Division

ELECTRONIC SAFETY & SECURITY REQUIREMENTS

INTRUSION ALARM SYSTEMS

General:

1. Provide submittal and shop drawings to District Architect for review with Facilities prior to acceptance.

PART 1 GENERAL

1.1 GENERAL AND SPECIAL CONDITIONS

- A. General and Special Conditions apply to all work under this section.
- B. The Contractor shall furnish all labor, equipment, tools, material, drawings, et cetera, necessary for a complete intrusion alarm system. The system shall be as designed by the Owner. The purpose of the furnished specifications and drawings is to convey to the Contractor the scope of the work required, all of which the Contractor is responsible to furnish.
- C. The Contractor shall examine all existing physical conditions which may be material to, or affect, the performance of his work. No extra payments will be allowed made necessary by his failure to do so. Any omission, discrepancy, or lack of clarity shall be promptly identified to the Owner and Engineer for clarification prior to bidding the project.
- D. The Contractor shall provide all devices and equipment required by these specifications and drawings. Under no circumstances shall the Contractor omit or delete any devices or equipment without the written directive of the Owner or Engineer.

1.2 DEFINITIONS

A. AHJ – Authority Having Jurisdiction (DSA-Inspector)

- B. Approved Unless otherwise stated, materials, equipment, or submittals approved by the Owner, Architect, or AHJ
- C. Communicator The Control/Communicator
- D. Concealed Hidden from view
- E. Contractor The Company awarded the primary contract for this work and any of its subcontractors, vendors, suppliers, or fabricators.
- F. Device any peripheral equipment including, but no limited to, door contacts, motion detectors, keypads, expansion modules, sounders, etc.
 - 1. Applied to wiring, conduit, etc. installed or run above drop ceilings, in chases, inside walls, etc.
 - 2. Applied to door contacts, installed inside the top of door frames and doors.
- G. Dispatch The San Diego Community College Police Dispatch Center.
- H. District The San Diego Community College District.
- I. Engineer The system designer or engineering company designated by the owner.
- J. EOL End-of-line resistor. Typically 1000 (1k) ohms for Bosch equipment.
- K. Exposed Visible or not concealed
 - 1. Applied to wiring, conduit, etc. installed or run on walls, ceilings, etc. where it is visible.
 - 2. Applied to door contacts, installed on door frames and doors at the top of the door.
- L. IAC Intrusion Alarm Communicator, see 'Communicator' above.
- M. Intrusion Alarm System the entire system including all panels, devices, wiring, etc.
- N. Owner San Diego Community College District.
- **O.** Panel see 'Communicator' above.

1.3 SCOPE OF WORK

- A. The Contractor shall furnish and install, unless otherwise indicated, all items required for a complete Intrusion Alarm System(s) as described in these specifications and drawings.
 - 1. Provide a new, state of the art Intrusion Alarm System. This is to include all wiring, communicators, modules, door contacts, motion detectors, keypads, panic/hold-up switches and any other devices and equipment specified either in these specifications or on the blueprints.
 - 2. Provide a network connection for each Panel from the nearest available connection to the District network. Cable to be run by others.
 - **3.** Provide an on-site, factory trained technician acceptable to the Owner and AHJ to supervise the installation.
 - 4. Provide an on-site project manager.
 - 5. Conduct weekly progress meetings and issue monthly written job progress reports to the Owner's Representative and Engineer.
 - 6. Submit shop drawings to the Engineer or Owner's Representative for approval by the Engineer and Owner.
 - 7. The contractor shall provide any x-ray of walls or slabs prior to core drilling and any required fireproofing or sealing of the cores.
 - 8. Prior to the final acceptance test and pre-testing by the Contractor, conduct a complete test of the entire system upon completion of the installation to assure the Owner's Representative and Engineer that the system is operational.
 - 9. Conduct the final acceptance test. The Alarm Contractor shall furnish personnel who are familiar with the installation at a time convenient to the Owner's Representative, the Engineer, and the AHJ. This test shall take place as soon as convenient after the completion of the installation and prior to the building being turned over to the Owner for occupation. If necessary, any punch list items shall be corrected and the entire system re-tested at the Contractor's expense prior to final acceptance of the system. The two-year warranty shall begin upon acceptance of the system by the Owner's Representative, the Engineer, and the AHJ.
 - 10. Provide training of the Owner's personnel as required by the Owner. A maximum of two days shall be required for this training.

11. Provide a two-year job site warranty of all materials and labor as specified elsewhere in this section.

1.4 RELATED WORK

- A. Materials and work specified in other sections.
 - 1. Fire stopping
 - 2. Basic electrical materials and work
 - 3. Mechanical (heating and air-condition duct locations, etc.)

1.5 SYSTEM DESCRIPTION

- A. The Intrusion Alarm System shall be a state-of-the-art, networked system and shall be programmable using the District's current software over the District network (WAN).
- B. The Intrusion Alarm System shall communicate to Dispatch via the District WAN.
- C. Each Alarm Initiation Device shall be on its own zone either on the Communicator or on a zone expansion module connected to the Communicator.

1.6 APPLICABLE STANDARDS

The latest adopted issue of the following standards is hereby made a part of this specification:

- A. NFPA 70 National Electrical Code
- B. Uniform Building Code (with California Amendments)

1.7 SUBMITTALS

- A. Provide complete product data (including manufacture's descriptive and technical literature) and catalogue cut sheets clearly marked to indicate the model and catalogue number of each device for approval by the engineer and Owner's Representative.
- B. Provide shop drawings including building floor plans showing device locations, complete wiring and schematic diagrams, conduit size, wire routing, and field terminations; panel layout including all modules and interconnections with the panel. The shop drawings shall show the proposed layout of the panel and all peripheral equipment and devices, its location in relation to other equipment in the area, and clearances for maintenance and serviceability. Shop drawings shall be prepared using a minimum scale of 1/8'' = 1 foot for plans and $\frac{1}{4''} = 1$ foot for details.
- C. Provide substantiating calculations showing the adequacy of power supplies and back-up batteries. If additional power supplies are required, provide calculations for those as well. All power supplies shall have a minimum of 20 percent additional capacity for later expansion if necessary.
- D. Provide submittals within two weeks of notice to proceed. Partial submittals are NOT acceptable and will be returned to the contractor unreviewed.
- E. All costs to review additional submittals resulting from an initial rejection shall be the responsibility of the submitting contractor. The Owner shall back-charge the Contractor for additional review(s).
- F. Submittals rejected by the Owner's Representative and the engineer shall be corrected and resubmitted within seven (7) days of the review letter date.

1.8 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- A. Contractor will deliver all materials to area of project designated by the Owner's Representative. Vehicles shall not block fire lanes or fire doors during delivery of materials
- B. Owner will not accept deliveries for the Contractor
- C. The Owner's Representative will designate an area within the facility for storage of all materials. At the end of each working day, all materials shall be returned to the designated area. Material, equipment, tools, etc will not be left outside the storage area without the consent of the Owner's Representative

- D. The cost of all material handling, delivery and freight is the Contractor's responsibility. The Owner or his representatives will not be responsible for material delivered to the site.
- E. Maintain premises free from accumulation of waste materials or rubbish caused by this work. At the end of each day, remove from the site all surplus materials, tools, and all waste. The Contractor shall leave the premises clean to the Owner's satisfaction.
- F. The Contractor shall arrange and pay for parking

1.9 WARRANTY

- A. The Contractor shall provide a two (2)-year written guarantee against defects in material and workmanship furnished under this Contract. The costs of such guarantee shall be part of the purchase price. The guarantee commences when the Owner's Representative and Engineer accept the system and installation
- B. The guarantee shall include all necessary material, travel, labor and parts to replace defective components or materials at the job site. The Contractor shall commence repair of any "in guarantee" defects within 24 hours of notification of such defects.
- C. The Contractor shall make allowances in his guarantee to cover diagnosis of system defects, which might ultimately be the responsibility of others to correct. When this occurs, the Owner's Representative and other affected trades shall be notified.
- D. The Contractor shall keep in effect the performance bond for one year after the system has been accepted by the Owner's Representative and the Design Professional

1.10 AS-BUILT DRAWINGS

A. Maintain at the site an up-to-date, marked set of as-built drawings, which shall be corrected and delivered to the Owner's Representative upon completion of the work

1.11 CHANGES

A. No changes are to be made in the installation from the layout unless specifically approved by the Owner's Representative. This does not include minor revisions for the purpose of coordination of work.

1.12 DAMAGE

A. The Contractor shall be responsible for all damage to the building, its contents, systems, etc. caused by his work during or after installation, testing, clean-up, etc.

1.13 CLEAN-UP

- A. Maintain the premises free from accumulation of waste materials or rubbish caused by this work to the Owner's standard for cleanliness. Carpeting shall be protected from damage and clean up will be the responsibility of the Contractor.
- B. At the completion of work, remove all surplus materials, tools, etc. and leave the premises clean to the Owner's standard of cleanliness.

1.14 SAFETY

A. All work shall be performed in compliance with the Occupational Safety and Health Act of 1970 (OSHA) and Construction and Safety Act Standards.

1.15 QUALITY ASSURANCE

- A. The Intrusion Alarm Contractor shall maintain a fully staffed branch office including application engineers, drafters and technical service personnel within 30 miles of the San Diego metropolitan area.
- B. The electrical contractor shall perform installation of all electrical circuits for the Intrusion Alarm System, including wire installation and terminations. The Intrusion Alarm Contractor shall install all intrusion alarm wiring related devices and make all connections associated with them.

PART 2 PRODUCTS

2.1 EQUIPMENT

- A. Acceptable equipment for this project must be suitable for use with the District Wide Area Network (WAN)
- **B.** Acceptable equipment for this project must be compatible with the Bosch RPS programming software and be downloadable over the District WAN.
- C. Acceptable equipment for this project shall have sufficient zone and user capacity to handle the usage for which it is intended.
- D. Product data information for alternate products shall be submitted to the Engineer and Owner's Representative within seven (7) days after the pre-bid meeting for product equivalency approval.
- E. Products for this project shall be of the latest design; obsolete or discontinued products will not be accepted.

2.2 INSTALLATION MATERIAL

- A. Wiring
 - 1. All wiring is to be solid jacketed: stranded wire is not to be used.
 - 2. All field wiring is to be 22-4 solid station wire with a white outer jacket. Conductor shielding shall be Red, Black, Yellow and Green.
 - 3. Wiring between the panel (and peripherals) and the punch blocks shall be 22-10 or 22-12 solid station wire. Conductor shielding shall be Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, and White. Pink and Tan shielding are the standard for the additional wires for the 12-conductor wire (22-12)
 - 4. All field wiring is to be clearly labeled with permanent marker to be readily identifiable at punch blocks. Each wire is to be labeled with the type of device and its location in such a way as to identify the specific device to which it is connected..

5. Splices shall be kept to a minimum. All splices shall be made only in terminal cabinets or on approved backboards using 50-pair, #66 punch blocks. Standoffs are not to be used with the punch blocks.

B. Conduit

- a. Where used, conduit shall be 1/2" minimum and shall conform to NFPA 70 for the specific application
- b. Conduit that is concealed or installed in unfinished areas shall be electric metallic tubing and flexible conduit in conformance with NFPA 70.
- c. Conduit exposed to weather shall comply with NFPA 70 and the requirements of the AHJ.
- d. All fittings shall be listed and approved for the specific conduit. For threaded rigid steel conduit do not use threadless or compression-type fittings.
- e. All EMT conduit fittings shall be steel or malleable iron compression couplings and connectors.
- f. Maximum conduit fill shall be fifty (50) percent of that permitted by the California Electrical Code
- g. All concealed system conduit shall be blue in color or externally identified at 10-foot intervals, in each space, and at junction box covers, by permanent blue paint suitable for the purpose.
- h. Exposed conduit in finished areas shall be plastic wiremold type as specified elsewhere or on the blueprints. Fill shall not exceed fifty (50) percent of its rated capacity. Wiremold not closely matching the surface on which it is installed shall be painted to match the surface on which it is installed.

C. Terminal Cabinets

a. Minimum size shall be 11 inches x 15 inches x 4 inches deep with a hinged lockable cover. For cabinets 24 inches x 24 inches or larger plate covers mounted with tamper resistant screws may be used.

b. Terminal cabinets shall be identified as part of the Intrusion Alarm System on the outside face of the cabinet with an engraved plastic label using ½ inch white letters on a blue background.

D. Plenum Cable

- a. Shall be installed per National Electrical Code, Articles 725 and 760.
- b. The cable shall be marked with the wire model number, wire gauge, and number of conductors.
- c. The cable shall be UL listed for low voltage signaling applications.

2.3 CONTROL EQUIPMENT

- A. Communicator (Intrusion Alarm Communicator, Panel)
 - The communicator shall be a Bosch 9412G-C with a DX4020 Network Interface Module unless otherwise specified. If building usage permits the 7412G-C may be used in buildings of less than 20,000 square feet with approval of the engineer. The 9412G-C must be used in buildings of 20,000 square feet or larger or where more than 56 zones are required. The DX4020 is to be mounted inside the communicator cabinet and connected to the District network using a Category 5 or better cable. Firmware version 7.06 is not to be used – version 7.07 or higher is preferred. The latest version (currently version 3 – 9412GV3), shall be used.

In the event this communicator is no longer available another communicator may be used provided that it has at least the same capabilities and is compatible with the Bosch RAM/RPS programming software. Otherwise the communicator shall be supplied with at least two (2) computers, to be specified by the District IT department and include all software necessary for trouble shooting, upgrading, and programming the new equipment. These computers are to be installed (1 in the College Police dispatch center and the other in the Alarm Technicians' office), programmed and tied

into the District network by the contractor in cooperation with the District Alarm Technicians and the District IT department.

- 2. The communicator shall be capable of communicating to the alarm monitoring system in Dispatch via the District network and include all equipment necessary for such communication.
- 3. Unless otherwise specified the communicator shall be manufactured by Bosch and be the model specified.
- 4. The communicator shall be programmable via the District network using the Bosch RPS software.
- 5. A separate electrical outlet shall be provided for each communicator. The outlet shall be a duplex type mounted in a single gang box with the grounding terminal at the bottom. Outlets for the alarm systems shall be on a separate dedicated circuit. The circuit breaker shall be clearly marked and have a breaker lock to prevent the breaker from being accidentally turned off.
- **B.** Power Supplies
 - 1. All power supplies shall be designed with a capacity of at least 20 percent more than currently used.
 - 2. If more power is required than is available from the communicator, additional auxiliary power supplies shall be used. Each auxiliary power supply shall be 12 VDC and a minimum capacity of 5 amps. (Altronix LCS5C12X or approved equal.)
 - **3.** Back-up power supplies (batteries) shall be of sufficient capacity to operate the system for a minimum of eight (8) hours.

C. Keypads

- 1. Keypads shall be Bosch D1260W unless otherwise specified
- 2. A maximum of eight (8) keypads shall be connected to each communicator.
- **3.** Each keypad shall be assigned a unique address. Where possible the keypad address shall correspond with the area to which it is assigned

D. Modules

- 1. Network interface module (NIM) Bosch DX4020. Used to connect the communicator to the District WAN.
- 2. Zone expansion module Bosch D8128D. Eight (8) zone module used to connect additional zones to the communicator. One required for each additional eight zones or portion thereof in excess of the eight zones available on the main board of the communicator.
- 3. Relay module Bosch D8129. Used to add additional outputs to the communicator. One is available (relay A) on the main board of the communicator.

2.4 ALARM INITIATING DEVICES

- A. Door Contacts GE/Sentrol 1087T
 - 1. Unless otherwise indicated, are to be surface mount, spdt (form C) type Sentrol 1087T or approved equal.
 - 2. Flush mounted contacts may only be used where aesthetics is a concern. In aluminum or silver colored frames use USP 270 spdt or approved equal. Under no circumstances are flush mount contacts to be used in steel doors or steel door frames.
 - 3. Are to be of a color that most closely matches the door and frame on which they are mounted
- B. Roll-up Door Contacts GE/ Sentrol 2207AU
 - 1. Unless otherwise indicated, are to be floor mounted.
 - 2. The magnet is to be mounted magnet side down and may need a mounting bracket for proper orientation.
- C. Explosion-proof Door Contacts GE/Sentrol 2807T

- **1.** To be used where the potential of explosion exists: for example welding gas or gasoline storage areas.
- D. Motion Detectors Honeywell/C&K DT7400 Series
 - 1. Unless otherwise indicated are to be wall mounted and be of the dual technology (combination PIR and microwave) type Honeywell/C&K DT7400 series or approved equal.
 - 2. In very large open areas (fifty feet or more in each direction) a ceiling mounted detector may be used with the approval of the Engineer and Owner's Representative Honeywell/C&K DT5360 or approved equal.
 - 3. In all cases motion detectors are to be of a range appropriate to the area being protected.
- E. Hold-up/Panic Switches
 - 1. Unless otherwise specified, are to be of the latching type using a metal forked key to reset. Amseco HUS-7AI or approved equal.
- F. Projector Alarms
 - 1. May be used in other applications as well such as large screen monitors.
 - 2. Shall be of the pull-apart type GRI 4704A or approved equal
 - 3. The assembly shall consist of the following:
 - a. One GRI 4704A contact
 - b. Two each GRI M4704 magnets & 4635 sockets. (One each comes with the contact)
 - c. One Omron 6C873 (or equal) relay
 - d. One ATW SGST-W (or equal) minihorn
 - e. Necessary mounting hardware

2.5 OTHER EQUIPMENT

- A. Sounders
 - 1. Minihorns ATW SGST-W or approved equal.

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2. Sirens – ATW 508 or approved equal. Only to be used in area where the ambient noise level is such that a minihorn could not be readily heard.

PART 3 INSTALLATION

3.1 EQUIPMENT

- A. General
 - 1. The Contractor shall provide factory trained and authorized personnel for on-the-job supervision of the proper installation of devices in cooperation with, or as may be required by, other trades. This shall include the following:
 - a. Provide specific on-site instructions to others on mounting and installation of each type of device by physically observing the installation of one or more of each type of device, as required, to assure that the installer is properly instructed in the work.
 - b. Provide supervision as required by others to properly perform alarm installation work.
 - c. Coordinate with the Engineer and District alarm technicians the programming of the communicator and all related equipment.
 - d. Perform a complete test of the system, certifying that all devices have been activated and that the devices and systems have performed in accordance with the requirements of this specification.
 - e. Provide as-built layout drawings and detailed wiring diagrams to the Engineer and Owner's Representative.
 - 2. All mounting screws, except those supplied with the equipment, shall be combination phillips/slotted head. When mounting hardware is supplied, the equipment shall be mounted using the supplied hardware where feasible.
 - 3. All communicators, panels, terminal cans, punch blocks, modules, etc. shall be mounted no lower than 48 inches (to the bottom) nor more than 78 inches (to the top) above the finished floor.

4. All Bosch equipment is to only be installed by Bosch trained and certified installers or under the direct supervision of the District Alarm Technicians.

B. Wiring

- 1. All device wiring is to be home run from each device to the room where the communicator is located or other designated centralized location (such as a remote telecommunications room) and terminated on a 50 pair #66 punch block. Each alarm initiating device (motion detector, door contact, hold-up button, etc.) shall be on its own zone on the communicator. Wiring from the communicator (or modules) is to be on the left side of the punch block. Wiring out to the devices is to be on the right side of the punch block. Connection between the left and right sides shall be made using bridging clips.
- 2. Loop wiring is to be #22-4 solid white jacket station wire unless otherwise specified. The conductor insulation shall be red, black, yellow, and green. The red/black combination is to be used for power only. Each wire is to be labeled at the punchblock with the type of device and its location in such a way as to identify the specific device to which it is connected.
- 3. Loop wiring for devices not requiring power shall be yellow/black for the primary loop and, if a second loop is used on the same wire, red/green for the second loop. The yellow (or red) shall be the loop feed and the black (or green) shall be the loop return or common.
- 4. Motion detectors and other devices requiring power shall use the red as positive power, black as negative power, yellow as loop feed, and green as loop return or common.
- C. Communicator
 - The communicator is to be mounted on a ¾" plywood backboard using four #10, ¾" or 1" long, pan head screws with combination flat/Phillips head using the cabinet furnished by the manufacturer of the communicator.
 - 2. Wiring from the punch block to the communicator shall be #22-10 or 22-12 solid station wire. If 22-12 is used the tan and pink wire may not be utilized. Conductor insulation colors shall be as listed below. Wires shall be run and be connected as follows:

	Wire	Use	(7412)	(9412)	
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Black	Common (#12)	- Power		(#29)		(#29)
Brown	Zone #1 (#11)	Zonex 2 out	()		(#26)	
Red	Zone #2 (#13)	+ DC Power	(#32)		(#32)	
Orange	Zone #3 (#14)	Zonex +Power	(#32)		(#24)	
Yellow	Zone #4 (#16)	Data Out		(#31)		(#31)
Green	Zone #5 (#17)	Data In	(#30)		(#30)	
Blue	Zone #6 (#19)	Zonex 2 in	()		(#25)	
Violet	Zone #7 (#20)	Zonex 1 out	(#28)		(#28)	
Grey	Zone #8 (#22)	Zonex 1 in	(#27)		(#29)	
White	Common (#12)	Zonex -Power	(#29)		(#23)	

3. Zone expansion may be accomplished by using a Bosch D8128D OctoPOPIT 8-zone module for each additional 8 zones or portion thereof. Up to eight OctoPOPITs may be used for the 7412 or 15 per Zonex loop (30 total) for the 9412.

D. Modules

- 1. D8128D OctoPopit
 - a. This is an 8-zone expansion module used for adding addition zones to the Communicator. One module is needed for each additional eight (8) zones or portion thereof.
 - b. D8128D OctoPOPIT modules may be added to the communicator. Each OctoPOPIT must be programmed sequentially (i.e. the first for zones 9 thru 16, the second for zones 17 thru 24 etc.) prior to power up. All zones on each OctoPOPIT require an EOL resistor.
 - c. If installed remotely, may need to be wired directly to the Zonex loop on the main board of the communicator without going through a punch block. If more than one OctoPopit is used, the jumper supplied with the unit may be used to interconnect the additional units.
 - d. Wiring between the OctoPOPIT and the punch block shall be 22-10 or 22-12 (see Communicator above) solid wire and connected as follows:

Brown	1st Zone (9, 17, etc.)	Loop Feed
Red	2nd Zone (10, 18, etc.)	Loop Feed
Orange	3rd Zone (11, 19, etc.)	Loop Feed

	Yellow	4th Zone	e (12, 20, etc.)	Loop Feed
	Green	5th Zone	e (13, 21, etc.)	Loop Feed
	Blue	6th Zone	e (14, 22, etc.)	Loop Feed
	Violet	7th Zone	e (15, 23, etc.)	Loop Feed
	Gray	8th Zone	e (16, 24, etc.)	Loop Feed
	Black	Commor	n	Loop Return
White		Common		Loop Return

- 2. D-8129 Relay Module
 - a. This is an 8-relay output module. One module is needed for each additional eight (8) outputs or portion thereof.
 - b. Each module needs to be programmed prior to power up.
 - c. If used for minihorns, the relay address must correspond with the address of the keypad with which the minihorn is associated.
 - d. If used for minihorns do not use relay A on the main board for a keypad associated minihorn, use the corresponding relay from the D8129 instead.
 - e. Install a jumper wire from the positive (+) power terminal of the D8129 to the common terminal of each relay.
 - f. Use the same wiring configuration as for the D8128D OctoPopit (section 3.3.A.3 above). Connect the black and white (common) wires to the negative (-) power terminal on the D8219 and the 'loop' wires to the Normally Open (NO) terminal for each relay..
- 3. DX4020 NIM
 - a. Must be mounted inside the communicator cabinet, in the right-hand position on the top of the cabinet.
 - b. Must be wired directly to the SDI bus on the communicator. Do not wire through a punch block.
 - c. To be programmed by the District alarm technicians.

E. Keypads

- 1. Keypads shall be mounted 48 inches above the finished floor maximum to the highest operating component of the keypad.
- 2. Wire to the keypads shall be 22-4 and have the specified colors from the SDI bus tied to the corresponding colors on the keypad harness.
- 3. A minihorn shall be installed directly above each keypad either four (4) feet above the keypad or maximum of 12 inches (to the bottom of the minihorn) below the ceiling, whichever is lower.
- F. Door Contacts
 - 1. Door contacts shall be installed on (or in) the door frame approximately four (4) inches from the latch side of the door.
 - 2. The yellow and black wires are to be used. The red and green wires are spares and may be cut off at the contact. If a second contact is connected to the same wire the red and green wires may be used for the second loop.
 - 3. The yellow (or red) wire shall be tied to the Closed Loop (CL) terminal and the black (green) wire to the Open Loop(OL) terminal.
 - 4. The EOL shall be installed between the Open Loop (OL) and Common terminals on the contact.

G. Motion Detectors

- 1. Unless otherwise specified motion detectors shall be installed using #6 pan head sheet metal screws seven feet six inches (7'6") to eight feet (8') above the finished floor or six inches (6") below the ceiling whichever is lower measured to the top edge of the detector.
- 2. The motion detectors shall be installed in such a way as to cover the area for which they are intended to protect (e.g. windows). If necessary they are to be corner mounted or mounted using swivels designed for use with the motion detector.

- 3. The ceiling mounted DT-5360 has a thirty (30) foot radius (minimum) coverage and is only be used in very large open areas. It must be mounted at least twenty-five (25) feet from any wall and thirty (30) feet from any window.
- 4. Motion detectors shall be wired as follows:

Conductor	Punch Block	Contact
Red	+ DC Power	Positive power (+) terminal
Black	- DC Power	Negative power (-) terminal
Yellow	Loop Feed	Closed loop (CL) terminal
Green	Loop Return	One side of the tamper switch

- 5. The EOL shall be tied between the Common alarm terminal and the opposite side of the tamper switch from the green wire.
- H. Panic/Hold-up Switches
 - 1. Panic/Hold-up switches shall be installed in such a way as to prevent accidental activation of the switch. They should not be mounted facing directly out or up, unless specifically designated.
 - 2. The same wiring scheme shall be used as for door contacts (section 3.4 above)
- I. PowerPoint Projectors
 - 1. Two magnet assemblies (GRI 4702M/4635) shall be used. One shall be mounted on the projector using LOCTITE Super Bonder 409 or equivalent. The other shall be mounted away from the projector (preferably on the ceiling) but close enough that the contact can easily be inserted into it without extending the contact cable.
 - 2. An ATW SGST-W Minihorn shall be mounted in close proximity to the projector (preferably on the ceiling) so that the wiring from the contact can be connected to the minihorn without splicing additional wire to it.
 - 3. A 12VDC double-throw relay (Omron 6C873 or approved equal) shall also be used.
 - 4. The wiring and devices shall be connected as follows:

A 22-4 white station wire from the punch block to the unit connected as follows:

Conductor	Punch Block	Contact
Red	+ DC Power	Open Loop on 4704A
Black	- DC Power	- Terminal on relay & minihorn
Yellow	Loop Feed	Yellow wire on relay (closed loop terminal)
Green	Loop Return	Green Wire on relay (open loop terminal)

Relay: Five wires (yellow, green black & 2 red) as follows:

Conductor	Relay	Other location(s)
Red	+ Coil	4704A Common & + terminal on minihorn
Black	- Coil	Black from panel & - terminal on minihorn
Red	Common contact	One side of EOL resistor
Green	Open Loop contact	EOL and green from punch block
Yellow	Closed Loop contact	Yellow from punch block

4704A Contact

Common	+ terminals on relay coil and minihorn
Open Loop	Red wire (+ DC Power) from punch block

If a wiring schematic is needed, it is available through the District Alarm Technicians' office.

J. Sounders

- 1. Sounders shall be mounted directly above each keypad either four (4) feet above the keypad or maximum of 12 inches (to the bottom of the minihorn) below the ceiling, whichever is lower and elsewhere as indicated.
- 2. A 22-4 wire shall be used to connect the sounder to the relay.
- 3. The red wire shall be for the positive (+) power and tied to the positive terminal on the sounder. The black wire shall be for the negative (-) and be tied to the negative (-) terminal on the sounder.
- 4. For sounder circuit requiring greater power (multiple minihorns, sirens, etc.) the yellow wire may be tied in parallel with the red wire and the green wire in parallel with the black wire. In such cases the red and yellow wires shall be twisted together as shall the black and green wires.

K. Other Devices

- 1. Other devices not requiring power shall be installed per manufacturer's instructions or as directed by the District Alarm Personnel. The same wiring scheme shall be used as for door contacts (section 3.4.B through 3.4.D above).
- 2. Other devices requiring power (such as glass break detectors) shall be installed per manufacturer's instructions unless otherwise specified or instructed by the District Alarm Personnel. The same wiring scheme shall be used as for motion detectors (section 3.5.D above).

3.2 TESTING / QUALITY CONTROL

- A. The final alarm acceptance test shall be coordinated with the Owner's Representative and the Engineer. A letter certifying that the installation is complete and fully operational shall be forwarded to the Owner and Engineer.
- B. The Contractor, the Engineer, Owner's Representative, and an authorized representative from each supplier of equipment shall be in attendance at the final acceptance test to make necessary adjustments. The final test shall include, but not be limited to:
 - 1. A test of the complete system for grounded, open and shorted circuits.
 - 2. A test of each device for functions specified and for the required alarm actions.
 - 3. All communications equipment shall be tested to ensure that all signals are received the SDCCD Police Dispatch Center. This includes, but is not limited to, all network and digital communications.
 - 4. A test of the system for electrical supervision.
 - 5. A test to verify that the emergency power source (back-up battery) is capable of operating the system for specified periods.
 - 6. A test to verify that the system will operate under specified trouble conditions.
 - 7. A test to verify that the system will perform all specified tasks
 - 8. A test to verify that a hard copy of all required system actions will be properly provided.

- C. A minimum of 2 day(s) may be required for these tests.
- D. If the system requires a retest by the Engineer or Owner's Representative, all costs for the retest shall be the responsibility of the Contractor.
- E. The Contractor shall pay all overtime pay required by the Owner's Representative for witnessing the acceptance test.

3.3 TRAINING

- A. Provide training of Owner's personnel in the proper operation procedures. The training program for the Owner's personnel shall include the following:
 - 1. Operations and Maintenance Manuals containing complete operating instructions, outline step-by-step procedures required for system start up, operation, and shut down, including the manufacturer's name, model number, service manual, parts lists, and brief description of all equipment and their basic operation features. Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and as-built blueline drawings of the complete system, including conduit layout, equipment layout, device labels, and simplified wiring and control diagrams of system. Operations and Maintenance Manuals shall be submitted and approved prior to conducting the training course.
 - 2. Three separate 2 -hour training sessions for operating personnel. The sessions are to cover proper operating and response procedures. These instructions shall be sufficient to enable an untrained person to properly operate the system.

3.4 AS-BUILTS

- A. Provide a complete set of reproducible, two (2) blue line prints, and a set of disks in AutoCAD of the drawings and wiring diagrams reflecting "as-built" conditions.
- B. Provide a complete set of "as-built" data sheets for all equipment connected to the system.
- C. Provide complete "as-built" software for all relevant components.
- D. All items of this section shall be provided prior to final payment request.

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3.5 SPARE PARTS

- A. All spare parts shall be directly interchangeable with the corresponding components of the installed system
- B. The following spare parts shall be furnished to the Owner. Quantities to be specified elsewhere.
 - 1. Door contacts
 - 2. Motion detectors (of each type)
 - 3. Panic/Hold-up witches
 - 4. Keypads
 - 5. Expansion modules
 - 6. Any other device(s) specified

FIRE ALARM SYSTEMS

1 GENERAL

1.1 GENERAL AND SPECIAL CONDITIONS

- A. General and Special Conditions shall apply to all work under this section.
- B. The Contractor shall furnish all equipment, materials, tools, labor, engineering, drawings, etc. necessary for a complete total coverage, addressable fire alarm system. The Contractor shall not delete any equipment or devices without the written directive of the Owner and Engineer.
- C. The purpose of the furnished specifications and drawings is to convey to the Contractor the scope of work required, all of which the Contractor is responsible to

furnish, install, adjust, and make operable.

- D. The fire alarm system shall comply with all applicable codes including, but not limited to, the following: National Fire Code (NFPA72), California Building Code, California Fire Code, National Electric Code (NFPA70).
- E. The Contractor shall examine all existing physical conditions, which may be material to the performance of his work. No extra payments will be allowed to the Contractor as a result of extra work made necessary by his failure to do so. Omission, discrepancy or lack of clarity shall be promptly identified to the Owner and Engineer for clarification prior to the bid due date.
- F. Doors that lead to the Fire Alarm Panel shall have signage in RED that reads, "FIRE CONTROL PANEL INSIDE."

1.2 DEFINITIONS

- A. ADA -- Americans with Disabilities Act.
- **B.** AHJ -- Authority Having Jurisdiction (Division of State Architect).
- C. Approved -- Unless otherwise stated, materials, equipment, or submittals approved by the Owner, Architect or AHJ.
- **D.** Contractor -- The Company awarded the prime contract for this work and any of its subcontractors, vendors, suppliers or fabricators.
- E. CSFM -- California State Fire Marshal.
- F. District (The District) -- The San Diego Community College District
- **G.** Engineer -- Engineer or engineering company designated by the District.
- H. FACP -- Fire Alarm Control Panel.
- I. Fire Alarm System The entire fire alarm system including all panels, annunciators, devices, and peripheral equipment. The system shall monitor all devices and connected equipment and generate all appropriate responses and signals.
- J. Listed -- Materials or equipment included in a list published by a nationally

recognized laboratory that maintains periodic inspection of production of listed equipment and material, and whose listing states either that the equipment or materials meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

- K. NFPA -- National Fire Protection Association.
- L. Owner The San Diego Community College District

1.3 SCOPE OF WORK

- A. The Contractor shall furnish and install, unless otherwise indicated, items required for a complete fire alarm system as outlined in these specifications and shown on the drawings. The work includes, but is not necessarily limited to, the following:
 - 1. Provide a new state-of-the-art fully automatic addressable fire alarm system, including smoke detectors, manual pull stations, heat detectors, duct detectors, ADA compliant annunciation (strobes, horns, etc.), waterflow switches, valve supervisory devices, magnetic door holders and any other devices or equipment specified either elsewhere in these specifications or on the blueprints.
 - 2. Provide a point addressable control system, addressable initiating devices, signaling devices, indicating devices, sensors, annunciators, relays, software, accessories and other materials and equipment for a complete operating system.
 - **3.** Provide monitoring of the fire sprinkler system.
 - 4. Provide duct-mounted smoke detectors in the main supply-air ducts(s) to effect shutdown of each air handler rated at supplying more than 2000 CFM. Provide control relays to actuate smoke/fire doors as shown on the drawings.
 - 5. Connect to the existing HVAC control system to provide control functions, in accordance with the specifications.
 - 6. Provide a network connection from the new FACP to the existing fire alarm OnyxWorks or current District monitoring system including all necessary

hardware components. Network drop to be furnished by others.

- 7. Install all data into the OnyxWorks or current District monitoring software. This shall include all data necessary for the proper functioning of the system and shall include, but not necessarily be limited to, the building graphics (blueprints/floorplans for the project, device types, locations and addresses, etc.), panel information, network IP addresses, etc.
- 8. Provide smoke detectors in each elevator machine room and in each interior elevator lobby. Provide relay modules to effect primary and alternate floor recall of each elevator. Connect the new fire alarm system to the elevator controls for elevator recall. Where required provide heat detectors to be mounted at the top of each elevator shaft. Heat detectors shall be fixed temperature.
- 9. Provide detailed terminal-to-terminal alarm system shop drawings, wiring diagrams, and battery calculations for all components and voltage drop calculations (voltage drop not to exceed 10% per notification appliance circuit), sequence of operation, and operating and maintenance instructions. Drawings (plans) shall use
- **10.** Provide an on-site, factory-trained technician acceptable to the Engineer and the Owner's Representative to supervise the installation.
- **11. Provide an on-site project manager.**
- **12.** Conduct weekly progress meetings and issue monthly written job progress reports to the Owner's Representative and the Engineer.
- **13.** Submit shop drawings and product data submittals to the Engineer for approval by the Engineer and Owner.
- 14. Where required the Contractor shall provide x-ray of walls or slabs prior to any core drilling and any required fireproofing of the cores.
- **15.** The Contractor shall submit a bar graph schedule at the pre-Construction meeting.
- **16.** Conduct a complete test of the system upon completion of installation to assure the Owner's Representative, the Engineer, and the AHJ that the

system is operational. This test shall take place prior to a final acceptance test and pre-testing by the Contractor.

- 17. Conduct the final acceptance test as required by CFC/NFPA 72. The Alarm Contractor shall furnish personnel who are familiar with the installation at a time convenient to the Owner's Representative, the Engineer and the AHJ. The two-year warranty shall begin upon approval by the Owner's Representative, the Engineer and the AHJ. The acceptance test shall take place as soon as convenient after the completion of the installation.
- **18.** Provide training of the Owner's personnel in accordance with the specification.
- **19.** Provide a two-year job site warranty of all materials and labor furnished under this section.

1.4 RELATED WORK:

- A. Materials and methods specified in other sections:
 - 1. Automatic Sprinkler System.
 - 2. Firestopping.
 - **3.** Basic Electrical Materials and Methods, Division 1600, except where modified in this section.
 - 4. Mechanical (Fan and Smoke Control) Division 15.
- B. Materials furnished and installed by others but wired by this Contractor:
 - 1. Sprinkler waterflow switches, valve supervisory switches and other sprinkler supervisory switches shall be furnished and installed by others. The Fire Alarm Contractor shall wire these switches to the fire alarm system and adjust them for proper operation.

1.5 SYSTEM DESCRIPTION

A. The fire alarm system shall be a UL listed; CSFM approved addressable system Volume II - 107 10/31/11 SAN DIEGO COMMUNITY COLLEGE DISTRICT 2011 District Design Guidelines & Standards Manual

capable of individual annunciation of all devices as well as zoned alarm, common trouble, and supervisory signaling.

- B. The fire alarm system shall be capable of programming changes through the main CPU without the use of external devices such as laptop computers or proprietary programming tools.
- **C.** The fire alarm system shall be provided with a continuous sounding evacuation signaling system.
- D. Where indicated the fire alarm system shall be zoned in accordance with the specifications and drawings.
- E. System circuit wiring:
 - 1. All fire alarm and supervisory alarm initiating circuits shall be NFPA Style 4 or Style 6 (see manufacturer's specification for specific panel) Signaling Line Circuits (SLC) from the fire alarm control panel to the devices.
 - 2. Initiation Device Circuits (IDC) shall be wired NFPA Style B as part of an addressable device connected to an SLC circuit.
 - **3.** Notification Appliance Circuits (NAC) shall be wired NFPA Style Z as part of an addressable device connected to an SLC circuit.
 - 4. All notification appliance circuits shall be NFPA Style Y from the fire alarm control panel to the devices.
 - 5. All point addressable Signaling Line Circuits shall be NFPA Style 4 or Style 6.

1.6 APPLICABLE STANDARDS

- A. The latest adopted issue of the following standards is hereby made a part of this Work by reference thereto:
 - 1. NFPA 13 Sprinkler Systems
 - 2. NFPA 70 National Electrical Code,
 - 3. NFPA 72 National Fire Alarm Code,

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- 4. NFPA 90A Installation of Air Conditioning and Ventilating Systems
- 5. UL Standard 268 Smoke Detectors for Fire Protective Signaling
- 6. UL Standard 268A Smoke Detectors for Duct Application
- 7. UL Standard 1971 Signaling Applications for the Hearing Impaired
- 8. Americans with Disabilities Act (ADA)
- 9. American National Standards Institute (ANSI) A117.1
- 10. American National Standards Institute (ANSI) A17.1
- 11. California Building Code (CBC)
- 12. California Fire Code (CFC)

1.6 SYSTEM OPERATION

- A. The addressable fire alarm system shall perform the following functions:
 - **1.** Continuous monitoring of all supervisory signal initiating devices.
 - 2. Continuous monitoring of all electrically supervised fire alarm initiating, supervisory and notification appliance circuits.
 - **3.** Continuous monitoring of all panels, voice communication equipment, and data transmission lines.
 - 4. Continuous monitoring of all addressable modules.
 - 5. Operation of elevator controls as required.
 - 6. Operation of all audible and visual signals as indicated.
 - 7. Operation of all required HVAC controls as indicated.

- 8. Operation of all magnetic door holders
- B. Upon change in status of any device on the system, the CPU shall:
 - 1. Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.
 - 2. Display the account information, point number, point description and point status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks or current District monitoring system located in the District's Police Dispatch Center.
 - 3. Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications.
- C. Activation of any manual fire alarm station, waterflow switch, smoke detector, heat detector, duct smoke detector, sprinkler supervisory valve or other fire alarm initiating device shall cause the following functions to occur.
 - 1. Manual Pull Station operation shall:
 - a. Perform all operations as described in 1.7.B above.
 - b. Activate the audible and visible notification appliances throughout the building.
 - c. Activate the HVAC system fans, dampers and other mechanical equipment.
 - d. Release all doors normally held open by door-control devices.
 - e. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.
 - 2. Sprinkler system waterflow switch operation shall:
 - a. Perform all operations as described in 1.7.B above.
 - b. Activate the audible and visible notification appliances throughout the

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building.

- c. Activate the HVAC system fans, dampers and other mechanical equipment.
- d. Release all doors normally held open by door-control devices.
- e. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.
- 3. Area smoke detector or heat detector operation shall:
 - a. Perform all operations as described in 1.7.B above.
 - b. Activate the audible and visible notification appliances throughout the building.
 - c. Activate the HVAC system fans, dampers and other mechanical equipment.
 - d. Release all doors normally held open by door-control devices.
 - e. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.
- 4. Elevator lobby or elevator machine room smoke detector or heat detector shall
 - a. Perform all operations as described in 1.7.B above.
 - b. Activate the audible and visible notification appliances throughout the building.
 - c. Activate the HVAC system fans, dampers and other mechanical equipment.
 - d. Release all doors normally held open by door-control devices.
 - e. Recall the elevators to the first floor or alternate floor.
 - f. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.

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- 5. Duct smoke detector activation shall
 - a. As required operate as a supervisory device and perform all operations as described in 1.7.C.5 or as an alarm device and perform the same functions as a smoke detector as described in 1.7.C.3 above.
 - b. Activate the HVAC system fans, dampers and other mechanical equipment associated with the specific detector.
 - c. Shut down the supply air fan if the duct smoke detector is downstream of this fan.
 - d. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.
- 6. Supervisory device operation shall:
 - a. Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.
 - b. Display the account information, point number, point description and point status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks monitoring system located in the District's Police Dispatch Center.
 - c. Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications.
 - d. Where required transmit a supervisory signal to the College Police Remote Station via the digital communicator
- D. Removal of any devices, wiring disarrangement, or system component failure shall:
 - 1. Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.
 - 2. Display the account information, point number, point description and point

status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks monitoring system located in the District's Police Dispatch Center.

- 3. Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications
- 4. Where required transmit a supervisory signal to the College Police Remote Station via the digital communicator
- E. When any point in the system returns to normal, the CPU shall:
 - 1. Activate audible and visual indicators and display point identification, time, date and message.
 - 2. Acknowledgment of "system return to normal" will print the time, date, point identification and message. Acknowledgment will also silence all audible indicators associated with the point at the CPU.
- F. Where required zoned alarms shall be transmitted by the DACT. Each floor shall have a minimum of one zone. Automatic and manual devices shall not be combined on the same zone and, at a minimum, shall be separated by floor. Each of the following shall be on its own zone and shall not be combined onto zones with any other type of device: waterflow/pressure switches, supervisory devices, and duct detectors.

1.7 SUBMITTALS

- A. Provide complete product data (including manufacturer's descriptive and technical literature); and catalog cut sheets clearly marked to indicate model and catalog number, installation instructions, maintenance and testing procedures, dimensions, and wiring diagrams for the equipment provided. Where devices furnished by the Contractor involve work by another Contractor or Subcontractor, submit additional approved data sheets and shop drawing copies to the Contractor or Subcontractor.
- B. Provide shop drawings, including building floor, plans showing sequence of operations, device locations, complete wiring and schematic diagrams, including conduit size and wire routing, wiring size and counts, wire color codes, field terminations; control panel layout, including all modules, circuit terminals and

interconnections, overall cabinet dimensions; complete riser diagrams indicating wiring sequence for all devices and control equipment. Drawings shall show proposed layout and anchorage of equipment and appurtenances and equipment relationship to other parts of the work, including clearances for maintenance and operation. All shop drawings are to be provided with the manufacturer's logo clearly printed on each drawing.

- C. Provide substantiating calculations, including calculations for determining secondary power supply requirements and voltage drop calculations. Battery calculations shall list the supervisory and alarm current requirements for each component. Battery recharging period shall be included with the calculations. The voltage drop calculations shall list the distance and current draw of each notification appliance and the formula used and shall not exceed 10 percent.
 - 1. Prior to purchase or fabrication of any material, approval shall be obtained from The District and Engineer. Make six (6) complete submittals of all shop drawings, wire diagrams, and literature for review and approval.
 - 2. Provide complete submittal within two (2) weeks of notice to proceed.
 - **3.** PARTIAL SUBMITTALS ARE NOT ACCEPTABLE AND WILL BE RETURNED TO THE CONTRACTOR UNREVIEWED.
- D. Submittals rejected by the Owner's Representative and Engineer shall be corrected and resubmitted within seven (7) days of notification of rejection.
 1.8 DELIVERY, STORAGE, AND HANDLING OF MATERIALS
 - A. Contractor will deliver all materials to area of project designated by The District. Vehicles shall not block fire lanes or fire doors during delivery of materials.
 - B. Owner will not accept deliveries for the Contractor.
 - C. The Owner's Representative will designate an area within the facility for storage of all materials. At the end of each working day, all materials shall be returned to the designated area. Material, equipment, tools, etc will not be left outside the storage area without the consent of the Owner's Representative.
 - D. No material storage facilities are available on site. The Contractor is to include in his bid the cost of storage trailers or other suitable storage facilities. The Contractor's storage trailers will be parked in areas designated by the Owner.

- E. The cost of all material handling, delivery and freight is the Contractor's responsibility. The Owner or his representatives will not be responsible for material delivered to the site.
- F. Maintain premises free from accumulation of waste materials or rubbish caused by this work. At the end of each day, remove from the site all surplus materials, tools, and all waste. The Contractor shall leave the premises clean to the Owner's satisfaction.
- **G.** The Contractor shall arrange and pay for parking.

1.9 WARRANTY

- A. The Contractor shall provide a two (2)-year written warranty against defects in material and workmanship furnished under this Contract. The costs of such warranty shall be part of the purchase price. The warranty commences when the Owner's Representative and Engineer accept the system and installation.
- **B.** The warranty shall include all necessary material, travel, labor and parts to replace defective components or materials at the job site. The Contractor shall commence repair of any "in warranty" defects which may cause the fire alarm system to be impaired within 8 hours of notification of such defects.
- C. The Contractor shall make allowances in his warranty to cover diagnosis of system defects, which might ultimately be the responsibility of others to correct. When this occurs, the Owner's Representative and other affected trades shall be notified.
- **D.** The warranty shall include all necessary factory and field software required to perform the specified tasks.
- E. The Contractor shall include, as part of the two-year warranty, a test and inspection of the entire fire alarm system within one month prior to the end of the first year and another at within one month prior to the expiration of the two-year construction warranty. The Contractor shall provide a written report of any deficiencies and repair any of the deficiencies. The test and report shall conform to the certification as described in NFPA 72.

1.10 AS-BUILT DRAWINGS

- A. Maintain at the site an up-to-date, marked set of as-built drawings, which shall be corrected and delivered to The District upon completion of the work.
- B. Furnish the Owner with one (1) reproducible set of each approved shop drawing, revised to show "as-built" conditions.

1.11 CHANGES

A. Make no changes in installation from layout as shown on drawings unless the Engineer and DSA specifically approve change. This does not include minor revisions for the purpose of coordination.

1.12 DAMAGE

A. The Contractor shall be responsible during the installation and testing periods of the fire alarm system for any damage to the building, its contents, etc. caused by the Contractor's work.

1.13 QUALITY ASSURANCE

- A. The fire alarm system manufacturer shall maintain a fully staffed branch office including application engineers, drafters and technical service personnel within the San Diego metropolitan area.
- B. The Contractor shall employ NICET certified fire alarm system installers. Minimum certification for on-site supervisory personnel shall be Level III. Installers shall be minimum Level II.
- C. The electrical contractor shall perform installation of all electrical circuits for the fire alarm system, including wire installation and terminations. The fire alarm contractor shall install all fire alarm related devices and make all connections associated with them.

PART 2 PRODUCTS

2.1 EQUIPMENT

- A. Acceptable equipment for this project must be listed for use with the present fire alarm network operating system in use by the District.
- **B.** Product data information for other desired manufacturers shall be submitted to the Engineer and The District within Seven (7) days after the pre-bid meeting for product equivalency approval.
- C. Products for this project shall be of the latest design; obsolete or discontinued products will not be acceptable. All equipment supplied shall be UL and California State Fire Marshal (CSFM) listed for required function.

2.2 INSTALLATION MATERIALS

- A. All wire and cable shall be new and CSFM/UL listed and/or approved for use in fire alarm signal systems per CFC/NFPA 70, Article 760. All wire shall be solid conductors of copper, minimum size of No. 18 AWG, and insulation rated at 600V.
- B. Manufacturer's recommended wire type and gauge shall be used. If the fire alarm manufacturer specifies wire from a specific manufacturer(s), this wire shall be used unless the fire alarm manufacturer indicates in writing that other wire manufacturers are considered equal.
- C. All conduit, junction boxes, pull boxes and fittings shall conform to the following:
 - 1. Conduit:
 - a. Conduit shall be (3/4) -inch minimum electric metallic tubing (EMT) and flexible conduit (in wet areas use rigid steel conduit), in conformance with NFPA 70.
 - b. Conduit exposed to weather shall comply with NFPA 70 and the requirements of the AHJ.
 - c. Conduit exposed in finished areas shall be Wiremold 800 or 2300 series (plastic). In areas where the Wiremold does not closely match the surface on which it is mounted, it shall be painted to

match the surface and/or the surrounding area.

- d. All fittings shall be listed and approved for the specific conduit.
- e. For threaded rigid steel conduit do not use threadless or compression-type fittings.
- f. All EMT conduit fittings shall be steel or malleable iron compression-type couplings and connectors. Do not use set screw or indentation type of fittings.
- g. Maximum conduit fill shall be 75 percent of that permitted by the California Electrical Code.
- h. Magnetic door holding circuits and other non-power limited circuits shall be in separate raceways.
- i. Provide conduit and wiring between the FACP and each elevator machine controller to effect elevator recall as specified herein. This conduit and wiring shall be independent of that required for any other function.
- j. All concealed system EMT conduit shall red in color.
- k. Exposed flexible conduit used for attachment to waterflow and valve tamper switches or similar applications shall be liquid-tight and shall be the minimum length required for neat and secure installation. Flexible conduit shall not be buried or located closer than 12 inches to grade.
- 2. Junction and Pull Boxes:
 - a. Shall be installed in accordance with the National Electrical Code, state or local codes.
 - b. Provide galvanized sheet steel junction and pull boxes, with screw-on covers and of types, shapes, and sizes to suit each respective location and installation.
 - c. Boxes exposed to weather, moisture, at or adjacent to water or steam connections, at sprinkler waterflow switches and supervisory switches

shall be corrosion-resistant, cast-metal weatherproof outlet boxes of types, shapes, and sizes, including depth of boxes with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitable for each application, including face plate gaskets and corrosion-resistant fasteners.

- d. Each box shall be large enough to accommodate required splices and conduit in accordance with the NEC.
- e. Sectional boxes shall not be used.
- f. Boxes shall be painted red or otherwise designated for identification as part of the fire alarm system.
- **3.** Field Terminal Cabinets (FTC):
 - a. Shall be UL listed for use in electrical wiring systems.
 - b. Minimum size shall be 12 inches by 12 inches by 4 inches deep with a hinged lockable cover or a plate cover attached by tamper-resistant screws.
 - c. Terminals cabinets shall be mounted no less that 48 inches nor more than 78 inches above the finished floor
 - d. Terminal strips shall be numbered and a list of all termination's shall be permanently affixed to the inside cover of all terminal cabinets.
 - e. Terminal cabinets shall be identified as part of the fire alarm system on the outward face of the cabinet.
- 4. Plenum Cable:
 - a. Shall be installed per National Electrical Code, Articles 725 and 760.
 - b. The cable shall be marked with the wire model number, wire gauge, and number of conductors.
 - c. The cable shall be UL listed for fire alarm signaling applications.
- D. All wiring components shall be UL listed. Wiring methods shall conform to NFPA 70,

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Sections 760 and 780.

2.3 CONTROL EQUIPMENT

- A. Fire Alarm Control Panel (FACP):
 - 1. The FACP shall be fully compatible with OnyxWorks or the current District monitoring software. Compatability shall include, but not necessarily be limited to, the ability to modify programming, operate control functions (silence alarms, troubles, reset the panel, etc.), monitor (the FACP, devices, etc.), display devices by point (point address, location, and description), and check the status of the panels remotely using OnyxWorks or the current District monitoring software.
 - 2. The FACP shall be a Notifier NFS2 series (320, 640, or 3030) sized to allow a minimum of twenty-five percent (25%) expansion for future use. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.
 - **3.** The FACP shall be wall-mounted and installed in the location shown on the blueprints and approved by the Owner's Representative. The FACP shall be equipped with a locked enclosure having removable access panels for servicing of electronic components.
 - 4. The FACP shall contain a microprocessor based Central Programming Unit (CPU) and power supply. The CPU shall communicate with, and control, the following types of equipment used to make up the system: intelligent addressable smoke and heat detectors, addressable modules, printer, annunciators, and other system controlled devices.
 - 5. The CPU shall be equipped with a non-volatile main memory. This memory shall not be lost even if the system's primary and secondary power systems fail.
 - 6. Normal operating power for the FACP shall be a dedicated 120 VAC, single-phase, 60 Hz circuit supplied from the building distribution power panel. The circuit breaker shall be clearly marked and equipped with a lock to prevent accidental shutting off of the breaker.
 - 7. The system-operating terminal shall be an LCD display with a QWERTY keyboard and other keys for programming, accessing, and operating the system. Functions 10/31/11 SAN DIEGO COMMUNITY COLLEGE DISTRICT 2011 District Design Guidelines & Standards Manual

shall include, but not necessarily be limited to, adding or eliminating devices, accessing history logs, checking status of points, acknowledging and resetting signals, etc.

8. Bypass system functions or features during manual system tests shall be capable of being operated by using a single "hot button" for each function and shall include, but no necessarily be limited to, the following functions: horns & strobes, elevator recall, smoke control systems, door release equipment, automatic extinguishing systems, fan shut down, and smoke dampers.

2.4 ALARM INITIATING DEVICES

A. Manual fire alarm pull stations shall be provided where indicated. The manual fire alarm pull stations shall be cast metal type or Lexan red with raised or depressed lettering. The manual fire alarm pull station shall be dual-action type. Where pull station covers are used manual fire alarm pull stations are to be single action.

Surface-mounted stations shall mount on a red finished back box. Semi-recessed stations shall mount on a standard electrical box. Operation of a manual fire alarm station shall cause its contacts to lock-in until manually reset and visually indicate an actuation. The station shall be reset using the same key as the FACP.

Each station shall be individually addressed at the central control panel. Stations, which rely on wires from auxiliary contacts to the panel, do not meet this requirement.

- B. Sprinkler system waterflow switches are to be provided where indicated. The waterflow switches, which are wired under this section, shall contain a suitable, adjustable retard device; be of the vane type; and actuate upon flow from a single sprinkler. Waterflow switches shall be housed in a substantial metal housing with gasketed cover. The switch shall actuate in no less than 45 seconds nor more than 90 seconds after the inspectors test valve is opened. Pressure switches are not acceptable.
- C. Addressable point monitoring devices shall be provided to monitor waterflow switches. The wiring from the monitored device to the point-monitoring device shall be a (Style B) electrically supervised circuit. The point monitoring device shall send an individual address to the fire alarm control panel.
- D. Point addressable smoke detectors shall be provided where indicated.
 - 1. Photoelectric smoke detectors shall be provided with integral LED's to indicate detectors in alarm. The detectors shall operate from the 2-wire alarm initiating circuit

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and be listed under UL Standard 268, latest edition. Line transient and RFI protection shall be built into the detector. Mounted concealed detectors shall have a remote indicator light or LED. There shall be provisions for mounting a control relay in the base of the detector.

- 2. Ionization smoke detectors shall be provided with integral LEDs to indicate detectors in alarm. The detectors shall operate from the 2-wire alarm initiating circuit and be listed under UL Standard 268, latest edition. Line transient and RFI protection shall be built into the detector. Mounted concealed detectors shall have a remote indicator light or LED. There shall be provisions for mounting a control relay in the base of the detector.
- 3. Duct-mounted smoke detectors shall be provided, where indicated, with approved duct housings mounted on the exterior of the duct, and shall have perforated sampling tubes extended across the width of the duct. Each mounted concealed detector shall have a remote indicator light and a remote test and reset switch, which shall be clearly visible, clearly labeled and readily accessible. Provide an auxiliary D.P.D.T. load relay for fan shutdown control.

Duct detectors shall either be addressable or provided with an addressable point monitoring module.

- 4. HARSH type detectors shall be provided were indicated.
- E. Point addressable heat detectors shall be provided where indicated. The heat detectors shall be combination fixed temperature (135°) and rate-of-rise unless otherwise indicated. The heat detectors shall be self-restoring and contain an integral LED to indicate detectors in alarm.
- F. General
 - 1. Each device shall be field set and assigned a unique address. Devices that take their address from their position in the circuit are unacceptable because if devices are later added or removed, existing addresses, descriptors and commands must be reprogrammed.
 - 2. Additional devices must be capable of being added to the circuit from any point in the circuit and without affecting any existing device's address or function.
 - 3. All means of addressing detectors and modules must be by manually adjustable rotary type switches. Bar coded devices are not acceptable.

4. Each addressable device shall be provided with a clearly visible, printed label with the address of the device. This label shall be clearly readable from a distance of ten feet.

2.5 NOTIFICATION APPLIANCES

- A. Alarm horn units shall be provided as required to provide a sound level 15 dBA above ambient noise levels. The units shall be surface mounted in unfinished areas and semi-flush in finished areas. The units shall operate on 24 volts DC (VDC) polarized power to allow for supervision.
- B. Visual alarm units shall be provided where indicated. The visual alarm units shall contain strobe light source and sturdy transparent lens. Standard finish shall be red with the word "FIRE" imprinted on the body. All visual units shall operate on 24 VDC polarized power to allow for supervision. Visual units shall be in accordance with the ADA and UL Standard 1971.
- C. Fire alarm bells shall be provided where indicated. The bells shall be six-inch diameter, vibrating units with a minimum sound output of 90 dBA at 10 feet. All bells shall operate on 24 VDC polarized power to allow for supervision unless otherwise indicated.

2.6 SUPERVISORY DEVICES

- A. Valve supervisory devices shall be provided for all indicated sprinkler control valves. The valves including butterfly-type, O.S.& Y, or a combination of both. The valve supervisory devices shall be installed to transmit a supervisory signal to the panel within the first two turns of the control valve handle or when the stem of the valve has moved a distance of 1/5 of the length of the stem, whichever is less.
- B. Post indicator Valve (PIV) supervisory switches shall be provided for all indicated control valves. All switches shall be SPDT with gasketed rain-tight enclosures. The PIV supervisory switch shall be installed to transmit a supervisory signal within the first two turns, but no less than one-half turn, of the valve handle or when the stem of the valve has moved a distance of 1 /5 of the length of the stem, whichever is less.

2.7 CONTROL DEVICES

A. Provide control relays/contacts for elevator recall, fan shut down, and smoke control Volume II - 123 10/31/11 SAN DIEGO COMMUNITY COLLEGE DISTRICT 2011 District Design Guidelines & Standards Manual

sequence. The control relays/contacts shall be 24 VDC low voltage type, each with number of contacts as required and housed in metal enclosure. The contacts shall be rated as required for continuous duty.

- B. Magnetic door holders shall be provided where shown. The door holders shall be powered by 24 VDC circuits and shall be of the fail-safe design and shall have a minimum holding force of 25 pounds.
- **C.** Provide addressable control devices where shown to control fan units. The addressable control device shall be individually controlled from the FACP. Power to these devices shall be provided and supervised from the FACP.

2.8 REMOTE STATION TRANSMITTING EQUIPMENT

- A. Where required central station transmitters (DACT) shall be provided as indicated at the FACP to transmit alarm and trouble signals for fire alarm system to SDCCD Police Remote Station. Transmission methods shall satisfy requirements of the station and NFPA 72.
- B. Where required the DACT shall be as specified by the District and shall be compatible with the District's programming and monitoring software. A Universal DACT (UDACT) shall not be used.

2.9 REMOTE ANNUNCIATOR

- A. Provide LCD remote annunciators where indicated. The annunciator shall provide a backlit, super twist, 80 or 160 character liquid crystal display (LCD) for display of all system information. The annunciator shall also provide keys programmed for system control functions, such as acknowledge, silence, reset, as well as other custom-control functions as required. The annunciator shall be mounted with a clear, hinged, locking cover, using the same key as the fire panel.
- **B.** Provide graphic remote annunciators where indicated. The graphic annunciator shall be LED spot luminous for each zone in the system and shall have supervised wiring from the control panel. The complete graphic display shall be submitted to the Engineer for review prior to fabrication of the panel.
- C. Provide LED remote annunciator where indicated. The annunciator shall provide RED alarm and YELLOW trouble LEDs for each zone in the system and shall have supervised wiring from the control panel. The annunciator labeling shall be submitted to the Engineer for review

prior to fabrication of the panel..

PART 3 EXECUTION

3.1 INSTALLATION

- A. The contractor shall provide factory trained and authorized personnel for on-the-job supervision of the proper installation of devices in cooperation with, or as may be required by, other trades. This shall include the following:
 - 1. Provide specific on-site instructions to others on mounting and installation of each type of device by physically observing the mounting of one or more of each type of device, as required, to assure that the installer is properly instructed in the work.
 - 2. Provide supervision as required by others to properly perform alarm installation work.
 - **3.** Perform a complete test of the system, certifying that all devices have been activated and that the devices and systems have performed in accordance with the requirements of this specification.
 - 4. Install, test, trouble-shoot and correct all system software provided under this specification. This includes, but is not limited to, actual keyboard entry, reprogramming required to meet this specification, and any other tasks associated with the system software.
 - 5. Participate in other related testing, including smoke control, fire pump, fire sprinkler system, etc. which involves the operation of the fire alarm control panel and to verify the proper functioning of the fire alarm related equipment..
 - 6. Provide layout drawings and detailed wiring diagrams to the Division of the State Architect (DSA) as required by the Submittal section of these specifications and the AHJ.
- B. All work shall be installed as shown and in accordance with the manufacturer's specifications, unless otherwise specified
 - 1. Control Panel

The control panel and its components shall be securely mounted on a ³/₄ inch plywood backboard so that no part of the cabinet is less than 12 inches or more than 78 inches above the finished floor. All manually operable controls shall be at least three feet and less than five feet above the finished floor. Panel shall be installed to comply with the

requirements of UL 864.

Unless a separate battery cabinet is mounted directly below the control panel, no conduit is to penetrate the bottom of the control panel cabinet.

- 2. Detectors
 - Detectors shall be mounted on the ceiling not less than 4 inches (100 mm) from the side wall to the near edge, or if side wall, between 4 inches (100 mm) and 12 inches (300 mm) down from the ceiling to the top of the detector.
 - b. Detectors shall be located at least three feet from diffusers of air handling systems.
- 3. Manual Fire Alarm Stations

Manual fire alarm stations shall be mounted at 48 inches (145 mm) at the pull handle above the finished floor. Where the manual pull station and notification device are located in the same area they shall be center vertically with each other in the same location.

4. Visual Signal Appliances

Visual signal appliances shall be wall mounted such that the entire lens is no less than 80 inches (2030 mm) nor more than 96 inches (2435 mm) above the finished floor or 6 inches (152 mm) below the ceiling, whichever is lower.

5. Audible Signal Appliances

Where ceiling heights permit, wall-mounted appliances shall have their tops at 90 inches (2300 mm) above the finished. floor or 6 inches (152 mm) below the ceiling whichever is lower.

6. Combination Audible and Visual Signal Appliances

The location of audible/visual signal appliances shall comply with visual signal appliance mounting requirements.

7. Annunciators

Annunciators shall be mounted so that all controls shall be no less than 54 inches

or more than 60 inches above the finished floor. Where the annunciator, manual pull station and notification device are located in the same area they shall be center vertically with each other in the same location.

8. Peripheral Equipment

Where located remotely from the control panel all peripheral equipment (relay modules, monitoring modules, control modules, etc.) not located in terminal cabinets or device mounting boxes shall be mounted no less than 72 inches AFF.

Where located in exposed locations (lobbies, halls, offices, etc.), peripheral equipment shall be in a recessed cabinet with a hinged lockable door using the same key as the FACP, 48 to 72 inches AFF, and painted to match the surrounding wall.

- C. Contractor shall furnish all material and labor to provide a complete and functional system, which operates in accordance with the requirements of this specification. This shall include the following:
 - 1. Unless otherwise indicated all wiring is to be in conduit.
 - 2. Conduit, raceway and wiring systems as indicated herein, and throughout the specifications, and shown on the drawings.
 - a. All wiring shall be appropriately color-coded, and permanent wire markers shall be used to identify the terminations for each circuit at the control panel.
 - b. Strap or bundle all cables and wires inside equipment enclosures and terminal cabinets, parallel to the enclosure sides.
 - c. Splices shall be kept to a minimum. Splices shall be made in device mounting boxes and terminal cabinets only. Pull boxes and terminal cabinets must be clearly marked and readily accessible. More than four (4) splices in one location must be in a terminal cabinet.

Exception: Devices available only with "pig-tail" connections shall be connected to the circuit wiring using approved insulated wire nuts and wrapped with electrical tape.

- 2. Repair all surface areas where existing fire alarm equipment has been removed. All holes and walls shall be filled with UL fire-stopping material capable of maintaining the fire-resistance of the fire barriers.
- 3. Replace all damaged ceiling tiles.
- 4. Paint all exposed conduit, raceway, access panels, etc., and repair or patch surfaces to match existing finish.
- 5. All coring and sleeving required. Core drilling shall be performed by qualified personnel to minimize damage. All rebar shall be located before drilling. The Contractor shall repair any damage that occurs because of core drilling.
- 6. For existing facilities all underground trenching and conduit shall be the responsibility of the contractor.
- D. Pay for and obtain all permits, approvals, fees and charges required for this work.

3.2 TEST/FIELD QUALITY CONTROL

- A. The final alarm acceptance test shall be coordinated with the Owner and the Engineer. A letter certifying that the installation is complete and fully operational shall be forwarded to the Owner and Engineer.
- **B.** The final alarm acceptance test shall be done in compliance with CFC/NFPA72. All required documentation shall be completed and provided to the Owner upon acceptance of the system.
- C. The Fire Alarm Contractor and the Owner's Representative shall be in attendance at the final acceptance test to make necessary adjustments. The final test shall be conducted after final clean-up of the area. Per NFPA 72 (2007 edition paragraph 5.7.1.11) '[Smoke] Detectors shall not be installed until after the construction cleanup of all trades is complete and final.' The final acceptance test shall include, but not be limited to:
 - 1. A test of the complete system for grounded, open and shorted circuits.
 - 2. A test of each alarm-initiating and supervisory device for functions specified and for the required alarm actions.
 - 3. All communications equipment shall be tested to ensure that all signals are received

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the SDCCD Police Dispatch Center. This includes, but is not limited to, all network and digital communications (DACTs), types and accuracy of signals, etc.

- 4. A test of the system for electrical supervision.
- 5. A test to verify that the emergency power source is capable of operating the system for specified periods.
- 6. A test to verify that alarm signals will operate under specified trouble conditions.
- 7. A test to verify that the system will operate under specified trouble conditions.
- 8. A test to verify that the system will perform all specified tasks
- 9. A test to verify that sound uniformity of voice alarm system has been achieved and voice messages are intelligible in all areas of coverage.
- **10.** A test to verify that a hard copy of all required system actions will be properly provided.
- D. A minimum of 3 day(s) will be required for these tests.
- E. If the system requires a retest by the Engineer, all costs for the retest shall be the responsibility of the Contractor.
- F. The Contractor shall pay all overtime pay required by the AHJ for witnessing the acceptance test.
- G. Provide a separate test message to facilitate testing of the required voice message unit.
- H. Contractor shall be present at other related tests, including but not limited to, emergency generator, fire pump, and smoke control.

3.3 TRAINING

- A. Provide training of Owner's personnel in the proper operation procedures. The training program for the Owner's personnel shall include the following:
 - 1. Operations and Maintenance Manuals containing complete operating instructions, outline step-by-step procedures required for system start up, operation, and shut down, including the manufacturer's name, model number, service manual, parts lists,

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and brief description of all equipment and their basic operation features. Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and as-built drawings of the complete system, including conduit layout, equipment layout, device labels, and simplified wiring and control diagrams of system. Operations and Maintenance Manuals shall be submitted and approved prior to conducting the training course.

2. Three separate 2 -hour training sessions for operating personnel. The sessions are to cover proper operating and response procedures. These instructions shall be sufficient to enable an untrained person to properly operate the system.

3.4 AS-BUILTS

- A. Provide three (3) complete sets of prints, at least one of which is reproducible, and a set of disks in AutoCAD of "as-built" drawings and wiring diagrams
- B. Provide a complete set of "as-built" data sheets for all equipment connected to the system.
- C. Provide complete "as-built" software for all relevant components including, but not limited to, FACP programming and OnyxWorks (or current monitoring software) data files.
- D. Provide NFPA 72 completion certificate, signed by the AHJ.
- E. Provide a completed test form which complies with NFPA 72, signed and dated by the fire alarm system manufacturer or his agent.
- F. All items of this section shall be provided prior to final payment request.

3.5 SPARE PARTS

- A. All spare parts shall be directly interchangeable with the corresponding components of the installed systems.
- B. Spares of each of the following which have been used on this project shall be furnished to the Owner: Unless specified elsewhere quantities shall be a minimum of one of each device or two (2) percent of the number of each device used, whichever is greater.
 - 1. Manual fire alarm stations.

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- 2. Smoke detectors, including bases.
- 3. Duct type detectors
- 4. Heat detectors.
- 5. Control relays/devices
- 6. Addressable monitoring modules.
- 7. Strobe units.
- 8. Horn/strobe units (of each candela rating)

3.5 SERVICE CONTRACT

- A. If a separate test and inspection type service is requested, the service contract must include the following:
 - **1.** Performance of a test and inspection of the fire alarm system quarterly during which the Contractor shall:
 - a) Test the operation of each waterflow alarm device in the alarm system by opening the inspector's test valve, test alarm and trouble transmitters, and visually inspect each device as it is tested.
 - b) Test the operation of each supervisory valve switch by opening the valve and verifying the receipt of a signal within the first two renovations of the hand wheel or within one-fifth of the travel distance, and visually inspect each device as it is tested.
 - c) Remove any dirt or dust and make any minor adjustments or calibrations, which are apparent from inspection or testing of the device.
 - 2. Perform a semi-annual test of the entire smoke detection system and manual fire alarm system as per NFPA 72 testing method requirements.
- B. Emergency service, including all parts and labor, during the warranty period is

to be included in the system purchase price

- C. Service definitions:
 - 1. Emergency Services: Emergency service is a special request for assistance from the Owner that necessitates a special trip or labor. A request to advance a regularly scheduled test and inspection trip is not emergency service.
 - 2. Quoted Rates: Quoted rates refer to the labor rates quoted on the bid form or to adjusted rates which shall be supplied to the Owner at the beginning of each new contract term. In absence of this contract, the rates shall be Contractor's currently published billing rates.
- D. A written test and inspection report is to be submitted to The District at completion of every periodic system test and inspection visit.



NOT USED

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END OF VOLUME II

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