

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

Latest Update 08-09-2024 See underlined text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off "Underlines".)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 28.

1.2 SUMMARY

A. Section Includes:

1. Fire alarm systems with manual stations, detectors, signal equipment, controls, digital amplifiers, booster panels, digital voice communication and devices.
2. Connection to door hardware for door closers/holders, electric door locks, and release existing devices that interface with fire alarm systems.
3. Contractor shall provide and install microprocessor based fire alarm and detection system devices in accordance with NFPA 72. The system components shall be the product of Notifier. Installation shall include all parts, labor, software, and hardware necessary to effect a complete installation.

B. Section Includes: <Engineer to Edit for Project Requirements>

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Non-system smoke detectors.
5. Heat detectors.
6. Notification appliances.
7. Firefighters' two-way telephone communication service.
8. Magnetic door holders.
9. Remote graphic annunciator Panel.
10. Addressable interface device.
11. Digital alarm communicator transmitter.
12. Radio alarm transmitter.
13. System printer.
14. Duct smoke detectors.

15. Emergency telephone stations.
16. Remote transponder panel.
17. Emergency power supply.
18. Control relays and contact input modules.
19. Line isolation modules.
20. Knox Box.
21. Beam Detectors.
22. Remote Fire Annunciator.
23. Graphic Annunciator panel.
24. Interface to existing Campus Central Network Stations.

1.3 SYSTEM DESCRIPTION

- A. Non-coded, UL-certified addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.
- B. Non-coded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.
- C. System shall be capable of full monitoring, control and remote control through UMB Campus Central Network Stations. System to have voice audible capability and shall be connected to UMB Mass Notification System.
- D. Mass Notification System (MNS) shall be designed and installed per NFPA 72. System shall meet the requirements of one-way emergency communications systems with in-building MNS capabilities.
- E. Presently, UMB has a contract to upgrade the existing buildings FACP and Network Command Centers (NCC's) with the latest version of Software/Firmware. Under this project, the contractor shall coordinate with the UMB Project Manager for the programming of the building panel and the correct version of Software/Firmware must be provided prior to programming.
- F. UMB does not have a service contract with any other company to work on the existing fire alarm system. Any certified Notifier Fire Alarm System distributor can work on the system. Upon request the contractor shall provide proof of their Notifier Engineered System Distributor Agreement to the University.
- G. General: <Engineer to Edit for Project Requirements. This paragraph only applies to buildings with upgrade/replacement of existing Fire Alarm System in its entity>
 1. The existing fire alarm control panel for the building is a Notifier NFS2-640 with DVC Voice Command Unit. The Notifier NFS2-640 is currently monitoring an existing 3rd party panel that is acting as the main building panel. The current system is a horn/strobe system. Bidders will be responsible for supplying all components

to complete a fully functional Emergency Voice Evacuation in accordance with the project specifications and drawings. The contractor is responsible for determining if the existing NFS2-640 panel will provide adequate capacity to support all required points/zones under this contract and if NFS2-640 cannot support the additional points/zones, then the panel shall be upgraded to Notifier Model NFS2-3030. The cost of any necessary upgrade to Notifier Model NFS2-3030 must be included in the lump sum base bid price. DO NOT PROVIDE Notifier Model NCA-2, network control annunciator for additional points/zones. UMB does not monitor networks at the buildings.

2. Each day, the contractor and sub-contractors shall sign-in and sign-out the fire alarm system at the Campus Police Station located at Pine St. Annex, 222 N Pine St, Baltimore, MD.
- H. Prior to starting of work, UMB will test the existing building fire alarm system to identify any deficiencies: <Engineer to Edit for Project Requirements. This paragraph only applies to buildings with upgrade/replacement of existing Fire Alarm System in its entity>
- I. Prior to programming the fire alarm system at all buildings, the contractor shall contact UMB Project Manager to obtain available nodes.
- J. Prior to programming of the new/existing FACP, the contractor shall verify in field exact room numbers and names for all initiating devices, elevator numbers and stair numbers to program the correct device address.
- K. Initiating Devices: Provide initiating devices for each application throughout as required by NFPA 72.
- L. Provide interface connections for all elevator functions. If the buildings have multiple elevator controllers, provide monitor modules for each elevator.
- M. Notification Appliances:
 1. Provide combination speaker/strobe signals throughout as required to ensure audibility and intelligibility of signal as detailed in NFPA 72.
 2. Provide any additional notification appliances as required by the ADA.
 3. Fire alarm notification appliances shall remain active until the fire alarm system is manually silenced or acknowledged.
 4. Both audible and visible notification appliances shall be simultaneously deactivated.
- N. Auxiliary Functions:
 1. Door Holders – Release doors automatically upon activation of associated smoke detector(s).

2. Smoke Dampers – Close respective smoke damper upon activation of associated duct smoke detector(s).
3. Provide 3rd party interface connections to building security system, halon system etc. as required.

O. Voice/Alarm:

1. During normal system operation, activation of any alarm initiating device shall cause an attention signal to be broadcast over audible signals to be followed by a custom voice message.

- P. There are four (4) Network Command Centers (NCC) installed on the campus. Provide all new work associated with the connections, programming and modifications to the existing NCC's under this project. : <Engineer to Edit for Project Requirements, this only applies to New Building Construction>

1.4 SUBMITTALS

- A. General Requirements: For general requirements see Architectural Specification Division 01 Section "Submittal Procedures" and Division 260000 "Basic Electrical Requirements".

- B. In addition to the requirements identified in Architectural Specification Division 01 Section "Submittal Procedures" the fire alarm contractor shall also comply with the following:

1. UMB requires the Fire Alarm Submittal to be submitted electronically as one (1) complete submission as a "pdf" file for review. Partial Submittals will be rejected.

- a. The complete submittal must be reviewed and approved by the A/E and the UMB Fire Marshal before installation can take place. The submission shall include the following:

- 1) Product data
- 2) Shop drawings (See Paragraph 'D' below for requirements)
- 3) Voltage drop calculations
- 4) Installers qualifications

- b. The warranty information and maintenance manuals shall be included in the Division 28 Project O & M Manual. Do not include this data in the Fire Alarm Submittal.

2. Shop Drawings shall be prepared by persons trained and certified by the manufacturer in fire-alarm system design. Shop drawings shall be signed or stamped by an individual with one of the following qualifications:

- a. NICET fire-alarm technician, Level IV minimum.

- b. Professional Engineer registered in the State of Maryland.
 - c. The qualified individual signing the shop drawings must attend any and all review comment resolution meetings requested by the University.
 3. Submissions to UMB Fire Marshal:
 - a. Include copies of annotated Contract Drawings as needed to depict component locations to facilitate review. Resubmit if required to make clarifications or revisions to obtain approval.
 4. Renovation Projects: For projects involving only modifications to an existing FAS, the University will provide electronic copies to the FAS manufacturer of their latest version of the FAS As-Builts. The FAS manufacturer will make all necessary revisions to the FAS as-builts and submit them for review/approval. Once the project is completed, the FAS manufacturer will update the copies for forwarding electronically to the University for archiving. In revising the electronic copies of the University's as-builts, please perform the changes in the following format:
 - a. Show all new wiring and equipment in bold so it is convenient to differentiate between new and existing.
 5. After contract award and before material is ordered submit electrically all product data, shop drawings, drawings and other such descriptive data as the Engineer may require to demonstrate compliance with the contract documents as required by the contract clauses for review and approval.
 6. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable publication references, years of satisfactory service, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.
- C. Product Data: For each type of product specified.
- D. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 1. Comply with NFPA 72 "Documentation" chapter.
 2. Include voltage drop calculations for notification appliance circuits.
 3. Include battery-size calculations.
 4. Load Calculations - Provide load calculations for all NAC circuits while noting both current demand and future capacity in amperes.

5. Device Address List: Coordinate with final system programming. Floor plans shall include address numbers for all devices.
 6. System Sequence of Operation: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
 7. Details of graphic and alphanumeric annunciators.
 8. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 9. Include half-size plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
 10. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 11. Include List of extra materials to be provided for the project.
 12. Shop Drawings must include the following:
 - a. Provide floor plans with ALL device locations and their associated addresses. Floor plans must be drawn to scale. Provide graphic scales on the drawings.
 - b. For new building construction projects or replacement of existing building entire fire alarm system projects, use NFPA 170 symbols.
 - c. For renovation projects match the symbols used on As-Builts.
 - d. Provide a riser diagram, regardless of system size.
 - e. Wiring Diagrams: Provide the following:
 - 1) Detail wiring and differentiate between manufacturer-installed and field-installed wiring.
 - 2) Include diagrams for equipment and for system with all terminals and interconnections identified.
 - 3) Include all internal network cards and boards in FACP and Transponder Panels.
 - f. Provide excel file of device list so that labels can be edited by UMB.
- E. Qualification Data: For qualified Installer.

- F. Field quality-control reports.

- G. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - 3. Record copy of site-specific software.
 - 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals.
 - 5. Manufacturer's required maintenance related to system warranty requirements.
 - 6. Abbreviated operating instructions for mounting at fire-alarm control unit.

- H. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On USB Flash Drive, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

- I. Informational Submittals: Submit the following:
 - 1. Operating Instructions: For mounting at FACP.
 - 2. Product Certificates: Signed by manufacturers of system components certifying that products furnished comply with requirements.
 - 3. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

4. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Comply with NFPA 72.
- J. Project Closeout Submittals: Submit the following in accordance with the UMB General Conditions.
1. Electronic Copies of System Program: Provide a minimum of two (2) electronic copies of the system program on USB Flash Drive. Store one (1) USB Flash Drive copy of the program at the FACP and hand the other copy over to the Project Manager. Besides being required by NFPA 72, the purpose for this requirement is to ensure the owner always has on hand a "bug free" copy of the original.
 2. Manufacturer's As-Built Drawings: Submit one (1) set of the Manufacturer's As-Built Drawings as a hard copy to UMB Fire Marshal for review prior to scheduling a Final Acceptance Test.
 - a. As-Built Drawings: The FAS Manufacturer shall revise/update the FAS Shop Drawings to accurately reflect the following field installation data/conditions:
 - 1) All individual device addresses on the floor plans.
 - 2) Conduit/SLC & NAC Loop Wiring Layout - Show routing of all FAS wiring and raceway including riser runs and while noting all FAS device and panel locations. Identify all panels with their respective ID numbers/lettering as entered in the FAS programming software. Where multiple FAS circuits are run in parallel and/or grouped together, attach drawing notes to the runs to identify the individual FAS circuits in the grouped or parallel run. Delineate overhead versus underground runs by using dashed lines for underground.
 - 3) Riser and/or connection diagram.
 - b. Equipment Data: Provide Manufacturer's catalog information on all internal network cards/option modules in the system.
 - c. Provide both paper copies and electronic files in AutoCAD 2018 or latest edition used by UMB in "dwg" and "PDF" file formats. Provide two (2) full-size paper copies (24 inches x 36 inches) and three (3) half-size copies for UMB review personnel only. Provide graphic scales on the drawings.
 3. Updated copies of load calculations, System Program and Sequence of Operation as submitted during in the shop drawing phase.
 4. Maintenance Data: For fire alarm systems. Comply with NFPA 72.
 5. Record of Completion: Comply with NFPA 72.

1.5 QUALITY ASSURANCE

- A. The contractor shall have (or contractually be supported by a company who has) on staff and assigned to the project a NICET Level IV certified person for fire alarm systems.
<Consult with UMB Fire Marshal and Edit for Project Requirements>
- B. The contractor shall have (or contractually be supported by a company who has) on staff and assigned to the project a NICET Level III certified person for fire alarm systems.
<Consult with UMB Fire Marshal and Edit for Project Requirements>
- C. A NICET Level II or higher Fire Alarm Technician or a Fire Alarm Technician with minimum of two (2) years' experience shall install and terminate fire alarm devices, cabinets and panels. The Fire Alarm technicians installing the equipment shall be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and indicated on the drawings
- D. An electrician or NICET Level II Fire Alarm Technician shall install conduit for the fire alarm system.
- E. Installer must provide a list of five (5) previous projects done for the FAS manufacturer that are equivalent in FAS system type and scope of this project.
- F. Manufacturer Qualifications: Firm experienced in manufacturing systems similar to those indicated for this Project and with record of successful in-service performance.
- G. Source Limitations: Obtain fire alarm system components through one source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- H. Compliance with Local Requirements: Comply with applicable building code, local ordinances and regulations, and requirements of UMB Fire Marshal.
- I. Comply with NFPA 70 and 72.
- J. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify UMB Project Manager no fewer than ten (10) days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with fire-alarm outage without UMB Project Manager's written permission.
 - 3. Where a required existing fire protection system is out of service or during system

Outage, the contractor shall provide fire watch as required by the UMB Fire Marshal until the existing system is restored. See link below:

<https://www.umaryland.edu/policies-and-procedures/library/public-safety/procedures/fire-watch.php>

1.7 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring as directed by UMB Project Manager and UMB Fire Marshal. Existing equipment shall be removed immediately after new equipment is accepted. <Engineer to Edit for Project Requirements>

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver materials to UMB Project Manager with Bill of Materials in accordance with UMB general conditions. **Include list of extra materials with the shop drawing submittal.** Where multiple buildings are being bid as one project, provide extra materials for each building.
 - 1. Smoke Detectors, Heat Detectors (each type), Fire Detectors, and Flame Detectors: Quantity equal to 10% of amount of each type installed, but no fewer than 1 unit of each type.
 - 2. Detector Bases: Quantity equal to 2% of amount of each type installed, but no fewer than one (1) unit of each type.
 - 3. Keys: One (1) extra set for access to locked and tamper proofed components.
 - 4. FMM-1, FDM-1, FRM-1, FCM-1, FMM-101 addressable modules. Provide quantity equal to 20% of amount installed, but not less than two (2) units.
 - 5. Line-Isolation Modules (ISO-X): Two (2) spares.
 - 6. Telephone Modules (FTM): Two (2) spares.
 - 7. Printer Ribbons: Six (6) spares.

1.9 WARRANTY/GUARENTEE

- A. See Division 26, Specification Section “Basic Electrical Requirements” for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following: <Engineer to Edit for New Project Requirements. Coordinate with UMB Project Manager>

1. New Fire Alarm System NOTIFIER:
 - a. Fire Alarm Control Panel Model NFS2-3030 with display.
 - b. Digital Voice Command (DVC), Voice Evacuation Control System.

- B. Manufacturers: <Engineer to Edit for Renovation Project Requirements>

1. Existing Fire Alarm System NOTIFIER:
 - a. Fire Alarm Control Panel Model [NFS2-640] [NFS2-3030] with display.
 - b. Digital Voice Command (DVC), Voice Evacuation Control System.
2. Provide for the existing system, as required and as indicated on the drawings: <Engineer to Edit for Project Requirements>
 - a. Refer to Para, 2.2 and 2.3.
 - b. Modifications to wiring and connections.
 - c. Reprogramming of control panel, addresses, etc.
 - d. Additional parts, modules, amplifiers, relays, etc.
 - e. Connections to existing supervisory and alarm devices not being replaced with new.
 - f. Connections for auxiliary functions, as required.
 - g. Extensions of signal control and power wiring, as required. SLC and/or NAC 'T' taps are strictly prohibited on both SLC and NAC loops. If this poor workmanship is discovered, it will be required to be removed.
 - h. Connections to new and existing components.
 - i. The existing devices shall be upgraded with proper addressable modules, monitoring modules, relay modules etc. and any new devices shall be provided with new modules to ensure that the system is code compliant as required by the UMB Fire Marshal.
 - j. All existing duct smoke detectors in the building shall be replaced with new addressable type. Replace existing sampling tube and all accessories for a complete new installation.
 - k. Provide 3rd party interface connections to security system, halon system etc.
 - l. Provide all new wiring.
 - m. Provide interface connections for all elevator functions. If the buildings have multiple elevator controllers, provide monitor modules for each elevator.
 - n. Mass Notification System

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one (1) or more of the following devices [and systems]: <Engineer to Edit for Project Requirements>
1. Manual stations.
 2. Heat detectors.
 3. Flame detectors.
 4. Smoke detectors.
 5. Elevator Machine Room initiating devices.
 6. Verified automatic alarm operation of smoke detectors.
 7. Automatic sprinkler system water flow.
 8. Fire-extinguishing system operation.
 9. Fire standpipe system.
 10. Fire Pump Running
 11. <Insert alarm-initiating devices and systems>.
- B. Supervisory signal initiation shall be by one (1) or more of the following devices and actions:
1. Valve supervisory switch.
 2. Low-air-pressure switch of a dry-pipe or preaction sprinkler system.
 3. Elevator shunt-trip supervision.
 4. Beam detectors.
 5. Halon system.
 6. Duct smoke detectors.
 7. <Insert supervisory signal-initiating devices and actions>.
- C. System trouble signal initiation shall be by one (1) or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of primary power at fire-alarm control unit.
 4. Ground or a single break in fire-alarm control unit internal circuits.
 5. Abnormal ac voltage at fire-alarm control unit.
 6. Break in standby battery circuitry.
 7. Failure of battery charging.
 8. Abnormal position of any switch at fire-alarm control unit or annunciator.
 9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 10. <Insert trouble signal-initiating devices and actions>.
- D. System Trouble and Supervisory Signal Actions: Initiate and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer. Transmit trouble and supervisory signals to remote alarm receiving central network stations.

- E. Control of System: By FACP and by Remote Transponder(s) as required on Contract Drawings.
- F. System Supervision: Automatically detect and report open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
- G. Priority of Signals: Automatic alarm response functions resulting from alarm signal from one zone or device are not altered by subsequent alarm, supervisory, or trouble signals. Alarm signal is highest priority. Supervisory and trouble signals have second- and third-level priority. Higher-priority signals take precedence over signals of lower priority, even when lower-priority condition occurs first. Annunciate and display all alarm, supervisory, and trouble signals regardless of priority or order received. If a live mass notification message is sent from the Campus Police, the broadcasted message shall have priority over the recorded building voice message.
- H. Noninterference: Signal on one zone shall not prevent receipt of signals from other zones.
- I. System Reset: All zones are manually resettable from FACP after initiating devices are restored to normal.
- J. Transmission to Remote Alarm Receiving Station (Back-up Dialer): Provide Addressable Relay Modules (FRM-1) and a Digital Alarm Communication Transmitter (DACT) by the Fire Alarm Control panel as indicated. Arrange and program the DACT to route "alarm signals" only to the Campus Police back-up dialer.
- K. Transmission to Remote Alarm Receiving Central Network Station: Provide all network programming for identification of devices at the existing fire alarm control panel and at the Central Network Station located at the Campus Police, UMB Fire Marshal's Office, and Pearl Street Garage Electronics Shop.
- L. Provide all network programming on node assigned to each building on the network system.
- M. Loss of primary power at FACP initiates trouble signal at FACP and Graphic Annunciator Panel (GAP). Both FACP and GAP shall indicate when fire alarm system is operating on secondary power supply.
- N. Fire Alarm System Elevator Recall Requirement(s): Unless otherwise indicated, all alarms received at the FACP shall automatically result in the recalling of all building elevators. Unless otherwise approved by the UMB Fire Marshal, all other Trouble and Supervisory signals shall not automatically recall the elevators.
- O. Basic Alarm Performance Requirements: Unless otherwise indicated, fire alarm signal activation shall initiate the following:
 - 1. Notification-appliance operation:

- a. General Alarm – All notification appliances in the building shall activate upon any alarm signals.
- b. Voice Message - All floors. Recorded (FEMALE VOICE) message, shall be played throughout the building. The message shall be:

“MAY I HAVE YOUR ATTENTION PLEASE; MAY I HAVE YOUR ATTENTION PLEASE. AN EMERGENCY HAS BEEN REPORTED IN THE BUILDING. PLEASE LEAVE THE BUILDING BY THE NEAREST MARKED EXIT OR EXIT STAIRWELL. EXIT DIRECTLY TO THE OUTSIDE OF THE BUILDING FROM THE STAIRWELL. DO NOT REENTER THE BUILDING. DO NOT USE THE ELEVATORS.”

Final wording of the above message must be submitted with the shop drawings for review and approval.

- c. Provide the following recorded (FEMALE VOICE) Testing Message, programmed at the control panel:

“MAY I HAVE YOUR ATTENTION PLEASE; MAY I HAVE YOUR ATTENTION PLEASE. WE ARE CONDUCTING A TEST OF THE FIRE ALARM SYSTEM IN THE BUILDING. DISREGARD ANY EVACUATION ANNOUNCEMENTS YOU MAY HEAR. IF AN ACTUAL EMERGENCY OCCURS YOU WILL BE NOTIFIED.” This message shall repeat for 4 times.

- d. Provide the following recorded (FEMALE VOICE) Test Completed Message programmed at the control panel:

“MAY I HAVE YOUR ATTENTION PLEASE; MAY I HAVE YOUR ATTENTION PLEASE. WE HAVE COMPLETED THE FIRE ALARM TESTING IN THE BUILDING. ANY EVACUATION NOTIFICATION AFTER THIS ANNOUNCEMENT IS FOR REAL. THANK YOU FOR YOUR COOPERATION.” This message shall repeat for 4 times.

- e. Provide the following recorded (FEMALE VOICE) Maintenance Message programmed at the control panel:

MAY I HAVE YOUR ATTENTION PLEASE, MAY I HAVE YOUR ATTENTION PLEASE. WE ARE PERFORMING MAINTENANCE ON THE FIRE ALARM SYSTEM IN THE BUILDING. DISREGARD ANY EVACUATION ANNOUNCEMENTS YOU MAY HEAR. IF AN ACTUAL EMERGENCY OCCURS YOU WILL BE NOTIFIED.” This message shall repeat for 4 times.

- f. Provide the following recorded (FEMALE VOICE) Maintenance Completed Message programmed at the control panel:

“MAY I HAVE YOUR ATTENTION PLEASE; MAY I HAVE YOU ATTENTION PLEASE. WE HAVE COMPLETED FIRE ALARM SYSTEM MAINTENANCE IN THE BUILDING. ANY EVACUATION NOTIFICATION AFTER THIS ANNOUNCEMENT IS FOR REAL. THANK YOU FOR YOUR COOPERATION.” This message shall repeat for four (4) times.

2. Identify alarm at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock all electrical door locks unless directed otherwise by UMB Project Manager.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Activate smoke-control system (smoke management) at firefighter smoke-control system panel.
9. Activate stairwell and elevator-shaft pressurization systems.
10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
11. Recall elevators to primary or alternate recall floors.
12. Record events in the system memory.
13. Record events by the system printer.
14. Mass Notification Broadcast: In the event of an emergency, if a mass notification message is sent from the Campus Police, the broadcast message shall override the building recorded voice message.
15. <Insert signal-initiating actions>.

P. Building HVAC System Duct Smoke Detector Control via the BAS: The following requirements apply to all building 'HVAC Systems.' A building HVAC System is defined as an individual air circulation system comprised of a supply air system and a return air system. An HVAC System can be either a 100% outside air system or a re-circulating air system. Prior to making any interface connections to the building HVAC system, the contractor shall coordinate with UMB Project Manager and review building sequence of operations. Existing building BAS system is [SIEMENS] [JOHNSONS CONTROLS] [DELTA CONTROLS]. Contractor shall hire services of [SIEMENS] [JOHNSONS CONTROLS] [DELTA CONTROLS] to program the existing BAS system such that any activation of the duct smoke detector on the HVAC system shall report the status of the HVAC system to remote BAS network. <Engineer to Edit for Project Requirements>.

1. Provide duct smoke detectors in accordance with all applicable codes and standards. Do not provide additional detectors that are not required by code unless specifically requested by UMB.
2. For each duct detector, provide a remote LED indicator for quick identification of the detectors' location. Mount the remote LED at six (6) inches to twelve (12) inches below the ceiling in the wall, or in corridor space or ceiling. Remote LED indicators

must be located in the same room as the duct detector or in the corridor directly outside. For detectors located in rooftop HVAC system units, mount the remote LED indicator just inside the units' mantrap door for quick identification. Do not include the test switch option with the remote LED indicator. For detectors located in shafts or remote spaces, mount the remote LED indicator in corridor. Provide device address on the remote LED.

3. The buildings BAS will coordinate the shutdown of an HVAC System and its' associated smoke and fire dampers due to a duct smoke detector activation from the FAS. **Do not perform any direct interconnection between the duct smoke detectors contact outputs and the HVAC System starter(s) and any of its' smoke and fire dampers. Provide a dedicated addressable relay for interface connections.**
4. Provide a dedicated 'FRM-1' addressable relay for each HVAC System with duct smoke detectors regardless of the quantity of duct smoke detectors on the HVAC System. The output from the 'FRM-1' relay will be used to represent a 'shutdown request' to the BAS for the multiple duct smoke detectors on each HVAC System.
5. For each [existing] [new] HVAC System, coordinate with the [BAS Contractor] [UMB Energy Manager/UMB Project Manager] **<Engineer to Edit for Project Requirements>** and locate the dedicated 'FRM-1' relay next to the ATC Network Panel that will be used to receive a 'shutdown request' from the FAS due to a duct smoke detector activation.
6. Since most buildings have several HVAC Systems over 2,000 cfm, the above requirements will have several dedicated 'FRM-1' relays next to the ATC Panel(s). Again, provide a dedicated 'FRM-1' relay for EACH HVAC system with duct smoke detectors and locate them next to the ATC Panel(s). Coordinate with the [BAS Contractor] [UMB Energy Manager/UMB Project Manager] **<Engineer to Edit for Project Requirements>** to determine the exact location of EACH of the dedicated 'FRM-1' relays.
7. Please refer to the 'Identification' Section in Part 3 for labeling requirements of the HVAC System 'FRM-1' relays.
8. When a duct smoke detector activates, the following sequence of events should occur:
 - a. The detector reports a 'supervisory' signal to the FAS which is relayed to the UMB network stations as a 'supervisory' signal.
 - b. The FAS will initiate a contact output from the 'FRM-1' relay associated with the detector in alarm to the BAS System Panel which in turn will execute shutting down the HVAC System and closing any associated smoke and fire dampers.

Q. Building HVAC System Manual Control & Remote Monitoring:

1. HVAC Systems that do not serve life safety purposes: All responsibility for providing manual override switches, remote LED status indicators, and a building riser (if applicable) has been moved to the BAS System contractor's scope of work.

The BAS contractor will provide a dedicated panel next to the GAP for this purpose. This "HVAC System Monitoring and Control Panel" should in no way be interconnected with the FAS.

2. HVAC Systems Dedicated for Life Safety Purposes: The FAS directly monitors and controls all HVAC Life Safety systems such as, Stairwell Pressurization Fans, Atrium Exhaust Systems, etc. Provide the following:

- a. Provide a dedicated 'FRM-1' relay for each fan motor. Using the 'FRM-1' relay provide a control output to start and stop the fan motor and derive a status input from the starter for remote monitoring at the GAP.
- b. At the GAP, provide dedicated key switches for each fan motor and separate 'run' and 'off' status LED's in a separate NEMA 1 enclosure. Provide dedicated addressable modules for interface connections with GAP and FACP.

- R. Alarm Silencing, System Reset and Indication: Controlled by switches in FACP.

1. Silencing-switch operation halts alarm operation of notification appliances and activates alarm silence light. Display of identity of alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.

- S. Remote Detector Sensitivity Adjustment: Manipulation of controls at FACP causes selection of addressable smoke detectors for adjustment, display of their current status and sensitivity settings, and control of changes from primary to alternate sensitivity setting. Sensitivity adjustment will be recorded in system memory and printed out by system printer. FAS shall automatically perform sensitivity test at no more than one month intervals.

- T. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble), and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate printout of list of historical log of events.

- U. FACP and Remote Alphanumeric Displays: Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating report. Display monitoring actions, system and component status, system commands, programming information, and data from system's historical memory.

2.3 FIRE-ALARM CONTROL UNIT

- A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
 - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer. The clock shall be set to the official US Time per the National Institute of Standards and Technology.
 2. Addressable initiation devices that communicate device identity and status.
 - a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.
 - b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 3. Addressable control circuits for operation of mechanical equipment.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, NFS2-3030 2 line(s) of 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
 3. Password: Contractor shall not change FACU password without written approval from UMB Electronics Shop and UMB Fire Marshal.
- C. Circuits:
1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B, with isolator modules to isolate each floor. Provide 20% spare capacity on each signaling line circuit.
 2. Serial Interfaces: Two RS-232 ports for printers.
- D. Stairwell Pressurization: Provide an output signal using an addressable relay to start the stairwell pressurization system. Signal shall remain on until fire-alarm system is reset. Signal shall not stop in response to alarm acknowledge or signal silence commands.
1. Pressurization starts when any alarm is received at fire-alarm control unit.
 2. Alarm signals from smoke detectors at pressurization air supplies have a higher priority than other alarm signals that start the system.

- E. Smoke-Alarm Verification:
1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
 3. Record events by the system printer.
 4. Sound general alarm if the alarm is verified.
 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- F. Notification Appliance Circuit: Operation shall start with a temporal pattern followed by the recorded voice message and continue alternating between the two.
- G. Elevator Recall/Shunt Trip:
1. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
 2. Water-flow alarm connected to sprinkler in an elevator and elevator machine room shall shut down elevators associated with the location without time delay.
- H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, supervisory and digital alarm communicator transmitters, and digital alarm radio transmitters shall be powered by 24-V dc source.
1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Sealed, valve-regulated, recombinant lead acid.
- J. Instructions: Provide manufacturers printed instructions inside FACU cabinet door.
- K. 'Trouble,' 'Supervisory,' and 'Alarm' Contact Outputs to the UMB Central Monitoring Station and Autodialing Systems:
1. Provide six (6) 'FRM-1' relays for remotely reporting 'Trouble,' 'Supervisory,' and 'Alarm' contact outputs to the UMB Network Stations. Only 'Alarm' shall report to the Backup dialer System.
 2. Mount the six (6) 'FRM-1' relays next to the FACP and put them on the local SLC that serves the floor the FACP is located on.
 3. This requirement applies regardless of whether the Fire Alarm Control Panel has some amount of these outputs built into its' circuit boards. Do not use non-addressable, current relays to multiply these built-in outputs for this purpose.

- L. UMB Custom Control Switches for FACP: Provide the following custom controls and switches integral to the FACP:
1. Provide an "All Evac." control switch that activates notification appliances on all floors while executing all life safety relays to recall the building elevators, notify the campus police via the remote reporting system, dropping out door holders, and starting any Life Safety HVAC systems (e.g. Stairwell Pressurization Fans, Atrium Exhaust System, etc.). The "All Evac" button shall be located in a different column on the FACP than the other auto – disable switches. If it cannot be located in a different column, provide at least one (1) blank/unused button between "All Evac" and disables.
 2. Provide an auto-disable control switch to disable all notification appliances in order to avoid disturbing building occupants during maintenance and/or repair work on the system.
 3. Provide an auto-disable control switch to disable all elevator recall.
 4. Provide an auto-disable control switch to disable all HVAC systems impacted by activation of the fire alarm system.
 5. Provide an auto-disable control switch to disable all automatic door unlocks and all door hold-open magnets.
 6. Provide an auto-disable control switch to disable all fire shutters.
- M. Self-testing:
1. The FACP shall perform a test at least weekly to check the internal diagnostics of all connected devices. Test shall verify that all detector internal sensitivity levels are within range and if not, then issue a trouble/supervisory signal.
- N. The audio amplifiers will provide audio power (@70 Volts RMS) for distribution to speaker circuits. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier. The audio amplifier shall include an integral power supply and shall provide built-in LED indicators. All the controls shall be built-in to the audio amplifier. System shall be capable of backing up digital amplifiers. Provide model DAA2 series amp.
- O. Standby (backup) Audio Amplifiers shall be provided that automatically sense the failure of a primary amplifier, and automatically program themselves to select and de-multiplex the same audio information channel of the failed primary amplifier, and fully replace the function of the failed amplifier. Provide model BDA-70 series amp.
- P. The stairwells shall be a dedicated paging zones and the speakers used therein for that purpose only.
- Q. Audio Message Generator (Prerecorded Voice)/Speaker Control:

1. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.
2. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers. The message shall be repeated four (4) times. Pre- and post-message tones shall be supported.
3. A built-in microphone shall be provided to allow paging through speaker circuits.
4. System paging from emergency telephone circuits shall be supported.
5. The audio message generator shall have the indicators and controls to allow for proper operator understanding and control.

R. Digital Voice Command Center:

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.
2. Function: The Voice Command Center equipment shall perform the following functions:
 - a. Operate as a supervised multi-channel emergency voice communication system.
 - b. Operate as a two-way emergency telephone system control center.
 - c. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
 - d. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
 - e. Provide all-call Emergency Paging activities through activation of a single control switch.
 - f. As required, provide vectored paging control to specific audio zones via dedicated control switches.
 - g. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
 - h. Provide a software utility capable of off-line programming for the VCC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the VCC shall not inhibit the emergency operation of other nodes on the fire alarm network.
 - i. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SCL controlled switching.
 - j. The Digital Voice Command shall be modular in construction and shall be capable of being field programmable without requiring the return of any

- components to the manufacturer and without requiring use of any external computers or other programming equipment.
- k. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.
- S. Provide ACS Series Annunciators at Fire Alarm Control Panel for annunciation and control of Fire Alarm Control Panel. #ACM-XXAT.
- T. Lights adjacent to buttons on the control panel should not engage unless the corresponding auto disable, or button is pushed.

2.4 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
- 1. Manual stations shall be Notifier NBG12-LX. For outdoor locations provide weatherproof manual pull stations Notifier NBG-12LOB.
 - 2. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 3. Station Reset: Key- or wrench-operated switch.
 - 4. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.
 - 5. Provide manufacturer's optional RED back-boxes for mounting of all fire alarm pull stations.

2.5 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
- 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be two wire type.
 - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.

7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors shall be Notifier Model # FSP-951

C. Duct Smoke Detectors shall be Notifier Model #DNR with FSP-951R HEAD.

1. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
2. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
3. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detectors shall be Notifier Model FST-951 for indoor applications. Heat detectors for unconditioned spaces and parking garages shall be Notifier Model # 302 series.

C. Heat Detector, Combination Type: Actuated by either a fixed temperature of [135°F] <Insert temperature> or a rate of rise that exceeds [15°F] <Insert temperature> per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

D. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of [194°F] <Insert temperature>

1. Mounting: Adapter plate for outlet box mounting.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

E. Continuous Linear Heat-Detector System:

1. Detector Cable: Rated detection temperature [155°F] <Insert temperature>. NRTL listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short-circuit wires at the location of elevated temperature.

2. Control Unit: Two-zone or multizone unit as indicated. Provide same system power supply, supervision, and alarm features as specified for fire-alarm control unit.
3. Signals to Fire-Alarm Control Unit: Any type of local system trouble shall be reported to fire-alarm control unit as a composite "trouble" signal. Alarms on each detection zone shall be individually reported to central fire-alarm control unit as separately identified zones.
4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.7 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.
 1. Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly.
- B. Audio Amplifier Output Capability: Confirm adequate amplification is built into system to support throughout the protected area/space regardless of distance from nearest audible device as well as type of audible device being provided (e.g. speaker, horn, and trumpet).
- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol. Provide horns in mechanical rooms or where indicated on the drawing. Provide Wheelock Model #HNR.
- D. Weatherproof Horn/Strobes:
 1. Provide weatherproof horn/strobes with weatherproof back boxes as indicated on the drawings.
 - a. Audible Strobe, Wheelock # ASWP-24MCWH-FR
 - b. Strobes, Wheelock # AH-24WP-R
 - c. Back boxes for weatherproof horns/strobes, Wheelock # WPBB-R and WBB-R.
- E. Beacon Lights:
 1. Provide rotating beacon lights in mechanical rooms or where indicated on the drawings. Edwards # 53DR-GW with WBR mounting bracket.
 2. Provide weatherproof flashing beacon lights where indicated on the drawings. Edwards # 125HALFR24D/125R (RED) with suitable mounting bracket.

F. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum one (1) inch high letters on the lens.

1. Rated Light Output:
 - a. 15/30/75/110 CD, selectable in the field.
2. Mounting: Recessed wall or ceiling mounted are acceptable.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.
7. Provide Wheelock Exceeder Series.

G. Speaker/Strobe Notification Appliances:

1. Speakers shall be provided for use with 70v system.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.
4. Mounting: Recessed wall or ceiling mounted are acceptable.
5. Matching Transformers: Tap range matched to acoustical environment of speaker location.
6. Provide Wheelock E50 Series Speakers/Speaker Strobes.

H. Mount all notification appliances in manufacturer's optional red boxes.

2.8 FIREFIGHTERS' TWO-WAY TELEPHONE COMMUNICATION SERVICE

A. Dedicated, two-way, supervised, telephone voice communication links between fire-alarm control unit and remote firefighters' telephone stations. Supervised telephone lines shall be connected to talk circuits by controls in a control module. Provide the following:

1. Common-talk type for firefighter use only.
2. Selective-talk type for use by firefighters and fire wardens.
3. Controls to disconnect phones from talk circuits if too many phones are in use simultaneously.
4. Audible Pulse and Tone Generator, and High-Intensity Lamp: When a remote telephone is activated, it causes audible signal to sound and high-intensity lamp to flash.
5. Selector panel controls shall provide for simultaneous operation of up to six telephones in selected zones. Indicate ground faults and open or shorted telephone lines on the panel front by individual LEDs.

6. Display: [Graphic] [Liquid-crystal digital] <Insert display type> to indicate location of caller.
7. Remote Telephone Cabinet: Flush- or surface-mounted cabinet as indicated, factory-standard red finish, with handset.
 - a. Install one-piece handset to cabinet with vandal-resistant armored cord. Silk-screened or engraved label on cabinet door, designating "Fire Emergency Phone."
 - b. Remote Telephone Cabinet shall be provided in all Elevator lobbies in lieu of Telephone Jack Stations.
8. Remote Telephone Jack Stations: Single-gang, stainless-steel-plate mounted plug, engraved "Fire Emergency Phone."
9. Handsets: Push-to-talk-type sets with noise-canceling microphone stored in a cabinet adjacent to fire-alarm control unit or in the fire command center, as indicated.
10. The remote telephone jack stations must be individually addressable for individual status monitoring via LED's at FACP.
11. Indoor Identification: Station number and location.
12. Provide stainless steel telephone jack receptacles clearly identified with "FIRE FIGHTERS TELEPHONE" for use with portable fire fighter telephone handsets. They shall be flush, or surface mounted as shown on the plans.
13. Handsets shall be made of ABS plastic with sixty (60) inch coiled cords and be stored on handset hangers in a key locked enclosure painted "RED" and labeled "Emergency Telephone Handsets"
14. Cabinet: Flush or surface mounted as indicated, 0.05-inch minimum stainless steel with latched hinged door with red trim.
15. Provide a minimum of fifteen (15) remote telephone handsets.
16. Notifier Model AFAWS-TELC/AFAWS-BX/AFAWS-LR or AFAWS-LS

2.9 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.[Coordinate magnetic door holder requirements with architectural door hardware, if provided under architectural door hardware, identify on the drawings] <Engineer to Edit for Project Requirements>
 1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
 2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
 3. Rating: 24-V ac or dc. <Engineer to Edit for Project Requirements>
 4. Rating: 120-V ac. <Engineer to Edit for Project Requirements>
- B. Material and Finish: Match door hardware.

- C. Magnetic door holders are not to be served by "emergency" power. Magnetic door holders are released when "normal" power fails.

2.10 GRAPHIC DISPLAY ANNUNCIATORS

- A. Description: Duplicate annunciator functions of FACP for alarm, supervisory, and trouble indications.
1. Mounting: Flush cabinet, NEMA 250, Class 1. See Contract Drawings for details. If space conditions does not allow for flush mounting, contractor shall coordinate with UMB project manager and get final approval for surface mounted cabinet.
- B. Display Type and Functional Performance: Individual LED for each type of alarm and supervisory device, and LEDs to indicate normal power and trouble.
1. An alarm or supervisory signal causes illumination of floor light, device type light, and location.
 2. System trouble causes illumination of all lights above and also trouble light.
 3. Additional LEDs indicate normal power mode status for system.
 4. A test switch tests LEDs mounted on panel. Switch does not require key operation. There shall be no audible signal associated with the testing of the LED's.
 5. Graphics: Integrate LED displays with graphic display panel to form graphic annunciator.
 6. Battery power on.
- C. Graphic Display Annunciator: The Graphic Display Annunciator shall be provided with the following features and as directed by the UMB Fire Marshal.
1. Wall-mounted flush backlit panel indicating building floor plan with **"YOU ARE HERE"** designation in red text.
 2. The building graphic shall have a white background and depict the building outline, stair locations (with stair labels), all elevators (with elevator labels), elevator machine rooms, location of the fire alarm control panel, location of fire pump (if any), a North arrow, and any other designations as required by the UMB Fire Marshal.
 3. Provide an LED on the building graphic as follows:
 - a. "RED" for Alarm/Normal Power failure, "YELLOW" for Supervisory and "GREEN" for Normal.
 - b. An "LED" shall also be provided to identify floor, device type, and location.
 - c. Pull Station – 'RED'.
 - d. Smoke detector – 'RED'.
 - e. Heat detector – 'RED'.
 - f. Water flow – 'RED'.
 - g. Duct detector – 'YELLOW'.
 - h. Tamper switch – "YELLOW".
 - i. Fire Pump Running – "RED".

- j. Fire Pump Trouble – “YELLOW”.
 - k. Fire Pump Normal - “GREEN”.
 - l. Halon System – “YELLOW”.
 - m. Beam detector – “YELLOW”.
- D. Materials: Anodized aluminum frame with graphics on white Plexiglas protected by non-glare Plexiglas.
- E. Floor plan lines are to be black and all text shall be black one quarter (1/4) inch high minimum, except for “YOU ARE HERE,” fire pump and FACP, which shall be red text.
- F. Mounting: Integral with lamp-type annunciator.
- G. Provide graphic annunciator as manufactured by QED or approved equal.
- H. Trouble signal shall not light for the same event when a supervisory signal is illuminated.
- I. Prior to fabrication of the Graphic Annunciator Panel the contractor shall submit final layout of the Graphic Annunciator Panel for approval by UMB Fire Marshal. Any errors or omissions on the graphic annunciator panel are the responsibility of the contractor at no additional cost to the owner.
- J. Update existing Graphic Annunciator Panel as necessary for updated floor plans and/or changes to device locations. : <Engineer to Edit for Project Requirements>
- K. On the Graphic Annunciator Panel provide building name and address.
- L. Where multiple devices are located within the space, provide only one LED for that area and program for each device.

2.11 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall and to circuit-breaker shunt trip for power shutdown. <Insert functions>.

2.12 CONTROL RELAY AND CONTACT INPUT MODULES

- A. Description: Units are equipped for wall mounting, complete with red enclosures.
 - 1. Wall-Mounted Units: Flush mounted, unless otherwise indicated.
 - 2. Rating: 120-VAC.
 - 3. Provide auxiliary control relays and required control power circuiting for all life safety relay functions (e.g. elevator recall, door holder release, electric door lock

- release, notifying the backup auto dialer system, etc.). Provide dedicated relays for each door holder installation (i.e. do not use current relays or use riser wiring), electric door lock location, and for alarm signals being reported to the auto dialer. Relays must be UL listed and compatible with the fire alarm system manufacturer's equipment.
4. Provide a dedicated 'FDM-1' module for each set of Sprinkler System Flow Switch and Tamper switch locations. In other words, provide a dedicated addressable point/signal for each Flow Switch, Tamper Switch, etc. do not combine or parallel tamper and/or flow switches to a single fire alarm system relay input. This slows down UMB's ability to quickly locate the source of a constant alarm or trouble signal.
 5. Provide a dedicated 'FRM-1' relay for each building HVAC System with duct smoke detectors as noted earlier.
 6. Provide a dedicated 'FRM-1' relay for each locked building exit door with a manual pull station that is required to be tied into the Fire Alarm System. Refer to Door Hardware Schedule for further details.
 7. Mount all relays in FAS manufacturer's red enclosures.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER – (BACK-UP DIALER)

- A. Digital alarm communicator transmitter shall be compatible with the UMB Police Station back-up receiver and shall comply with UL 632.
- B. Functional Performance: Unit shall receive an alarm from the fire-alarm control unit and automatically capture one telephone line and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service is interrupted for longer than forty five (45) seconds, transmitter shall initiate a local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
 1. Verification that telephone lines are available.
 2. Programming device.
 3. LED display.
 4. Manual test report function and manual transmission clear indication.
 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission to Campus Police shall include the following:
 1. Alarm signal. Program to Code 01.
- E. Secondary Power: Integral rechargeable battery and automatic charger.

- F. Where indicated on the drawings, provide Notifier Model #411UDAC back-up dialer, installed in a separate enclosure. Final connection and programming of the dialer shall be coordinated with UMB Electronics Shop.
- G. The existing receiver unit at the Central Station is Honeywell MX-8000.
- H. The backup dialer shall automatically reset after a FACP is reset and shall not be manually reset.

2.14 INTERFACE CONNECTIONS TO EXISTING CAMPUS CENTRAL NETWORK STATIONS

A. General:

- 1. The existing Campus – wide Central Fire Alarm Monitoring & Control (FAMC) and Mass Notification System (MNS) is Class A , dedicated campus fiber network. The FAMC system consist of four (4) Network Command Centers (NCC) with PC based head-end workstations with graphical user interfaces that allow for centralized alarm annunciation, monitoring and control at each NCC of all building fire alarm systems, their respective individual signaling line circuits, notification appliance circuit loops and associated individual devices. The NCC's also has the capability to remotely broadcast real-time and pre-recorded voice messages via a microphone at Campus Police. The four (4) NCC's are located at Campus Police, UMB Fire Marshal's Office, Pearl Street Garage Electronics Shop and Pearl Street Garage Work Control Center.
- 2. The existing FAMC, MNS & NCC is Notifier ONYX WORKS – NW Work Stations with NFN wire PC Card, Graphic User Interface software and hardware for NOTI-FIRE NET (NFN) with Gateway.

B. For building renovation projects existing NCC's must be upgraded with new and latest floor plans with device locations. These modifications only applies to where initiating devices are added or being replaced.

- 1. The existing four (4) Network Command Centers (NCC) have been upgraded under a separate contract and are still under warranty with M.C. Dean, Inc. All work associated with the connections, programming, and modifications to the existing NCC's must be performed by M.C. Dean, Inc. UMB will hire M.C. Dean, Inc. under a separate service contract to perform all work. This contractor will be responsible for coordinating all work with M.C. Dean, Inc to perform all work related to upgrading/modifications to four (4) NCC's. M.C. Dean, Inc. will provide the work as follows:
 - a. Programming of the NCC's to communicate with building Fire Alarm Control Unit/Fire Alarm Control Panel.

- b. Convert CADD files to META files for Graphic User Interface and upload on to NCC's.
 - c. Provide complete Point ID descriptions and locations of devices for new graphic screen shots.
 - d. Program and test all new Point ID's.
 - e. Program and test Mass Notification Message Broadcast.
 - f. Provide all hardware, software, programming tools and documentation necessary to modify the system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.
2. Before M.C. Dean, Inc. can perform the work on the existing NCC's, the contractor shall provide M.C. Dean, Inc. updated and approved as-built fire alarm system shop drawings hard copy and CADD files, with exact device locations and addresses, as well as the updated building FACP program.
- C. For New Project on UMB Campus provide the following for a fully operational FAMS & MNS capabilities: **<Engineer to Edit for Project Requirements>**
1. In new Fire Alarm Control Panel/Control Unit provide high speed Network Communications Module type HS-NCM-MF.
 2. Provide OM1 type 12 MM fiber optic cable to complete/continue Class A loop between the existing building and new building:
 - a. The network shall be capable of communicating via fiber optic medium. Shall be a hybrid cable multimode under a single plenum jacket, armored fiber. Fiber without an armor jacket must be installed in a protective corrugated flexible raceway "Innerduct".
 - b. The network shall support fiber optics with the following specifications: Multimode-62.5/125 micrometers tight buffer construction with aramid yarn strength member, plenum jacket, indoor/outdoor rated, maximum 8dB total attenuation between nodes with connector type LC. Manufacturer: OCC, type DX or GX series.
 - c. Terminate new fiber at wall mounted patch panel.
 3. Termination Hardware: Wall-mounted optical fiber patch panel with hinged front door, mounting guides, and designation panels, installed adjacent to Fire Alarm Control Panel. Populate with coupler panels and LC couplers.
 - a. Manufacturer: Siecor/Corning or approved equal. Part Number: WCH wall mounted units, WCH-12P-91, MULTIMODE PANELS.

4. Provide jumper (patch cords) cables for connection from the Fire Alarm Control Unit/Fire Alarm Control Panel to patch panel.
5. Patch Cords:
 - a. Multimode 62.5/125 micrometers, zipcord cable patch cord, with a RED jacket. Supports all bandwidths, dual-window, and low-loss. Complies with Bellcore FDDI, TIA/EIA-568, and ICEA standards.
 - b. Manufacturer: Lucent/Avaya, Siecor/Corning or approved equal. Part Number: Lucent/Avaya LL2SC-SCO or Siecor 9191-02K5141-M.
 - c. Patch Cord Length: Maximum length ten (10) feet. Coordinate final length with UMB.
6. The existing four (4) Network Command Centers (NCC) have been upgraded under a separate contract and are still under warranty with M.C. Dean, Inc. All work associated with the connections, programming, and modifications to the existing NCC's must be performed by M.C. Dean, Inc. UMB will hire M.C. Dean, Inc. under a separate service contract to perform all work. This contractor will be responsible for coordinating all work with M.C. Dean, Inc to perform all work related to upgrading/modifications to four (4) NCC's. M.C. Dean, Inc. will provide the work as follows:
 - a. Programming of the NCC's to communicate with building Fire Alarm Control Unit/Fire Alarm Control Panel.
 - b. Convert CADD files to META files for Graphic User Interface and upload on to NCC's.
 - c. Provide complete Point ID descriptions and locations of devices for new graphic screen shots.
 - d. Program and test all new Point ID's.
 - e. Program and test Mass Notification Message Broadcast.
 - f. Provide all hardware, software, programming tools and documentation necessary to modify the system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.
7. Before M.C. Dean, Inc. can perform the work on the existing NCC's, the contractor shall provide M.C. Dean, Inc. updated and approved as-built fire alarm system shop drawings hard copy and CADD files, with exact device locations and addresses, as well as the updated building FACP program.

2.15 EMERGENCY POWER SUPPLY

- A. General: Components include nickel-cadmium battery, charger, and automatic transfer switch.
 - 1. Battery Nominal Life Expectancy: Twenty (20) years, minimum.
- B. Battery Capacity: Comply with NFPA 72.
- C. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 % of connected system load while maintaining batteries at full charge. If batteries are fully discharged, charger recharges them completely within four hours. Charger output is supervised as part of system power supply supervision.
- D. Integral Automatic Transfer Switch: Transfers load to battery without loss of signals or status indications when normal power fails.

2.16 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by manufacturer of device.
 - 2. Finish: Paint of color to match the protected device.

2.17 REMOTE POWER SUPPLY PANEL

- A. Where required on the Contract Drawings, provide the following Remote Power Supplies Panel with battery charger:
 - 1. Panel shall be Notifier Model #FCPS-24S8, as needed to provide sufficient power for notification circuits. Include batteries sized to provide twenty four (24) hour battery backup. Provide enclosure sized to support the above equipment.
 - 2. In each FCPS, provide FM-101 monitoring module to individually monitor trouble at FACP.
 - 3. FCPS (FABP) shown on the drawings is preliminary and reflect the design intent only. Contractor shall verify system power supply requirements and confirm quantity of power supplies needed.

2.18 SYSTEM PRINTER

- A. Description: Separately mounted twenty four (24) pin 'dot-matrix' printer.
- B. Provide portable stand for printer with paper storage space. Stand should be roughly three (3) feet H x two (2) feet W x two (2) feet deep. Confirm size with dimensions of dot-matrix printer.

2.19 WIRE

- A. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
- B. Power-Limited Circuits: NFPA 70, Types MC FPLP
 - 1. For use on fire alarm circuits as required.
 - 2. Continuous red identifying stripe.
 - 3. UL Listed Fire Alarm Cable.
 - 4. Rated for use in plenums.
 - 5. Rated for through penetrations of one (1), two (2), and three (3) hour fire walls.
 - 6. Individually twisted pairs and shielding, as required per fire alarm system manufacturer.
 - 7. Fire resistant and low smoke.
 - 8. NEC compliant.
- C. Refer to Part 3 under "Grounding and Shielding" for additional cabling/wiring requirements and their applicability for the FAS wiring provided. Confirm all shield and grounding requirements with equipment vendor prior to installing any FAS circuit wiring.

2.20 LINE-ISOLATION MODULES

- A. Provide minimum one ISO-X per floor, maximum twenty five (25) devices per ISO-X.

2.21 KNOX BOX

- A. Obtain a signed copy of the "Fire/Police Rapid Entry System - Authorization/Order Form" from the UMB Fire Marshal and provide the Knox Box in the Fire Command Center, building Main Lobby, or outside the building as approved by the UMB Fire Marshal.
 - 1. KNOX-BOX 4403 Series with dual-key and Hinged Door (KNOX-BOX phone #800-552-5669).
 - a. Recess Mount in optional Recessed Mounting Kit (RMK).
 - b. Black finish color.
 - c. Provide at least four (4) key hooks inside the knox box.

2.22 TRANSIENT PROTECTION

- A. Provide transient protection at the source panel for the following circuits at the specified locations that maybe vulnerable to voltage swells in the event of a lightning strike, ground swell or other phenomena. Although it may not entirely safeguard field wiring and/or devices, it will minimize the spread of loss to the more costly FAS Panel Circuit Boards.
- B. 120VAC Power Circuits: Provide Silicone Surge Suppression for 120VAC to all control panel, transponder panel, graphic annunciator panels' and any other FAS power supplies. Mount surge suppressors at panel power supply terminals.
- C. Low-Voltage, Shielded & Non-Shielded, Power-Limited Circuits: Provide Silicone Surge Suppression for the following low-voltage circuits that serve the following locations:
 - 1. SLC & NAC (including speaker, voice audio, strobe, and horn): The top three (3) levels/floors; the bottom two (2) levels/floors; and all stairwells regardless of length of run in stairwell.
 - 2. Phone & Network Phone: The top three (3) levels/floors; bottom two (2) levels/floors; and all stairwells regardless of length in stairwell.
 - 3. FAS Backbone Network Loops: Protect ALL FAS Network and Network Data Circuits. The protected runs will include, but NOT be limited to, the following:
 - a. FACP - Transponder; Transponder - Transponder; Transponder - FACP.
 - b. GAP - FACP; FACP - remote printer; GAP - remote printer.
 - c. GAP - Remote Annunciator; FACP - Remote Annunciator; Remote Annunciator - Transponder.
 - 4. Low-Voltage Power Circuit Risers: All low-voltage power circuit risers located in and/or serving stairwell devices.

2.23 BEAM DETECTORS

- A. Provide Addressable Beam Detector with remote test station with key lock. Notifier #FSB-200S/RTS151KEY.

PART 3 - EXECUTION

3.1 SEQUENCE OF INSTALLATION (FOR ENTIRE BUILDING FIRE ALARM REPLACEMENT PROJECTS) <Engineer to Edit for Project Requirements>

- A. First - Install FAS backbone and risers.

- B. Second - Install head end equipment (FCPS, DAA's, Power Supplies etc.) in electrical closets on each floor and coordinate this with installation of FAS risers. Provide programming of the FCPS and DAA at the FACP for each floor devices as necessary.
- C. Third – Install horizontal cabling and appliances and devices on each floor.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA and manufacturers installation instructions for installation of all fire-alarm equipment, devices and appliances.
- B. Equipment Mounting: Install fire-alarm control unit on concrete base with tops of cabinets not more than seventy two (72) inches above the finished floor. Comply with requirements for concrete base specified in Division 03 Section "[Cast-in-Place Concrete] [Miscellaneous Cast-in-Place Concrete]." <Engineer to Edit for Project Requirements>
- C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections. <Engineer to Edit for Project Requirements>
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing control monitoring equipment as necessary to extend existing control monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- D. Remote Status and Alarm Indicators: Install near each sprinkler water-flow switch and valve-tamper switch.

3.3 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Door Hardware section. Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than three (3) feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
3. Smoke dampers in air ducts of designated air-conditioning duct systems.
4. Alarm-initiating connection to elevator recall system and components.
5. Alarm-initiating connection to activate emergency lighting control.
6. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
7. Supervisory connections at valve supervisory switches.
8. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
9. Supervisory connections at elevator shunt trip breaker.
10. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
11. Supervisory connections at fire-pump engine control panel.
12. <Insert connections>.

- C. For each tamper, flow and pressure switch on the sprinkler system, provide a dedicated address point. DO NOT “DAISY CHAIN” OR “PARALLEL” tamper, flow or pressure switch to a common addressing point or monitoring module.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Identification for Electrical Systems section.
- B. SLC Loop Devices: Label all SLC loop devices to note the device address and purpose.
- C. Where EOL resistors have been installed for SLC or NAC circuits at device/junction box, panel etc., provide label, “EOL RESISTOR__OHMS SLC OR NAC CIRCUIT #.
- D. Fire Alarm System Conduits and Cabling: Label all FAS raceway/conduit at every floor for vertical runs; at each penetration to a junction box, transponder panel, security panel, etc.; every ten (10) feet to fifteen (15) feet in concealed accessible areas (horizontal runs) and every twenty five (25) feet in exposed areas (horizontal runs) per UMB Standards. Wording for the FAS Raceway and Cabling shall be as follows:
 1. FAS Backbone Network Loop: to read "FAS Vertical Network Loop – XX/0."
 2. FAS Device Loop: to read "FAS Notification and Signal Appliance Loop XX Floor – XX/0."
- E. Fire Alarm System Cabling Installed Exposed in Concealed Ceilings without Being in Raceway: Verbiage and Spacing of labeling shall be as stated above except labels shall be attached directly to cable jackets. Maximum length of label is not important.

- F. Fire Alarm System Junction Boxes and Outlets Including Relay Modules: All fire alarm system junction boxes, outlets and covers shall be : “RED” in color and labeled as per the following:
1. Junction Boxes: Same as raceway serving the junction box. Otherwise, to read "Fire Alarm System – XX/0."
 2. Relay Modules: to read " _____ Building FAS XXth Floor [Door Holder], [or Generator Monitoring], [or Elevator Recall], [or AHU ____ Duct Smoke Shutdown], [or Door Release], [or Alarm, Supervisory, Trouble Output to Remote HONEYWELL, Backup System] [or Alarm, Supervisory, Trouble Output to Remote, Network System]– XX/0."
- G. HVAC System 'FRM-1' Relay Duct Smoke Detector 'Shutdown Requests': Label each 'FRM-1' relay located at the ATC Panel(s) to identify its' address, purpose, and the individual HVAC System that it controls. For example, "HVAC System No. ____ Duct Smoke Detector Shutdown" - Address 62-51.

3.5 WIRING INSTALLATION

- A. Wiring Method:
1. Install wiring in metal raceway according to Raceways and Boxes section, unless otherwise directed on the contract drawings. Conceal raceway except in unfinished spaces and as indicated. DO NOT conceal fire alarm conduits in slabs.
- B. Wiring Method: <Engineer to Edit for Project Requirements. This paragraph only applies to buildings with upgrade/replacement of existing Fire Alarm System or renovation projects>
1. Wiring Method: Provide all new wiring for the new fire alarm system. For exposed structure install wiring in EMT conduit. In concealed spaces provide plenum rated fire alarm cable. Plenum rated cables shall not be strapped, taped, or attached by any means to the exterior of any conduit, raceway, piping, ceiling grid or ductwork as means of support. Plenum cables shall be independently supported from the ceiling structure with J-hooks at four (4) feet intervals. For exposed structures outdoors and in parking garages install wiring in schedule 40 PVC conduits above six feet. For exposed and subject to severe physical damage, provide wiring in rigid steel conduit. Provide expansion joint fittings as required. Where existing conduits are being utilized, do not use existing in-slab conduits.
- C. Wiring within Enclosures: Separate class 1 power-limited and class 2/class 3 non-power-limited conductors as recommended by manufacturer. Provide terminations of class 1 power-limited and class 2/class 3 non-power-limited conductors in all system components as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire alarm system to terminal blocks. Mark each terminal according to system's wiring

diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

- D. Wire Nuts, Straight Connectors, Terminal Strips, etc.: The use of wire nuts, straight connectors, terminal strips, etc. for cable splicing is absolutely prohibited. Pull new cable to the nearest upstream and downstream devices when adding new devices to an existing SLC and/or NAC.
- E. SLC and/or NAC 'T' Taps: 'T' taps are strictly prohibited on both SLC and NAC loops.
- F. Color-Coding: Color-code fire alarm conductors differently from normal building power wiring. Use one color-code for alarm circuit wiring and different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices.
- G. Risers: Install at least two vertical cable risers to serve fire alarm system. Separate risers in close proximity to each other with minimum one-hour-rated wall, so loss of one riser does not prevent receipt or transmission of signal from other floors or zones.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- C. Specific Shielding and Grounding Requirements: Unless directed otherwise by the equipment vendor, provide circuit shielding and grounding as per the following:
 - 1. All circuits except for speaker circuits must be shielded.
 - 2. All circuit shields must be continuous at the field devices and only be grounded at the point of origin (i.e. the FACP or remote transponder panel).
 - 3. All Backbone Network Loop wiring must be shielded with the shields tied together at each drop (i.e. the transponder panels) and grounded at the FACP.
 - 4. Addressable Relays: All addressable relay module circuit boards must be grounded (unless otherwise instructed by vendor) and their shield wires continuous OR the boards not grounded, and the shield wiring be used as the grounding conductor.
 - 5. Where FAS circuits are run in non-metallic raceway, the above requirements must be followed to ensure adequate grounding and shield protection is provided.
- D. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.

- E. Install grounding electrodes of type, size, location, and quantity as indicated. Comply with installation requirements in Grounding and Bonding section.
- F. Ground equipment and conductor and cable shields. For audio circuits, minimize, to greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.
- G. Ground radio alarm transmitter system and equipment as recommended by manufacturer.

3.7 FIELD QUALITY CONTROL <Engineer to Edit for Project Requirements>

- A. Final Acceptance test shall be witnessed by the UMB Fire Marshal.
- B. Prior to testing of the system with the UMB Fire Marshal, the contractor shall conduct pre-testing of the system and correct all deficiencies.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- D. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Contractor Pretesting: After installation, align, adjust, and balance system and perform complete pretesting. Determine, through pretesting, compliance of system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of

acceptance test results. Provide documentation summarizing pretesting to UMB Fire Marshal. Documentation should include statement that system is working properly and summary of corrections made during pretesting. Project Manager may attend contractor pretesting as desired.

- I. The contractor shall have a fire alarm technician present during all tests and shall have laptop with them to modify and program changes during the tests.
 - J. Final acceptance testing with the UMB Fire Marshal: After installation, align, adjust, and balance system and perform complete testing with the UMB Fire Marshal.
 - K. Initial Test Notice: For new buildings, provide minimum of ten (10) days' notice in writing when system is ready for initial acceptance testing. For occupied/existing buildings, UMB Fire Marshal initial test must occur within three (3) days of successful contractor pretest.
 - L. All testing will be verified at the main fire alarm control panel, at the building annunciator panel, and at the Campus Police Network Command Center. The contractor is responsible for providing all necessary personal to accomplish this testing at these three locations in addition to in the field.
 - M. The contractor shall switch over the fiber network connection to the new fire alarm control panel. The existing back-up dialer connected to the existing third party panel shall remain in operation. This switch over shall only be done on the day of or the day prior to the scheduled testing day.
 - N. Prior to the pretest, the contractor shall switch over the connections to the new modules for door holders, elevator controllers and any other auxiliary devices that are related to operation of the fire alarm system for life safety. This switch over shall be done on the day of or the day prior to the scheduled testing day.
 - O. Prior to conducting the pretest, the contractor shall switch over modules for tamper switches, flow switches, fire pump controller connections and duct smoke detectors. This switch over shall only be done on the day of or the day prior to the scheduled testing day.
 - P. Prior to the pretest, the contractor shall install and program screen shots with locations of all devices on all floors to all Network Command Centers.
 - Q. All required testing materials shall be provided by the contractor.
- 3.8 FIRE ALARM SYSTEM TESTING PROCEDURES WHEN REPLACING EXISTING SYSTEM: <Engineer to Edit for Project Requirements.
- A. Initial Testing with the UMB Fire Marshal shall be as follows:
 - 1. The initial test will consist of the following:

- a. Test the operation of all notification appliances through-out the building.
 - b. Test the operation of all initiating devices and supervisory devices.
 - c. Test elevator recalls. (All functions)
 - d. Test mass notification broadcast message from campus police to the building.
 - e. Test mass notification broadcast message from campus police to the building while the building fire alarm system is activated. The message from campus police shall override building message.
 - f. Test operation of trouble signals and all programmed buttons on FACP.
 - G. After the completion of the initial test, UMB Fire Marshal will indicate which devices/systems passed and failed. Further directions will be provided as to whether the old devices can be switched over to the new fire alarm system.
- B. Final Testing with the UMB Fire Marshal shall consist of full acceptance test.
- C. After final acceptance of the testing by the UMB Fire Marshal, the contractor shall submit NFPA 72 certification for records.

3.9 FEES

- A. A fee applies if testing with the Fire Marshal reveals that the fire alarm system does not meet applicable codes and standards, the project specifications and/or the design documents. Each failed test will result in a \$250 fee.
1. If any programming changes are required during the test or after, the test is considered a failed test.
 2. Any issue that requires re-testing is considered a failed test.
 3. Any test in which the contractor fails to show at the scheduled start time or is not prepared to perform the test with testing materials is considered a failed test.
- B. Invoices will be sent to the contract holder from the University of Maryland, Baltimore Central Administration Support Services (CASS) Department. Payment must be made electronically with credit card or via check. Cash payment is not acceptable.
- C. Failure to pay the fee within 30 days of receipt will result in appropriate administrative and/or legal action. Further inspection or testing may not take place until the fee is paid in full. This may result in delay of the issuance of a use and occupancy permit for the building or facility.

3.10 DEMONSTRATION <Engineer to Edit for Project Requirements>

- A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.
- B. General: Comply with Division 1. Engage factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide minimum of four (4) hours' training.
2. Training Aid: Use approved final version of operation and maintenance manual as training aid.
3. Schedule training with Owner with at least seven (7) days' advance notice.

3.11 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: When requested within two (2) years of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and sensitivities to suit actual occupied conditions. Provide up to three requested visits to Project site for this purpose.

3.12 CLEANING AND ADJUSTING

- A. Cleaning: Comply with Section 01740. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.13 REPAIRS & RESTORATION OF SURFACES AND FINISHES: <Engineer to Edit for Renovation Project Requirements>

- A. Restore all finishes, equipment and surfaces to original condition, where affected by the work. Provide the following, where applicable, in accordance with accepted trade standards and to Owner's satisfaction:
 1. Replace damaged ceiling tiles.
 2. Replace ceiling tiles where removal has left holes or cuts in original tiles.
 3. Patch, repair and repaint all walls and surfaces cut, penetrated or otherwise disturbed by the work.
 4. Patch holes and penetrations in wood, masonry and plaster.
 5. Provide suitable cover plates for all recessed back boxes of equipment removed and not covered by new devices.
 6. Provide larger trim or cover plates for new devices, where old back boxes, holes, etc. are not concealed by new work.

END OF SECTION 283111