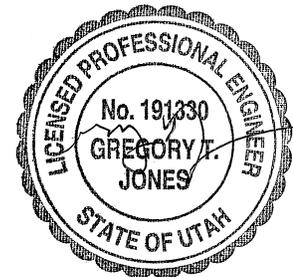
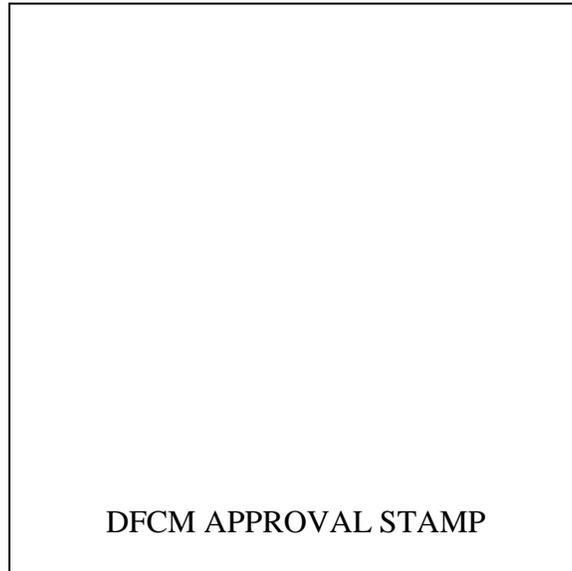




**FIRE/EMERGENCY VOICE ALARM SYSTEMS  
UTAH VALLEY UNICERSITY – CENTRAL CAMPUS  
800 WEST UNIVERSITY PARKWAY  
OREM, UT  
DFCM # 12142790**

**SPECIFICATION SECTION 13851  
FIRE/EMERGENCY VOICE ALARM SYSTEMS**



03/05/2013

**SECTION 13851 - FIRE ALARM/EMERGENCY VOICE ALARM SYSTEMS (NETWORKED)**

**PART I - GENERAL**

1.01 RELATED DOCUMENTS:

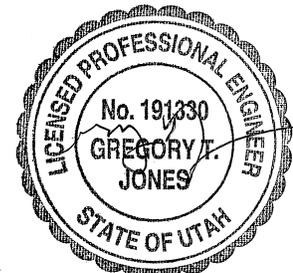
- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.02 DESCRIPTION OF WORK:

- A. This section of the specifications includes the demolition of existing fire alarm systems and furnishing, installation, connection and testing of new, networked fire alarm/emergency voice alarm systems to protect all buildings on the on the central campus of Utah Valley University in Orem, UT. Fire alarm/emergency voice alarm systems shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panels (FACP), remote power supplies, amplifiers/transponders, auxiliary control devices and relays, local operating consoles/annunciators, conduit and wiring as shown on the drawings and specified herein. All fire alarm/emergency voice alarm systems on campus shall be interconnected by a fire alarm network with a network control center to be installed in the police dispatch area of the Gunther Technology Building.
- B. Fire alarm/emergency voice alarm systems for the following buildings are included in this contract:
  - 1. Library (LI)
  - 2. Liberal Arts (LA)
  - 3. Physical Education (PE)
  - 4. Events Center (EC)
  - 5. Science Building (SB)
  - 6. Pope Science (PS)
  - 7. Sorensen Center (SC)
  - 8. Environmental Technology (ET)
  - 9. Browning Administration (BA)
  - 10. Woodbury Business (WB)
  - 11. Losee Center (LC)
  - 12. Sparks Automotive (SA)
  - 13. Gunther Technology (GT)
  - 14. Computer Science (CS)

1.03 QUALITY ASSURANCE:

- A. The fire alarm/emergency voice alarm systems shall comply with requir..... (National Fire Alarm Code) except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
- B. Major system components (control equipment, power supplies, amplifiers, network modules, network controllers/annunciators, etc.) for the fire alarm/emergency voice alarm systems shall be from a single manufacturer to ensure network inoperability. All products shall be furnished, installed, programmed and tested by a factory authorized/trained representative of the equipment Manufacturer. Fire alarm equipment installer shall have a local office located within 75 miles of the project location and shall be capable of providing emergency service (including parts/repairs) within 24 hours of notification by customer.

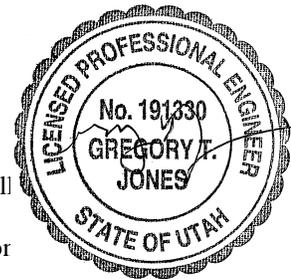


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- C. All initiating devices shall be listed compatible with the control equipment used.
- D. Materials, devices and equipment shall be Underwriters Laboratories (UL) listed or Factory Mutual approved for use in fire alarm/emergency voice alarm systems and shall comply with all applicable requirements of the following UL standards:
  - 1. UL 38 Manually Actuated Signaling Boxes
  - 2. UL 50 Cabinets and Boxes
  - 3. UL 864 Control Units for Fire Protective Signaling Systems
  - 4. UL 268 Smoke Detectors for Fire Protective Signaling Systems
  - 5. UL 268A Smoke Detectors for Duct Applications
  - 6. UL 464 Audible Signaling Appliances
  - 7. UL 521 Heat Detectors for Fire Protective Signaling Systems
  - 8. UL 1971 Visual Notification Appliances.
- E. Shop drawings shall be prepared by an engineering technician or senior engineering technician (Level III or Level IV) NICET certified for fire alarm design. Include NICET certification number on the drawings. Drawings will be signed by the technician and submitted for approval under his name.
- F. Contractor (and/or subcontractor) shall be licensed as both an electrical and a fire alarm contractor in the State of Utah. License shall be active throughout the duration of the project.

1.04 SUBMITTALS:

- A. Descriptive Data: Descriptive data shall be submitted on the following items of material and/or equipment. Such data shall consist of manufacturer's or supplier's catalog information in sufficient detail to allow verification that the material and/or equipment meets the specification requirements, or is equal to that specified. Descriptive data shall be included with the shop drawings submittal described in paragraph B below.
  - 1. Fire alarm control panels.
  - 2. Network command center
  - 3. Cable for network communications
  - 4. Local Operating Consoles/Annunciator panels.
  - 5. Remote power supplies for notification appliance circuits.
  - 6. Amplifiers/Transponders
  - 7. Initiating devices (smoke detectors, heat detectors, manual pull etc.)
  - 8. Relay modules to control protected premise fire safety function
  - 9. Notification appliances.
- B. Shop Drawings: Prior to ordering or installing any equipment, contractor shall prepare shop drawings for each building and for the campus network for submittal to Owner/Engineer. Shop drawings shall include sufficient information, clearly presented, to determine compliance with drawings and specifications. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts. Indicate type and gauge of wire to be used for each different circuit type. Show annunciator layout, configurations, and terminations.
- C. Submit four sets of drawings, descriptive data, battery calculations and voltage drop calculations to the Owner/Engineer for review. After review and acceptance by the Owner/Engineer, submit to



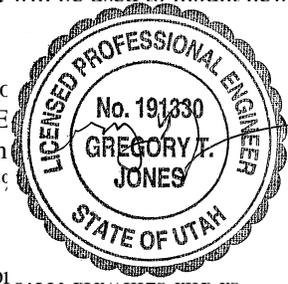
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State Fire Marshal for review. Any review comments, and associated drawing revisions, from state or local approving authorities that affect the system design shall be approved by the Owner/Engineer prior to installation.

- D. Testing Documentations/Certificates: Upon completion of installation and prior to final acceptance testing, complete and submit fire alarm/emergency voice alarm system record of completion. Record of completion, along with all other material and test certificates shall be submitted to Project Engineer.
- E. As-Built Drawings: A complete set of “as-built” drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system. As built drawings shall be furnished in printed (reproducible) format as well as electronic format (DWG and PDF files on CD).
- F. O&M Manuals: Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the owner upon completion. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.
- G. Warrantee Letter: Provide letter stating that contractor will warrant all equipment and wiring to be free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance. Provide information regarding any equipment warrantee provided by the equipment manufacturer that exceeds 365 days.

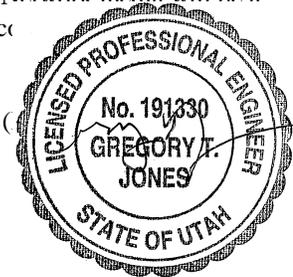
1.05 SYSTEM DESCRIPTION:

- A. Remove, modify or upgrade existing fire alarm/emergency voice alarm systems for all campus buildings as described on project drawings. A new intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and emergency voice alarm communication system shall be installed in accordance with the specifications and as indicated on the Drawings. Upgrade or replace all control equipment, enclosures, power supplies, initiating circuits and devices, notification appliance circuits and devices. Existing conduit and wiring may be reused where compatible with the new system. Add new conduit and wiring where existing conduit/wiring is not adequate or where no conduit/wiring exists. Existing junction boxes may remain where they comply with the provisions of the specification and will be used to mount new devices.
- B. Existing FACP in each building shall be upgraded or replaced to be cc control center and shall include emergency voice alarm capabilities. E addressable with integrated signaling line circuits (SLC) with sufficient devices and control modules required with an additional reserve of 20% future expansion.
- C. Furnish and install addressable initiating devices as indicated on the p specified below:
  - 1. Smoke detectors: Install smoke detectors on ceiling/deck of all corridors, lobbies, concourses and all areas open to corridors/lobbies/concourses. Install additional detectors above all fire alarm system control equipment. Detectors shall be located in conformance with NFPA 72 with a maximum spacing of 30' between detectors (or all portions of protected area within 21' of a detector).
  - 2. Heat detectors: Install heat detectors on ceiling/deck of elevator equipment areas, elevator shafts and other areas as indicated on plans. Heat detectors shall be fixed temperature type (135 deg-f). Detectors shall be located in conformance with NFPA 72 with a maximum spacing of 50' between detectors.
  - 3. Duct smoke detectors: Install duct smoke detectors where indicated on plans and in return



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- ducts of all air movement systems with a capacity in excess of 2,000 cfm. Required number and location of duct smoke detectors shall conform to IMC (2009) and manufacturer's requirements. Duct smoke detectors are not required where entire area served by air movement system is protected by area smoke detection systems.
4. Projected beam smoke detectors: Install projected beam type smoke detectors where indicated on plans. Install in accordance with NFPA 72 and manufacturer's requirements. Detectors shall be single ended type with all power/controls contained at one end with a reflector unit only on the opposite end. Beam detectors shall include an integrated testing system utilizing opaque screens/filters. Test/reset switches shall be provided for each detector and shall be key operated or located within a secure room.
  5. Monitor modules: Install monitor modules to facilitate connection of existing conventional initiating devices (water flow, valve supervisory, fire suppression systems, etc.) that remain to new fire alarm system. Provide a separate monitor module for each water flow switch. A single monitor module may be used for multiple valve supervisory switches where each of the valves connected to the module serves the same purpose/zone.
- D. Provide addressable relay modules as required to provide the following protected premise fire safety functions:
1. Release fire/smoke dampers
  2. Fan shutdown
  3. Fire door release
  4. Activation of NAC Circuits
  5. Elevator recall (primary and secondary)
  6. Actuation of smoke control systems
- E. Furnish and install notification appliances and remote power supplies/amplifiers for notification appliance circuits. Quantity and location of power supplies/amplifiers shall be sufficient to create a separate notification zone (audible and visible signals) for each floor level of each building.
- F. Install a fire alarm network to connect all fire alarm control panels on campus with a central Network Annunciator and Information Management System to be located in police dispatch of the Gunther Technology Building. Provide network interface cards in each FACP. Provide network media to interconnect each FACP and the network command center. Network media will be a combination of fiber optic cable supplied by UVU and fiber optic or copper cable supplied by Contractor. See Sheet FA-01 for network schematic.
- G. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC) shall be installed at 100 percent of its total capacity during initial installation.

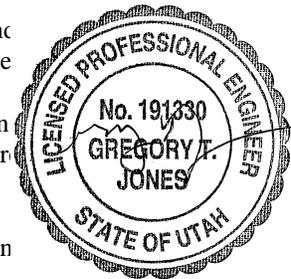


1.06 SYSTEM DESIGN:

- A. Basic Performance:
1. Network Communications Circuit Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class A configuration (NFPA Style 7).
  2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Style 6 (Class A).
  3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class A (NFPA Style D).
  4. Notification Appliance Circuits (NAC) Serving Strobes and Speakers: Wired Class A (NFPA Style Z).
  5. On Style 6 or 7 (Class A) Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.

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6. Alarm Signals Arriving at INCC COMMAND CENTER: Not be lost following primary power failure until alarm signal is processed and recorded.
  7. Transponders:
    - a. Operate in peer-to-peer fashion with other panels and transponders in system.
    - b. Each transponder shall store copy of audio evacuation messages and tones.
    - c. Systems that use centralized message storage and control at main fire alarm control panel shall not be acceptable.
  8. Network Node Communications and Audio Evacuation Channels:
    - a. Communicated between panels and transponders on single pair of copper wires or fiber optic cables.
    - b. To enhance system survivability, ability to operate on loss of INCC Command Center, short or open of entire riser at INCC Command Center shall be demonstrated at time of system acceptance testing.
  9. Signaling Line Circuits (SLC):
    - a. Reside in remote transponders with associated audio zones.
    - b. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in system.
    - c. On loss of INCC Command Center, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.
    - d. Systems that provide a “Degraded” mode of operation upon loss of INCC Command Center or short in riser shall not be acceptable.
  10. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.
  11. Amplifiers: Located in transponder cabinets serving no more than 3 floors per transponder to enhance system survivability, reduce required riser wiring, simplify installation, and reduce power losses in length of speaker circuits.
  12. Speaker NAC Circuits: Arranged such that there is a minimum of 1 speaker circuit per fire alarm zone.
  13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
  14. Speaker Circuits:
    - a. Electrically supervised for open and short circuit conditions.
    - b. If short circuit exists on speaker circuit, it shall not be acceptable.
    - c. Arranged for 25 VRMS and shall be power limited in accordance with manufacturer's requirements.
    - d. 20 percent spare capacity for future expansion or increased requirements.
  15. Speaker Circuits and Control Equipment:
    - a. Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
    - b. Systems utilizing “bulk” audio configurations shall not be acceptable.
  17. Voice Communication:
    - a. Connect telephone circuits to speaker circuits to allow voice communication over speaker circuit from telephone handset.
    - b. Capable of remote phone-to-phone conversations and party-line communications as required.
- B. Basic System Functional Operation: When fire alarm condition is detected and reported by 1 of the system alarm initiating devices, the following functions shall immediately occur:
1. System Alarm LEDs: Flash.
  2. Local Piezo-Electric Signal in Control Panel: Sound at a pulse rate.

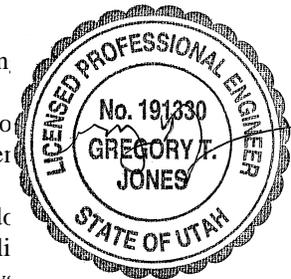


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3. 80-Character LCD Display: Indicate all information associated with fire alarm condition, including type of alarm point and its location within protected premises.
4. Historical Log: Record information associated with fire alarm control panel condition, along with time and date of occurrence.
5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
6. Audio Portion of System: Sound 3 rounds of slow whoop tone followed by voice evacuation message and this scenario repeating or other message as approved by local authority until system is reset.

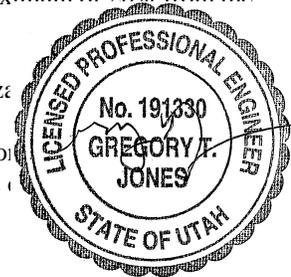
C. Fire Alarm System Functionality:

1. Provide complete, electrically supervised distributed, Style 7 networked analog/addressable fire alarm and control system, with analog initiating devices and integral multiple-channel voice evacuation.
2. Fire Alarm System:
  - a. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
  - b. Incorporate multiprocessor-based control panels, including Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI), Intelligent Network Transponders (INX), communicating over peer-to-peer token ring network with capacity of up to 64 nodes.
3. Each ILI Node: Incorporate a minimum of 2 Signaling Line Circuits (SLC), with capacity to support at least 99 analog addressable detectors and at least 98 addressable modules per SLC.
4. Voice and Data Riser: Transmit over single pair of wires or fiber optic cable.
5. Each Intelligent Network Transponder: Capable of providing 16 distributed voice messages, fire fighter phones connections, SLC loop for audio control devices, and integral network interface.
6. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
7. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
8. Network:
  - a. Based on peer-to-peer token ring technology operating in Style 7 configuration.
  - b. Capability of using twisted-pair wiring, pair of fiber optic cable with core diameter of 200 microns, or both, to maximize flexibility in system.
9. Each Network Node:
  - a. Capability of being programmed off-line using Windows software supplied by fire alarm system manufacturer. Capability of connecting laptop computer into any other node in system. System software to be downloaded to each transponder at each transponder location shall not be acceptable.
  - b. Capability of being grouped with any number of additional nodes to produce a “Region”, allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing “Master/Slave” configurations shall not be acceptable.
  - c. Capability of annunciating all events within its “Region” or annunciating all events from entire network, on front panel LCD without additional equipment.
10. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.



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11. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
  12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.
- C. All copper wiring shall be free of opens, shorts and grounds. All wiring shall be installed in rigid conduit, metallic clad cable (MC), armored cable (AC) or EMT. All penetrations through rated partitions shall be fire stopped with a suitable caulking compound. All wiring (except new power distribution circuits) shall be fire power limited (FPL) with minimum 300V insulation or equivalent complying with NFPA 70 Article 760.
- D. Provide a ground fault detection circuit, to detect positive and negative grounds on all field wiring. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground fault will not interfere with the normal operation, such as alarm, or other trouble conditions.
- E. Except for Owner supplied fiber optic cable (see Sheet FA-01), all cabling used to create the fire alarm network shall be new fiber optic or copper cable that meets the requirements of the fire alarm control equipment manufacturer. Fiber shall be single mode, low loss, 9/125 um, maximum total attenuation of 15 db with a minimum of 4 fibers per cable. Cable shall be plenum rated, rodent resistant and suitable for installation in moist environments.
- F. Except for Owner supplied fiber optic cable (see Sheet FA-01), all network cable shall be installed in conduit (rigid or emt). Coordinate location of communications conduit with owner. Conduit is not required where network fiber can be installed on and secured to existing cable trays in building corridors.
- G. All low voltage circuits will be protected by microprocessor controlled power limiting or have self restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.
- H. Notification circuits shall be designed to limit the voltage drop to a maximum of 20% from the power supply to the most remote device on any notification circuit.
- I. All visible alarms within a single field of view shall flash in synchroniza
- J. Secondary power supply (battery backup) shall be provided for each control panel, horn and amplifier and shall be sufficient to provide a minimum of 24 hours of operation with an additional reserve to operate the system for 15 minutes in alarm.



1.07 WARRANTY:

- A. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.

1.08 APPLICABLE CODES AND STANDARDS:

- A. The specifications and standards listed below form a part of this specification. The system shall fully comply with all applicable provisions of the latest issue of these standards.
1. International Building Code – 2009 edition
  2. International Fire Code – 2009 edition

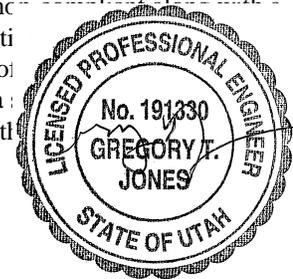
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3. International Mechanical Code – 2009 edition
4. Utah State Fire Marshal Rule R710-4
5. NFPA 70 - National Electrical Code – 2011 edition
6. NFPA 72 - National Fire Alarm Code – 2010 edition
7. NFPA 101 Life Safety Code – 2009 edition
8. ASME A17.1 – current edition
9. DFCM standards/established procedures

**PART II - PRODUCTS**

2.01 GENERAL:

- A. All equipment and components shall be new, and the manufacturer's current model. The installer shall be an authorized representative of the manufacturer of the major equipment, such as control panels and shall be responsible for the satisfactory installation of the complete system. Major system components (control equipment, power supplies, amplifiers, network modules, network controllers/annunciators, etc.) for the fire alarm/emergency voice alarm systems shall be from a single manufacturer to ensure network inoperability. Fire alarm equipment installer shall have a local office located within 75 miles of the project location and shall be capable of providing emergency service (including parts/repairs) within 24 hours of notification by customer.
- B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. Fasteners and supports shall be adequate to support the required load.
- D. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section. For equipment other than that specified, provide proof that such substitute equipment equals or exceeds features, functions, performance, and quality of specified equipment. This proof shall be provided by submission of a copy of specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant with a letter from engineering manager or product manager at factory that certifies the equipment as either compliant or non-compliant including a detailed explanation of why it is as non-compliant. In order to ensure that the Owner is provided with a copy of the required survivability features, this letter shall also specifically certify that the equipment is complying with the test requirements of this section.



2.02 CONDUIT AND WIRE:

- A. Conduit:
  1. Conduit shall be in accordance with The National Electrical Code (NEC), local and DFCM requirements.
  2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
  3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
  4. Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and

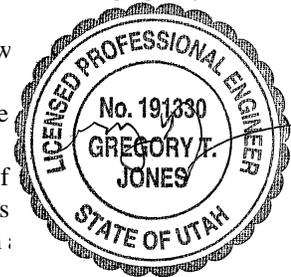
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signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the equipment manufacturer.
6. Conduit shall be 3/4 inch minimum.
7. Install conduit attached to structure by straps, staples, hangers or similar fittings designed and installed to support conduit. Installation shall conform to DFCM requirements, NFPA 70 Article 760 and 300.4.
8. Conduit shall be rigid or EMT. Flexible conduit may be used for a drop to a single device. Metal clad or armored cable may be used as an alternate to conduit where installed and supported in accordance with NFPA 70, DFCM requirements and NEMA RV1.
9. Conduit shall be concealed above ceilings or in walls where ceiling or walls are present. Conduit may be installed exposed in unfinished areas.
10. Conduit and junction boxes used for the fire alarm/emergency voice alarm system shall be marked and labeled to indicate that they are part of the building fire alarm/emergency voice alarm system. Conduits shall be periodically marked with red paint and labeled to indicate the circuit type and designation contained inside. Junction boxes shall be painted red.

B. Wire:

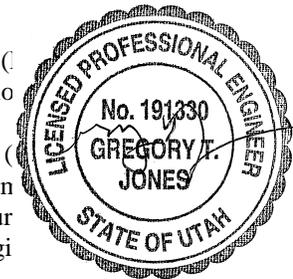
1. All fire alarm/emergency voice alarm system wiring must be new unless specified herein.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm/emergency voice alarm system. Number and size of conductors shall be as recommended by the fire alarm/emergency voice alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 12 or 14 AWG (1.63 mm) for notification appliance circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. All wiring shall be installed inside permanent conduit or raceway approved junction boxes or enclosures.
5. The system shall permit the use of IDC and NAC wiring in the with the multiplex communication loop.
6. All field wiring shall be completely supervised. In the event of disconnected standby battery, removal of any internal modules field wiring; a trouble signal will be activated until the system : wiring are restored to normal condition.
7. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.
8. The fire alarm control panel and remote notification circuit power supplies shall be connected to dedicated branch circuits. Existing power circuit to FACP to be removed may be reused. Each circuit shall be labeled at the power distribution panel as FIRE ALARM. Primary power wiring shall be 12 AWG. Cabinets shall be grounded securely to either a cold water pipe or grounding rod.



2.3 INTELLIGENT NETWORK COMMAND CENTER HARDWARE (INCC)

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- A. Intelligent Network INCC Command Center (INCC): Emergency command center shall include all necessary hardware and software (including software licenses) to display complete status of all networked fire alarm systems on campus. Fire alarm system status shall be displayed on a color LCD monitor with a minimum diagonal dimension of 17". LCD monitor shall display building map for each building as well as each individual fire alarm initiating device in each building. Emergency command center shall include controls for all networked emergency voice alarm systems on campus that will enable initiation of pre-recorded or manual audio messages in each individual building or to all campus buildings simultaneously. Emergency Command Center shall be located in Police Dispatch of the Gunther Technology Building. Coordinate location and space required with UVU Fire Marshal.
- B. System Cabinet(s):
1. Surface or semi-flush mounted with texture finish.
  2. Consist of back box, inner door, and door.
  3. Available in at least 3 sizes to best fit project configuration.
  4. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
  5. Wiring Gutter Space: A minimum of 1-inch wiring gutter space behind mounting plate.
  6. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.
- C. Power Supply Module (PM): Use latest technologies to provide power to INCC and incorporate the following features:
1. Power-saving switching technology using no step-down transformers.
  2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions for INCC Command Center Modules.
  3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.
- D. Batteries:
1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Auxiliary Systems.
- E. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VG) shall be a multi-function board interchangeable in both INCC and INX. Function shall include the following features as a minimum:
1. Microprocessor: INI-VG shall have Digital Signal Processor (DSP) technology that shall monitor all system events and perform all system program (CBE) functions. System program shall not be lost upon failure of secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIMING functions for maximum flexibility.
  2. Network Interface: Operate at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to 64 nodes in peer-to-peer fashion.
  3. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
  4. Microphone Input: On-board and allow for addition of local microphone when used as INCC Command Center, including speaker circuit control.
  5. Signal Processing: INCC shall use advanced Digital Signal Processing (DSP) technology to allow maximum flexibility of digital audio and control capabilities and operation.



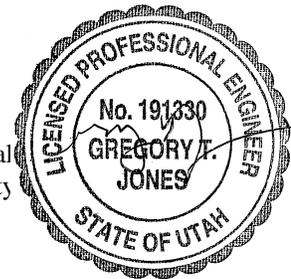
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Signals to and from INCC shall be transmitted over single pair of twisted unshielded wire or fiber optic pair.

6. Field Programmable: INCC shall be capable of being fully programmed or modified by Field Configuration Program (FCP), to be downloaded via portable computer from any node in system.
7. Control-by-Event Programming (CBE): INCC shall be capable of programming using Boolean logic including AND, OR, NOT, COUNT, TIMING, and CALENDAR functions to provide complete programming flexibility.
8. Remote INCC Command Center Options: System shall have capability of adding remote INCC Command Centers or re-locating INCC Command Centers utilizing only single pair of twisted unshielded wire or fiber optic pair for all functions.
9. RS-485 Serial Output: System shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet.
10. Riser Wiring: All data, voice, and fire fighter phone riser shall transmit over single pair of twisted unshielded wire or fiber optic pair for all functions configured in Style 7 format. Any short or open in data, voice, or phone sections shall not affect transmission over remainder of network.
11. Style 7 Network: All communication between control panels and transponders shall be through supervised Style 7 token passing network. In event of single short, open, or ground, all system communication shall operate as normal and report fault. This protection shall incorporate all data, voice, and fire fighter phone transmissions. Upon single short, open, or ground of either system data, live voice, pre-recorded channels, or phone risers, the function of each of these items shall continue to operate. "Degrade" functionality shall not be acceptable. This shall be demonstrated at system acceptance.

F. LCD Display Module:

1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
  - a. AC Power On: Green.
  - b. Alarm: Red.
  - c. Supervisory: Yellow.
  - d. System Trouble: Yellow.
  - e. Power Fault: Yellow.
  - f. Ground Fault: Yellow.
  - g. System Silenced: Yellow.
2. 80-Character Alphanumeric Display: Provide status of all analog monitor and control modules. Display shall be liquid crystal type in dark and under all light conditions.
3. Panel shall contain 4 functional keys:
  - a. Alarm Acknowledge.
  - b. Trouble Acknowledge.
  - c. Signal Silence.
  - d. System Reset/Lamp Test.
4. Panel shall contain 3 configuration buttons:
  - a. Menu/Back.
  - b. Back Space/Edit.
  - c. OK/Enter.
5. Panel shall have 12-key telephone-style keypad to permit selection of functions.

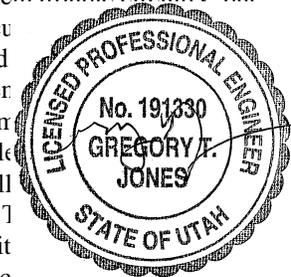


- G. Intelligent Loop Interface (ILI): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in

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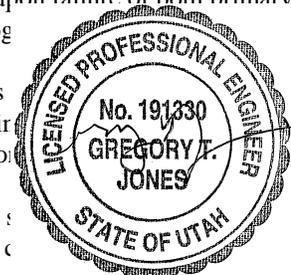
stand-alone enclosure or integrated with Intelligent Network INCC Command Center (INCC) as specified.

1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
3. RS-485 Serial Output: Each ILI shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. RS-485 bus shall support at least 4 LCD annunciators.
4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.
5. Control-by-Event (CBE) Program: ILI shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
  - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry but shall not interfere with proper operation of other circuitry.
  - b. Yellow "SYSTEM TROUBLE" LEDs shall light and shall steadily sound when trouble is detected in system or short circuits on SLC or NAC circuits, disarrangement of microprocessor or any identification module shall activate this trouble circuit. Trouble signal shall operate "TROUBLE ACKNOWLEDGE" switch. If subsequent trouble conditions occur, trouble circuit alarm, all trouble signals shall be suppressed with exception of "SYSTEM TROUBLE" LEDs.
9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify individual unit that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization



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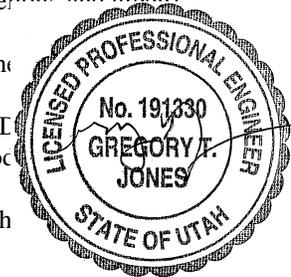
- sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display “Test Failed” indication, and identify individual device that failed.
11. Off-Premises Connection:
    - a. Fire Alarm System: Network annunciator for fire/emergency voice alarm system will be located in police dispatch which meets the requirements for a Proprietary Monitoring Station as contained in NFPA 72. No additional off-premise monitoring will be required.
  12. Network Annunciator Option: Each ILI and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
  13. Redundant History Log: Each ILI shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from INCC Command Center followed by extraction of history log from any loop driver location, including INCC Command Center or Transponder.
  14. LEDs Indicator and Outputs: Each ILI Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
    - a. Power: Green.
    - b. Alarm: Red.
    - c. Supervisory: Yellow.
    - d. General Trouble: Yellow.
    - e. Ground Fault: Yellow.
    - f. Transmit: Green.
    - g. Receive: Green.
  15. Auxiliary Power Outputs: Each ILI Loop Interface shall provide the following supply outputs:
    - a. 24 VDC non-resettable, 1 amp. maximum, power limited.
    - b. 24 VDC resettable, 1 amp. maximum, power limited.
  16. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated “watchdog” circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean log NOT, TIME DELAY functions for maximum flexibility.
  17. Auto Programming: System shall provide for all SLC devices programmed into system. Upon activation of auto programming present shall activate. This allows for system to be commissioned of additional downloads.
  18. Environmental Drift Compensation: System shall provide for s Compensation by device. When detector accumulates dust in c unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
  19. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
  20. 1-Man Walk Test:
    - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while



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annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.

- b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
  21. Signaling Line Circuits: Each ILI module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 99 analog sensors and 98 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
  22. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
  23. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
  24. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
  25. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.
- H. Auxiliary Switch Module (ASM):
1. Each ASM-16 has 16 programmable push-button switches.
  2. Each push-button switch has 3 associated status LEDs (red, yellow, and green) configurable to indicate any combination of functions.
  3. Flexible switch configurations to allow flexible set-up of phone function circuits.
  4. An insertable label to identify function of each switch and LED.
  5. Provide capability to communicate with up to 16 ASM-16 modules from INCC Command Center.
  6. Specialty modules that only perform 1 task such as speaker, phone, etc. shall be acceptable.
- I. Telephone Assembly: Include the following items:
1. Mounting cabinet which occupies 2 module locations on inner door of INCC.
  2. Standard phone operating on piezo effect with integral 6-foot cord.
  3. Interconnect cable for connection of phone to Command Center.
- J. Microphone Assembly: Include the following items:
1. Mounting cabinet which occupies 1 module location on inner door of INCC.
  2. Interconnect cable for connection of microphone to INI-VG.
  3. 1 noise canceling microphone with push-to-talk button.

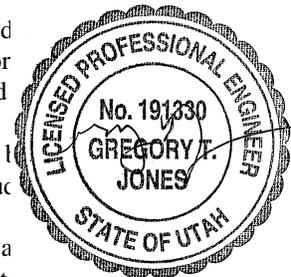


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- K. Network Repeater Module (RPT):
  - 1. Intelligent Network Interface shall provide interconnection and protection of remote INCC Command Centers and Transponders. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, fiber, or wire/fiber configurations as determined by field conditions.
  - 2. Fiber configurations shall use “ST”-type connectors and be able to operate with up to 200-micron multi-mode fiber, but optimize for 62.5/125. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.
  
- L. Network Graphic Annunciator (NGA): Network able, 1/4 VGA, touch-screen annunciator with the following characteristics:
  - 1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
  - 2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
    - a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
    - b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.4 INTELLIGENT NETWORK TRANSPONDER (INX) – (Servers as fire alarm control panel for each building):

- A. System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. INX shall receive, transmit, and regenerate voice, fire fighter phones, and data over single pair of wire or fiber optic cable.
  
- B. INX shall provide full multi-channel distributed voice messaging, with integrated switching amplification, and SLC and extended phone riser. INX shall communicate with network system in true peer-to-peer fashion operating at 625 K baud over any combination of fiber or wire media. INX shall consist of the following units and components.
  
- C. System Cabinet: System cabinet shall be surface or semi-flush mounted shall consist of 4 parts, back box, back plate, inner door, and outer door INI-VG, PM-9 power supply, up to 4 - AM50, microphone, and related
  
- D. Intelligent Network Interface Voice Gateway (INI-VG): INI-VG shall be interchangeable in both INCC and INX. Functions of board shall include a minimum:
  - 1. Network interface operating at 625 K baud configurable with a and/or fiber topologies. Interface shall communicate with up to 7100 control panels in peer-to-peer fashion.
  - 2. Signaling Line Circuit (SLC): INI-VG shall generate local SLC to communicate with and control up to 16 AOM-TEL modules and 32 AOM-2S or AOM-MUX circuits for fire phone interfacing and additional split-speaker circuits.
  - 3. RS-485: Provide capability to communicate with up to 16 ASM-16 modules, when used in INX mode up to 3,000 feet.
  - 4. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.



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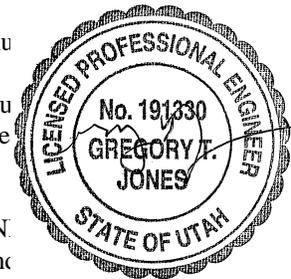
5. Voice Generation: INI-VG shall incorporate all processing to allow for 16 distinct pre-recorded messages used in priority fashion with message 1 as highest priority. Total length for 1 to 16 messages shall be up to 3 minutes.
- E. Power Supply Module (PM): PM-9 power supply shall supply all power necessary under normal and emergency conditions. Power supply shall provide capacity to charge up to 55 amp-hour batteries while under full load. Technology used shall be of power-saving switching configuration, eliminating need of stepping transformer.
- F. Audio Amplifier (AM): Include as a minimum, the following features:
  1. 50-watt switching audio amplifier, requiring no transformer when used in 25-watt mode.
  2. 2 individually addressable speaker circuits, each with capability of handling part or all of 50-watt supplied power.
  3. Power shall be 24 VDC supplied via terminal block from local PM-9 power supply.
  4. Ability to select from 1 of 16 pre-programmed messages in INI-VG, and paging from locally or from INCC Command Center.
  5. Back-up amplification configurable so 1 AM-50 can perform back-up or 3, or perform 1-to-1 back-up if configured to do so in programming.
  6. Status LEDs to indicate normal operation and trouble condition.

2.5 PRINTERS

- A. Printers: Automatic type, printing code, time, date, location, category, and condition.
  1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with current time-of-day and date.
  2. Standard carriage with 80 characters per line.
  3. Use standard pin-feed paper.
  4. Enclose in separate enclosure suitable for placement on desktop or table.
  5. Communicate with control using interface complying with EIA-232-D.
  6. Power: 120 VAC at 60 Hz.

2.6 NOTIFICATION APPLIANCE POWER SUPPLIES

- A. Notification appliance power supplies shall provide 8.0 amps of continuous power. Power supplies shall include the following features:
  1. Integral Charger: Charge up to 18.0 amp-hour batteries and supply power.
  2. 2 Input Triggers. Input trigger shall be Notification Appliance control panel) or relay.
  3. Surface-mount back box.
  4. Ability to delay AC fail delay in accordance with applicable NFPA 72.
  5. Power limited circuitry in accordance with applicable UL standard.
  6. Operates as sync follower or a sync generator.

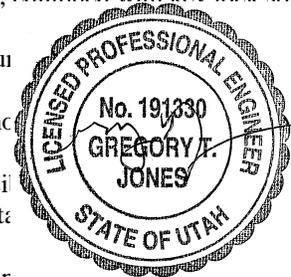


2.7 SYSTEM PERIPHERALS

- A. Addressable Devices – General:
  1. Provide address-setting means using rotary-decimal switches.
  2. Use simple to install and maintain decade-type (numbered 0 to 9) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.

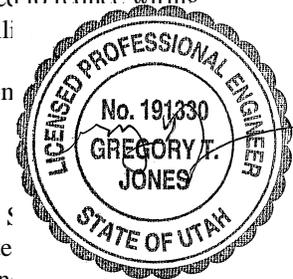
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3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
  4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.
  5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
  6. Using software in INCC Command Center, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
  7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
  8. Following bases and auxiliary functions shall be available:
    - a. Standard base with remote LED output.
    - b. Sounder base rated at 85 dBA minimum.
    - c. Form-C relay base rated 30 VDC, 2.0 A.
    - d. Isolator base.
  9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
  10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (ION, PHOTO, THERMAL).
  11. Each addressable device shall be permanently labeled to indicate programmed devices number/address. Address shall be of sufficient size and clarity to be read by an inspector from the floor level below the device.
- B. Addressable Manual Stations:
1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
  2. Operated Station: Visually apparent, as operated, at a minimum (30.5 m) from front or side.
  3. Stations shall be designed so after actual activation, they cannot be reset except by key reset.
  4. Manual stations shall be constructed of Lexan with clearly visible markings provided on cover. The word FIRE shall appear on front of station in letters 1/2 inches (44 mm) or larger.
  5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.
- C. Intelligent Thermal Detectors (ATD-RL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and have rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. Connect via 2 wires to fire alarm control panel signaling line circuit.
- D. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light-scattering) principle to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.
- E. Intelligent Duct Smoke Detectors:



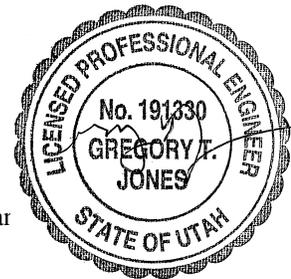
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1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.
  2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
  3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
  4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.
- F. Addressable Dry Contact Monitor Modules:
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
  2. Mount in standard deep electrical box.
  3. IDC Zone: Suitable for Style B operation.
- G. Addressable Control Modules:
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
  2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
  3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
  4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- H. Addressable Relay Modules:
1. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relays shall be energized at same time on same pair of wires.
  2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
- I. Isolator Modules:
1. Provide to automatically isolate wire-to-wire short circuits on 1 SLC branch. Isolator module shall limit number of modules or devices on 1 SLC branch. Isolator module shall be inoperative by short-circuit fault on SLC loop segment or branch. Isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
  2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
  3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
  4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
  5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.



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- J. Addressable Projected Beam Detectors:
1. Single-ended, reflective design.
  2. Six user-selectable sensitivity levels.
  3. Operates in range from 16 feet to 328 feet.
  4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
  5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
  7. UL Listed.
  8. Ability to be tested using built-in calibrated test filters actuated from remote test station.
- K. Graphic Annunciator:
1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per ILI-MB-E3 or INI-VG.
  2. EIA-485 Repeater: Available to extend EIA-485 wire distance in 3,000-foot (914.4-m) increments.
  3. ANU-48: Provide interface to approved UL-listed graphic-style annunciator and provide each of the features specified.
- L. LCD Display Annunciator:
1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
    - a. Alarm Acknowledge.
    - b. Trouble Acknowledge.
    - c. Signal Silence.
    - d. System Reset/Lamp Test.
    - e. System Drill Test.
  2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
    - a. Alarm.
    - b. Supervisory.
    - c. System Trouble.
    - d. Power Fault.
    - e. System Silenced.
  3. Mount on standard 3-gang surface or flush electrical box.
  4. Each ILI-MB-E3: Accommodate up to 5 remote LCD-7100 ar located up to 3,000 feet from control panel.
- M. Portable Emergency Telephone Handset Jacks:
1. Flush mount on stainless steel plates as indicated on the Drawings.
  2. Approved for emergency telephone system application.
  3. Insertion of remote handset plug into jack shall send signal to fire INCC Command Center which shall audibly and visually indicate on-line condition and sound a ring indication in handset.
  4. 2-Way Emergency Telephone System: Support a minimum of five (5) handsets on line without degradation of signal
  5. Cabinet: Provide in fire control room to house 10 portable handsets.
- N. Fixed Emergency Telephone Handsets:



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1. Telephone Cabinets:
  - a. Paint red and clearly label emergency telephone.
  - b. Locate as indicated on the Drawings.
  - c. Key same as INCC Command Center, INX Transponders, and manual stations.
2. Handset Cradle: Cam-operated microswitch connection such that lifting handset off cradle sends signal to fire INCC Command Center which shall audibly and visually indicate on-line (off-hook) condition. Open blade finder contacts shall not be acceptable.
3. 2-Way Emergency Telephone System: Support a maximum of five 5 handsets on line (off hook) without degradation of signal.

- O. Speakers:
1. Operate on 25 VRMS or with field-selectable output taps from 0.25 to 2.0 watts.
  2. Speakers in Corridors and Public Spaces: Produce nominal sound output of 84 dBA at 10 feet (3 m).
  3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
  4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.

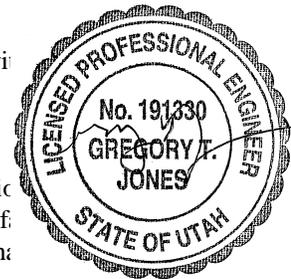
- P. Strobes:
1. Compliance: ADA and UL 1971.
  2. Maximum Pulse Duration: 0.2 second.
  3. Strobe Intensity: UL 1971.
  4. Flash Rate: UL 1971.
  5. Strobe Candela Rating: Determine by positioning selector switch on back of device.

- Q. Speaker/Strobes:
1. Operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watt
  2. Speakers in Corridors and Public Spaces: Produce nominal sound output of 84 dBA at 10 feet (3 m).
  3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
  4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.
  5. Audibility: NFPA 72.
  6. Maximum Pulse Duration: 0.2 second.
  7. Strobe Intensity: UL 1971.
  8. Flash Rate: UL 1971.
  9. Strobe Candela Rating: Determine by positioning selector swi

2.8 SPARE DEVICES:

- A. Furnish the owner with a stock of spare initiating devices and notificatio future addition/relocation of devices or replacement of equipment that f warrantee period. Manufacturer and model number of spare devices sha used for the system installation. Minimum number and type of devices per building shall be as indicated below:

1. Five addressable heat detectors.
2. Twenty addressable smoke detectors.
3. Five addressable manual pull stations.
4. Ten addressable contact monitor module.
5. Five addressable control modules.
6. Twenty notification appliances corresponding to the type and proportion of notification appliances installed.
7. Two addressable duct mounted smoke detector (duct mounting kit and sampling tube).



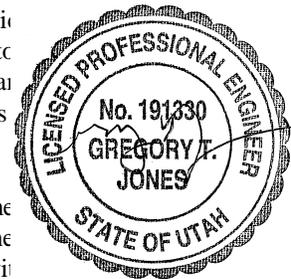
**PART III - EXECUTION**

3.01 INSPECTION:

- A. Contractor shall be responsible to attend a mandatory pre-bid walk through of each building. If required, additional pre-bid inspections can be arranged. The contractor shall be responsible to examine all areas and conditions under which fire alarm/emergency voice alarm systems are to be installed and identify conditions detrimental to proper completion of the work. All unsatisfactory conditions shall be specifically identified in the bid.
- B. Extent and location of existing fire alarm equipment shown on bid drawings is based on informal field surveys of each building and should be considered to be approximate. Contractor shall be responsible to conduct a detailed inspection to verify conditions prior to preparing shop drawings and/or installing the new fire alarm/emergency voice alarm system.

3.02 INSTALLATION:

- A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period.
- C. All fire detection and alarm system devices, control panels and remote annunciators (unless otherwise noted on drawings) shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- D. Contractor is responsible for making his own job check and any necessary adjustments in the design prior to installation. Make final coordination with existing building elements and adjust design as necessary. Major conflicts shall be brought to the attention of the Project Engineer for resolution.
- E. Work shall be performed in a manner to minimize interruptions in service of the fire alarm/emergency voice alarm system and fire alarm network. Contractor shall provide a fire watch throughout all times that the automatic fire alarm system is interrupted. Off-premise monitoring of the fire sprinkler control valves shall be provided at all times.
- F. Existing conduit and junction boxes not used for the new fire alarm/emergency voice alarm system may remain. Contractor shall remove all existing wiring from abandoned junction boxes. Abandoned junction boxes in finished areas shall be covered with a cap approved by the owner).
- G. Work only in one area of a building at a time. Complete all required work in that area before proceeding to the next area.
- H. Contractor shall prepare a schedule of work to be performed and submit the schedule to the building coordinator for review/approval.
- I. Work during normal business hours will be allowed but must be scheduled in advance with the building coordinator. Operations involving the creation of dust, debris or distracting noise shall be scheduled in advance with the building coordinator and shall be performed early in the morning or



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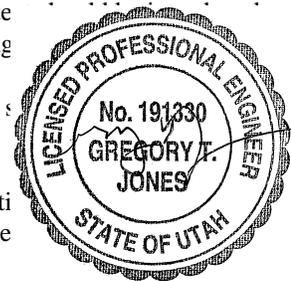
near the end of the work day.

3.03 FIELD QUALITY CONTROL:

- A. Obtain permits and post bonds as required by state and local AHJ's (Authorities Having Jurisdiction).
- B. Inform AHJ's of job progress. Request presence of AHJ's, perform tests, and document results using Contractor's Material and Test Certificates.

3.04 TESTING/TRAINING:

- A. Make and pay for all tests required by applicable codes during and after completion of the work and correct and defects in the systems indicated by the tests.
- B. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system.
- C. Testing shall include but not be limited to the following:
  - 1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
  - 2. Open initiating device circuits and verify that the trouble signal actuates.
  - 3. Open signaling line circuits and verify that the trouble signal actuates.
  - 4. Open and short notification appliance circuits and verify that trouble signal actuates.
  - 5. Ground initiating device circuits and verify response of trouble signals.
  - 6. Ground signaling line circuits and verify response of trouble signals.
  - 7. Ground notification appliance circuits and verify response of trouble signals.
  - 8. Check alert tone and prerecorded voice message to all alarm notification devices.
  - 9. Check installation, supervision, and operation of all intelligent smoke detectors using walk test.
  - 10. Each of the alarm conditions that the system is required to detect the system. Verify the proper receipt and the proper processing and the correct activation of the control points.
  - 11. Test system batteries to verify that secondary power supply is specified standby and alarm power.
- D. Train the Owner's maintenance personnel in the proper operation, testing of installed equipment. Training shall be sufficient to enable owner to safely remove devices and make programming changes.



3.05 FINAL INSPECTION:

- A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.06 INSTRUCTION:

- A. Instruction shall be required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

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- B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation"

3.07 CLEANING:

- A. Remove dust, scale, debris, and foreign substances from interior and exterior of devices, equipment, and materials prior to installation.
- B. Upon job completion, remove tools, surplus materials and equipment, leaving all areas broom clean.

3.07 AUTHORITIES HAVING JURISDICTION:

- A. Acceptance of installation is subject to final inspection and approval by:
  - 1. State of Utah Fire Marshal's Office
  - 2. State of Utah Division of Facilities and Construction Management
  - 3. UVU Physical Facilities Department
  - 4. UVU Fire Marshal
  - 5. Project Engineer

END OF SECTION 13851

