

UIC COM PEORIA

The following listed documents comprise the project manual for the project listed above. Where numerical sequence of sections is interrupted, such interruptions are intentional.

The complete Project Manual for this project consists of this entire Volume 1 and 2, which must not be separated for any reason. The Architect and Owner disclaim any responsibility for any assumptions made by a contractor or subcontractor who does not receive a complete Project Manual, including all sections listed in the Table of Contents.

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260553	Electrical Systems Identification	AEI	09/15/16
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260923	Lighting Control Devices	AEI	09/15/16
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SECTION 011000

SUMMARY

GENERAL

1.1 PROJECT DESCRIPTION

- A. Project Name and Address: University of Illinois College of Medicine at Peoria Interior Renovations Address: 1 Illini Drive, Peoria, IL 61605.
- B. Owner: University of Illinois College of Medicine at Peoria.
- C. Related Requirements: The General Conditions, Supplementary Conditions, and all Division 00 and 01 Sections are a part of each and every Section of the Project Manual Specifications, Volumes One and Two.
- D. See Division 00 Bidding and contract provisions for additional information regarding multiple prime bidding requirements.

1.2 MULTIPLE PRIME BIDDING

- A. Division 01- General Work includes fire protection and plumbing.
 - 1. Interior remodeling required to support the addition of M-1 students in fall of 2017. General work to include fire protection and plumbing work. New partitions and architectural finishes to be provided in two renovated areas of existing building. In building area A, existing lecture room A200A will be enlarged to be large enough to hold 70 students for team based learning. This area of renovation will be approximately 4000 S.F. Selective demolition is included in scope of work. Plumbing to be provided for new single occupant toilet room reusing existing fixtures. In building area B, program areas to create a gross anatomy lab include: the anatomy lab, classroom, locker rooms and adjacent spaces. This suite will be approx. 4193 gsf. Plumbing scope of work includes new sinks and emergency shower in anatomy lab and lavatories in locker rooms.
 - i. Addendum 1- Each trade is responsible for creating penetrations required by their scope of work and patch/repair existing construction as required. Penetration Firestopping to be provided as required by code. Labor rates to be based on regular time work schedule.
 - ii. No trailer is required on site. Space for weekly construction meeting to be provided on site by university.
 - iii. Each trade is responsible for removing their waste material from the site. General contractor typically coordinates dumpster rental/ waste management between the different trades. Assumption is that one dumpster will be on site at a time.

- iv. See logistic plan for service access locations and path of travel for construction. General contractor to provide floor protection at path of travel with 4'x8' sheets of masonite, taped down at edges and joints. Continuous plastic sheeting/ 'visqueen' underlayment to be placed under masonite. Floor protection is only required at the second floor. General contractor to provide daily cleaning/ maintenance in path of travel.
- v. Owner does not require flood or earthquake insurance.
- vi. Addendum 2: general contractor to include an allowance of \$5,000 for installation of concrete underlayment at FL-1 & FL-3

2. General Work- Relevant Specification Sections include the following, in addition to all Division 00 Bidding and contract provisions and Division 01 General Requirements.

- 024119 Selective Demolition
- 035416 Hydraulic Cement Underlayment
- 055000 Metal Fabrications
- 061053 Miscellaneous Rough Carpentry
- 064113 Wood-Veneer-Faced Architectural Cabinets
- ~~076200 Sheet Metal Flashing and Trim~~
- 078413 Penetration Firestopping
- 078443 Joint Firestopping
- 079200 Joint Sealants
- 079219 Acoustical Joint Sealants
- 081113 Hollow Metal Doors and Frames
- 087100 Door Hardware
- 088000 Glazing
- 088300 Mirrors
- 092116.23 Gypsum Board Shaft Wall Assemblies
- 092216 Non-Structural Metal Framing
- 092900 Gypsum Board
- 093013 Ceramic Tiling
- 095113 Acoustical Panel Ceilings
- 096513 Resilient Base and Accessories
- 096516 Resilient Sheet Flooring
- 096813 Tile Carpeting
- 097200 Wall Covering
- 099123 Interior Painting
- 099653 Electrostatic Metal Painting
- 101000 Visual Display Surfaces
- 101423.13 Room-Identification Signage
- 102113.13 Metal Toilet Compartments
- 102239 Folding Panel Partitions
- 102600 Wall and Door Protection
- 102800 Toilet, Bath, and Laundry Accessories
- 104413 Fire Protection Cabinets
- 104416 Fire Extinguishers
- 105113 Metal Lockers
- ~~115213 Projection Screens~~ Projection Screens provided by AV Vendor under separate contract
- 122413 Roller Window Shades

123213 Manufactured Wood-Veneer-Faced Casework
 123616 Metal Countertops
 123623.13 Plastic-Laminate-Clad Countertops
 200000 General Mechanical Requirements
 200529 Mechanical Supporting Devices
 200553 Mechanical Systems Identification
 200573 Mechanical Systems Firestopping
 200700 Mechanical Systems Insulation
21 0000 General Fire Suppression Requirements
21 1314 Automatic Fire Sprinkler System
22 0000 General Plumbing Requirements
22 0533 Electrical Heat Tracing
22 1118 Water Distribution System
22 1314 Sanitary Waste and Storm Drainage Systems
22 2114 Plumbing Specialties
22 4000 Plumbing Fixtures

B. Division 03 – Heating Work

1. Temperature Controls Contractor shall integrate to existing Tridium system and shall provide building controller and software updates for the renovated building. A new controller and programming will be required for a new air handling unit and new terminal units. Controllers, programming, wiring, valves and sensors shall be provided as identified on drawings and as written in specifications.
2. Renovated building area is broken up into two areas of renovation, Area A- Team Based Learning Classroom and Area B-Gross Anatomy Lab, totaling approximately 8,193 gsf. Heating and Piping contractor to provide new hot water reheat piping to new Anatomy Lab located on the 2nd floor Area B, and new heat piping to dedicated roof mounted air handler including re-circulating in-line pump and control valves. Provide new dedicated DX split system air conditioning units to IT/AV closets B227, including new refrigerant and condensate piping, route refrigerant piping up to remote mounted air cooled condenser and condensate piping down to nearest floor drain. New hot water and chilled water tie-in points will be made in the first floor mechanical room and routed up to the second and third floors via new utility chases. The Area A- Team Based Learning Classroom: dedicated DX split system air conditioning units to IT/AV closets A217, including new refrigerant and condensate piping, route refrigerant piping up to remote mounted air cooled condenser and condensate piping down to nearest floor drain.
 - i. Addendum 1- Each trade is responsible for creating penetrations required by their scope of work and patch/repair existing construction as required. Penetration Firestopping to be provided as required by code.
 - ii. Labor rates to be based on regular time work schedule.
 - iii. No trailer is required on site. Space for weekly construction meeting to be provided on site by university.
 - iv. Each trade is responsible for removing their waste material from the site.
 - v. Heating and Piping contractor to include an allowance for 40 hours of re-search time to trace existing temperature controls, heating and piping building services in Rooms B221 and B223. All unused wiring, conduit, hangers, etc to be removed.

vi. Owner does not require flood or earthquake insurance.

3. Heating Work- Relevant Specification Sections include the following, in addition to all Division 00 Bidding and contract provisions and Division 01 General Requirements.

<u>078413</u>	<u>Penetration Firestopping</u>
200000	General Mechanical Requirements
200513	Motors
200529	Mechanical Supporting Devices
200553	Mechanical Systems Identification
200573	Mechanical Systems Firestopping
200700	Mechanical Systems Insulation
230000	General HVAC Requirements,
230550	Vibration Isolation
230594	Water Systems Test Adjust Balance
<u>230901</u>	<u>Control Systems Integration</u>
230902	Control Valves and Dampers
230903	Control Instrumentation
230923	Direct Digital Controllers and Networks
230924	Graphical User Interface Integration
230993	Control Sequences
232116	Pipe and Pipe Fittings
232118	Valves
232120	Piping Specialties
232123	Pumps
232314	Refrigeration Systems
<u>232514</u>	<u>Chemical Treatment Systems</u>
237214	Heat Recovery Equipment
237328	Factory Fabricated Custom Air Handling Units (<u>applies to Division 3 and 4, unit provided by ventilation contractor</u>)
238123	Self-Contained air Conditioning Units
238214	Heating and Cooling Terminal Devices
238216	Coils

C. Division 04 – Ventilation Work

1. Renovated building area is broken up into two areas of renovation, Area A- Team Based Learning Classroom and Area B-Gross Anatomy Lab, totaling approximately 8,193 gsf. Ventilation contractor to provide new dedicated roof mounted air handler with heat recovery system and integral exhaust fan. Route new galvanized supply and exhaust ductwork to and from new Anatomy Lab located on the 2nd floor Area B. The Anatomy lab will consist of new Phoenix supply and exhaust air valves, high and low level exhaust and high supply air duct distribution.
2. The Area A- Team Based Learning Classroom, will utilize the existing supply and return system. Ventilation contractor to provide new supply variable air volume boxes with sound traps, new supply air duct distribution off of existing supply mains, ceiling diffusers and return grilles to plenum return ceiling.

- i. Addendum 1- Each trade is responsible for creating penetrations required by their scope of work and patch/repair existing construction as required. Penetration Firestopping to be provided as required by code.
 - ii. Labor rates to be based on regular time work schedule.
 - iii. No trailer is required on site. Space for weekly construction meeting to be provided on site by university.
 - iv. Each trade is responsible for removing their waste material from the site.
 - v. Ventilation contractor to include an allowance for 40 hours of research time to trace existing ventilation building services in Rooms B221 and B223. All unused ducts, hangers, diffusers etc to be removed.
 - vi. Owner does not require flood or earthquake insurance.
3. Ventilation Work- Relevant Specification Sections include the following, in addition to all Division 00 Bidding and contract provisions and Division 01 General Requirements.

<u>075323</u>	<u>EPDM Roofing</u>
<u>076200</u>	<u>Sheet Metal Flashing and Trim</u>
<u>078413</u>	<u>Penetration Firestopping</u>
200000	General Mechanical Requirements
200513	Motors
200529	Mechanical Supporting Devices
200553	Mechanical Systems Identification
200573	Mechanical Systems Firestopping
200700	Mechanical Systems Insulation
230000	General HVAC Requirements
230550	Vibration Isolation
230595	Air Systems Test Adjust Balance
233114	Ductwork
233118	Built-Up Air Handling Housings
233314	Ductwork Specialties
233400	Fans
233600	Air Terminal Devices
233713	Diffusers, Registers and Grilles
234114	Filters
237328	Factory Fabricated Custom Air Handling Units

D. Division 05 – Electrical Work

- 1. Renovated building area is broken up into two areas of renovation, Area A- Team Based Learning Classroom and Area B-Gross Anatomy Lab, totaling approximately 8,193 gsf. Electrical contractor to provide lighting and receptacles in renovated spaces as shown on electrical drawings. Electrical connections will be required for new rooftop air handling unit. The electrical scope of work will support power and data requirements of new audio visual system in classrooms, anatomy lab and seminar rooms. Electrical contractor to install only conduit and back boxes with pull string for A/V. Installation of audiovisual equipment, cabling, and terminations will be performed by AV vendor under separate contract.

- i. Addendum 1- Each trade is responsible for creating penetrations required by their scope of work and patch/repair existing construction as required. Penetration Firestopping to be provided as required by code.
 - ii. Labor rates to be based on regular time work schedule.
 - iii. No trailer is required on site. Space for weekly construction meeting to be provided on site by university.
 - iv. Each trade is responsible for removing their waste material from the site.
 - v. Electrical contractor to include an allowance for 40 hours of research time to trace existing electrical building services in Rooms B221 and B223. All unused wiring, conduit and hangers to be removed.
 - vi. Owner does not require flood or earthquake insurance.
2. Electrical Work- Relevant Specification Sections include the following, in addition to all Division 00 Bidding and contract provisions and Division 01 General Requirements.
- | | |
|-------------------|---|
| <u>078413</u> | <u>Penetration Firestopping</u> |
| 26 0000 | General Electrical Requirements |
| 26 0516 | Owner-Furnished Equipment |
| 26 0519 | Low-Voltage Electrical Power Conductors and Cables |
| 26 0526 | Grounding and Bonding for Electrical Systems |
| 26 0529 | Hangers and Supports for Electrical Systems |
| 26 0533 | Raceway and Boxes for Electrical Systems |
| 26 0553 | Electrical Systems Identification |
| 26 0593 | Electrical Systems Firestopping |
| 26 0923 | Lighting Control Devices |
| 26 2200 | Low-Voltage Transformers |
| 26 2416.13 | Lighting and Appliance Panelboards |
| 26 2416.16 | Distribution Panelboards |
| 26 2726 | Wiring Devices |
| 26 2813 | Fuses |
| 26 2816 | Enclosed Switches and Circuit Breakers |
| 26 5000 | Lighting Systems |
| <u>270000</u> | <u>General Communications Requirements</u> |
| <u>270526</u> | <u>Grounding and Bonding for Communications Systems</u> |
| <u>27 0528.29</u> | <u>Hangers and Supports for Communications Systems</u> |
| <u>27 0528.33</u> | <u>Raceway and Boxes for Communications Systems</u> |
| <u>27 0553</u> | <u>Communications Systems Identification</u> |
| <u>27 1500</u> | <u>Communications Horizontal Cabling</u> |
| <u>283113</u> | <u>Fire Detection and Alarm Systems</u> |

1.3 USE OF PREMISE

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to Contract Limit Lines, Property Lines.
 - 2. Owner Occupancy: Allow for Owner occupancy of site and use by the public.

3. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.4 OCCUPANCY REQUIREMENTS

- A. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building

PRODUCTS (Not Used)

EXECUTION (Not Used)

END OF SECTION

SECTION 23 7328

FACTORY FABRICATED CUSTOM AIR HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED WORK

- A. Section 20 0513 - Motors
- B. Section 20 0514 - Variable Frequency Drive (VFD) System
- C. Section 20 0529 - Mechanical Supporting Devices
- D. Section 20 0553 - Mechanical Systems Identification (Nameplate Markings)
- E. Section 20 0700 - Mechanical Systems Insulation
- F. Section 23 0550 - Vibration Isolation
- G. Section 23 0901 - Control Systems Integration
- H. Section 23 0902 - Control Valves and Dampers
- I. Section 23 0903 - Control Instrumentation
- J. Section 23 0905 - Instrument Point List
- K. Section 23 0923 - Direct Digital Controllers and Networks
- L. Section 23 0993 - Control Sequences
- M. Section 23 2116 - Pipe and Pipe Fittings
- N. Section 23 2118 - Valves
- O. Section 23 2120 - Piping Specialties
- P. Section 23 3314 - Ductwork Specialties
- Q. Section 23 3400 - Fans
- R. Section 23 4114 - Filters
- S. Section 23 8216 - Coils
- T. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables
- U. Section 26 0533 - Raceway and Boxes for Electrical Systems
- V. Section 26 2726 - Wiring Devices
- W. Section 26 2816 - Enclosed Switches and Circuit Breakers
- X. Section 26 2913 - Enclosed Controllers
- Y. Section 26 5100 - Interior Lighting

1.2 REFERENCE

- A. Work under this Section is subject to requirements of Contract Documents including General Conditions, Supplemental Conditions, and sections under Division 01 General Requirements.

1.3 SUBMITTALS

- A. Shop Drawings (Product Data) for all equipment including, but not limited to, the following:
 1. Appropriate identification
 2. Complete drawings showing plans and sections including details of construction
 3. Overall unit dimensions and individual components and sections dimensions
 4. Shipping and operating weight of unit and/or sections
 5. Structural design load
 6. Details of component support
 7. Capacities/ratings
 8. Materials of construction
 9. Thermal and acoustical performance of wall, roof and floor panels
 10. Pressure ratings and leakage ratings
 11. Thermal break construction details and performance calculations or test data
 12. Each component manufacturer's name, model number and data (Refer to each component section for submittal requirements.)
 13. Air leakage rates and test data
 14. Wiring diagrams and terminal points for control panels provided with units
 15. Manufacturer's installation instructions
 16. Air handling unit manufacturer's local representative and phone number

1.4 DESIGN CRITERIA

- A. For housings and floors operating under positive pressure (fan discharge side), maximum allowable deflection at panel midpoint shall not exceed 1/240th of any span in any direction at +10" WG.
- B. For housings and floors operating under negative pressure (fan inlet side), maximum allowable deflections at panel midpoint shall not exceed 1/240th of any span in any direction at -10" WG.
- C. Air handling unit manufacturer shall provide equipment as specified and install equipment furnished by others to result in complete and operational unit. Unit manufacturer shall assume single source responsibility for all air handling unit components and accessories.
- D. Furnish units complete with fans, piping, valves, piping specialties, actuators, motors, coils, humidifiers, drain pans, filter sections, damper sections and interior lighting, meeting configuration and as shown on drawings, specified and as scheduled. All unit components shall meet this Section of specification and all requirements specified in each section and division listed under Related Work. Control dampers shall be provided by unit manufacturer. Control dampers actuators will be furnished by Control Contractor and shall be field-installed by Mechanical Contractor.
- E. All materials shall meet NFPA 90A Flame and Smoke Generation Requirements.
- F. Units shall be UL or ETL listed in accordance with UL Standard 1995.
- G. Unless otherwise indicated, galvanized steel shall be G90 according to ASTM A924 (formerly ASTM A525), A653 and ASTM A-90 and aluminum sheet shall be 3003-H14 alloy, conforming ASTM B209.
- H. Each fan and motor combination shall be capable of delivering 110% of air quantity scheduled at scheduled total static pressure without operating into motor service factor.

- I. Motor furnished with fan shall not operate into motor service factor in any cases.
- J. Where inlet and outlet ductwork at any fan is changed from that shown on drawings, submit scaled layout of the change and system effect factor calculations, indicating increased static pressure requirement as described in AMCA Publication 201. This Contractor shall be responsible for any motor drive and/or wiring changes required as result of duct configuration changes at fan.
- K. Air handling unit static pressure to take into consideration actual static pressure loss of components furnished within unit.
- L. Wire brush all welds with solvent and wipe clean all bare metal before painting.
- M. Air handling unit shall be constructed for outdoor application and shall be designed for roof mounting on concrete curb provided by GC. For outdoor units, allow for snow and wind loading in accordance with the governing building Code when calculating allowable deflections.

1.5 FINAL CLEANING

- A. Outside and inside of each air handling unit shall be thoroughly cleaned. Use industrial grade cleaners to remove construction dust, sheet metal mill finish or grease. All proposed cleaning materials shall have contents identified and approved prior to use. Cover unit openings with sheetmetal or other proper material until ductwork is connected to maintain unit cleanliness.

1.6 MANUFACTURER QUALIFICATIONS

- A. Air handling units shall be manufactured by qualified unit manufacturer that has been making custom units for at least 10 yrs, and shall carry manufacturer's nameplate. Unit manufacturer shall be held responsible for specified performance of units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Engineered Air, , Ventrol, , and MarCraft **and York Custom**, with operating characteristics as scheduled and physical dimensions as shown on drawings and/or detailed.

2.2 UNIT BASE

- A. Unit base shall be fabricated from structural steel.
- B. Base shall be sized to provide sufficient height above floor to accommodate cooling coil drain trap height indicated on details. Additional steel base may be used as sub-base to provide the required trap height. Sub-base may be provided at factory by unit manufacturer or provided at field by Installing Contractor.
- C. Weld steel solid at connection points to assure rigidity. Size perimeter steel to allow for rigging and handling.
- D. Locate and size base cross supports to support internal components.
- E. Provide lifting lugs to perimeter base steel. Incorporate means of attaching cable or chain into each lug.
- F. Base shall be split in maximum size pieces to allow for economical shipment to jobsite and placement within building. Provide bolting structural steel on both sides of split for field joining.
- G. Unit base shall be primed and finished with rust inhibiting epoxy paint.

2.3 UNIT FLOOR

- A. Unit floor shall be constructed to meet the maximum allowable deflection, and constructed of no lighter than:
 - 1. 3/16" plate of 304 stainless steel.
- B. Floor joints and seams shall be sealed to meet allowable housing leakage rate specified. Use acrylic latex sealant meeting ASTM C834-76 (1981) or polyurethane sealant, ASTM C-920, Type S, Grade NS, Class 25, USDA Approved.
- C. Entire floor including base drain pans shall be insulated on underside to have same thermal and acoustical performance specified for unit housing. Insulation shall be supported by minimum 20 ga galvanized steel liner with joints sealed to provide continuous vapor barrier.
 - 1. Provide recessed drain pans as integral part of unit floor in pre-heating coils, outside air sections and humidifier sections.
 - 2. Drain pans shall be constructed from minimum 16 ga 304 SS sheet, all seams continuously welded with minimum 2" turned up.
 - 3. Drain pan shall be double sloped; pitched down in direction of air flow and pitched sideways to drain connection.
 - 4. Locate drain connections at lowest point of pan, one on either end. Connections shall extend through perimeter base channel and be continuously welded to insure air-tight seal as well as eliminate requirement for backup wrench during field piping. Provide removable cap on each drain connection.
 - 5. Refer to Cooling Coil Section for cooling coil drain pan requirements.
- D. Service corridor shall use same construction as unit, except floor shall be constructed of 3/16" aluminum plate with diamond-tread. Width of service corridor shall be as shown, but not less than 60".

2.4 UNIT HOUSING

- A. Unit housing shall be constructed of 4" thick double wall panels meeting thermal, acoustical and structural requirements specified.
- B. Panels shall utilize modular panel type construction. Panels may be self-supporting with internal support structure or supported by structural frame work.
- C. Panel joints and seams shall be sealed with proper gasket and caulking to meet maximum allowable housing leakage rate specified.
- D. Panel system, including service corridor where used, shall incorporate thermal break design at panel frames, joining mullions, supporting base, or corners. Thermal break is defined as prevention of condensation on outside surface of unit casing with 92°F dry bulb and 82°F wet bulb temperature in adjacent space and 50°F dry bulb temperature inside air handling unit.
- E. Unit manufacturer shall submit, as part of Shop Drawings, details of thermal break construction and calculations or test data indicating that thermal break design will prevent condensation on outside surface of unit casing with specified air temperatures at outside of unit and specified air temperature at inside of unit.
- F. Outer face of panels for indoor units shall be constructed of no lighter than:
 - 1. 16 ga galvanized steel or 18 ga if injected foam panels are used.
- G. Outer face of panels for outdoor units shall be constructed of no lighter than:
 - 1. 16 ga galvanized steel with 2 coats of primer having total dry film thickness of 5 mils and one finish coat of enamel. Finish color will be manufacturer's standard color.
- H. Solid inner face of panels shall be constructed of no lighter than:

1. 20 ga galvanized steel
 2. Unit casing shall be insulated with minimum 3 pcf density glass fiber, or 3 pcf density polyurethane foam insulation. Composite panel shall have heat transfer factor not greater than 0.12 Btu/(h·ft²·°F). All products as applied shall meet NFPA 90A possessing flame spread rating of not over 25 and smoke developed rating of not over 50.
 3. Acoustical absorptive panels shall have perforated inner face constructed of no lighter than 22 ga galvanized steel with fibrous inert core.
- I. Use solid inner surface for all sections
 - J. Use solid inner surface for all sections except fan inlet and discharge sections where perforated inner face to be used.
 - K. Provide center vertical partition to divide units into modules, as detailed on drawings. Partition panels shall be same construction as housing wall panels except both faces to be constructed of no lighter than 16 ga solid galvanized steel.
 - L. Provide blank-off panels with proper gaskets and sealants to prevent air bypass around equipment such as filters, coils, humidifiers and sound attenuators. Blank-off panels shall be constructed of galvanized steel no lighter than 16 ga unless otherwise noted. Blank-off panels at cooling coil sections shall be insulated with 3/4" thick insulation similar to AP Armaflex SA Duct Liner. Do not insulate blank-off panels between cooling coils located above drain pans.
 - M. Panel manufacturer shall have published literature available stating sound absorption coefficient of panel system obtained using ASTM Method of Test for Sound Absorption of Acoustical Materials in Reverberation Rooms (ASTM Designation C423-66), and sound transmission loss obtained using procedures conforming to ASTM Designation E90-70, E413-70T and other pertinent standards.
 1. Sound Transmission Loss in accordance with ASTM E90 shall equal or exceed the following:

	Octave Band Center Frequency (Hz)					
	125	250	500	1000	2000	4000
Transmission Loss (dB) of 4" Panels	21	24	34	44	51	53

2. Sound performance tests must be documented by independent laboratory (ETL, Riverbank Laboratories, Kideras Labs, etc.).
- N. Manufacturer shall also have published literature available describing load-carrying capabilities and thermal characteristics of the panel system.
- O. Entire roof of outdoor units shall be constructed with standing seam of 1-1/2" in height and filled with sealant for water-tight joints. Roofing shall be sloped 1/4" per foot with gutter and downspout mounted on low side of unit.

2.5 ACCESS DOORS

- A. Each unit section shall have 24" x 72" access door, unless shown differently on drawings.
- B. Fan section access door shall be sized to allow removal of fan wheel and motor through door, but not smaller than 30" x 72". If access door needs to be wider than 36", removable access panel may be provided.
- C. Access doors and door frames shall have similar thermal break construction as specified under Unit Housing.
- D. Access doors shall be same construction as housing panels.

- E. Access doors located downstream of cooling coils shall be true thermal break design with no metal to metal contact.
- F. Access doors shall be guaranteed tight closing through use of seals around entire periphery. Provide neoprene gasket between door frame and housing for air tight seal.
- G. Each access door shall contain 1/4" thick wire glass or double glazed tempered glass window minimum size of 12" x 12" or 12" round. Window shall be double paned with vapor seal construction.
- H. Each access door shall be furnished with corrosion resistant metal hinges or continuous piano hinge and shall have at least 2 stainless steel or aluminum alloy handles operable from both sides.
- I. Doors shall open against higher air pressure to affect seal.

2.6 ACCESS SECTIONS

- A. Access sections shall allow minimum of 30" between adjoining equipment. Provide access doors as indicated on the plans.

2.7 REMOVABLE ACCESS PANELS

- A. Removable access panels shall be provided as indicated on drawings and where equipment removal is not possible through access door. Removable panels shall be same construction as housing panels.

2.8 FILTER SECTIONS

- A. Filters shall be provided as specified and scheduled. Holding frames shall be installed by unit manufacturer to raise filters off floor and to prevent leakage in accordance with filter manufacturer's installation recommendation by unit manufacturer.

2.9 PREHEAT COIL SECTION

- A. Provide preheat coils, piping and internal piping as specified and indicated on drawings.
- B. Install coils, piping, and specialties not to block face area of coils. Terminate piping outside of unit casing for connection by Mechanical Contractor. Provide necessary pipe supports and hangers.
- C. Each coil shall be supported by galvanized steel frame which is independent of unit casing. Support frame shall allow individual coil removal. Coils shall be removable through unit access doors. Blank-off panels shall be galvanized steel sheets.

2.10 HEAT RECOVERY COIL SECTION

- A. Provide heat reclaim coils, piping and internal piping as specified and indicated on drawings.
- B. Install coils, piping, and specialties not to block face area of coils. Terminate piping outside of unit casing for connection by Mechanical Contractor. Provide necessary pipe supports and hangers.
- C. Each coil shall be supported by 304 stainless steel frame, which is independent of unit casing. Support frame shall allow individual coil removal. Coils shall be removable through unit access doors. Blank-off panels shall be 304 stainless steel sheets with insulation as specified.

2.11 COOLING COIL SECTIONS

- A. Provide cooling coils, piping and piping specialties specified, and indicated on drawings.
- B. Install coils, internal piping, and specialties not to block face area of coils. Terminate piping outside of unit casing for connection by Mechanical Contractor. Provide necessary pipe supports and hangers.

- C. Each coil shall be supported by 304 stainless steel frame which is independent of unit casing. Support frame shall allow individual coil removal. Coils shall be removable through unit access doors or removable access panels. Blank-off panels shall be 304 stainless steel sheet with insulation as specified.
- D. Each coil shall be provided with minimum 16 ga 304 stainless steel all welded condensate drain pan extending min. 6", but no more than 12" downstream of coil face. Each drain pan shall have sufficient depth to hold condensate water but not less than 2". Bottom drain pan shall extend min 18". Drain pans shall cover U bends of coil and any other pipes and components that form condensation. Drain pan shall be sloped in 2 directions (pitched down in direction of airflow and pitched sideways to drain connection) for self-drainage at minimum 1/4" per foot. Drain pan shall be individually piped down to drain pan located below, and bottom drain pan to be piped to hub drain at exterior of unit. Drain connection opening shall be flush with bottom of pan. Side pan connection located at lowest point of pan may be used only where bottom pan connection cannot be used. Drain pipes of intermediate and main drain pans shall be 304 stainless steel with sufficient size, but not less than 1-1/2"
 - 1. Furnish drain pan with separate overflow drain connection located just below overflow rim of pan.

2.12 FAN SECTION

- A. Fan and motor shall be provided as scheduled and meet requirements of appropriate Specification Sections.
- B. Fan and motor shall be factory mounted on vibration isolation equipment meeting requirements of Section 23 0550 - Vibration Isolation. Vibration base shall include integral adjustable motor base. If inertia bases are required, provide required concrete in factory.
- C. Unit manufacturer shall provide flexible connection between fan and discharge wall.
- D. Motor Removal:
 - 1. For motors 15 hp and larger, provide motor removal rail sized for L/400 deflection when fully extended and subjected to weight of motor at furthest extreme position.
 - 2. Removal rail shall be mounted in fan section, directly over motor, perpendicular to side of AHU.
 - 3. Removal rail shall be designed with roller so motor can be fully removed from unit to distance motor diameter plus minimum of 6", and lowered onto dolly with traversing arm able to freely move while carrying motor weight.
 - 4. Motor shall be able to be removed through access door or access panel.
- E. Fan Array:
 - 1. Fan array system shall consist of multiple, direct driven, arrangement 4 plenum fans constructed per AMCA requirements for duty specified. Fans shall be selected to deliver scheduled airflow quantity at scheduled operating total static pressure and scheduled fan/motor speed. Fan array shall be selected to operate at system total static pressure that does not exceed 90% of scheduled fan's peak static pressure producing capability at scheduled fan/motor speed. Each fan/motor cube shall include 11 ga, A60 Galvanized steel intake wall, 14 ga spun steel fan inlet funnel, and 11 ga G90 Galvanized steel motor support plate and structure. Fan intake wall, inlet funnel, and motor support structure shall be powder coated for superior corrosion resistance. Motors shall be standard pedestal mounted type, T-frame motors selected at specified operating voltage, rpm, and efficiency as needed to meet performance requirements. Motors shall include isolated bearings or shaft grounding. Each fan/motor cartridge shall be dynamically balanced to meet AMCA standard 204-96, category BV-5, to meet or exceed Grade 2.5 residual unbalance.
 - 2. Fan array shall provide uniform air flow and velocity profile across entire air way tunnel cross section. Airflow and velocity shall not exceed scheduled cooling coil and/or filter bank face velocity when measured at a point 12" from intake side of fan wall array intake plenum wall, and distance of 48" from discharge side of fan wall intake plenum wall.

3. Provide partition between fans to minimize system effect.
4. Provide structural frame to support upper fans with solid floor panel partition between fans as shown on drawings to minimize system effect.
5. Each fan/motor cube shall be equipped with metal grating fan outlet guard.
6. Each fan in array shall be provided with back flow prevention means that produces less than 0.10" of static pressure drop and/or system effect when that fan is enabled. Any such system effects and/or pressure drops shall be submitted and included as component in determining fan system total static pressure as submitted. Manufacturer's pressure drop ratings of any such equipment, developed from straight run test conditions will not be accepted.
7. Provide one variable frequency drive for fan array in AHU-1. Fan array shall be sized such that upon single fan failure, remaining fans could ramp up and provide same 100% design capacity.
8. Technology with multiple fans having individual VFDs may be considered.
9. Provide local electrical disconnect for each fan.
10. Contractor shall provide all wiring to air handling unit components that require power.

2.13 DIFFUSER SECTION

- A. Provide with diffusers to distribute fan discharge air evenly over unit cross section. Diffusers shall be minimum 16 ga galvanized steel or aluminum plate with proper perforation. Maximum PD of diffuser plate shall be 0.3" WG. Reinforce and support plate adequately.

2.14 DISCHARGE AIR SECTION

- A. Provide with framed discharge opening or spun bellmouth fitting conforming to size and configuration of the ductwork.

2.15 CONTROL DAMPERS

- A. Refer to Section 23 0902 - Control Valves and Dampers, for control dampers.
- B. Outside air dampers shall be equal to Tamco Series 9000 thermally insulated dampers.
 1. Extruded aluminum (6063T5) damper frame shall not be less than 0.080" in thickness. Damper frame shall be 4" deep. Outside air dampers shall be insulated with polystyrofoam on four sides.
 2. Blades shall be extruded aluminum (6063T5) profiles. Dampers shall be internally insulated with expanded polyurethane foam and shall be thermally broken. Complete blade shall have an insulating factor of R-2.29 and temperature index of 55.
 3. Blade seals shall be of extruded EPDM. Frame seals shall be of extruded TPE thermoplastic. Seals shall be secured in integral slot within aluminum extrusions.
 4. Bearings shall be composed of Celcon inner bearing fixed to 7/16" aluminum hexagon blade pin, rotating within polycarbonate outer bearing inserted in frame, resulting in no metal-to-metal or metal-to-plastic contact.
 5. Linkage hardware shall be installed in frame side and constructed of aluminum and corrosion-resistant, zinc-plated steel, complete with cup-point trunnion screws for slip-proof grip.
 6. Dampers shall be designed for operation in temperatures ranging between -40°F and 212°F.
 7. Air leakage through 48" x 48" damper shall not exceed 4.12 cfm/ft² against 4" WG differential static pressure at standard air.
 8. Pressure drop of fully open 48" x 48" damper shall not exceed .03" WG at 1000 fpm.

2.16 FLOOR OPENING PROTECTION

- A. Floor openings shall have safety grates using 1" x 1/8" steel bar stock on 1-1/4" center spacing. Grates shall have same finish as floor. Provide 1-1/2" lip of galvanized steel at entire perimeter of opening.

2.17 ROOF CURB

- A. Unit manufacturer shall furnish roof curb for AHU-1 unit. Roof curb shall be 18" high and constructed from minimum 12 ga galvanized steel. At each of 4 corners, curb shall be joined together with corner post that is welded to one section of curb and then field bolted to adjacent section. Wood nailer shall be attached to inside flange of curb for field attachment of flashing and roof membranes.

2.18 CONTROLS

- A. All Control devices except for those that control the heat recovery system, will be furnished by Control Contractor and shall be factory installed by unit manufacturer as shown on plans and as described in control section of Specifications.
- B. The heat recovery system controls will be provided by the air handler manufacturer.

2.19 TESTING

- A. Owner and/or Owner's representative may elect to witness tests. Notify Owner and/or Owner's representative of test date at least 2 weeks in advance. Submit certified test data to Engineer for approval.
- B. Unit manufacturer shall provide factory tests to verify casing leakage after units are assembled.
- C. Unit manufacturer and installing contractor shall jointly provide field tests to verify casing leakage after units are installed at jobsite. Coordinate with Electrical Contractor for power to unit test fan.
- D. Casing leakage tests shall verify that unit casing leakage is less than **1%** of design air flow at specified static pressure.
 1. Seal duct openings in positive pressure section. Connect this section to fan developing **10"** WG positive static pressure, and read air flow of this fan using approved air flow measuring device. Fan air flow measurement shall be considered casing leakage of this Section.
 2. Seal duct openings in suction side of unit. Connect this section to fan developing **10"** WG in negative static pressure, and read fan air flow of this fan using approved air flow measuring device. Fan air flow shall be considered casing leakage of this Section.
 3. Conduct casing leakage test individually for each air handling unit. Total casing leakage shall be calculated as sum of positive pressure section leakage and negative pressure sections leakage. Total casing leakage shall not exceed the allowable rate specified above.
- E. Unit manufacturer shall provide factory panel deflection test. Conduct this test in conjunction with casing leakage testing.
 1. Panel deflection test for panels under positive pressure shall verify that unit casing deflection is less than 1/200 of the longest plane being measured at 1-1/2 times design static pressure or 10" WG positive, whichever is greater.
 2. Panel deflection test for panels under negative pressure shall verify that unit casing deflection is less than 1/200 of the longest plane being measured at 1-1/2 times design static pressure or 10" WG negative, whichever is more negative.
 3. Deflection shall be measured at 2 points for positive pressure sections and 2 points for negative pressure sections (total 4 points at panel seams) at mid-point of panel height.

2.20 ELECTRICAL SERVICE

- A. Provide adequate lighting and switching so equipment can be observed and maintained in safe manner. Combination lighting and convenience outlet circuit is required for each section of unit. Each access section shall contain a minimum of one light fixture. Sections wider than 12 ft shall have multiple light fixtures with maximum spacing of 6 ft.
 1. Provide light switch with pilot light for each access section. Locate switch near access door.
 2. Wire all lights to single junction box with single switch with pilot light.

3. Light fixtures shall be marine type incandescent bulb type. Provide bulbs for each fixture.
- B. Lights, switches, convenience outlets, wiring and conduit shall meet requirements of appropriate Specification Sections of Division 26.
 1. Provide two points of power connection, one for 3 Ph, 480 V and one for 1 Ph, 120 V power connection.
- C. Seal electrical penetrations into unit air-tight.
- D. For outdoor air handling units, unit manufacturer shall provide cabinet built into side of unit for mounting of VFD and temperature control panel. Unit manufacturer shall coordinate size of cabinet with equipment being furnished to ensure it is of adequate size to contain VFD and temperature control panel. Cabinet shall have weather tight access door to provide access to VFD and panel from outside of air handling unit. Cabinet shall be cooled with air supplied through dampered opening from discharge side of supply fans.

2.21 PIPED SERVICE

- A. Interior piping and equipment installation shall be complete. Piping shall be installed and tested per appropriate specification section. Unit manufacturer shall be responsible for any leaks, which occur in unit during system testing which occurs before system startup.
- B. Extend piping for each coil and humidifier if used through panel casing. Terminate piping with flange for pipe 2-1/2" and larger or threaded connection for pipe 2" and smaller with caps.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Units shall be assembled in unit manufacturer's plant to allow for testing of complete unit.
- B. Unit manufacturer shall supervise and be responsible for all field joining of the modules, including sheet metal, electrical and piping. Local trades may provide labor for unit assembly and installation.
- C. Joints in floor between modules shall be air and water tight.
- D. Unit manufacturer shall provide and install all equipment within unit as specified including fans, motors, coils, humidifiers, dampers, sound attenuating devices, piping, piping specialties, ductwork specialties, lights, switches and all equipment necessary to complete air handling equipment contained within housings. Mechanical and electrical connections (i.e., piping and conduit) shall be stubbed through housing so that appropriate Contractor may provide service to air handling unit. Electrical wiring and control wiring shall terminate in junction boxes on accessible side of unit.
- E. Provide structural steel sub-base as required. Refer to Unit Base in Part 2.
- F. Field mounting of any equipment on housing walls or roof is not allowed without prior approval of Engineer.
- G. Unit manufacturer and installing contractor shall coordinate with other trade Contractors, all necessary requirements to assure proper air handling unit installation.

3.2 INSTRUMENT TEST HOLES

- A. Provide instrument test holes at air entering and air leaving side of all internal air handling unit components for static pressure differential or temperature measurements. Refer to Section 23 3314 - Ductwork Specialties, for instrument test holes.

3.3 PROTECTION OF OPENINGS

- A. Protect openings on housings during construction against entry of foreign matter and construction dirt.

3.4 FIELD TESTING

- A. Unit manufacturer and installing contractor shall jointly perform field casing leakage test on each completed housing assembly as previously specified and shall be responsible for repair of all leaks. Submit certified test data to Engineer for approval.
- B. Temporary sealing of access doors, condensate drains, etc. is not allowed during field testing except to troubleshoot leakage points.

END OF SECTION

SECTION 28 3113
FIRE DETECTION AND ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED WORK

- A. Section 21 1314 - Automatic Fire Sprinkler System
- B. Section 23 0993 - Control Sequences
- C. Section 26 0000 - General Electrical Requirements
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems
- F. Section 26 0533 - Raceway and Boxes for Electrical Systems
- G. Section 26 0553 - Electrical Systems Identification

1.2 REFERENCE

- A. Work under this section is subject to requirements of Contract Documents including General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements.

1.3 DESCRIPTION

- A. In general, work consists of:
 - 1. Furnish and install complete Hard-wired, Zoned, Non-coded Fire Alarm System, as shown on plans.
 - 2. System to be wired, connected, and left in first class operating condition.
 - 3. System includes:
 - a. Heat Detectors
 - b. Smoke Detectors
 - c. Alarm indicating appliances
 - d. Terminations
 - e. Other necessary material for complete operating systems.
 - 4. New devices will be connected to existing Simplex fire alarm system.
 - 5. Field survey the existing building fire alarm system to confirm spare and expansion capability of the existing fire alarm system.

1.4 REFERENCE STANDARDS

- A. IBC - 2000 - International Building Code
- B. IFC - 2000 - International Fire Code
- C. NECA 305 - Standard for Fire Alarm System Job Practices
- D. NFPA 72 - National Fire Alarm Code
- E. NFPA 101 - Life Safety Code
- F. UL 268 - Smoke Detectors for Fire Protective Signaling Systems

- G. UL 497B - Protectors for Communications and Fire Alarm Circuits
- H. UL 521 - Heat Detectors for Fire Protective Signaling Systems
- I. UL 864 - Control Units for Fire Protective Signaling Systems
- J. UL 1480 - Speakers for Fire Protective Signaling Systems
- K. UL 1481 - Power Supplies for Fire Protective Signaling Systems
- L. UL 1711 - Amplifiers for Fire Protective Signaling Systems

1.5 QUALIFICATIONS

- A. Equipment shall be supplied by company specializing in fire alarm and smoke detection systems with 5 yrs documented experience
- B. Work shall be performed by licensed contractor regularly engaged in installation and servicing of fire alarm systems.
- C. Furnish proof of 5 yrs documented experience and factory authorization to furnish and install equipment proposed.
- D. Contractor shall be located within 100 miles of Project site.
- E. Programming of existing building Simplex Fire Alarm system shall be performed by a technician certified by Simplex in order to maintain the UL listing of existing building fire alarm system, and to extend the UL listing of the overall fire alarm system to the new devices installed under this scope of work.

1.6 SUBMITTALS

- A. Submit shop drawings for equipment provided under this Section.
- B. Submit bill of materials listing part number and quantity of components and devices.
- C. Submit block diagrams showing layout and operation of entire system.
- D. Submit schematic diagrams of circuits from field devices to terminal strip(s) associated with Control Panel.
 - 1. Diagrams shall show schematic wiring of equipment and connections to be made to devices.
 - 2. Terminal connections in equipment shall be numbered to correspond to diagrams.
 - 3. Wiring diagrams shall be coordinated so that terminal numbering, circuit designation and equipment or device designations are same on drawings.
- E. Submit standby battery power calculations.
- F. Submit sound amplifier and strobe power supply calculations showing current draws for devices and modules during standby and alarm and trouble conditions.
- G. Submit voltage drop calculations for both initiating and alarming circuits.
- H. Submit to Authority Having Jurisdiction:
 - 1. Copy of shop drawings as required to show component locations.
 - 2. Upon receipt of comments from Authority, make resubmission if required to make clarifications or revisions to obtain approval.
 - 3. Include fees associated with this in bid.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (DEVICES ONLY)

- A. Cooper Wheelock
- B. Edwards Systems Technology (EST)
- C. Simplex Grinnell

2.2 SYSTEM OPERATIONS

- A. Alarm Initiation
 - 1. System alarm operation after activation of any manual station, automatic detection device, or sprinkler flow switch shall match current building sequence of operation for system initiation, including:
 - a. Mechanical controls shall activate air-handling systems as specified by Division 23.
- B. Supervision
 - 1. System shall independently supervise new devices in identical manner as existing devices are supervised:
- C. Smoke Detection Operation
 - 1. Smoke detector alarms shall be processed in identical manner as existing smoke detector alarms.
- D. System Response
 - 1. Maximum elapsed time from sensing fire at non-smoke detector initiating device or second smoke detector until it is recorded at Control Panel and remote annunciator shall not exceed 5 seconds, and not exceed 15 seconds for remote station reporting.
- E. Air Handling Unit System Operation/Interface
 - 1. Control Panel shall provide output alarm interface to air handling/energy management system controllers, which in turn shall perform automatic functions as specified in Division 23.
 - 2. Fire alarm Control Panel shall provide manual control mode to override fire alarm panel's signal so that air-handling units can be restarted.

2.3 PERIPHERAL DEVICES

- A. Initiating device shall be labeled with zone number and order in zone. Information shall be visible from floor at device's location, i.e., (ZONE 1, 2 OF 3).
- B. Speaker/strobe units shall be labeled with circuit numbers, i.e., (CKT 1)
- C. Location of end-of-line device shall be indicated on device that contains same.
- D. Labeling shall be done with legible machine-typed lettering.
- E. Labeling shall be consistent with existing facility labeling standards. Confirm with Owner.

2.4 SPEAKER/STROBE UNITS

- A. Combination Speaker/Strobe Devices
 - 1. Speakers:
 - a. Operate on 24 V DC supplied by system amplifiers circuit
 - b. Include separate wire leads for in/out wiring for each leg of associated signal circuit. Tappings of signal device conductors shall not be acceptable.

- c. Be suitable for rear mounting behind audio-visual assemblies, which shall be flush or semi-flush mounted, with manufacturer back boxes and flush trim ring.
 - d. Have field adjustable output taps, 3 taps minimum.
 - e. Provide minimum sound pressure level of 85.7 dBA at 10' using 1-watt tap.
 - f. Provide a minimum sound pressure level of 90 dBA at 10' using the 2-watt tap.
 - g. Include a blocking capacitor for line supervision and screw terminal for in-out wiring.
2. Strobes:
- a. Multi tap units with taps at 15, 30, 75 and 110 cd
 - b. Tapped at 15 candela peak power or as noted on drawings
 - c. In compliance with ADA requirements
 - d. On separate supervised circuit from horn circuit
 - e. Synchronized so strobes units within sight of each other flash simultaneously
 - f. Cover plate shall be White with "FIRE" in red lettering.
3. Strobe circuit loading shall be calculated at 75 cd tap for all devices.

2.5 SMOKE DETECTORS

- A. Smoke detectors:
- 1. Photoelectric type
 - 2. Obtain operating power from the Fire Alarm Control Panel supervised detection circuit
 - 3. Operating voltage shall be 24 VDC (nominal).
 - 4. Have magnetically operated functional test switch
 - 5. Have flashing status indicating LED for visual supervision. When detector is actuated, flashing LED shall latch on steady and at full brilliance.
 - 6. Capable of being supplied with remote alarm LED indicator
 - 7. Provide solid-state construction and compatibility with other normally open fire alarm detection loop devices, (heat detectors, manual stations, etc.).
 - 8. Be factory calibrated to least allowable sensitivity adjustment
- B. Detector may be reset by actuating Control Panel reset switch.
- C. Detector head shall be easily disassembled to facilitate cleaning.

2.6 DUCT SMOKE DETECTORS

- A. Duct smoke detectors:
- 1. Photoelectric type
 - 2. Installed in duct detector housing
 - 3. Split type, i.e., mounting base with removable, locking detecting head. Contacts between base and head shall be bifurcated type using spring-type, self-wiping contacts.
 - 4. Alarm LED shall be visible through transparent front cover of duct detector housing.
- B. Removal of detector head shall interrupt supervisory circuit and cause trouble signal at control panel.
- C. Duct housing couplings shall be slotted to insure proper alignment of sampling and exhaust tubes.
- D. Floor plan of room showing detectors and addresses shall be located adjacent to mechanical room door.
- 1. Provide Plexiglas cover over plan.

2.7 FAULT ISOLATOR MODULE

- A. Provide Fault Isolator Module (FIM) on initiating device circuits in following situations:
 - 1. Loop extends to another floor
 - 2. Loop extends to another building
 - 3. For each 25 devices on a loop
- B. Fault Isolator Module:
 - 1. Automatically re-connect isolated section of loop upon correction of fault conditions.
 - 2. Not require any address setting
 - 3. Operations shall be totally automatic. It shall not be necessary to replace or reset FIM after its normal operation.
 - 4. Include LED, which shall flash under normal operation and illuminate steady to indicate short circuit.

PART 3 - EXECUTION

3.1 GENERAL

- A. Circuiting class shall match existing building types.
- B. Installation shall be done in neat, workmanlike manner in accordance with manufacturer's recommendations.
- C. Smoke detectors shall not be mounted until construction is completed.

3.2 RACEWAYS

- A. Fire Alarm Panel Risers shall be in conduit system separate from other building wiring.
- B. Branch Circuit wiring shall be in conduit system separate from other building wiring.
- C. Minimum 3/4" steel raceway. See Section 26 0533 - Raceway and Boxes for Electrical Systems.
- D. Contractor shall size conduit and boxes by circular mil size of cable in conduit or box.
- E. Surface access to existing alarm initiating circuits in public areas shall be via UL listed surface metal raceways (minimum equivalent to 3/4" conduit) and box extensions.
- F. Existing conduit and surface metal raceway that are not 3/4" size may be reused if found to have adequate space for existing and new conductors.
- G. Fire alarm raceway shall be red.

3.3 CONDUCTORS

- A. Cables and wires shall be provided per manufacturer shop drawings.
- B. Wiring shall be supervised.
- C. Conductors shall be color-coded. Coding shall be consistent through out facility.
- D. Green wire shall be used only for equipment ground.
- E. Where fire alarm circuits enter or leave building, additional transient 75 to 90 V gas tube protection shall be provided for each conductor.

- F. Wiring of initiating device circuits, alarm horn circuits, and alarm strobe circuits shall be #14 AWG minimum.
- G. Fire alarm cable shall be held in place at device box by means of 2-screw connector (do not use squeeze or crimp type connectors).
- H. Splices or connections shall be made within approved junction boxes and with approved fittings.
- I. Boxes shall be red and labeled "FIRE ALARM SYSTEM" by decal or other approved markings.
- J. Horn and strobe circuits shall have separate conductors, and shall operate independently of each other.
- K. Tray cable is not acceptable for use as fire alarm systems raceways.

3.4 DEVICE MOUNTING

- A. Recommended mounting heights, and requirements are as follows:
 - 1. Audio-Visual Devices
 - a. Install flush, semi-flush 6" below finished ceiling or 80" from bottom of device to finished floor.
 - b. No devices protruding 4" or more shall be installed lower than 80".
 - c. Audio/visual devices may be installed on the ceilings in accordance with NFPA 72 - Table 2-A.
 - d. For surface mounting, use manufacturer-supplied backboxes and trim plates.
 - e. Mark each device with its circuit number.
 - 2. Heat and Smoke Detectors
 - a. Location of detectors shown on plans is schematic only. Detectors must be located according to code requirements.
 - b. Surface mounted detectors shall be installed using back boxes equal to base size. Standard octagon and square boxes are not acceptable.
 - c. Detectors shall be located on the highest part of smooth ceiling so that edge of detector is no closer than 4" from sidewall.
 - d. Ceilings with beams, joists or soffits that exceed 8" in depth require special planning and closer spacing.
 - e. Mount detectors on sidewalls with top of detector no closer than 4" from ceiling and no further away than 12".
 - f. Smoke detectors shall not be installed closer than 3' from air supply diffusers.
 - g. No detectors shall be installed in direct airflow.
 - h. Heat and smoke detectors should be located near center of open area, which they protect.
 - i. Mark zone number and ranking of each detector on its base.
 - j. For intelligent systems, mark address and loop number on each detector's base.

3.5 DEMOLITION

- A. Existing equipment that is removed shall be inventoried and turned over to Owner
- B. Upon inspection by Owner, Contractor shall dispose of equipment that is deemed useless to Owner.
- C. Contractor shall remove abandoned devices and conduit not being reused.

3.6 IDENTIFICATION LABELS

- A. Junction boxes shall be painted red and labeled "Fire Alarm."
- B. Circuits must be labeled with name of circuit and area being served by circuit.

- C. Labels shall be permanent, and be machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS SHALL BE ALLOWED.
- D. Labels shall be self-laminating, white/transparent vinyl and be wrapped around cable.
- E. Flag type labels are not allowed.
- F. Labels shall be of adequate size to accommodate circumference of cable being labeled and properly self-laminate over full extent of printed area of label.
- G. Adhesive type labels not permitted except for wire identification.
- H. Wiring color code shall be maintained throughout installation.
- I. Green wire shall be used only for equipment ground.

3.7 MANUFACTURER'S SERVICES

- A. Supervision of installation shall be provided by trained service technician from manufacturer of fire alarm equipment.
- B. Technician shall be US certified and have had minimum of 2 yrs of service experience in fire alarm industry.
- C. Technician's name shall appear on equipment submittals and letter of certification from fire alarm manufacturer shall be sent to project engineer.
- D. Manufacturer's service technician shall be responsible for following items:
 - 1. Pre-installation visit to job site to review equipment submittals and verify method by which system shall be wired.
 - 2. Make periodic job site visits to verify installation and wiring of system.
 - 3. Upon completion of wiring, final connections shall be made under supervision of technician.
 - 4. At time of final checkout, technician shall give operational instructions to Owner and/or Owner's representative.
 - 5. Job site visits shall be dated and documented in writing and signed by electrical contractor.
 - 6. Discrepancy shall be noted on document and copy kept in system job folder, which shall be available to project engineer any time during project.

3.8 TESTING

- A. Manufacturer's authorized representative shall perform complete functional test of each system and submit written report to Contractor attesting to proper operation of completed system prior to final inspection.
- B. Contractor shall test each device in system before system is considered substantially complete.
- C. Completed fire alarm system shall be fully tested by Contractor in presence of Owner's representative and local Fire Marshal.
- D. Upon completion of successful test, Contractor shall:
 - 1. Certify system to Owner in writing
 - 2. Complete NFPA 1-7.2.1 record of completion form
 - 3. Provide as-builts and O&M manuals.
- E. Acceptance of fire alarm system shall be contingent upon:
 - 1. Demonstration by installer to UIC Electrical department that every device and equipment of the fire alarm system is performing in accordance with specifications and approved shop drawings.

- a. UIC Electrical Department shall receive 3 sets each of approved shop drawings, equipment brochures, and owner's manuals.
2. UIC electricians receiving training on trouble shooting.
3. After completion of the fire alarm system, the installer shall himself test all devices and shall be required to certify in writing that he has satisfactorily tested all devices, the annunciator and the control panel, and is ready to demonstrate the system to the University. The OCP Project Manager, in consultation with UIC Electrical Department, will schedule the fire alarm test.

3.9 WARRANTY

- A. Warrant completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of 2 yrs from the date of substantial completion of project.
- B. Post warranty period along with company's name and telephone number inside fire alarm panel.
- C. Warranty service for equipment shall be provided by system supplier's factory trained representative.
- D. Warranty shall include parts, labor and necessary travel.
- E. Occupied facility shall not be without UL and NFPA approved and fully operational fire alarm system for period longer than 2 h. Emergency response shall be provided within 2 h of notification, to contractor, of failure of system to perform operationally per UL and NFPA standards.
- F. Identify zones or loops of existing operational fire alarm system required to be temporarily deactivated for purposes of adding new devices or relocating existing devices.
- G. Identify zones or addressable loops that will be partially or fully required to be demolished so that the remaining fire alarm system of the building will remain operational at all times. Relocate end of line resistor as required.
- H. Non-emergency service calls shall be responded to within 24 h of notification to contractor.
- I. Repairs and/or replacement shall be completed within 72 h of time of notification. Other than emergency, actual repairs and/or replacement shall be provided during normal working hours, Monday through Friday, excluding holidays.
- J. If repair and/or replacement cannot be made within prescribed time, other means and methods of protection shall be provided to insure safety of building occupants during which time system is not in compliance with standards. This may involve up to and include hiring Owner approved qualified personnel to stand fire watch, at contractor's expense.

3.10 TRAINING

- A. Contractor shall provide minimum of 4 h system operation training for Owner, Architect/Engineer, and fire department personnel.
- B. Training session shall be at a time to be stipulated by Owner.
- C. Training shall be completed prior to final inspection.

3.11 SPECIAL CONSIDERATIONS

- A. Contractor shall notify Owner's security officer 24 h in advance of any zones inoperative for a period of time exceeding 2 h.
- B. Existing fire alarm systems must be returned to full operation at end of each working day, or notification to campus security of what zones are inoperative on a daily basis in writing, hand delivered.

3.12 SPARE PARTS

A. Contractor shall provide the following spare parts in quantities shown, with a minimum of 1/item:

<u>Quantity</u>	<u>Type of Device Present</u>
10%	Photoelectric smoke detectors
10%	Smoke detector bases
1%	Duct detectors with housing and sample tubes
1%	Horn/strobe Units
1%	Strobes

END OF SECTION