATCH PANEL
42	
41	
40	
39	
38	
37	
36	
35	
34	
33	
32	
31	
30	
29	
28	
27	
26	
25	
24	CISCO CHASSIS SWITCH*
23	
22	
21	
20	
19	
18	
17	
16	2U WIRE MANAGER
15	
14	6A - 48-PORT PATCH PANEL
13	
12	6A - 48-PORT PATCH PANEL
11	
10	6A SHIELDED - 24-PORT PP
09	
08	
07	
06	
05	
04	UPS*
03	
02	
01	

RR.2

45	2U WIRE MANAGER
44	
43	CAT. 6 48-PORT PATCH PANEL
42	
41	CAT. 6 48-PORT PATCH PANEL
40	
39	CAT. 6 48-PORT PATCH PANEL
38	
37	CAT. 6 48-PORT PATCH PANEL
36	
35	CAT. 6 48-PORT PATCH PANEL
34	
33	2U WIRE MANAGER
32	
31	
30	
29	
28	
27	
26	
25	
24	CISCO CHASSIS SWITCH*
23	
22	
21	
20	
19	
18	
17	
16	2U WIRE MANAGER
15	
14	CAT. 6 48-PORT PATCH PANEL
13	
12	CAT. 6 48-PORT PATCH PANEL
11	
10	CAT. 6 48-PORT PATCH PANEL
09	
08	CAT. 6 48-PORT PATCH PANEL
07	
06	CAT. 6 48-PORT PATCH PANEL
05	
04	2U WIRE MANAGER
03	
02	
01	

RR.1

45	2U WIRE MANAGER
44	
43	
42	4U PCH FIBER TRAY
41	
40	
39	
38	
37	
36	TOA AMP*
35	
34	
33	
32	PHILIPS AP CONTROLLER*
31	
30	PHILIPS KVM*
29	
28	
27	
26	
25	
24	
23	
22	PHILIPS MONITORING*
21	
20	
19	
18	
17	
16	
15	
14	
13	
12	
11	
10	
09	
08	
07	
06	
05	
04	
03	
02	
01	

MANUFACTURER
MODEL
HEIGHT
WIDTH
DEPTH
CABINET TYPE
BASE MOUNTING
DOOR STYLE
CABLE MGMT.
POWER DIST.
VENTILATION
POWER CIRCUITS
LOCATION
SERVICE DESC.

CHATSWORTH
66353-703
84"
20.31"
18"
2-POST
ANCHOR TO FLOOR
NONE
VERTICAL
HORIZONTAL PDU*
PASSIVE AIR FLOW
SEE POWER DRAWINGS
TELECOM ROOM #
OWNER EQUIP./BACKBONE

CHATSWORTH
66353-703
84"
20.31"
18"
2-POST
ANCHOR TO FLOOR
NONE
VERTICAL
HORIZONTAL PDU*
PASSIVE AIR FLOW
SEE POWER DRAWINGS
TELECOM ROOM #
HORIZONTAL DISTRIBUTION

CHATSWORTH
66353-703
84"
20.31"
18"
2-POST
ANCHOR TO FLOOR
NONE
VERTICAL
UPS
PASSIVE AIR FLOW
SEE POWER DRAWINGS
TELECOM ROOM #
HORIZONTAL DISTRIBUTION

*INDICATES PROVIDED BY OWNER

NOTE: VERIFY RACK LAYOUT WITH OWNER PRIOR TO INSTALLATION

Typical Rack Diagram Detail – Fig T2-4

3. Illustrations: Typical Details

The following details are typically found on all new construction and renovation projects to re-enforce standards and expectations for each of the installing contractors.

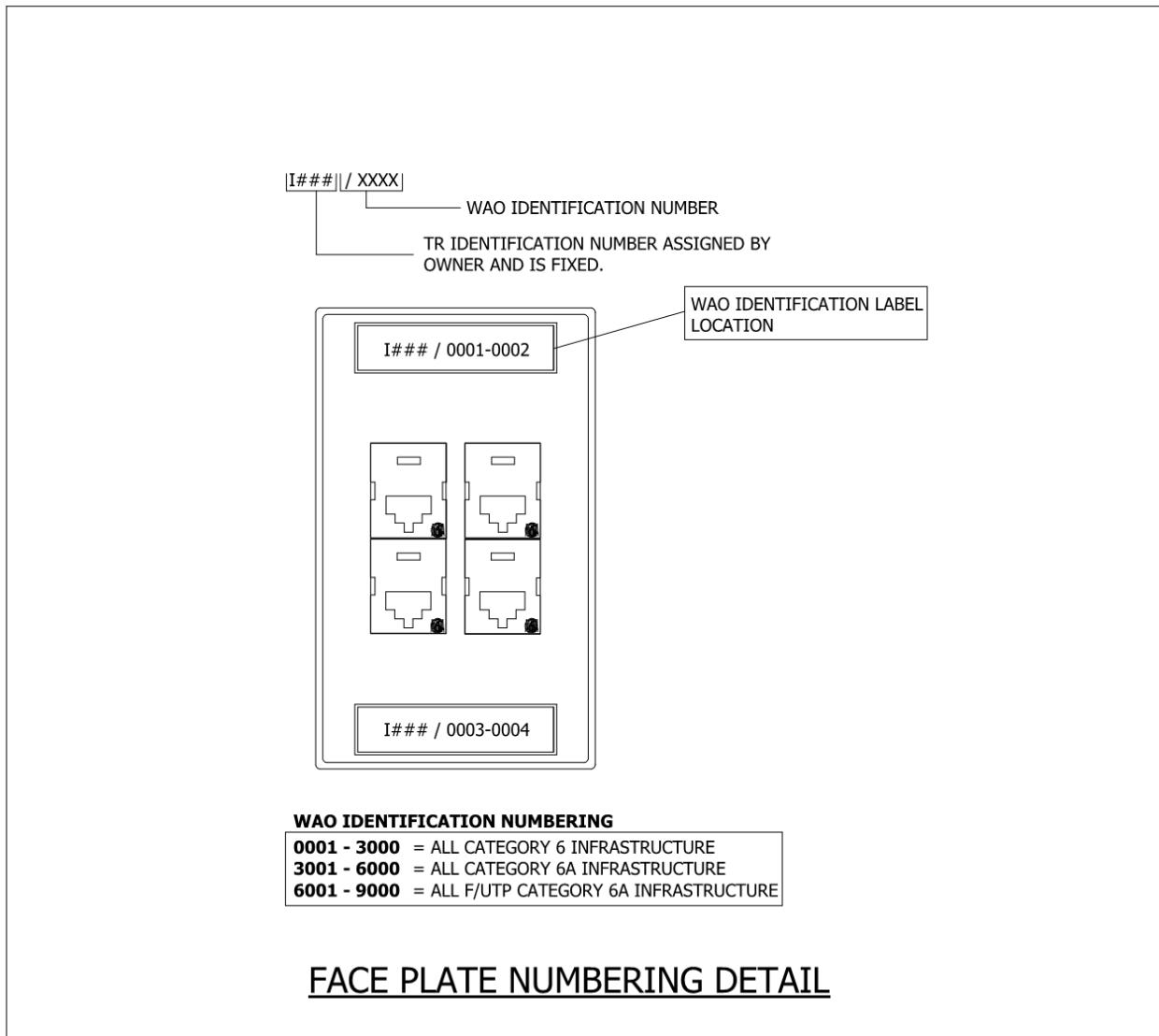


Fig D1-1 – Typical Work Area Outlet Labeling Details

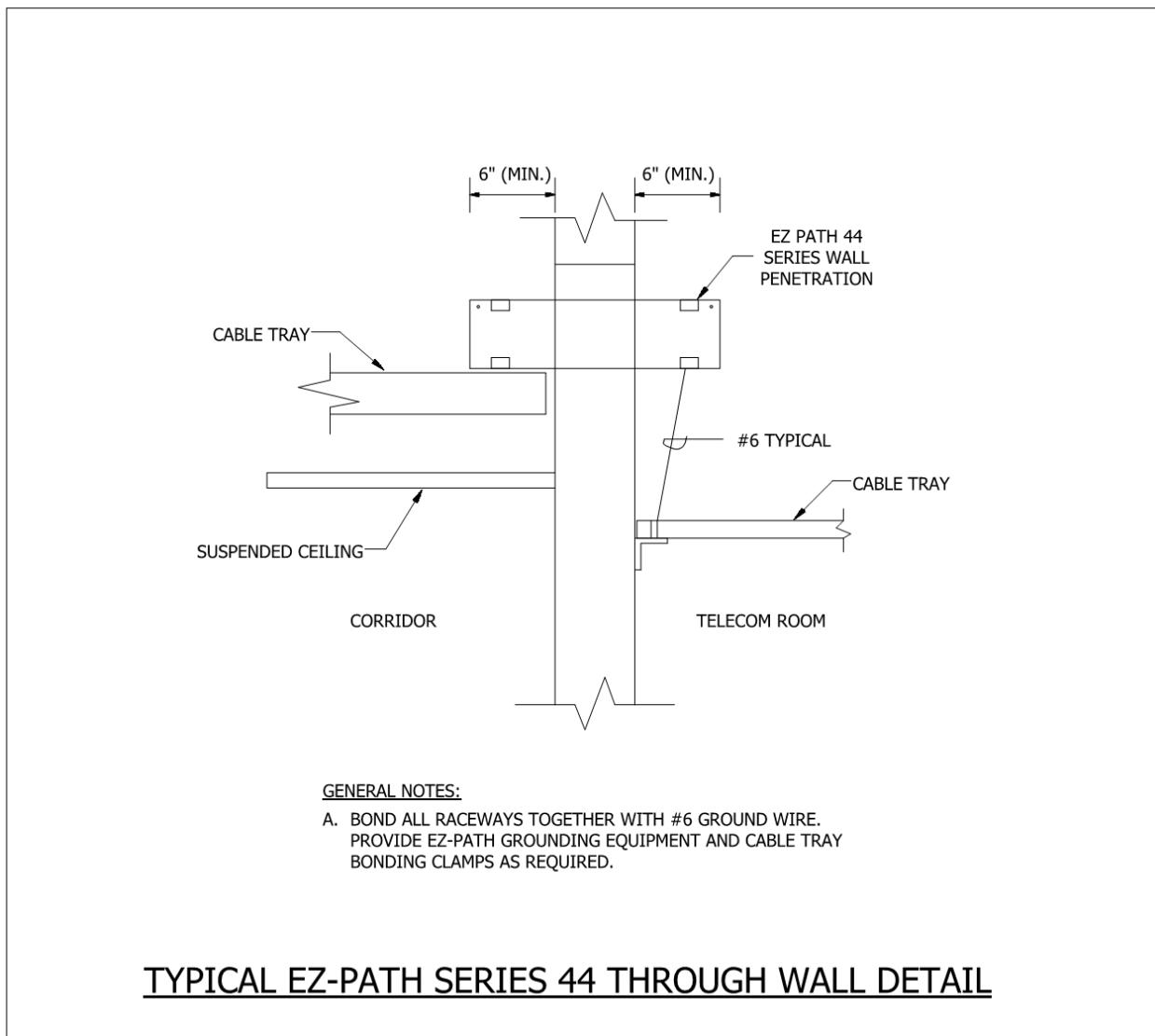


Fig D1-2 – Typical EZ-Path Installation Detail

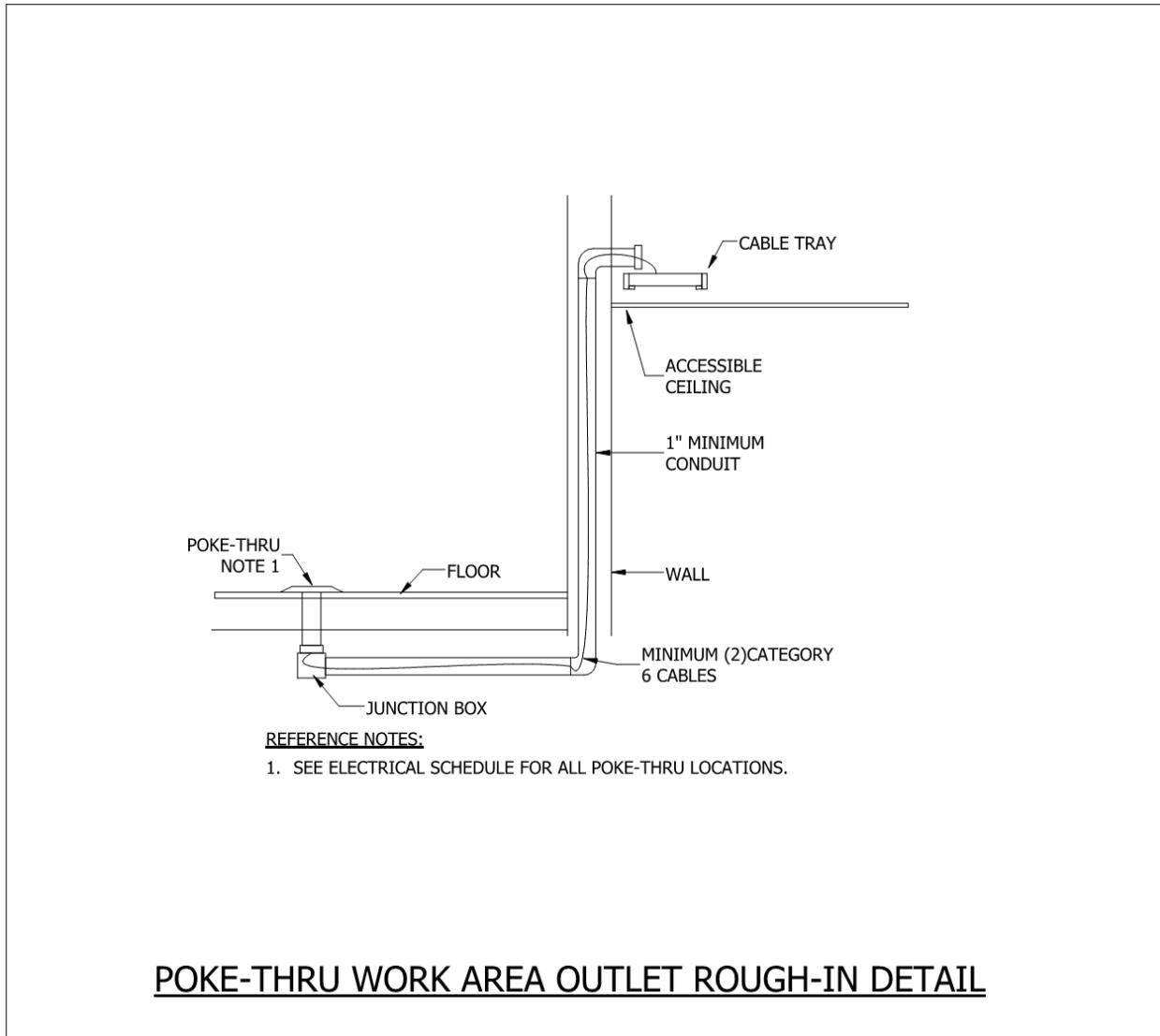
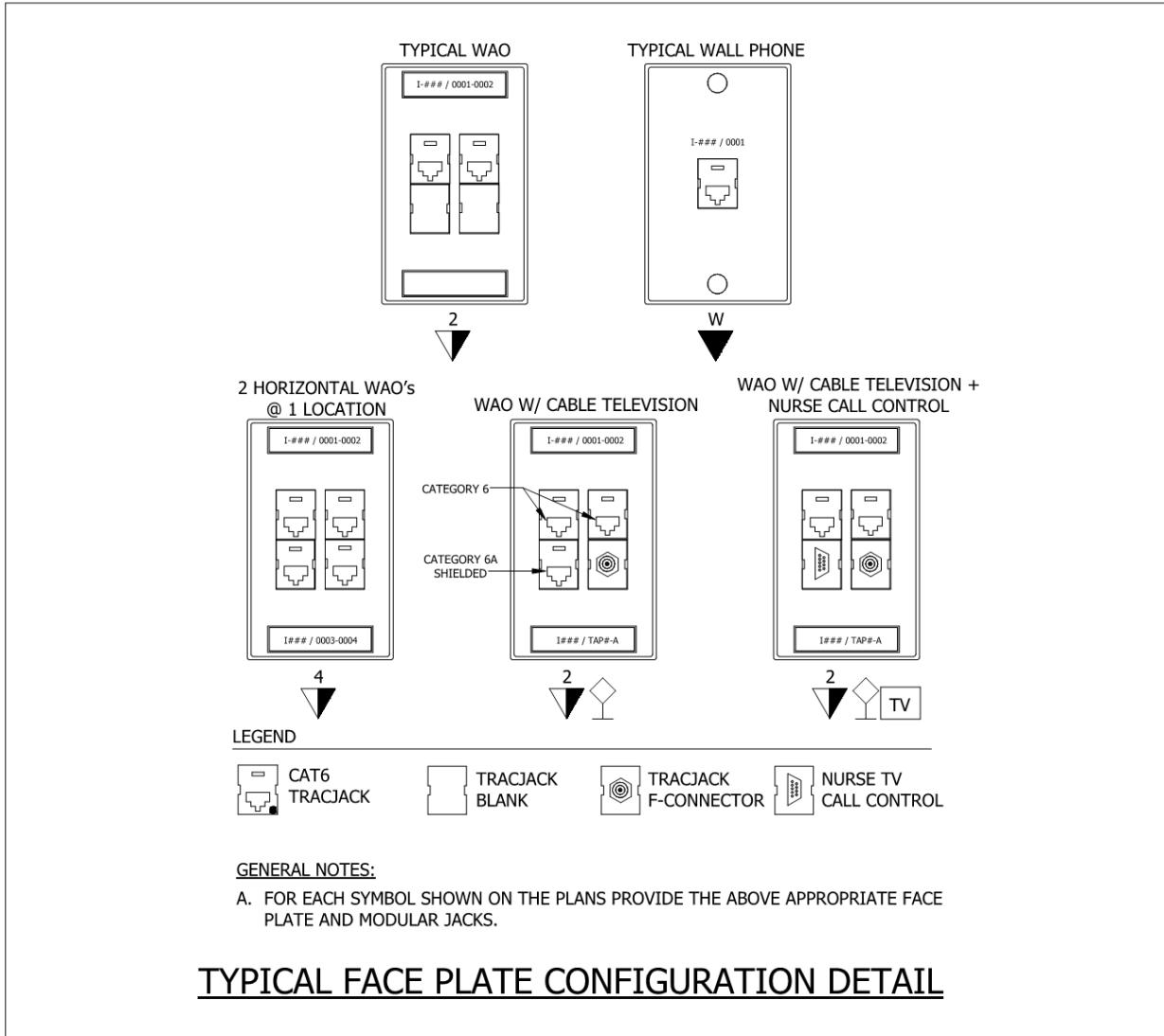
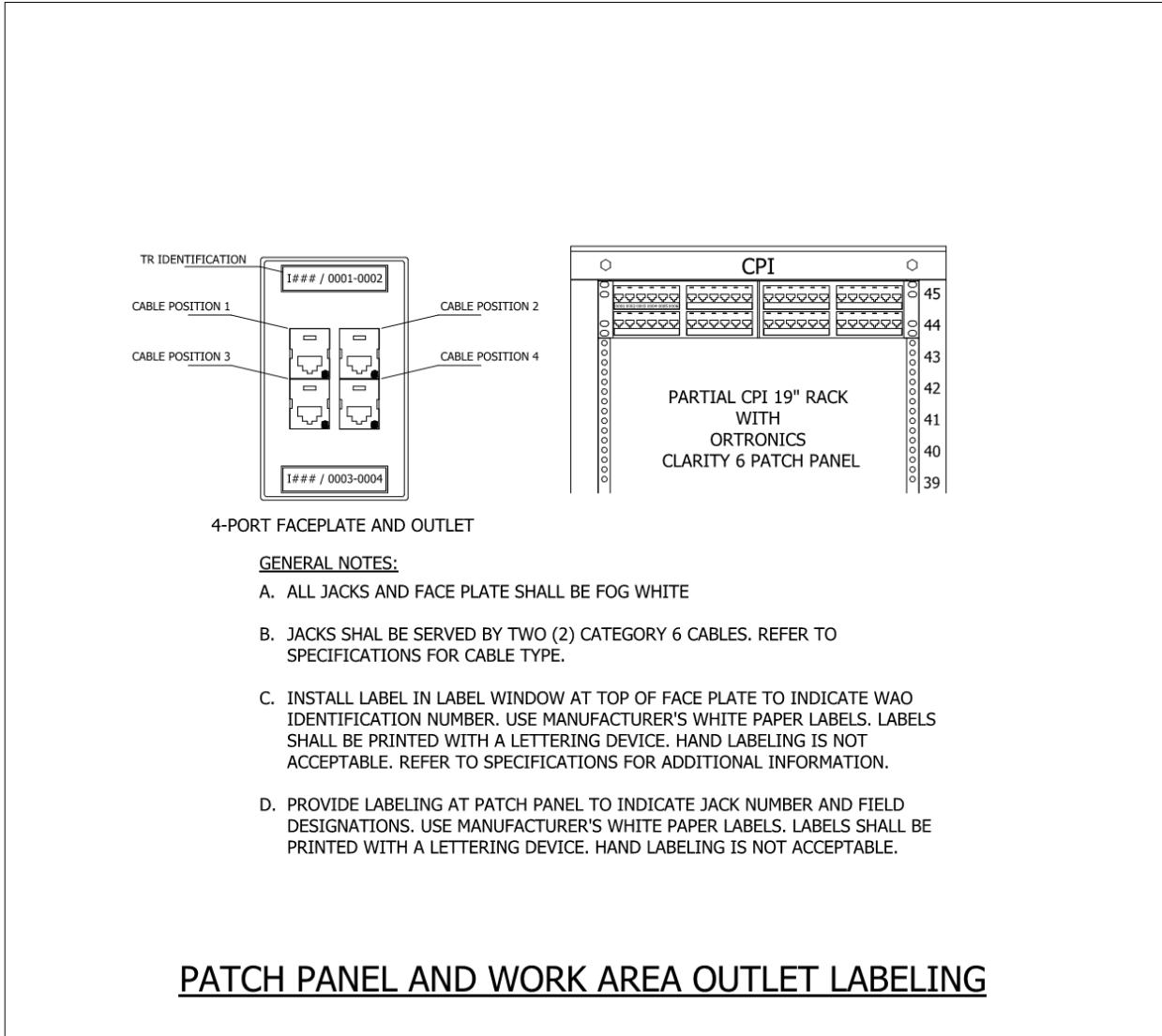


Fig D1-3 – Typical Poke-Thru Work Area Outlet Rough-in Detail

**Fig D1-4 – Typical Face Plate Configuration Detail**

**Fig D1-5 – Typical Patch Panel Detail**

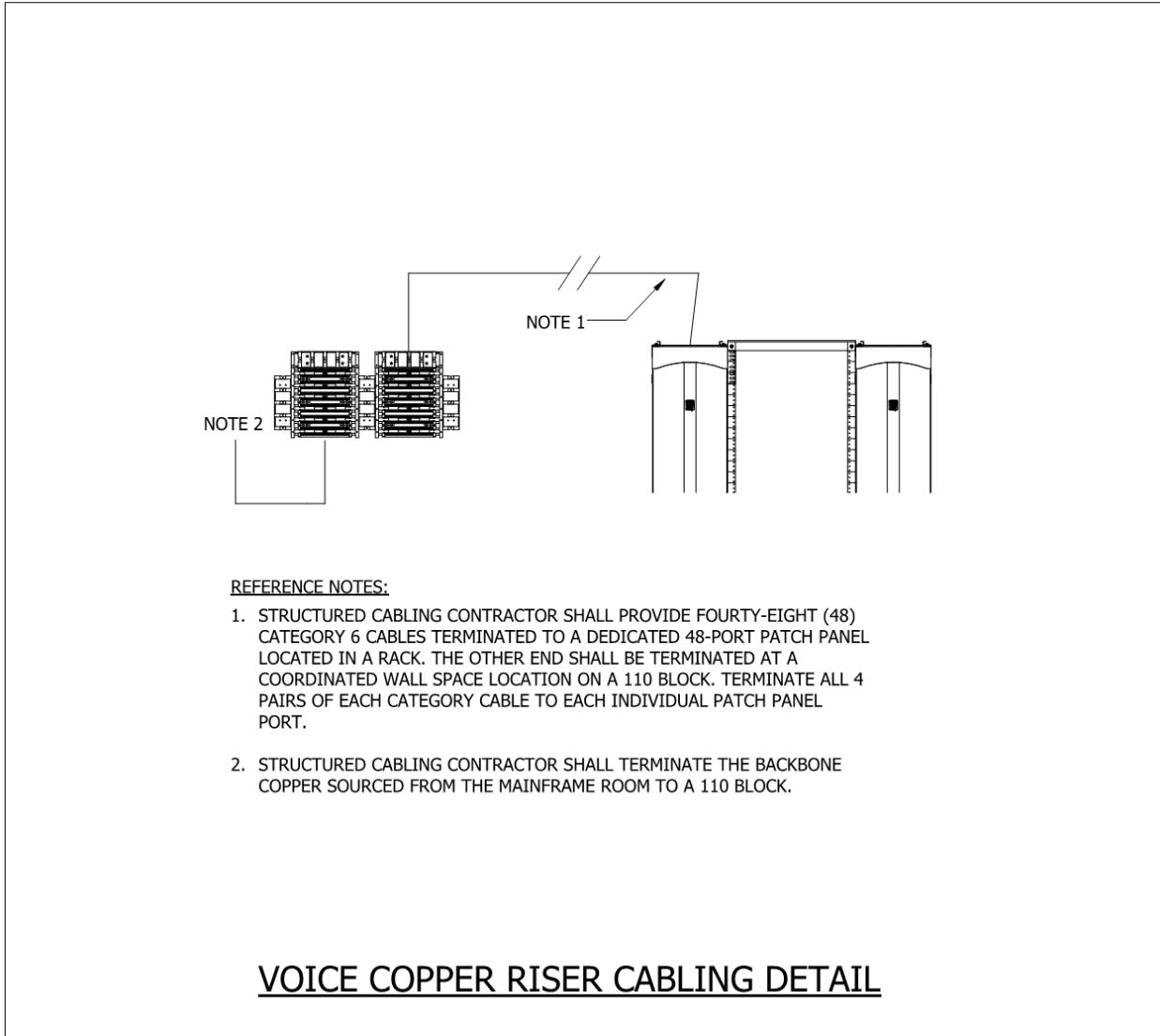
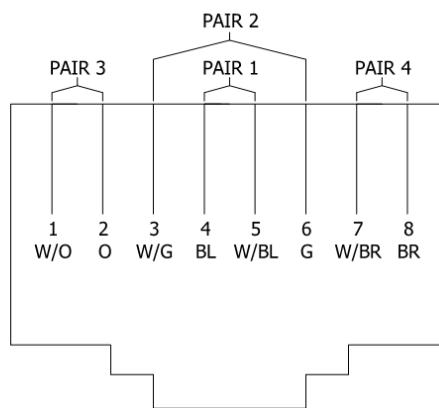


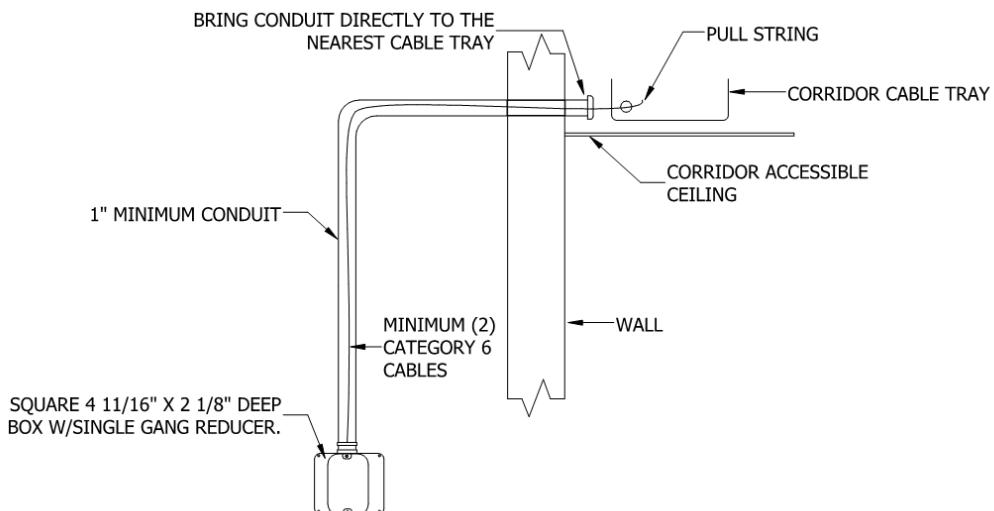
Fig D1-6 – Typical Copper Riser Cabling Termination Detail



APPLICATION	LABEL COLOR	FRAME TERMINATION
FIRST LEVEL BACKBONE	WHITE	MAIN HOUSE COUNT TERMINATION BLOCK LABEL
STATION CABLE	BLUE	HORIZONTAL FIELD IN ALL CLOSETS
EQUIPMENT CABLES	PURPLE	EQUIPMENT CABLE FIELD IN ALL CLOSETS

TIA/EIA T-568B JACK TERMINATION AND TABLE OF LABEL COLOR CODES

Fig D1-6 – T-568B Termination Detail



GENERAL NOTES:

- A. EVERY WORK AREA OUTLET (WAO) GETS ONE TYPICAL ROUGH-IN.

TYPICAL CONDUIT PATHWAY TO WORK AREA OUTLET

Fig D1-7 – Typical Conduit Pathway to Work Area Outlet Detail

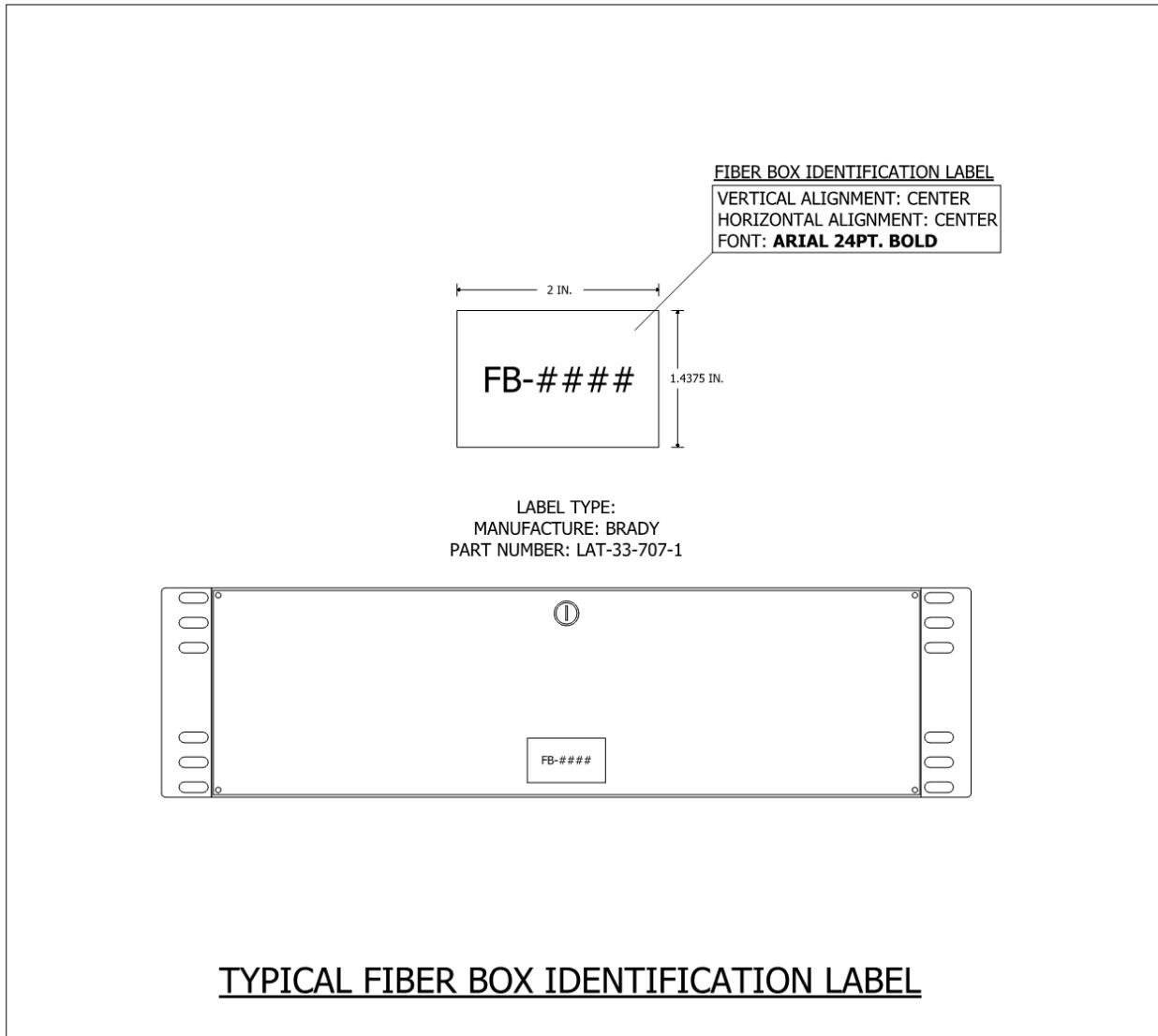


Fig D1-7 – Typical Fiber Box Identification Label Detail

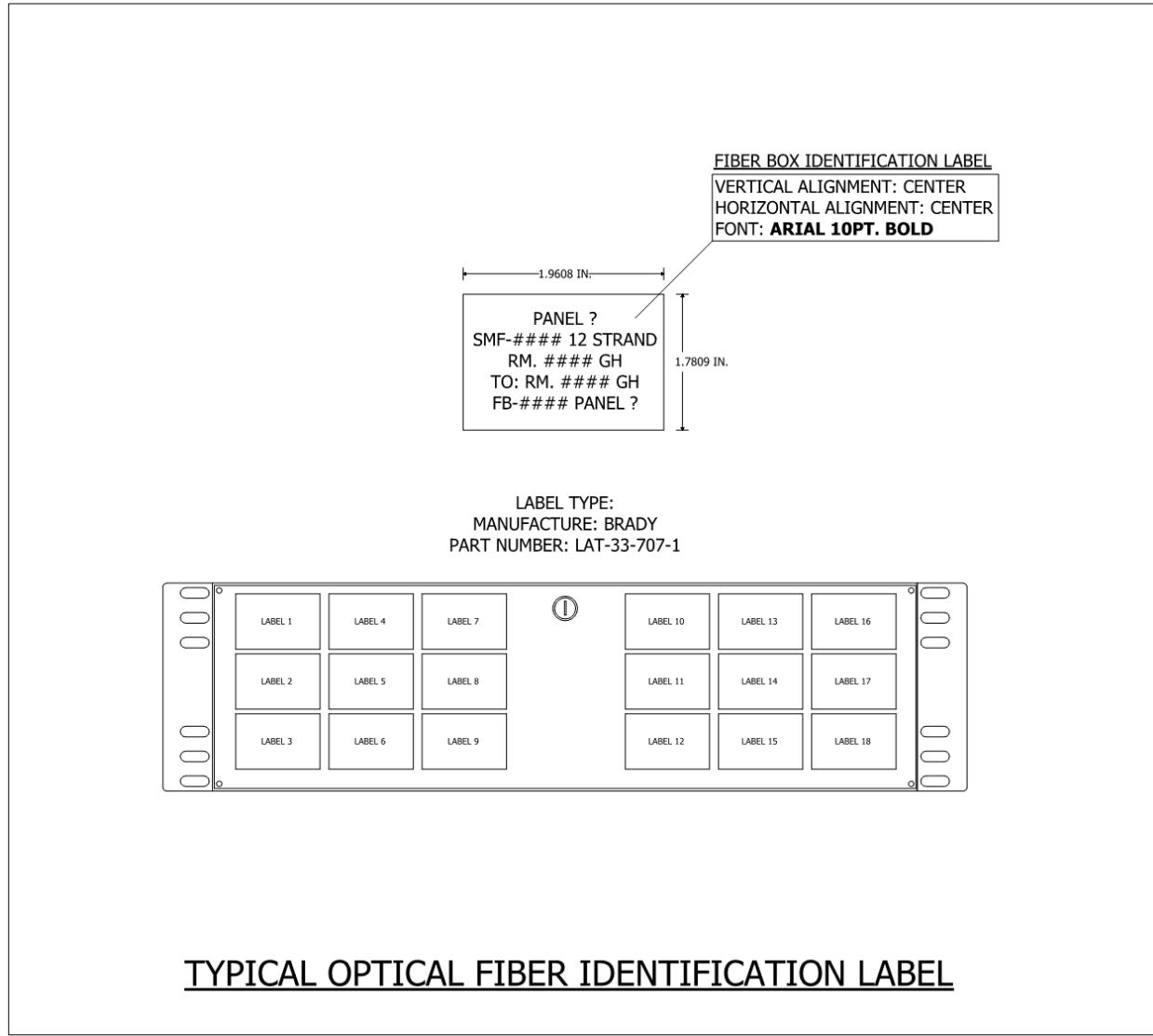


Fig D1-7 – Typical Optical Fiber Identification Label