

SECTION 13120
PRE-ENGINEERED METAL BUILDING SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED -

- A. Work of this section covers the design, fabrication and erection of a modular, rigid frame type, pre-engineered metal building of dimensions, slope and heights indicated on drawings.
- B. Building components specified herein include structural framing, roof panels, framed openings, *cantilever supports and framing*, flashings, gutters and downspouts (refer to drawings), bracing, fasteners, and accessories as indicated or specified including any framing pieces to accommodate installation of doors, fans, etc. shown on the drawings for a complete engineered building system.
 - 1. Contractor shall review all documents and accommodate loading of such items as fans and hood exhaust, louvers, overhead doors, etc.
 - 2. Provide overhangs as shown on the drawings: standard and extended overhangs.
 - 3. Structural deviations from that shown on the drawings, i.e. endwall framing, must be coordinated with architectural elements shown and shall be approved by the architect.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest edition of each reference shall apply unless otherwise specified.
 - 1. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
AISC S326 (1989) Voluntary Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings. (Allowable Stress Design)
 - 2. AMERICAN IRON AND STEEL INSTITUTE (AISI)
AISI - 01 (1999) Cold-Formed Steel Design Manual
 - 3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
ASTM A36/A572/A992 Structural Steel
ASTM A65 Steel Sheet, Zinc-Coated (G-90 Galvanized) by Hot-Dip Process, Structural (Physical) Quality.
ASTM A475 Extra High Strength Grade Cable
ASTM A529 High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A1011 SS/HSLAS, /ASTM A607, Gr. 55 Steel, Sheet and Strip
ASTM A792 SS Steel Sheet, Aluminum-Zinc Alloy Coated by Hot-Dip Process
ASTM A53 / A500, Gr. B Hollow Structural Shapes
ASTM A307 Common Bolts
ASTM A325 / A490 High Strength Bolts
ASTM B117 Salt Spray (Fog) Testing
ASTM D523 Specular Gloss
ASTM D4214 Evaporating Degree of Chalking of Exterior Paints
ASTM D968 Abrasion resistance of Organic Coatings by Falling Abrasive
ASTM D2244 Calculation of Color Differences from Instrumentally Measured Color Coordinates

4. ASTM D2247 Testing Water Resistance of Coatings in 100% Relative Humidity
AMERICAN WELDING SOCIETY (AWS)
AWS D1.1 (2000) Structural Welding Code-Steel
5. FEDERAL SPECIFICATIONS (FS)
FS TT-P-664 Protective Coatings for Fabricated Structural Members
6. METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)
MBMA-01 (2002) Low Rise Building Systems Manual
7. UNDERWRITERS LABORATORIES, INC (UL)
UL 580 Test for Uplift Resistance of Roof Assemblies

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: United States owned company regularly engaged in the fabrication of metal building systems for a minimum of 10 consecutive years and a member of the Metal Building Manufacturer's Association.
 1. Certified by American Institute of Steel Construction (AISC) Metal Building Certification Program (Category - MB).
- B. As a basis of quality, these specifications herein delineate the material quality, design criteria and workmanship used in building systems designed, manufactured and furnished by United Structures of America, Inc., Red Dot Buildings or Metallic Building Company. Like products of other manufacturers may be approved providing they meet all the requirements specified herein. Approval of such is subject to requirements as set forth in the general section of these specifications.
- C. All structural mill sections and welded up plate sections shall be designed in accordance with the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", and all cold-formed steel structural members shall be designed in accordance with AISI "Specifications for the Design of Cold-Formed Steel Structural Members".
- D. All roof panels shall be designed in accordance with the AISI "Specifications for the Design of Light Gauge Cold-Formed Steel Structural Members".
- E. All welding shall be in accordance with the AWS "Structural Welding Code", D1.1.
- F. Building loading application and design shall be in accordance with the specified Building Code, or if none is specified, the Metal Building Manufacturers Association's "Recommended Design Practices Manual"

1.4 SUBMITTALS

- A. Certifications: Provide a letter of design certification for the structural framing system, signed and sealed by a qualified professional engineer registered in the **State of Louisiana** where the jobsite is located. The certification letter shall indicate this location has been accommodated with loading per **International Building Code 2021**, AISC – Category MB certification shall be indicated for the Design facility and the Manufacturing facility.
- B. Design Drawings: Submit anchor bolt layouts, framing plans, elevations and necessary sections and details.
 1. Provide erection drawings bearing the seal of a Louisiana Professional Engineer.

2. Provide layouts of roofing panels, edge conditions, panel joints, corners, trims and flashings.
3. Foundation Reactions: Provide for foundation reactions and size anchor bolts as well as the required anchor bolt embedment length and details to resist anchor bolt pull-out and bearing stresses acting on the anchor bolts and base plates per **International Building Code 2021**

1.5 DESIGN LOADING CRITERIA

- A. Design shall meet or exceed **IBC 2021** for this location. Dead Loads shall consist of weight of metal building and components of finished building documented in attached drawings, mechanical equipment, lighting, etc suspended from the structure.
- B. DEFLECTION CRITERIA
 1. Primary Framing: L/200 to coordinate with masonry
 2. Frame side sway: Range from H/400 with the design wind load.
 3. Secondary Roof Framing: L/150
 4. Secondary Wall Framing: L/90

1.6 WARRANTIES

- A. Provide building manufacturer's warranty guaranteeing the building system against defects in material for one year from the date of acceptance and shall provide for replacement of warranted material as required within that time period.
- B. Roof Panel Integrity: Provide manufacturer's standard twenty year warranty against perforation of metal panels due to corrosion under normal weather and atmospheric conditions.
- C. Roof Panel Finish: Provide manufacturer's standard twenty year warranty against cracking, peeling and color fade. The following are the color fade and chalking limitations:
 1. Color Retention: No color change in excess of an average of 5 NBS Units when measured in accordance with the procedure set forth in ASTM D2244.
 2. Chalking: Minimum of 8 rating when tested in accordance with ASTM D659.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. The building shall be a sloped roof building of steel frames, purlins and columns, with building width, length and bay spacing, eave height and roof slope as indicated on the drawings.

2.2 PRIMARY FRAMING

- A. The pre-engineered structure system varies:
Rigid frames with **straight columns**, purlins, etc. End wall may be end wall frame coordinated with Architectural layout. Refer to the drawings. Bracing shall accommodate Architectural features shown in drawings.
- B. The materials used in the fabrication of the primary framing shall be designed utilizing standard practices, generally in compliance with the AISC code.

1. Structural flat plate, strip and/or bar stock generally shall conform to the physical requirements of ASTM A1011, ASTM A572, ASTM A529, A607, or ASTM A36 as applicable, and shall have a minimum yield strength of 55,000 psi.
2. W, M, and S shapes shall be of material conforming to the physical requirements of ASTM A36/A572/A992 and shall have a minimum yield strength of 36,000 psi.
3. Round pipe or tube sections shall be of material conforming to the physical requirements of ASTM A53 grade B and shall have a minimum yield strength of 35,000 psi.
4. Members fabricated from plate or bar stock materials shall have flanges and webs joined on one side of the web by a submerged arc continuous weld process.

2.3 SECONDARY FRAMING

- A. Secondary framing shall be the structural members which distribute the loads to the primary framing systems, and shall include the eave struts, purlins, girts, wind bracing and other miscellaneous structural members. They shall be manufactured of cold-form light gage sections, welded plate sections and/or structural shapes.
 1. Eave struts shall be nominal 8", 10" or 12" deep "cee" shaped members, and shall be designed as simple span for the specified loads.
 2. Purlins and girts shall be nominal 8", 10", or 12" deep "zee" or "cee" shaped members, and shall be designed as simple span, partially continuous or continuous for the specified loads.
 3. Wind and seismic longitudinal bracing shall consist of a system of diagonal (cable or structural shapes) bracing, portal frames, cantilevered / fixed base columns or diaphragm bracing.
 4. Miscellaneous members shall normally be those members such as base angles, flange braces, jambs, headers, etc. These members shall be engineered for the specific purpose they serve within the over-all Metal Building System.
 5. Provide Secondary Members needed for mounting of doors, **including overhead doors** that must anchor to steel and mechanical equipment and as shown on drawings for infill wall supports and openings.
- B. Materials used in the fabrication of secondary framing shall be designed utilizing standard practices, generally in compliance with the applicable sections of AISC and AISI.
 1. Cold form members shall be fabricated of material conforming to the physical requirements of ASTM A1011 or A607 and shall have a minimum yield strength of 55,000 psi.
 2. Cable bracing shall be coordinated with architectural elements shown and shall be fabricated of material conforming to the physical requirements of ASTM A475-78 for extra strength grade. If cable bracing cannot be coordinated, this contractor will provide for alternate means of bracing at no additional cost.

2.5 STRUCTURAL PRIMER

- A. After fabrication, all components fabricated from welded plate sections, structural shapes or round pipe shall be prepared equal to the standards of SSPC-SP2 and primed with one shop coat of red primer which meets or exceeds the end performance of Federal Specification TTP-664. Primer shall be applied to a dry film thickness of 1 mil.
- B. Material used for components fabricated by cold form process shall be precoated by a commercial coater using a preparation process equal to SSPC-SP10 and after oven heating, apply a red oxide primer which meets or exceeds the end performance of TTP-664. Primer shall be applied to a dry film thickness of .5 mil.

2.6 ROOF COVERING

- A. Roof covering shall consist of the roof panels, their attachments, trim and sealants for use on the exterior of the roof and shall be equal to the following:
 - 1. Panel Rib Roofing panels shall have uplift resistance to 90 mph wind certified by Factory Mutual with Kynar 500 finish to be selected.
 - 2. Roof covering shall provide a 36" net coverage with ribs **to match existing**. Panel laps shall be at major ribs. Anchor with gasketed self-drilling color matched fasteners and weatherproof with sealants at every metal-to-metal contact point. Panels shall be continuous from ridge to eave until panel exceeds 40' and/or panel becomes prohibitive to handle (must be shown on shop drawings).
- B. Material used in the fabrication of roof panels shall be a minimum of 24 gage having a minimum yield strength of 50,000 psi. Exterior finish for roofing shall be Galvalume or precision coated, commercial grade Fluoropolymer-series 500 coating with color to be selected by the owner from the manufacturers standard colors.

2.8 METAL SOFFIT PANELS, GUTTER, EAVE TRIM, ETC.

- A. Metal soffits are not required on this project. (Only as indicated on Drawings)
- B. Gutters and downspouts shall match building materials and shall meet construction standards of Sheet Metal Manufacturers' Associations standards.

2.9 ACCESSORIES

- A. ROOF FLASHING UNITS shall nominally be used for roof mounted mechanical equipment and/or vents. Flashings units are not intended to support any type of load. Loads are supported by means of subframes and/or auxiliary secondary support systems. Flashing base configuration shall match the panel profile of the roof on which it is used.
- B. ROOF CURB UNITS are available in peak or hillside applications. Curbs are at least 18 gage galvanized material with welded construction and are insulated. Provide roof curb units with a baked-on powder coated finish to match the roof panel finish.
- C. ROOF JACKS shall be for flashing of plumbing vent stacks and/or other pipe-like penetrations. Jacks shall be black with flat, malleable bases that can be field formed to fit any standard panel configuration. Jacks shall have a heat range of -65 degrees centigrade to +250 degrees centigrade.
- D. FRAMED OPENINGS IN WALLS shall normally be an opening framed with 16 gage minimum, cold-formed members designed to meet the specified loads. Openings shall be trimmed in accordance with USA's standard practices unless shown otherwise on drawings.
- E. LOUVERS shall be shop fabricated out of 18 gage galvanized steel, self-framing and self-mulling, welded frames with 20 gage galvanized blades. Louvers shall have weathertight (refer to section 10210). Louvers are to be provided with a color finish to match metal wall panels. Louvers shall be size and location shown on the drawings. A removable insect screen and bird screen shall be provided with each louver

- F. *INSULATION will be furnished by others -see section 07219.*

PART 3 - EXECUTION

3.1 PREPARATION

- A. Erection of the pre-engineered building shall be preformed by a company regularly engaged in the erection of metal buildings for a minimum of 5 years.
- B. Work shall be coordinated with work of other trades so that construction work of all trades can be properly completed.
- C. Before proceeding with the erection and in time to permit correction of defective setting, the owner shall verify the location and elevation of all anchor bolts for column bases.
- D. Erection practices shall conform to the MBMA "Code of Standard Practices" Section 5

3.2 ERECTION

- A. Erect building in accordance with the building manufacturer's erection drawings and written instructions.
- B. Field modifications shall not be made to structural members except as authorized by the building manufacturer.
- C. Erect building and all components plumb, true and level to lines and profiles indicated.
- D. Framing: Level base plates to a true even plane with full bearing to supporting structures.
- E. Purlins and Girts: Locate and space girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to straight line with temporary shoring until secured by exterior sheeting.
- F. Bracing: Provide diagonal cable bracing (or other bracing as required by design) in roof and sidewalls as indicated on the erection drawings.
- G. Roofing: Arrange and nest side-lap joints so prevailing winds blow over lapped joints. Apply panel and associated items for neat and weather tight enclosure. Avoid panel creep or applications not true to line. Protect factory finishes from damages.
 - 1. Field cutting of panels by torch is not permitted.
 - 2. Install weather seals as per manufacturer's instruction.
- H. Sheet Metal Accessories: Install gutters, downspouts, curbs, trim and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight anchorage.

3.3 CLEAN-UP AND PAINTING

- 3.3.1 Clean building and components free of dirt, dust, grease and oil.

3.3.2 Prepare surfaces and touch up structural steel, purlins, girts and other framing members with coating system of same type and color as used in shop coat.

3.3.3 Clean exposed surfaces of the building promptly after erection is completed. Clean pre-finished work per coating manufacturer's directions.

END OF SECTION

DIVISION 13 - ELECTRICAL SAFETY AND SECURITY
SECTION 13850 - FIRE DETECTION AND ALARM

PART 1.00 GENERAL

1.01 INCLUDED IN THIS SPECIFICATION

- A. Provide a complete fire alarm system per this project's plans and specifications. The system shall include a state-of-the-art, software-based control panel using addressable and analog type initiating.
- B. These specifications and the accompanying Drawings define the intent of the fire alarm system to be provided. In addition to the system as specified herein and shown on the Drawings, the Contractor shall provide all planning, design, calculations, equipment, devices, raceways, boxes, cabling, system programming and any other component or service required for a complete, fully operational and code compliant system.

1.02 REFERENCES

- A. Electrical Industries Association (EIA):
 - 1. RS-232-D – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - 2. RS-485 – Electrical Characteristics of Generators and Receivers for Use in Balanced Multipoint Systems
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
 - 2. NFPA 13 – Installation of Sprinkler Systems.
 - 3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
 - 4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
 - 5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
 - 6. NFPA 70 – National Electrical Code (NEC).
 - 7. NFPA 72 – National Fire Alarm Code 2010 Edition
 - 8. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 9. NFPA 101 – Life Safety Code 2012 Edition
 - 10. NFPA 750 – Standard on Water Mist Fire Protection Systems.
 - 11. NFPA 5000 – Building Construction and Safety Code.
 - 12. IBC Chapters 9 & 10 2012 Edition
 - 13. ADAAG Americans with Disabilities Act Application Guidelines
- C. Fire Alarm Control Panel Equipment: System shall comply with applicable provisions of the following UL standards and classifications:
 - 1. UL 864 9th Edition
 - 2. UOJZ, Control Units, System.
 - 3. SYZV Control Units, Releasing Device.
 - 4. UOXX, Control Unit Accessories, System.

- D. The Fire Alarm Control Panel's U.L. Listed signaling types shall be:
1. Digital alarm communicator
 2. Other Technology

1.03 SUBMITTALS

- A. Equipment Submittal Brochures:
1. Provide minimum 10 copies of submittal brochures and shop drawings.
 2. Submittal brochures shall be bound by means of 3 ring binders, binding combs or similar. Stapled brochures will be rejected.
 3. Provide one submittal brochure in color, highlighted and reserved for use by the Louisiana State Fire Marshal Plan Review Office. This copy shall become the record copy for the project.
 4. Include a cover page that indicates the following minimal information:
 - a. Project name and address.
 - b. Engineered systems distributor's name and contact information.
 - c. Installing contractor's name and contact information.
 - d. The date of the equipment submittals and date of any subsequent required re-submittals. Indicate on revised submittals the original submittal date and re-submittal date.
 - e. Architectural project review number assigned by the Louisiana State Fire Marshal's Office.
 5. Provide a Scope of Work Narrative describing the system's basic operating premise in written word.
 6. Provide a detailed Sequence of Operation Matrix Grid tailored for this project indicating the cause and effect of all fire alarm system control panels, input and output functions.
 7. Include a system bill of material prepared specifically for this project. Include the make, model, description, quantity and manufacturer for every component to be installed in the project.
 8. Provide manufacturer's data sheet for each component to be installed in the project. For data sheets that include multiple part numbers, options and accessories, the components included or pertinent to this project shall be highlighted in yellow.
 9. Include the U.L. (Underwriters Laboratories) Certification for each component to be installed in the system. The U.L. Certification shall be placed directly behind its corresponding data sheet.
 10. Manufacturers device compatibility documentation shall be included proving testing and operational compatibility between control panels and peripheral devices.
 11. Separate battery calculations shall be provided for each control panel and prepared on manufacturer's official worksheets.
- B. Shop Drawings
1. Shop drawings shall be prepared with the contractor's own title block which shall include:
 - a. Project name and address.
 - b. Contractor's name, address and phone number.

- c. Date.
 - d. Drawing pages shall be numbered.
 - e. Bound with spines and stapled.
 - f. Floor plan scale.
 - g. Louisiana State Fire Marshal architectural assigned project number.
 - h. Revision number with re-submittal dates.
2. Drawings shall contain one floor per page. If a floor must be split use match lines and references that refer sheet number to match lines.
 3. Floor plan shop drawings shall be prepared in AutoCAD.
 4. Prepare floor plans to a 1/8" = 1'-0" scale unless directed otherwise by the architect.
 5. Show all equipment, control panels, and device locations.
 6. Include a distinct address for every device including panels, initiating, notification, auxiliary, and peripheral devices. All visual notification appliances shall have their candela indicated.
 7. Floor plans shall include the following:
 - a. Door swings.
 - b. Room names and numbers.
 - c. Reflected ceiling plan overlay.
 - d. Ceiling heights.
 - e. Fire and smoke barriers.
 - f. Office furnishings when available.
 8. Include a symbol schedule of devices for this project.
 9. Include the necessary details and general notes for mounting heights, device placement restrictions, etc.
 10. End-of-line symbols shall be shown on the floor plans.
 11. Riser locations shall be indicated on the floor plan by a bold circle.
 12. A detailed riser shall be provided as part of the shop drawings. The riser shall include:
 - a. Control panels, power supplies, annunciators, demark cabinets, each identified with its own address and description matching the symbol schedule.
 - b. Operating power requirements with breaker panel and breaker number identification.
 - c. All system circuits including initiating, notification, SLC, power, control, monitor, network, audio, riser, fiber optic, phone, category cable and auxiliary circuits. Circuits shall be individually addressed indicating wire type, size, quantity and color.
 - d. Provide a point to point diagram of every system device on its riser circuit using the exact device symbol as the floor plan. Provide the corresponding device address and candela rating next to each device.
 - e. Provide the cumulative current draw at the end of each notification appliance circuit.
 - f. Indicate location and placement of surge suppressors.
 - g. Provide detail circuit diagrams for connections with systems from other trades.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, number and manufacturer.
- B. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Protect materials from damage during handling and installation.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Personnel shall be trained and certified by manufacturer for installation of units required for this Project and shall be supervised by a Nicet Level III Supervisor.
 - 2. Manufacturer's product shall have been in satisfactory operation on three installations of similar size, type and design as this project, for approximately 3 years.
 - 3. The installing contractor shall have been actively engaged in the business of designing, selling, installing, and servicing fire alarm systems for at least ten (10) years.
 - 4. The installing contractor shall provide 24-hour, 365 days per year emergency service with factory trained, state licensed service technicians.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Source Limitations: Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer.

1.06 MAINTENANCE AGREEMENT

- A. Contractor shall warranty material and installation against defects in manufacturing and workmanship for a period of one year beginning on the date of final acceptance of the project. Warranty related service calls shall be provided at no charge during the contractor's normal working hours.
- B. Initial Maintenance Service: Beginning at Substantial Completion, provide full inspection and maintenance by skilled employees of manufacturer's designated service organization during the Warranty period, including any special warranty period specified.
 - 1. Include inspection, maintenance, testing, and repair contract in compliance with the manufacturer's recommended routine preventive maintenance program and NFPA 72 requirements necessary to maintain full ongoing listing on the complete installed system.
 - 2. Provide parts and supplies same as those used in the manufacture and installation of the original equipment.
 - 3. The contractor performing the contract services shall be qualified and listed to maintain ongoing certification and listing of the completed system.
- C. Extended Maintenance Service: Offer for the Owner's consideration and evaluation at the time of Product Data Submittal, a priced inspection, maintenance, testing, and repair

contract in compliance with the manufacturer's recommended routine preventive maintenance program and NFPA 72 requirements necessary to maintain full ongoing listing on the complete installed system.

1. The services offered under this contract shall begin after the completion of the Initial Maintenance Service and Warranty Period.
2. The Owner shall have the option of renewing for single or multiple years, up to five years, at the price quoted upon completion of the Warranty period.
3. The contractor performing the contract services shall be qualified and listed to maintain ongoing certification and listing of the completed system.

1.07 COORDINATION

- A. Coordinate installation and operational requirements for automatic elevator recall, including but not limited to the recall signal time frame, with Division 14 and with authorities having jurisdiction.
- B. Coordinate installation and operational requirements for fire-protection systems, including but not limited to water-based sprinkler system, pre-action system and clean agent extinguishing system, with Division 21.
- C. Coordinate installation and operational requirements for smoke control systems with Division 23.
- D. Coordinate installation and operational requirements for kitchen fire-suppression systems with hood manufacturer, fire-suppression system manufacturer and with Division 23.

PART 2.00 PRODUCTS

2.01 MANUFACTURERS

- A. The following are acceptable manufacturers and series for control panels.
 1. Gamewell S3 Series
 2. Edwards I0 Series
- B. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality.
- C. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section. For equipment other than listed above provide proof that such substitute equipment equals or exceeds features, functions, performance, and quality of specified equipment. This proof shall be provided by submission of a copy of specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant along with a letter from engineering manager or product manager at factory that certifies information presented as either compliant or non-compliant including a detailed explanation of each paragraph identified as non-compliant. In order to ensure that the Owner is provided with a system that incorporates required survivability features, this letter shall also specifically certify that the system is capable of complying with the test requirements of this section.

2.02 FIRE ALARM SYSTEM OPERATIONAL DESCRIPTION

- A. The fire alarm system shall be fully addressable with notification and initiation devices as shown on drawings. Additional components shall be provided as required for a complete, functional, and code compliant system.
- B. Alarm Signals:
 - 1. Fire Alarm signal initiation shall be by one or more of the following devices and/or systems:
 - a. Manual Pull Stations
 - b. Heat Detectors
 - c. Smoke Detectors
 - d. Heat detectors in elevator shaft and pit.
 - e. Fire-extinguishing system operation including but not limited to fire suppression for kitchen, dry-pipe sprinkler system and pre-action sprinkler systems.
 - 2. Supervisory signal initiation shall be by one or more of the following devices and/or actions:
 - a. Duct-Mounted smoke detectors.
 - b. Valve supervisory switch. (Operation of a fire-protection system valve tamper switch.)
 - c. Low-air-pressure switch of a dry-pipe sprinkler system.
 - d. Low-air-pressure switch of a pre-action sprinkler system.
 - e. Fire-pump running.
 - f. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 - g. Elevator shunt-trip supervision.
 - 3. System trouble signal initiation shall be by one or more of the following devices and/or actions:
 - a. Open circuits, shorts, and grounds in designated circuits.
 - b. Opening, tampering with, or removing alarm-initiating and supervisory signal initiating devices.
 - c. Loss of primary power at fire-alarm control unit.
 - d. Ground or a single break in fire-alarm control unit internal circuits.
 - e. Abnormal ac voltage at fire-alarm control unit.
 - f. Break in standby battery circuitry.
 - g. Failure of battery charging.
 - h. Abnormal position of any switch at fire-alarm control unit or annunciator.
- C. Specialized Alarm Actions:
 - 1. Elevator Recall: Activate elevator recall system to start in accordance with ANSI Standard A17.1 and NFPA 72. Comply with the following:
 - a. Initiate Elevator Recall Sequence to return elevators to their primary or alternate recall floors upon receipt of a General Alarm by the Fire Alarm Control Panel (FACP).
 - b. Smoke detectors designated for Elevator Recall shall be connected to fire-alarm system. Initiate a General Alarm upon detection of smoke.
 - c. Actuation of the elevator lobby detector located on the designated primary recall floor shall signal the cars to move to the alternate recall floor.

2. Elevator Shunt-Trip Operation: Heat detectors designated for elevator power removal shall be connected to fire-alarm system. Alarm-initiating devices, except those listed, shall not start elevator power removal.
 - a. Actuation of heat detectors in the locations indicated below shall shut down power, via a shunt trip operator, to the elevators associated with the location without time delay:
 - 1) Heat detector in elevator machine room; locate detector within two feet of each sprinkler head.
 - 2) Heat detectors in elevator hoistway; locate detector within two feet of each sprinkler head.
3. Air-Handling System Shut-Down: Upon receipt of a General Alarm by the Fire Alarm Control Unit perform the following, unless otherwise indicated in sequence for smoke control system or sequence for smoke venting system in a windowless anesthetizing locations:
 - a. Operate control relay contacts to signal shutdown of the Air-Handling system(s) serving the evacuation signaling zone where the alarm signal originated. Signal shall remain on until alarm conditions are cleared and fire-alarm system is reset. Signal shall not stop in response to alarm acknowledge or signal silence commands. Coordinate and interface with Division 23.
 - b. Shut the smoke or combination fire/smoke dampers at that specific air-handling units' supply and return connections.
 - c. Shut all smoke and combination fire/smoke dampers associated with the air handling system.
 - d. Provide for an adjustable time delay, initially set at 20 seconds, to delay the transmission of close signals to the dampers. The intent of this time delay is to allow the air-handling unit fan(s) to receive the stop signal and slow down before closing any dampers in order to avoid a high static-pressure alarm/trip on the air-handling system.
4. Duct-mounted smoke detector: Duct-mounted smoke detector shall initiate the following functions, unless otherwise indicated in sequence for smoke control system or sequence for smoke venting system in a windowless anesthetizing locations:
 - a. Initiate a Supervisory Alarm.
 - b. Shutdown the associated air-handling unit.
 - c. Shut the smoke or combination fire/smoke dampers associated with that specific smoke detector and shut the smoke or combination fire/smoke dampers at the associated air-handling unit.
 - d. Provide for an adjustable time delay, initially set at 20 seconds, to delay the transmission of close signal to the dampers. The intent of this time delay is to allow the air-handling unit fan(s) to receive the stop signal and slow down before closing any dampers in order to avoid a high static-pressure alarm/trip on the air-handling system.
5. Kitchen Fire-Suppression: An alarm signal from the kitchen fire-suppression system shall initiate the following functions prior to discharge of fire extinguishing agent:
 - a. Initiate General Alarm when the kitchen fire-suppression system is activated.

- b. Operate control relay contacts to remove power from equipment located equipment under kitchen hood. Relay control shall open circuit breaker via use of breaker-mounted shunt trip operator(s).
- c. Operate control relay contacts to close solenoid valve(s) to shut-off fuel supply to kitchen equipment under kitchen hood.
- d. Operate control relay contacts to initiate the smoke evacuation system. Coordinate and interface with Division 23.

2.03 CONTROL PANEL

- A. General Requirements:
 - 1. The system shall have the capability of being activated into alarm, supervisory and trouble modes of operation from both manual and automatic devices.
 - 2. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864
- B. System Cabinet
 - 1. Shall be all metal with a textured finish suitable for surface or semi-flush mounting. Cabinets containing anything non-metal are not acceptable.
 - 2. Front door of steel construction with lockout or dead-front inner door of steel construction to conceal internal circuitry and wiring.
 - 3. Cabinet shall be capable of housing batteries.
 - 4. Cabinet shall be pre-fabricated to accept all available internal circuitry. Installations with loosely hanging internal panel components will not be accepted.
- C. Main Power Supply
 - 1. Shall incorporate the latest power-saving switching technology using no step-down transformers.
 - 2. Shall provide minimum 7 amps of continuous rated output to supply all necessary power under normal and emergency conditions.
 - 3. Shall include an internal battery charger capable of charging up to 55 amp hour batteries while under full load.
 - 4. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the fire alarm control panel. A green "power on" LED shall be displayed continuously while incoming power is present at the building fire alarm control panel.
- D. Batteries
 - 1. Provide U.L. Listed batteries of sufficient capacity to provide power for the entire system automatically upon loss of AC power for a period of 24 hours with 15 minutes of alarm signaling at the end of the 24 hour period.
 - 2. Battery connectors shall be the exact size and type required for the standby battery posts or tabs.
 - 3. Connect batteries to the main panel with minimum 14 AWG stranded hook up wire. Red for positive and black for negative. Use fully insulated crimp style connectors.
- E. Battery Cabinets

1. Provide U.L. listed metal battery cabinet and enclosures with key lockable door for installations requiring batteries too large to be housed in control panels.
2. Battery cabinet shall be textured painted to match the control panel it is housing the batteries for.

F. Display

1. Main control panel shall include a color touch screen display for user interface.
2. Display shall be capable of a minimum 200 characters.
3. The touch screen communications shall be textual RS-485 based with the capability of being mounted locally or remotely.
4. The display shall provide both audible and visual annunciation of all system events.
5. Separate LED's shall be dedicated for:
 - a. AC (normal power): Green
 - b. Fire: Red
 - c. Hazard: Blue
 - d. Supervisory: Yellow
 - e. Trouble: Yellow
 - f. Silenced: Yellow
6. Pre-programmed keys shall be on board for:
 - a. Menu
 - b. Fire Drill
 - c. System Reset
7. Display shall contain a minimum 5 keys that can be custom programmed for system functions
8. The display shall be suitable to be remotely installed as a remote annunciator up to 3,000 feet away from the main CPU cabinet. The remote display shall be available with a manufacturer's custom metal cabinet suitable for surface or semi flush installation complete with a lockable see through door and textured finish matching the main control cabinet.

G. Main System CPU

1. System CPU shall incorporate a 32-bit RISC multiprocessor design on a single circuit board. An isolated watchdog circuit shall monitor the microprocessor and shall activate system trouble on the display upon any failure. The system program shall not be lost upon any loss of power. The CPU software shall support control-by-event (CBE) programming using Boolean logic including AND, OR, NOT, XOR and TIMING functions to provide complete custom programming flexibility. An auto programming option shall be available where only devices that are present on the SLC shall activate.
2. System shall be programmed via the manufacturer's proprietary field configuration program (FCP), allowing the project configuration custom programming to be uploaded and downloaded via a portable laptop computer at the project.
3. An RJ-45 Ethernet port shall be provided to accept downloaded programs from a portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall operate at 10/100 speeds.
4. An on-board supervised RS-232C Serial Output shall be included to operate remote printers and video terminals.

5. The system CPU shall include an on-board supervised RS-485 Serial Output for connection and communication to system modules. The RS-485 port shall allow for communication with remote annunciator modules up to 3,000' from the cabinet.
6. Smoke detector alarm verification shall be a standard software option while allowing other devices such as manual stations and sprinkler flow to create immediate alarms. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Standard software shall provide for the analog drift compensation of smoke detectors allowing each smoke detector to automatically adjust its sensitivity to accommodate changes caused by the effects of component aging or its surrounding environment including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display smoke detectors that require cleaning and maintenance.
8. System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be a recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor test shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
9. The system control panel shall be capable of setting any detector or sensor into Positive Alarm Sequence mode. Positive Alarm Sequence will operate in the following manner. Any alarms received from a device will activate an alarm at the control panel but will not execute any output functions (e.g. turning on the strobes or fire horns). The operator has 30 seconds to "acknowledge" the event or the system will activate a general alarm and sound all the fire horn and strobes. If the operator does acknowledge the vent within thirty (30) seconds, the panel will start a timer for 180 seconds (3 minutes) in which time the operator must find the device in alarm and reset the device. If the operator has not performed a reset within 180 seconds or a second device reports an alarm, the system will immediately sound the general alarm.
10. The CPU display shall have the option of being configured as an additional remote annunciator. This annunciator shall be mounted in its own metal cabinet with lockable door.
11. The CPU shall maintain a 4100 event history log. The log shall be maintained upon loss of any power.
12. 24 volt D.C. power-limited 1 amp outputs shall be provided for both resettable and non-resettable power. The outputs shall be screw terminal on board the CPU board.
13. Manufacturer's standard software shall accommodate a 1 man walk test feature.

H. Signaling Line Circuits

1. Provide 1 SLC loop for this project. Projects including more than 1 floor shall include a second SLC loop. Each SLC shall be capable of being wired Class B Style 4 or Class A Style 6 and shall operate in NFPA Style 7 configuration when equipped with isolator modules.
2. Each SLC shall accommodate a maximum 159 analog sensors and 159 monitor/control devices.

I. Notification Appliance Circuits

1. The CPU shall include a minimum 4 on-board polarized NAC circuits rated at 2 amps DC each. Each NAC shall be capable of being wired Class B, Style Y or Class A, Style Z.
- J. Dry Contacts
1. Form C dry contacts with a 2 amp at 30VDC resistive rating shall be included on-board the CPU for alarm, trouble and supervisory events.
- K. DACT
1. Fire alarm control panel shall include a Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges
 2. DACT shall be a U.L. listed internal component of the main control panel and shall be capable of transmitting specific detailed point by point system events to the monitoring station.
 3. Systems using external standalone digital communicators will not be accepted.
- L. Cellular/IP COMMUNICATOR
1. Provide a dual path commercial fire communicator as part of this project.
 2. Acceptable manufacturers:
 3. Fire-Lite Alarms Model IPGSM-4G by Honeywell. All equipment must be available "over the counter" through security equipment distributor network markets and can be installed by dealerships who are independent of the manufacturer. No substitutions allowed.
 4. The central station's supervisory equipment shall be Honeywell's AlarmNet Network Control Center.
 5. Contract the services of a monitoring company sub-contractor or distributor to provide, program the communicator and provide monitoring of the system.
 6. The communicator shall use the internet or GSM cellular network as a primary transmission format.
 7. IPGSM-4G Communicator is connected to any Fire Alarm Control Panel DACT telephone ports, the system shall be capable of transmitting Contact ID formatted alarms, supervisory or troubles to a Honeywell's AlarmNet Network Control Center equipped with a Honeywell AlarmNet receiver via Ethernet over a private or public WAN/LAN, Intranet or Ethernet.
 8. The IPGSM-4G Communicator shall include connections to the Fire Alarm Control Panel's phone outputs and shall convert the contact ID protocol into Ethernet Packets.
 9. The IPGSM-4G Communicator shall be completely field-programmable locally from a 7720P Programming Tool.
 10. The IPGSM-4G Communicator shall be capable of transmitting events in contact ID format.
 11. Communication shall include vital system status such as:

- a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
- b. Independent Addressable Device Status
- c. AC (Mains) Power Loss
- d. Low Battery and Earth Fault
- e. System Off Normal
- f. 24 Hour Test Signal
- g. Abnormal Test Signal (per UL requirements)
- 12. The IPGSM-4G Communicator shall support independent zone reporting via the Contact ID format. This format shall enable the central station to have details concerning the location of the fire for emergency response. The IPGSM-4G Communicator shall be capable of providing simulated phone lines to the Fire Alarm Control Panel. The IPGSM-4G Communicator shall communicate over IP or GSM primary and shall be transparent to the Fire Alarm Control Panel normal operation over phone lines.

2.04 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit.

2.05 PRINTERS

- A. A printer shall not be required for this project.

2.06 SUPPLEMENTARY NOTIFICATION APPLIANCE POWER SUPPLIES

- A. The following are acceptable manufacturers and series for supplementary notification appliance circuit power supplies. No substitutions are allowed. It is the intent of this specification that all notification equipment must be available over the counter through security equipment distributor network markets
 - 1. APS6 of APS10 with the appropriate amp.
- B. The supplementary NAC power supply shall offer up to 6.0 amps continuous regulated 24-volt power. The power supply shall include the following features:
 - 1. Integral Charger: Charge up to 35.0 amp-hour batteries and support 60-hour standby.
 - 2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or supervised addressable relay.
 - 3. Surface-mount back box.
 - 4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
 - 5. Power limited circuitry in accordance with applicable UL standards.
 - 6. Operates as sync follower or a sync generator.
 - 7. Shall have on-board built in sync capability for System Sensor and Wheelock brand appliances.

- C. Do not exceed 75% of the power supply's available listed current. Provide the necessary quantity of power supplies to satisfy this requirement with the quantity of devices indicated on the plans.

2.07 SYSTEM PERIPHERALS

- A. Every device's address shall be set by means of a rotary-decimal switch using a standard screwdriver. Devices using or requiring binary switches, handheld device programmers or addressed only through software mapping shall not be acceptable.
- B. Smoke detectors
 - 1. General Description:
 - a. UL 268 listed, operating at 24-V dc, nominal.
 - b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 - c. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
 - 2. Photoelectric Smoke Detectors:
 - a. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.
 - 3. Duct Detectors
 - a. Duct detectors shall be System Sensor DNR or DNRW Series housings.
 - b. Housings and all the related accessories listed below shall be provided for the each of the following:
 - 1) On the ductwork of every supply branch of every HVAC air handling/rooftop unit exceeding 2,000 CFM
 - 2) On the ductwork of every return branch of HVAC air handling/rooftop unit exceeding 2,000 CFM. Where duct detectors cannot be practically or effectively installed on return ductwork, securely fasten the duct detector on the side of the AHU and install and secure its sampling tube across the front of the return air filter.
 - 3) On every shown smoke and fire/smoke damper. Where duct detectors cannot be practically installed on dampers consult with the general contractor to coordinate their installation with other trades.
 - c. The housing shall include the listed addressable photoelectric smoke detector head which shall twist in and lock inside the housing.
 - d. Provide System Sensor DST Series sampling tube of enough length to extend 75% of the width of the duct it is being installed in. Sampling tubes in ducts exceeding widths of 6 feet shall exceed and install across the entire width of the duct and be supported by drilling a hole in the opposite side of the ductwork.
 - e. A System Sensor model RTS151KEY module shall be installed for each duct detector. Provide phenolic labels identifying the related HVAC unit it is connected to. The RTS151KEY module shall mount in a standard single gang electrical box. Verify and coordinate location of RTS151KEY modules with architect.
 - f. Provide one addressable relay module for each HVAC required function including:

- 1) AHU Shutdown
 - 2) Smoke damper operation
 - 3) Smoke sequence/exhaust/pressurization operations
- g. System designs incorporating hardwired, conventional relays for any mechanical functions are not allowed and will be subsequently rejected.

C. Pull Stations

1. Shall be fully listed and compatible with the furnished system, dual action, and constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters.
2. Stations shall be designed so after actuation they cannot be restored except by key reset.
3. Stations shall be keyed alike with the fire alarm control panel and NAC power supply.
4. Surface boxes shall be available as an option from the manufacturer.
5. Pull stations shall not utilize glass rods.

D. Thermal Detectors

1. Shall be listed and compatible with the furnished system.
2. Detector shall be rated at 135 degrees and shall have rate of rise element rated at 15 degrees per minute.
3. UL521 listed

E. Beam-Type Smoke Detector: Each detector shall consist of a separate transmitter and receiver, and shall have the following features:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Adjustable Sensitivity: At least six sensitivity levels, settable at the receiver, measured as percent of obscuration.
3. Two selectable alarm delay settings, allowing each to be associated with a corresponding sensitivity.
4. Separate Color-Coded LEDs: Indicate normal, alarm, and trouble status with remote indicator panels.

F. Addressable Monitor Modules

1. Where required provide addressable monitor modules to monitor normally open dry contacts from other non-addressable equipment.
2. Module shall be suitable for installation on a standard 4" square electrical box 2-1/8" deep and shall include the manufacturer's matching cover plate.
3. An LED shall be visible on the outside of the module's cover plate and shall flash under normal conditions and remain on steady when it's connected device is in alarm.
4. Modules not suitable for mounting directly onto a 4" square electrical box or those which wire with pigtail type connectors are not acceptable.

G. Supervised Addressable Output Module

1. Provide addressable supervised output module where required for the project to provide a supervised, programmed 24volt DC reverse polarity output.
2. Module shall be suitable for installation on a standard 4" square electrical box 2-1/8" deep and shall include the manufacturer's matching cover plate.

3. An LED shall be visible on the outside of the module's cover plate and shall flash under normal conditions and remain on steady when the module is activated.
- H. Addressable Relay Output Module
1. Provide addressable modules suitable for installation on a standard 4" square electrical box 2-1/8" deep and shall include the manufacturer's matching cover plate.
 2. The module shall provide two isolated sets of Form-C normally open and normally closed contacts
 3. Contact ratings shall be rated at minimum 2.0 amps resistive or 1.0 amp inductive
 4. An LED shall be visible on the outside of the module's cover plate and shall flash under normal conditions and remain on steady when the module is activated.
- I. Audio Visual Notification Appliances
1. Shall be System Sensor SpectrAlert Advance Series listed for use on both wall and ceiling as indicated on the plans.
 2. Provide devices white in color with red FIRE screened on device from manufacturer.
 3. Audio visual devices shall be one complete assembly utilizing a speaker for audible notification for this project.
 4. The device shall be suitable for mounting on standard electrical boxes using the manufacturer's universal mounting plate. The strobe device shall snap into the mounting plate and secured by one fastener.
 5. The manufacturer's mounting plate shall include screw terminals to accept all field wiring.
 6. Candelas shall be selectable in settings of 15, 15/75, 30, 75, 95, 110, 115, 135, 150, 177 and 185.
 7. The strobe shall be listed to U.L. 1971 standards and meet all current ADAAG Guidelines.
 8. The horn shall be listed to U.L. 464 approved for fire protective service and shall have three audibility options and an output to switch between a temporal three pattern and a non-temporal continuous pattern.
 9. Provide manufacturer's surface mount and weatherproof backboxes where required.
- J. MAGNETIC DOOR HOLDERS
1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
 - a. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
 - b. Wall-Mounted Units: Flush mounted unless otherwise indicated.
 - c. Rating: 24-V ac or dc.
 2. Material and Finish: Match door hardware.

2.08 WIRE AND CABLE

- A. The following are acceptable manufacturers:
1. Windy City Wire
 2. General Cable

- B. Cable shall be approved for plenum use without conduit per the NFPA 262 Flame Test
- C. Cable shall be approved per NEC 800, 760; UL, CMP, FPLP UL, RoHS Complaint

PART 3.00 EXECUTION

3.01 EXAMINATION

- A. Examine areas and surfaces to receive fire alarm system.
 - 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 - 2. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the Drawings.
- B. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas.
- C. Do not install smoke detectors before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.
- D. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- E. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install not less than 42 inches, not more than 48 inches, above finished floor measured to operating handle.
- F. Duct-Mounted Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- G. Heat Detectors in Elevator Shafts: Coordinate temperature rating, thermal response characteristic and location with sprinkler rating and location.
- H. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- I. Smoke- or Heat-Detector Spacing:
 - 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing

2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed the listing of the detector.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
5. HVAC: Locate detectors not closer than 5 feet (1.5 m) from air-supply diffuser or 3 feet (1 m) from return-air opening.
6. Lighting Fixtures: Locate centerline of detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.
- B. Testing:
 1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
 2. Close each sprinkler system control valve and verify proper supervisory alarm at Control Panel.
 3. Verify activation of flow switches.
 4. Open initiating device circuits and verify that trouble signal actuates.
 5. Open signaling line circuits and verify that trouble signal actuates.
 6. Open and short notification appliance circuits and verify that trouble signal actuates.
 7. Ground initiating device circuits and verify response of trouble signals.
 8. Ground signaling line circuits and verify response of trouble signals.
 9. Ground notification appliance circuits and verify response of trouble signals.
 10. Check installation, supervision, and operation of intelligent smoke detectors.
 11. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at Control Panel and correct activation of control points.
 12. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.
- C. Acceptance Testing:
 1. Before installation shall be considered completed and acceptable by AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by Engineer. Monitoring company and/or fire department shall be notified before final test in accordance with local requirements.
 2. Contractor's job foreman, in presence of representative of manufacturer, representative of Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at control panel.

3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
4. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of manufacturer and Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and fire department.
5. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.04 DEMONSTRATION

- A. Provide instruction as required for operating fire alarm system.

END OF SECTION