

HVAC Ward 5B and Chapel

Project Number 650-07-115

Addendum 4 Changes

- 1. Insert:** Section 28 31 00, Fire Detection and Alarm
- 2. Insert:** Section 28 31 00 Attachment 1, Providence VAMC Fire Alarm System Description

SECTION 28 31 00
FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section of the specifications includes the furnishing, installation, and connection of the fire alarm equipment to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control units, fire safety control devices, power supplies, and wiring as shown on the drawings and specified.
- B. Fire alarm systems shall comply with requirements of NFPA 72 unless variations to NFPA 72 are specifically identified within these contract documents by the following notation: "variation". The design, system layout, document submittal preparation, and supervision of installation and testing shall be provided by a technician that is certified NICET level III or a registered fire protection engineer. The NICET certified technician shall be on site for the supervision and testing of the system. Factory engineers from the equipment manufacturer, thoroughly familiar and knowledgeable with all equipment utilized, shall provide additional technical support at the site as required by the Contracting Officer or his authorized representative. Installers shall have a minimum of two years experience installing fire alarm systems.
- C. Fire alarm signals:
1. The existing building has a fully addressable, voice evacuation type fire alarm system, the intent is to modify and extend the existing system as required to accommodate the renovations. The existing system is comprised of two Notifier NFS2-3030 control panels.
 - a. All work on the existing fire alarm system shall be done by Wyman & Sons Electric (contact: David Wyman, Wyman & Sons Electric, 100 Palmer Avenue, Warwick, RI (401)737-0032. This Contractor shall contract with Wyman & Sons Electric for all required fire alarm system work.
- D. Alarm signals (by device), supervisory signals (by device) and system trouble signals (by device not reporting) shall be distinctly transmitted to the existing main fire alarm system control unit.
- E. The main fire alarm control unit shall automatically transmit alarm signals to a listed central station using a digital alarm communicator transmitter in accordance with NFPA 72. Verify proper system operation

once all changes have been made.

1.2 SCOPE

- A. All existing fire alarm equipment, wiring, devices and sub-systems that are not specifically indicated to be removed shall remain in place and fully operational at all times. All existing fire alarm conduit not reused shall be removed. All existing devices that are removed and not reinstalled shall be turned over to the COTR.
- B. Additions and deletions to the existing fire alarm system shall be designed and installed in accordance with the specifications and drawings. Device location and wiring runs shown on the drawings are for reference only unless specifically dimensioned. Actual locations shall be in accordance with NFPA 72 and this specification.
- C. Existing fire alarm bells, chimes, door holders, 120VAC duct smoke detectors, valve tamper switches and waterflow/pressure switches may be reused only as specifically indicated on the drawings and provided the equipment:
 - 1. Meets this specification section
 - 2. Is UL listed or FM approved
 - 3. Is compatible with new equipment being installed
 - 4. Is verified as operable through contractor testing and inspection
 - 5. Is warranted as new by the contractor.
- D. Existing 120 VAC duct smoke detectors, waterflow/pressure switches, and valve tamper switches reused by the Contractor shall be equipped with an addressable interface device compatible with the new equipment being installed.
- E. Existing reused equipment shall be covered as new equipment under the Warranty specified herein.
- F. Basic Performance:
 - 1. Alarm and trouble signals from each building fire alarm control panel shall be digitally encoded by UL listed electronic devices onto a multiplexed communication system.
 - 2. Response time between alarm initiation (contact closure) and recording at the main fire alarm control unit (appearance on alphanumeric read out) shall not exceed five (5) seconds.
 - 3. The signaling line circuits (SLC) between building fire alarm control units shall be wired Style 7 in accordance with NFPA 72. Isolation shall be provided so that no more than one building can be lost due to a short circuit fault.
 - 4. Initiating device circuits (IDC) shall be wired Style C in accordance with NFPA 72.

5. Signaling line circuits (SLC) within buildings shall be wired Style 4 in accordance with NFPA 72. Individual signaling line circuits shall be limited to covering 22,500 square feet of floor space or 3 floors whichever is less.
6. Notification appliance circuits (NAC) shall be wired Style Y in accordance with NFPA 72.

1.3 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Restoration of existing surfaces.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES: Procedures for submittals.
- C. Section 07 84 00, FIRESTOPPING: Fire proofing wall penetrations.
- D. Section 08 71 00, DOOR HARDWARE: Combination Closer-Holder.
- E. Section 09 91 00, PAINTING: Painting for equipment and existing surfaces.
- F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements for items which are common to other Division 26 sections.
- G. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits and boxes for cables/wiring.
- H. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW: Cables/wiring.

1.4 SUBMITTALS

- A. General: Submit 4 copies and 1 reproducible in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Drawings:
 1. Riser diagrams: Provide, for the entire system, the number, size and type of riser raceways and conductors in each riser raceway and number of each type device per floor and zone. Show door holder interface, elevator control interface, HVAC shutdown interface, fire extinguishing system interface, and all other fire safety interfaces. Show wiring Styles on the riser diagram for all circuits. Provide diagrams both on a per building and campus wide basis.
 2. Detailed wiring diagrams: Provide for control panels, modules, power supplies, electrical power connections, auxiliary relays and annunciators showing termination identifications, size and type conductors, circuit boards, LED lamps, indicators, adjustable controls, switches, ribbon connectors, wiring harnesses, terminal

strips and connectors, spare zones/circuits. Diagrams shall be drawn to a scale sufficient to show spatial relationships between components, enclosures and equipment configuration.

3. Two weeks prior to final inspection, the Contractor shall deliver to the COTR one (1) set of reproducible, as-built drawings, two blue-line copies and one (1) set of the as-built drawing computer files (using AutoCAD Release 14 or later). As-built drawings (floor plans) shall show all new and existing conduit used for the fire alarm system.

C. Manuals:

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets for all items used in the system, power requirements, device wiring diagrams, dimensions, and information for ordering replacement parts.
 - a. Wiring diagrams shall have their terminals identified to facilitate installation, operation, expansion and maintenance.
 - b. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
 - c. Include complete listing of all software used and installation and operation instructions including the input/output matrix chart.
 - d. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate, inspect, test and maintain the equipment and system. Provide all manufacturer's installation limitations including but not limited to circuit length limitations.
 - e. Provide standby battery calculations under normal operating and alarm modes. Battery calculations shall include the magnets for holding the doors open for one minute.
 - f. Include information indicating who will provide emergency service and perform post contract maintenance.
 - g. Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
 - h. A computerized preventive maintenance schedule for all equipment. The schedule shall be provided on disk in a computer format acceptable to the VAMC and shall describe the protocol for preventive maintenance of all equipment. The schedule shall include the required times for systematic examination, adjustment and cleaning of all equipment. A print out of the schedule shall

also be provided in the manual. Provide the disk in a pocket within the manual.

- i. Furnish manuals in 3 ring loose-leaf binder or manufacturer's standard binder.
 - j. A print out for all devices proposed on each signaling line circuit with spare capacity indicated.
2. Two weeks prior to final inspection, deliver four copies of the final updated maintenance and operating manual to the COTR.
- a. The manual shall be updated to include any information necessitated by the maintenance and operating manual approval.
 - b. Complete "As installed" wiring and schematic diagrams shall be included that shows all items of equipment and their interconnecting wiring. Show all final terminal identifications.
 - c. Complete listing of all programming information, including all control events per device including an updated input/output matrix.
 - d. Certificate of Installation as required by NFPA 72 for each building. The certificate shall identify any variations from the National Fire Alarm Code.
 - e. Certificate from equipment manufacturer assuring compliance with all manufacturers installation requirements and satisfactory system operation.

D. Certifications:

1. Together with the shop drawing submittal, submit the technician's NICET level III fire alarm certification as well as certification from the control unit manufacturer that the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include in the certification the names and addresses of the proposed supervisor of installation and the proposed performer of contract maintenance. Also include the name and title of the manufacturer's representative who makes the certification.
2. Together with the shop drawing submittal, submit a certification from either the control unit manufacturer or the manufacturer of each component (e.g., smoke detector) that the components being furnished are compatible with the control unit.
3. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL and NFPA 72 requirements.

1.5 WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of five (5) years from the date of acceptance of the entire installation by the Contracting Officer.

1.6 GUARANTY PERIOD SERVICES

- A. Complete inspection, testing, maintenance and repair service for the fire alarm system shall be provided by a factory trained authorized representative of the manufacturer of the major equipment for a period of five years from the date of acceptance of the entire installation by the Contracting Officer.
- B. Contractor shall provide all necessary test equipment, parts and labor to perform required inspection, testing, maintenance and repair.
- C. All inspection, testing, maintenance and permanent records required by NFPA 72, and recommended by the equipment manufacturer shall be provided by the contractor. Work shall include operation of sprinkler system alarm and supervisory devices as well as all reused existing equipment connected to the fire alarm system. It shall include all interfaced equipment including but not limited to elevators, HVAC shutdown, and extinguishing systems.
- D. Maintenance and testing shall be performed in accordance with NFPA 72. A computerized preventive maintenance schedule shall be provided and shall describe the protocol for preventive maintenance of equipment. The schedule shall include a systematic examination, adjustment and cleaning of all equipment.
- E. Non-included Work: Repair service shall not include the performance of any work due to improper use, accidents, or negligence for which the contractor is not responsible.
- F. Service and emergency personnel shall report to the Engineering Office or their authorized representative upon arrival at the hospital and again upon the completion of the required work. A copy of the work ticket containing a complete description of the work performed and parts replaced shall be provided to the VA Contracting Officer or his authorized representative.
- G. Emergency Service:
 - 1. Warranty Period Service: Service other than the preventative maintenance, inspection, and testing required by NFPA 72 shall be considered emergency call-back service and covered under the warranty of the installation during the first year of the warranty period,

unless the required service is a result of abuse or misuse by the Government. Written notification shall not be required for emergency warranty period service and the contractor shall respond as outlined in the following sections on Normal and Overtime Emergency Call-Back Service. Warranty period service can be required during normal or overtime emergency call-back service time periods at the discretion of the Contracting Officer or his authorized representative.

2. Normal and overtime emergency call-back service shall consist of an on-site response within two hours of notification of a system trouble.
3. Normal emergency call-back service times are between the hours of 7:30 a.m. and 4:00 p.m., Monday through Friday, exclusive of federal holidays. Service performed during all other times shall be considered to be overtime emergency call-back service. The cost of all normal emergency call-back service for years 2 through 5 shall be included in the cost of this contract.
4. Overtime emergency call-back service shall be provided for the system when requested by the Government. The cost of the first 40 manhours per year of overtime call-back service during years 2 through 5 of this contract shall be provided under this contract. Payment for overtime emergency call-back service in excess of the 40 man hours per year requirement will be handled through separate purchase orders. The method of calculating overtime emergency call-back hours is based on actual time spent on site and does not include travel time.

H. The contractor shall maintain a log at each fire alarm control unit. The log shall list the date and time of all examinations and trouble calls, condition of the system, and name of the technician. Each trouble call shall be fully described, including the nature of the trouble, necessary correction performed, and parts replaced.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by the basic designation only.
- B. National Fire Protection Association (NFPA):
 - 70-2005National Electrical Code (NEC).
 - 72-2002National Fire Alarm Code.

- 90A-2002 Installation of Air Conditioning and Ventilating Systems.
- 101-2003 Life Safety Code
- C. Underwriters Laboratories, Inc. (UL):
 - 2000-2000 Fire Protection Equipment Directory
- D. Factory Mutual Research Corp (FM): Approval Guide, 2005 Edition
- E. American National Standards Institute (ANSI):
 - S3.41-1996 Audible Emergency Evacuation Signal
- F. International Code Council, International Building Code (IBC) 2003 Edition

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS, GENERAL

- A. Existing equipment may be reused only where indicated on the drawings.
- B. Except as indicated in paragraph 1.2 A above, All equipment and components shall be new and the manufacturer's current model. All equipment shall be tested and listed by Underwriters Laboratories, Inc. or Factory Mutual Research Corporation for use as part of a fire alarm system. The authorized representative of the manufacturer of the major equipment shall certify that the installation complies with all manufacturer's requirements and that satisfactory total system operation has been achieved.

2.2 CONDUIT, BOXES, AND WIRE

- A. Conduit shall be in accordance with Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS and as follows:
 - 1. All new and reused conduit shall be installed in accordance with NFPA 70.
 - 2. Conduit fill shall not exceed 40 percent of interior cross sectional area.
 - 3. All new conduit shall be 19 mm (3/4 inch) minimum.
- B. Wire:
 - 1. All existing wiring shall be removed and new wiring installed in a conduit or raceway.
 - 2. Wiring shall be in accordance with NEC article 760, Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW), and as recommended by the manufacturer of the fire alarm system. All wires shall be color coded. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and 14 AWG for notification device circuits.

3. Addressable circuits and wiring used for the multiplex communication loop shall be twisted and shielded unless specifically excepted by the fire alarm equipment manufacturer in writing.
 4. Any fire alarm system wiring that extends outside of a building shall have additional power surge protection to protect equipment from physical damage and false signals due to lightning, voltage and current induced transients. Protection devices shall be shown on the submittal drawings and shall be UL listed or in accordance with written manufacturer's requirements.
 5. All wire or cable used in underground conduits including those in concrete shall be listed for wet locations.
- C. Terminal Boxes, Junction Boxes, and Cabinets:
1. Shall be galvanized steel in accordance with UL requirements.
 2. All new and reused boxes shall be sized and installed in accordance with NFPA 70.
 3. New and existing covers shall be repainted red in accordance with Section 09 91 00, PAINTING and shall be identified with white markings as "FA" for junction boxes and as "FIRE ALARM SYSTEM" for cabinets and terminal boxes. Lettering shall be a minimum of 19 mm (3/4 inch) high.
 4. Terminal boxes and cabinets shall have a volume 50 percent greater than required by the NFPA 70. Minimum sized wire shall be considered as 14 AWG for calculation purposes.
 5. Terminal boxes and cabinets shall have identified pressure type terminal strips and shall be located at the base of each riser. Terminal strips shall be labeled as specified or as approved by the COTR.

2.3 FIRE ALARM CONTROL UNIT

A. General: Existing

B. Power Supply: Existing

1. Provide calculations to indicate that the existing system power supplies have adequate capacity to accommodate all proposed revisions to the existing system. Provide additional new power supplies as required.

C. Circuit Supervision: Each alarm initiating device circuit, signaling line circuit, and notification appliance circuit, shall be supervised against the occurrence of a break or ground fault condition in the field wiring. These conditions shall cause a trouble signal to sound in the control unit until manually silenced by an off switch.

- D. Supervisory Devices: All sprinkler system valves, standpipe control valves, post indicator valves (PIV), and main gate valves shall be supervised for off-normal position. Closing a valve shall sound a supervisory signal at the control unit until silenced by an off switch. The specific location of all closed valves shall be identified at the control unit. Valve operation shall not cause an alarm signal. Low air pressure switches and duct detectors shall be monitored as supervisory signals. The power supply to the elevator shunt trip breaker shall be monitored by the fire alarm system as a supervisory signal.
- E. Trouble signals:
1. Arrange the trouble signals for automatic reset (non-latching).
 2. System trouble switch off and on lamps shall be visible through the control unit door.
- F. Function Switches: Provide the following switches in addition to any other switches required for the system:
1. Remote Alarm Transmission By-pass Switch: Shall prevent transmission of all signals to the main fire alarm control unit when in the "off" position. A system trouble signal shall be energized when switch is in the off position.
 2. Alarm Off Switch: Shall disconnect power to alarm notification circuits on the local building alarm system. A system trouble signal shall be activated when switch is in the off position.
 3. Trouble Silence Switch: Shall silence the trouble signal whenever the trouble silence switch is operated. This switch shall not reset the trouble signal.
 4. Reset Switch: Shall reset the system after an alarm, provided the initiating device has been reset. The system shall lock in alarm until reset.
 5. Lamp Test Switch: A test switch or other approved convenient means shall be provided to test the indicator lamps.
 6. Drill Switch: Shall activate all notification devices without tripping the remote alarm transmitter. This switch is required only for general evacuation systems specified herein.
 7. Door Holder By-Pass Switch: Shall prevent doors from releasing during fire alarm tests. A system trouble alarm shall be energized when switch is in the abnormal position.

2.4 VOICE COMMUNICATION SYSTEM (VCS)

- A. General:

1. The emergency voice communication system shall be extended as indicated throughout the renovated area.
 2. Upon receipt of an alarm signal from the building fire alarm system, the VCS shall automatically transmit a pre-recorded fire alarm message.
 3. The VCS shall supervise all speaker circuits, control equipment, remote audio control equipment, and amplifiers.
- B. Speaker Circuit Arrangement:
1. Speaker circuits shall be arranged such that there is one speaker circuit per smoke zone.
 2. Audio amplifiers and control equipment shall be electrically supervised for normal and abnormal conditions.
 3. Speaker circuits shall be either 25 VRMS or 70.7 VRMS with a minimum of 50% spare power available.
 4. Speaker circuits and control equipment shall be arranged such that loss of any one speaker circuit will not cause the loss of any other speaker circuit in the system.
- C. Digitized Voice Module (DVM) : Existing
1. The Digitized Voice Module shall provide prerecorded digitized evacuation and instructional messages. The messages shall be professionally recorded and approved by the COTR prior to programming.
 2. The DVM shall be configured to automatically output to the desired circuits following a 10-second slow whoop alert tone.
 3. Prerecorded magnetic taped messages and tape players are not permitted.
 4. The digitized message capacity shall be no less than 15 second in length.
 5. The digitized message shall be transmitted three times.
 6. The DVM shall be supervised for operational status.
 7. Failure of the DVM shall result in the transmission of a constant alarm tone.
 8. The DVM memory shall have a minimum 50% spare capacity after those messages identified in this section are recorded. Multiple DVM's may be used to obtain the required capacity.
- D. Audio Amplifiers:
1. Audio Amplifiers shall provide a minimum of 50 Watts at either 25 or 70.7 VRMS output voltage levels.
 2. Amplifiers shall be continuously supervised for operational status.
 3. Amplifiers shall be configured for either single or dual channel application.

4. Each audio output circuit connection shall be configurable for Style X.
5. A minimum of 50% spare output capacity shall be available for each amplifier. Verify that existing amplifiers have adequate capacity to accommodate all proposed new equipment. Provide additional new amplifiers as required.

2.5 ALARM NOTIFICATION APPLIANCES

A. Speakers:

1. Shall operate on either 25 VRMS or 70.7 VRMS with field selectable output taps from 0.5 to 2.0W and originally installed at the one-half watt tap. Speakers shall provide a minimum sound output of 80 dBA at ten feet with the one-half watt tap.
2. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
3. 100 mm (4 inches) or 200 mm (8 inches) cone type speakers ceiling mounted with white colored baffles in areas with suspended ceilings and wall mounted in areas without ceilings.

B. Strobes:

1. Xenon flash tube type minimum 15 candela in toilet rooms and 75 candela in all other areas with a flash rate of 1 HZ. Strobes shall be synchronized where required by the National Fire Alarm Code (NFPA 72).
2. Backplate shall be red with 13 mm (1/2 inch) permanent red letters. Lettering to read "Fire", be oriented on the wall or ceiling properly, and be visible from all viewing directions.
3. Each strobe circuit shall have a minimum of twenty (20) percent spare capacity.
4. Strobes may be combined with the audible notification appliances specified herein.

C. Fire Alarm Horns:

1. Shall be electric, utilizing solid state electronic technology operating on a nominal 24 VDC.
2. Shall be a minimum nominal rating of 80 dBA at ten feet.
3. Mount on removable adapter plates on conduit boxes.
4. Horns located outdoors shall be of weatherproof type with metal housing and protective grille.
5. Each horn circuit shall have a minimum of twenty (20) percent spare capacity.

2.6 ALARM INITIATING DEVICES

A. Manual Fire Alarm Stations:

1. Shall be non-breakglass, address reporting type.
2. Station front shall be constructed of a durable material such as cast

or extruded metal or high impact plastic. Stations shall be semi-flush type.

3. Stations shall be of single action pull down type with suitable operating instructions provided on front in raised or depressed letters, and clearly labeled "FIRE".
4. Operating handles shall be constructed of a durable material. On operation, the lever shall lock in alarm position and remain so until reset. A key shall be required to gain front access for resetting, or conducting tests and drills.
5. Unless otherwise specified, all exposed parts shall be red in color and have a smooth, hard, durable finish.

B. Smoke Detectors:

1. Smoke detectors shall be UL listed for use with the fire alarm control unit being furnished.
2. Smoke detectors shall be addressable type complying with applicable UL Standards for system type detectors. Smoke detectors shall be installed in accordance with the manufacturer's recommendations and NFPA 72.
3. Detectors shall have an indication lamp to denote an alarm condition. Provide remote indicator lamps and identification plates where detectors are concealed from view. Locate the remote indicator lamps and identification plates flush mounted on walls so they can be observed from a normal standing position.
4. All spot type and duct type detectors installed shall be of the photoelectric type.
5. Photoelectric detectors shall be factory calibrated and readily field adjustable. The sensitivity of any photoelectric detector shall be factory set at 3.0 plus or minus 0.25 percent obscuration per foot.
6. Detectors shall provide a visual trouble indication if they drift out of sensitivity range or fail internal diagnostics. Detectors shall also provide visual indication of sensitivity level upon testing. Detectors, along with the fire alarm control units shall be UL listed for testing the sensitivity of the detectors.

C. Heat Detectors:

1. Heat detectors shall be of the addressable restorable rate compensated fixed-temperature spot type.
2. Detectors shall have a minimum smooth ceiling rating of 2500 square feet.

2.7 SUPERVISORY DEVICES

A. Duct Smoke Detectors:

1. Duct smoke detectors shall be provided and connected by way of an address reporting interface device. Detectors shall be provided with an approved duct housing mounted exterior to the duct, and shall have perforated sampling tubes extending across the full width of the duct (wall to wall). Detector placement shall be such that there is uniform airflow in the cross section of the duct.
2. Interlocking with fans shall be provided in accordance with NFPA 90A and as specified hereinafter under Part 3.2, "TYPICAL OPERATION".
3. Provide remote indicator lamps, key test stations and identification nameplates (e.g. "DUCT SMOKE DETECTOR AHU-X") for all duct detectors. Locate key test stations in plain view on walls or ceilings so that they can be observed and operated from a normal standing position.

B. Sprinkler and Standpipe System Supervisory Switches:

1. Each sprinkler system water supply control valve, riser valve or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valve shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected to the fire alarm system by way of address reporting interface device.
4. The mechanism shall be contained in a weatherproof die-cast aluminum housing that shall provide a 19 mm (3/4 inch) tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting.
6. Where dry-pipe sprinkler systems are installed, high and low air pressure switches shall be provided and monitored by way of an address reporting interface devices.

2.8 ADDRESS REPORTING INTERFACE DEVICE

- A. Shall have unique addresses that reports directly to the building fire alarm panel.
- B. Shall be configurable to monitor normally open or normally closed devices for both alarm and trouble conditions.

- C. Shall have terminal designations clearly differentiating between the circuit to which they are reporting from and the device that they are monitoring.
- D. Shall be UL listed for fire alarm use and compatibility with the panel to which they are connected.
- E. Shall be mounted in weatherproof housings if mounted exterior to a building.

2.9 SMOKE BARRIER DOOR CONTROL

- A. Electromagnetic Door Holders:
 - 1. New Door Holders shall be standard wall mounted electromagnetic type. In locations where doors do not come in contact with the wall when in the full open position, an extension post shall be added to the door bracket.
 - 2. Operation shall be by 24 volt DC supplied from a battery located at the fire alarm control unit. Door holders shall be coordinated as to voltage, ampere drain, and voltage drop with the battery, battery charger, wiring and fire alarm system for operation as specified.
- B. A maximum of twelve door holders shall be provided for each circuit. Door holders shall be wired to allow releasing doors by smoke zone.
- C. Door holder control circuits shall be electrically supervised.
- D. Smoke detectors shall not be incorporated as an integral part of door holders.
- E. Where combination holder-closer units are required to match existing, these devices are furnished and installed as per Section 08 71 00, DOOR HARDWARE. Connection and wiring shall be as herein specified.

2.10 UTILITY LOCKS AND KEYS:

- A. All key operated test switches, control units, annunciator panels and lockable cabinets shall be provided with a single standardized utility lock and key.
- B. Key-operated manual fire alarm stations shall have a single standardized lock and key separate from the control equipment.
- C. All keys shall be delivered to the COTR.

2.11 SPARE AND REPLACEMENT PARTS

- A. None.
- B. Provide to the VA, all hardware, software, programming tools, license and documentation necessary to permanently modify the fire alarm system on site. The minimum level of modification includes addition and deletion of devices, circuits, zones and changes to system description, system operation, and digitized evacuation and instructional messages.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with NFPA 70, 72, 90A, and 101 as shown on the drawings, and as recommended by the major equipment manufacturer. Fire alarm wiring shall be installed in conduit. All conduit and wire shall be installed in accordance with Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS , Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW), and all penetrations of smoke and fire barriers shall be protected as required by Section 07 84 00, FIRESTOPPING.
- B. All new conduits, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. All existing accessible fire alarm conduit not reused shall be removed.
- C. All new or reused exposed conduit shall be painted in accordance with Section 09 91 00, PAINTING to match surrounding finished areas and red in unfinished areas.
- D. Existing devices that are reused shall be properly mounted and installed. Where devices are installed on existing shallow backboxes, extension rings of the same material, color and texture of the new fire alarm devices shall be used. Mounting surfaces shall be cut and patched in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Restoration, and be re-painted in accordance with Section 09 91 00, PAINTING as necessary to match existing.
- E. All fire detection and alarm system devices, control units and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Exact locations to be approved by the COTR.
- F. Speakers shall be ceiling mounted and fully recessed in areas with suspended ceilings. Speakers shall be wall mounted and recessed in finished areas without suspended ceilings. Speakers may be surface mounted in unfinished areas.
- G. Strobes shall be flush wall mounted 2,000 mm (80 inches) above the floor or 150 mm (6 inches) below ceiling, whichever is lower. Locate and mount to maintain a minimum 900 mm (36 inches) clearance from side obstructions.
- H. Manual pull stations shall be installed not less than 1050 mm (42 inches) or more than 1200 mm (48 inches) from finished floor to bottom of device and within 1500 mm (60 inches) of a stairway or an exit door.

3.2 TYPICAL OPERATION

- A. Activation of any manual pull station, water flow or pressure switch,

heat detector, kitchen hood suppression system, gaseous suppression system, or smoke detector shall cause the following operations to occur:

1. Operate the emergency voice communication system in the Building. For sprinkler protected buildings, flash strobes continuously only in the zone of alarm. For buildings without sprinkler protection throughout, flash strobes continuously only on the floor of alarm.
 2. Continuously sound a temporal pattern general alarm and flash all strobes in the building in alarm until reset at the local fire alarm control unit in the Building
 3. Release only the magnetic door holders in the smoke zone on the floor from which alarm was initiated after the alert signal.
 4. Transmit a separate alarm signal, via the main fire alarm control unit to the fire department.
 5. Unlock the electrically locked exit doors within the zone of alarm.
- B. Operation of duct smoke detectors shall cause a system supervisory condition and shut down the ventilation system and close the associated smoke dampers as appropriate.

3.3 TESTS

- A. Provide the service of a NICET level III, competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. Make all adjustments and tests in the presence of the COTR.
- B. When the systems have been completed and prior to the scheduling of the final inspection, furnish testing equipment and perform the following tests in the presence of the COTR. When any defects are detected, make repairs or install replacement components, and repeat the tests until such time that the complete fire alarm systems meets all contract requirements. After the system has passed the initial test and been approved by the COTR, the contractor may request a final inspection.
 1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 2. Test the insulation on all installed cable and wiring by standard methods as recommended by the equipment manufacturer.
 3. Run water through all flow switches. Check time delay on water flow switches. Submit a report listing all water flow switch operations

and their retard time in seconds.

4. Open each alarm initiating and notification circuit to see if trouble signal actuates.
5. Ground each alarm initiation and notification circuit and verify response of trouble signals.

3.4 FINAL INSPECTION AND ACCEPTANCE

- A. Prior to final acceptance a minimum 30 day "burn-in" period shall be provided. The purpose shall be to allow equipment to stabilize and potential installation and software problems and equipment malfunctions to be identified and corrected. During this diagnostic period, all system operations and malfunctions shall be recorded. Final acceptance will be made upon successful completion of the "burn-in" period and where the last 14 days is without a system or equipment malfunction.
- B. At the final inspection a factory trained representative of the manufacturer of the major equipment shall repeat the tests in Article 3.3 TESTS and those required by NFPA 72. In addition the representative shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of a VA representative.

PART 4 - SCHEDULES

4.1 SMOKE ZONE DESCRIPTIONS:

- A. Existing.

4.2 DIGITIZED VOICE MESSAGES:

- A. Existing.

4.3 LOCATION OF VOICE MESSAGES:

- A. Existing.

SECTION 28 31 00
FIRE DETECTION AND ALARM

Attachment 1

PROVIDENCE VAMC FIRE ALARM SYSTEM DESCRIPTION

The Providence VA Medical Center campus located at 830 Chalkstone Avenue in Providence, RI 02908-4799 utilizes (2) Notifier NFS2-3030 Fire Detection and Alarm System Control Panels (FACP's) in the main building denoted as Building 1. Current configuration of these panels provides a total of 10 signal line circuit (SLC) data addressable loops.

All networked panels in the outlying buildings on the campus utilize the Notifier NFS2-640 Fire Alarm Control Panels (FACP's). Notifier FlashScan® field devices are to be used with the described panels which greatly enhance the speed of communication between analog intelligent devices. Each building also utilizes, as a separate network node, the Digital Voice Command (DVC-EMF) with a Digital Audio Amplifier (DAA5025F).

The Notifier fire alarm system was recently installed in 2010 utilizing state of the art network-based components utilizing (armored) multi-mode fiber distributed underground to connect each FACP and audio DVC. The Notifier NCM-F Network Communications Module in each FACP provides the network-base fiber (Style 7) loop connection to all the panels. The Notifier NCA-2 is provided at the Operations Center Room D1 090 as the primary network command and control point of operation.

The DET-6B telegraph transmitters (electronic masterbox) are provided in the Fire Command Room 136 for transmission of general fire alarm signals to the Providence Fire Department for all campus networked FACP's through a municipal cable that leaves the main building of the VA Medical Center underground and connects to the Providence Fire Department City Loop circuit located via street light pole by the Regent Street entrance to the VA Medical Center.

Building 1 audio is provided from (1) DVC-EMF located in the Operations Center Room D1 090 and provides digital messages to (38) DAA-5025F audio amplifiers distributed within Building 1. Each DAA provides (4) each (Style Y) speaker circuits. Each identified "smoke zone" is provided with a separate "voice" circuit with its own dedicated amplifier.

The Main Lobby entrance and the Ambulatory Care entrance is provided with a Notifier LCD - 160 Remote Annunciator Panel (RAP), driven from the NCA - 2 in the Operations Center Room D1 090. A third LCD - 160 is located in the Emergency Room D11 76 reception desk area for 24 hour network monitoring. The Operations Center Room D1 090 is equipped with the Notifier ONYX First Vision Graphics Annunciator Panel (GAP) connected via Ethernet cables to an ONYX-works embedded workstation PC located at the PBX Operators Command Station in Room D1090. A second First Vision (GAP) is located at the eastside of the main building and is connected to a second workstation (PC) located in the Fire Command Room 136. These components provide graphical displays of the main building floor plans and outlying buildings to graphically display where an alarm condition as been initiated.

The Notifier DVC Digital Voice Command is the heart of the integrated full-featured audio command center. The DVC is located in the Operations Center Room D1 090 and provides the digital audio processor to generate audio messages and route them to the respective Notifier Digital Audio Amplifiers DAA-5025F (via Style 6/7 multi-mode fiber) and distributed System Sensor Wall Mounted Speakers. DVC's are powered by 24 Vdc from the local FACP power supplies. DAA's are powered from 120 VAC and are equipped with Battery Back-up.

Combination speaker-strobes and Strobe-only devices are powered and synchronized from "bell" circuits of the NFS2-640 FACP's in the outlying buildings and from the Notifier FCPS-24S8 power supply panels within Building 1. Building 1 NAC circuits are configured in two modes; Mode 1 (Type IV power supplies) provide (4) individual NAC circuits connected directly to FCPS, Mode 2 (Type I power supplies) provide power to a series of Notifier FCM - 1 Control Modules in conjunction with System Sensor Model MDL sync modules. Strobe synchronization in building 1 is provided from (3) individual sync circuits: (1) for the Sub-basement, (1) for 1st and 2nd Floors, and (1) for the 3rd Floor and above floors. All FCPS panels operate from 120 VAC and are equipped with battery back-up.

Additional FCPS panels (Type II Power Supplies) are utilized for 24Vdc power to door-holder and other ancillary/ auxiliary functions or 4-wire monitor/control devices such as Beam Detectors and Duct Smoke Detectors. Currently there are (6) FCPS panels installed for such devices throughout the main building.

The ONYX Work Stations located in the Operations Center Room D1090 and the Fire Command Room 136 provide graphical maps of the campus and main building floor plans for event reporting and historical data retrieval purposes for all network points on the system.

In addition, there are (2) Notifier PRN-6 printers used to provide a written record of all events associated with the network fire alarm system. The 1st printer located in the Operations Center Room D1 090 receives data from the NCA-2, the 2nd printer located in the Fire Command Room 136 receives data from the ONYX-works PC, both printers utilize serial communication.

A Notifier NFN Gateway is provided in the Audio/NCA panel located in the Operations Center Room D1 090 to provide connection (via owner provided connection) to owner's server. The NFN Gateway provides a means to access and view the system from a remote computer or laptop.

Modifications to the system will require fire protection engineering redesign and support using licensed professionals. Existing fire alarm system "as built" or "shop drawings" will be verified by A/E against actual system assembly prior to any redesign modification. All modifications will require updated drawings to be delivered to the VA after testing and commissioning has been completed. All work performed must meet current JCAHO, Healthcare, and the National Fire Protection Code (NFPA) standards.

Modifications to the system in which to add, delete, extend, or relocate,

field devices and or panels require extensive knowledge and experience with this state-of- the-art system. Use existing wiring conventions for all circuit types and perform additional load calculations for audio amplification circuits to ensure maintaining a consistent operable and reliable system by manufacturer's specifications - no exceptions. 2 Hour Fire Rated Cable/Conduit is required from panel to panel. Wiring inside a smoke zone for another smoke zone must also be in 2 Hour Fire Rated Cable/Conduit. All tamper and flow switch devices must have their own exclusive addressable interface monitor module (Notifier P/N FMM-1 Flash Scan Monitor Module) - no exceptions. There will be no substitutes.

In addition to the hardware modifications, extensive programming and reprogramming may be required to update graphic files and audio file messages based on smoke zones and floor plans of field device modifications. Voice activated messages may have to be added, deleted, or modified within an evacuation zone or modify alert messages going out to additional DVC's - DAA's or FACP's around the campus outside of the initiating zone. In this case, the ONYX Workstations (2), ONYX First Vision (2), DVC's (17), NCA-2 (1 each), NFS2-3030 (2), NFS2-640 (16), may require system reprogramming. Service personnel must be authorized and certified by Notifier to add, delete, modify, or repair any fire alarm system component. No exceptions.

Panel Types and Locations:

NFS2-3030 Building 1 - Room 136 (7 of 10 SLC loops installed)
Building 1 - Room D1013 Elevator Lobby (3 of 10 SLC loops installed)

NFS2-640 Buildings: 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 26, and 35
Building 32 - Currently deleted from network - under construction
Building 35 - DVC-DAA installed but is not equipped with speakers
Temporary Building - T18
Trailers: TR9, and TR32
Trailer - TR35 - Currently connected to the network but has no field devices connected to the panel - stand alone system is being utilized

Note: The NFS2-640's are equipped with only (1) SLC, a second SLC can be added if required.

Standard Cable & Wire Conventions:

- Signal Line Circuit (SLC) Cable [FPLR in conduit] [Style 6/7, Class A] Solid Copper 16AWG - 2/C Twisted/Unshielded - Red Jacket
- Speaker Circuit Cable [FPLR in conduit] [Style Y, Class B] Solid Copper 16AWG - 2/C Twisted/Shielded - Red Jacket/Blue Stripe
- Strobe Circuit Cable [FPLR in conduit] [Style Y, Class B] Solid Copper 14AWG - 2/C Twisted/Unshielded - Red Jacket/Yellow Stripe

Notes:

- Any of the above circuit types which cross over or between identified smoke zones are wired using UL Listed CIC cable - listed CIC cable provides 2 hour rating when installed in conduit - see original submittals for type provided.

- Additional wiring information may be obtained from current project documents: Door Holders - Yellow Blue (THHN/TFFN) Solid Copper 14 AWG Non-resettable power - Black/Red (THHN/TFFN) Solid Copper 14 AWG
- Additional wire should match existing and be minimum Solid Copper 18 AWG FPL or as specified by manufacturer's installation guides/documents including; Remote indicator/test switches, Remote Annunciators/microphones, strobe circuit sync lines, RS232/RS485 or other data lines, Fire Fighter Phones/Risers and all other command, control, monitor, ancillary and auxiliary wiring and cables.

VERY IMPORTANT - SOFTWARE / APPLICATIONS

- Extreme care should be taken regarding software applications data and programmer versions/revisions. System equipment was ordered in **2007** and is currently programmed using **Veri-fire 5.3** programmer version software. DVC's and DAA's are version **2.0** application/firmware data.
- **Upgrading of firmware, hardware or programmer** can have a cascade effect on other network panels/components. Replacement components should be brought to exact same version/revision as originally installed - compatibility issues can have a serious effect on system/network operations.
- **Audio Libraries** - Before downloading to DVC's, great care should be taken in ensuring that the audio library (message segments/files) path matches to original programming, failure to do so can result in loss of message sequences.

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