

## SECTION 28 0500

### COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

#### PART 1 GENERAL

##### 1.01 WORK INCLUDED

- A. Furnish and install complete raceway system and wiring for Electronic Safety and Security (ESS) equipment and devices as noted on the Drawings. Include necessary conductors, connectors, fittings, boxes, hangers and appurtenances.
- B. Size raceways and conduits as specified. Where no size is indicated, conduit may be the minimum code permitted size for the quantity of conductors installed, based on NEC tables for conductors with type THW/TW insulation.
- C. Size conductors as recommended by manufacturer.
  - 1. Comply with TIA/EIA Standards 569 and 607, latest edition.

##### 1.02 RELATED REQUIREMENTS

- A. Section 01 4500, Quality Control Requirements
- B. Section 01 7823, Training and Operations & Maintenance Manuals
- C. Section 26 0500, Common Work Results for Electrical.
- D. Section 26 0519, Low-Voltage Electrical Power Conductors and Cables
- E. Section 26 0529, Hangers and Supports for Electrical Systems
- F. Section 26 0533, Raceways, Boxes, and Conduits for Electrical

##### 1.03 REGULATORY REQUIREMENTS

- A. Comply with the following codes and standards, latest adopted revision.
- B. International Building Code (IBC).
- C. National Electrical Code (NEC).
- D. National Fire Protection Association (NFPA).
- E. National Electrical Manufacturers Association (NEMA).
- F. National Electrical Contractors Association (NECA).
- G. American National Standards Institute (ANSI).
- H. Underwriters Laboratories (UL).

##### 1.04 SITE VISITATION

- A. The Contractor shall visit the site prior to bidding and become familiar with existing conditions and all other factors that may affect the execution of the work. Include all related costs in the initial bid proposal.

##### 1.05 COORDINATION OF WORK

- A. Coordinate with other trades for proper installation of all items of equipment. Consult the Drawings of all other trades or crafts to avoid conflicts with cabinets, counters, equipment, structural members, etc. In general, the architectural drawings govern but conflicts shall be resolved with the Architect prior to rough-in.
- B. Verify the physical dimensions of each item of equipment to fit the available space. Coordination of the equipment to fit into the available space and the access routes through the construction shall be the Contractor's responsibility.
- C. Coordinate rough-in and wiring requirements for all equipment provided. Make installation and connections in accordance with manufacturer's instructions. Doors and access panels shall be kept clear.

##### 1.06 WARRANTY

- A. Provide a written warranty covering the work done under this Division as required by the General Conditions.

## **PART 2 PRODUCTS**

### **2.01 CONDUITS**

- A. Galvanized Rigid Conduit (GRC): Smooth surfaced heavy wall mild steel tube of uniform thickness and temper, reamed and threaded at each end and protected inside and out with galvanizing, sherardizing, or equivalent process. GRC shall comply with NEC Article 346.
- B. Intermediate Metallic Conduit (IMC): Smooth surface, intermediate wall mild steel tube of uniform thickness and temper, reamed and threaded at each end, and protected inside and out with galvanizing, sherardizing, or equivalent process. IMC shall comply with NEC Article 345.
- C. Electrical Metallic Tubing (EMT): Smooth surface, thin wall mild steel tube of uniform thickness and temper, galvanized or sherardized on the outside, and enameled on the interior. EMT shall comply with NEC Article 348.
- D. Flexible Conduits (Flex):
  - 1. Flexible Metallic Conduit: Interlocking single strip steel construction, galvanized inside and out after fabrication. Comply with NEC Article 350.
  - 2. Liquid Tight: Similar to flexible metallic conduit, except encased in a liquid tight polyvinylchloride or equivalent outer jacket over the flexible steel core. Comply with NEC Article 351.
- E. Rigid Non-Metallic Conduit: Type II PVC Schedule 40, suitable for use with 90°C rated wire. Conduit shall conform to UL Standard 651 and carry appropriate UL listing for above and below ground use.

### **2.02 FITTINGS**

- A. GRC and IMC:
  - 1. Threaded Locknuts: Sealing type where used with NEMA 2, 3, 3R, 4 and 12 enclosures.
  - 2. Threaded Bushings: 1 1/4 inch and larger, insulated, grounding type as required under Section 16450.
  - 3. Threaded Couplings: Standard threaded of the same material and as furnished with conduit supplied. Erickson type couplings may be used where required to complete conduit runs larger than 1 inch.
- B. EMT:
  - 1. Connectors: Steel compression ring or steel set screw type for conduit termination, with insulated throat, suitable for conditions used. Use lay-in grounding type bushings where terminating grounding conductors.
  - 2. Couplings: Steel compression ring or steel set screw type, concrete tight.
- C. Threadless: GRC and IMC couplings and box connectors may be steel threadless, compression ring or set screw type for use with conduits 1 inch and smaller where installed in poured concrete locations or where limited working space makes threaded fittings impractical.
- D. Weatherproof Connectors: Threaded.
- E. Expansion Couplings: Equal to O.Z. type EX with jumper.
- F. Seal-Offs: With filler fiber, compound, and removable cover.

### **2.03 BOXES**

- A. Wall Outlet Boxes: 4-inch square, 2 5/8-inch deep, minimum, with single-gang mud ring unless otherwise noted on the Drawings.
- B. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings; cast steel or aluminum with threaded hubs or bosses for use on walls.
- C. Large Boxes: Boxes exceeding 4-11/16 inches square when required shall be welded steel construction with screw cover and painted, steel gauge as required by physical size, Hoffman, Circle AW or approved equal.
- D. Systems: Boxes for systems devices shall be as recommended by the systems manufacturer, suitable for the equipment installed. Equip with grounding lugs, brackets, device rings, etc., as required.

## **2.04 POWER LIMITED WIRING**

- A. Copper, stranded or solid as recommended by the system manufacturer.
- B. Insulation shall be appropriate for the system and location used.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Conduit bends shall be large radius field bends or factory ells. Cast type fittings or sharp bends shall not be installed unless specifically approved by the systems installer. No section of conduit shall be longer than 100 feet or contain more than 180 degrees of bend between pull points or pull boxes.
- B. Where conduits are shown stubbed into a terminal area, stub 6 inches above floor or 12 inches down from ceiling at the appropriate terminal board location, terminating in insulating bushings.
- C. Provide a pull wire in all conduits longer than 15 feet or with more than 90 degrees of bend.
- D. Protect all existing equipment and devices that will remain in service during construction from mechanical injury and dust entry.
  - 1. Coordinate with system supplier for phasing and work scheduling.
  - 2. The inside radius of a bend in conduit shall be at least 6 times the internal diameter. When the conduit size is greater than 2 inches, the inside radius shall be at least 10 times the internal diameter of the conduit. For fiber optic cable, the inside radius of a bend shall always be at least 10 times the internal diameter of the conduit.
  - 3. Provide all low voltage conduit stub-outs with insulated bushings.
  - 4. Conceal all conduits in finished spaces. Concealed conduits shall run in a direct line with long sweep bends and offsets. GRC and IMC embedded in concrete below grade or in damp locations shall be made watertight by painting the entire male thread with Rustoleum metal primer or equal before assembly.
  - 5. Route exposed conduit parallel or at right angles to structural building lines and neatly offset into boxes. Conduits attached directly to building surfaces shall closely follow the surfaces. Conduit fittings shall be used to "saddle" under beams. Drilling or notching of existing beams, trusses on structural members shall be coordinated with Architect prior to commencing.
  - 6. GRC and IMC terminations at boxes, cabinets, and general wiring enclosures shall be rigidly secured with double locknuts and bushings or approved fittings. Conduit shall be screwed in and shall engage at least five threads in hub where conduit boxes with threaded hubs or bosses are used. Insulating bushings shall be used for conduits 1-1/4 inches or larger.
  - 7. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete, or foreign objects. Raceways shall be clean and dry before installation of wire and at the time of acceptance.
  - 8. Pack spaces around conduits with polyethylene backing rods and seal with polyurethane caulking to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating moisture barriers.

**END OF SECTION**



**SECTION 28 1300  
ACCESS CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Access control devices to be relocated and/or added to existing TriMet TRACS System based on the Lenel OnGuard PROI Access Control System (ACS).
- B. Additional power supplies and door controllers, if required to accommodate new devices.
- C. All hardware and software required for the installation of access control, video surveillance and/or intrusion systems is to be supplied and installed by TriMet's security contractor of record (presently REECE Complete Security Solutions).

**1.02 BID FORM**

- A. Where indicated in the Bid Form, provide a deductive alternate for the access control system other than infrastructure (conduit and boxes) to be provided.
  - 1. This shall include all components listed in Part 2 of this Section, and all labor associated with the installation including cabling.

**1.03 RELATED REQUIREMENTS**

- A. Section 01 3300, Submittals
- B. Section 08 7100, Door Hardware
- C. Section 28 0500, Common Work Results for Electronic Safety and Security
- D. Section 26 0519, Low-Voltage Electrical Power Conductors and Cables

**1.04 REFERENCES**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most recent edition adopted by Authority Having Jurisdiction, including all applicable amendments and supplements.

**1.05 ABBREVIATIONS**

- A. The following abbreviations will pertain to various parties noted in this specification and the drawings:
  - 1. GC: General Contractor
  - 2. SI: Security Integrator (Lenel VAR)
  - 3. EC: Electrical Contractor
  - 4. DH: Door Hardware Vendor/Contractor
  - 5. PPB: Portland Police Bureau
  - 6. TriMet: System Owner

**1.06 SYSTEM OPERATION**

- A. Magnetic Card Readers will allow access to the facility when a valid Card Key is presented to the reader.
- B. Card Readers will be controlled from a security control panel.
- C. Electric door locks and exit hardware will be provided by the door hardware supplier at access-controlled doors, as shown on Drawings.
- D. Request-to-exit sensors will be provided at access-controlled doors to allow unalarmed egress.
- E. Magnetic door contacts will be included at each access-controlled door to provide intrusion detection.

**1.07 SUBMITTALS**

- A. Shop Drawings: Provide system wiring diagram showing each device and wiring connection required.
- B. Product Data: Provide electrical characteristics and connection requirements.
- C. Test Reports: Indicate satisfactory completion of required tests and inspections.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Project Record Documents: Record actual locations of access authorization equipment.
- F. Operation Data: Operating instructions.
- G. Maintenance Data: Maintenance and repair procedures.

## **1.08 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience and with service facilities within 50 miles of the project.
- C. Installer Qualifications: Company must be a Lenel value added reseller specializing in installing the products specified in this section with minimum five years documented experience installing and servicing the Lenel OnGuard Platform. The Contractor shall have at least two Lenel Certified Experts on staff in Oregon.
- D. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and matching existing system.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Access Control shall be provided by Lenel via an authorized Value Added Reseller (VAR).

### **2.02 ACCESS CONTROL SYSTEM**

- A. Access Control System: Control access to building and selected areas using existing MIFARE-DESFIRE-EV1 cards.
  - 1. Building Areas: Control access into selected areas as shown on drawings.

### **2.03 COMPONENTS**

- A. Provide components that are UL listed for this application and ADA compliant.
- B. Provide minimum 4-hour battery backup for all powered components.

### **2.04 SMART CARD READER**

- A. Provide HID iClass Contactless Smart Card Reader compatible with MIFARE-DESFIRE-EV1 cards currently in use by Owner.
  - 1. Provide the following readers:
    - a. Standard wall reader shall be HID iClass R40.
      - 1) Typical unless otherwise noted/indicated on drawings.
    - b. Standard wall reader/keypad shall be HID iClass RK40.
      - 1) Provide at MDF/IDF and Armory as indicated on plans.
    - c. Mullion reader shall be HID iClass R15.
      - 1) Provide where indicated on plans.
- B. Reader may be located up to 500-feet away from main controller.

### **2.05 REQUEST-TO-EXIT**

- A. A. Request-to-Exit Sensor (REX) Provide motion detector to allow unalarmed egress from secured areas, DS 160.
- B. Provide detector with adjustable sensitivity and field of view.
- C. B. Request-to-Exit Switch/Contact (RX)
- D. 1. Where indicated in Door Hardware Schedule, a RX switch shall be provided with door locking hardware, and shall be used as the request-to-exit input for that door.

## 2.06 MAGNETIC DOOR CONTACTS

- A. Provide 3/4-inch diameter self-locking magnetic contacts.
- B. Coordinate with architectural door hardware requirements.
- C. Acceptable manufacturers:
  - 1. UTC/Sentrol
  - 2. George Risk Industries (GRI)

## 2.07 POWER SUPPLIES

- A. Door Hardware Vendor/Contractor supplied power supplies:
  - 1. Where indicate in the Door Hardware Schedule, power supplies for specific door locking configurations shall be furnished by Door Hardware Vendor/Contractor (DH), and turned over to Security Integrator (SI) for installation.
  - 2. SI shall coordinate with DH for minimally required quantity of specialty power supplies.
    - a. Indicate on ACS panel elevation in shop drawings space for two (2) additional power supplies in the future.
- B. Standard power supply for door locks not indicated to have a specialty power supply shall be Life Safety Power (LSP) with the following features:
  - 1. Power supply shall be capable of mounting Lenel Intelligent Controllers, door controllers, and auxiliary relays on back plane of enclosure.
  - 2. Provide power supplies as indicated below:
    - a. The following general features shall apply:
      - 1) 12 VDC and 24 VDC power supplies may be installed in the same LSP enclosure.
      - 2) Provide Rocker Switch/Bracket for each two (2) power supplies installed in LSP Enclosure.
        - (a) Each power supply will have its own switch to controller 120 VAC ON/OFF to the power supply.
      - 3) Provide permanent, machine printed label, 1/4" high letters for 120 VAC power source indicating room, panel and circuit number.
    - b. Powering Electronic components such as Intelligent Controller, door controllers, and auxiliary relays:
      - 1) Provide 12 or 24 VDC as required by manufacturer, minimum of 6-ampere rating.
      - 2) Do not use this power supply to power door locks.
      - 3) Provide LSP D8P for power distribution; rated as Class 2 output with PTC protection.
      - 4) Provide 20% spare circuit capacity.
      - 5) Power each component from its own PD output. Do not "daisy chain" the power input to ACS components.
    - c. Powering Door Locks & Duress Notification System (Horn & Colored Strobes)
      - 1) Provide 24 VDC minimum of 10-ampere rating.
      - 2) Provide LSP C8P; rated as Class 2 outputs with PTC protection.
        - (a) Door lock relay on door controller module shall be wired as a dry contact input on C8P.
        - (b) Do not control door lock power directly from module door lock relay.
        - (c) Each door lock shall have its own C8P control point.
      - 3) Provide 20% spare circuit capacity.
        - (a) Do not exceed 80% of power supplies amperage rating with all connected components and locks in powered mode.
  - 3. Monitor the following via separate input module (LNL-1100) for the following:
    - a. Each Power Supplies:
      - 1) AC Fail
      - 2) Battery Trouble
    - b. Enclosure Tamper Switch (included with LSP enclosure).

## 2.08 ACCESS CONTROL MODULES

- A. Intelligent Controller
  - 1. Provide Lenel Intelligent System Controller (ISC) LNL-3300
    - a. Coordinate with IT contractor for data connection to ISC.
  - 2. Dual Reader Interface
    - a. Provide Lenel Dual Reader Interface Module (DRI) LNL-1320 Series 3
      - 1) Do not use spare inputs from a DRI to monitor inputs of a door or other status conditions not associated with the doors assigned to Door 1 or Door 2 of the DRI.
  - 3. Input Control Module
    - a. Provide Lenel Input Control Module (ICM) LNL-1100 Series 3
      - 1) Provide as indicated for power supplies and where separate discreet inputs (such as duress buttons) are required.
  - 4. Output Control Module
    - a. Provide Lenel Output Control Module (OCM) LNL-1200 Series 3
      - 1) Provide as indicated for output controls as follows:
        - (a) Where a door configuration requires additional relay outputs associated in programming.
        - (b) Inputs to ACM8CB for duress notification (horn and colored strobes).

## 2.09 ACCESSORY DEVICES

- A. Timer Modules
  - 1. Provide timer modules for all access control doors with door operators. Time module shall provide delayed activation for the following:
    - a. Interior door operator station will be input as RX to ACS, and will perform the following:
      - 1) Shunt/Bypass Door Position Switch
      - 2) Unlock door lock
      - 3) Activate timer for 1 to 2 second delay to activate door operator.
    - b. Exterior door operator station, following valid card read:
      - 1) Shunt/Bypass Door Position Switch
      - 2) Unlock Door
      - 3) Activate timer for 1 to 2 second delay to close relay for making exterior door operator station "active" as direct input to door operator.
  - 2. Provide Altronix DTMR1 or equal.
- B. Relays and Base Module (Aux. Control)
  - 1. When an auxiliary control relay is required, provide Altronix RAC24 or equal.
- C. Door Sounder
  - 1. Where indicated on the plans, provide door sounder with the following features:
    - a. Double gang plate
    - b. Sounder, Piezo Buzzer 85dB
    - c. Bi-Colored LED
    - d. Keyed Bypass/Reset
    - e. Remote Bypass Input
      - 1) Delay Set to "0"
  - 2. Provide SDC EA-728V or equal.
- D. Momentary and Maintained Input Control Console
  - 1. Where indicated on the plans, provide the following SDC components or approved equal:
    - a. Slope front control console: TCC
    - b. Eight Momentary/Off/Maintained with LEDs Switch Panel: CL8, x1
    - c. Alarm, Reset Push Button & Key Lock Panel: EA, x1



## **2.10 DURESS NOTIFICATION DEVICES AND INPUTS**

- A. Duress Notification (Horn and Colored Strobes):
  - 1. Where indicated on the drawings (see sheet notes) provide the following:
    - a. Wheelock AMT horn with prioritized input.
      - 1) Coordinate with TriMet and PPB to determine single tone to be used for audible notification signal for both Reception and Holding.
      - 2) Provide with white housing, ceiling mount.
    - b. Wheelock Exceeder LED Colored Strobe
      - 1) Coordinate with TriMet and PPB for each one to have a colored strobe that uniquely identifies each duress area: Reception and Holding.
- B. Duress Inputs:
  - 1. Where indicated on plans, provide mushroom button with the following features:
    - a. Latching, requires turn to rest.
    - b. Red button
    - c. Blue Housing
    - d. DPDT Contacts
  - 2. Provide STI or approved equal.
  - 3. Coordinate under desk location with TriMet.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Make conduit and wiring connections to door hardware devices furnished and installed under Section 08 7100, Door Hardware.
- C. The cabling, raceway, backboxes and device/component mounting provisions are installed as part of the project work.
- D. Cable specifications, quantity and routing is provided from a TriMet pre-qualified installation Contractor. This access control system installation Contractor is independent of the project direct contract work. The project contract work is responsible for coordination and schedule of obtaining all required installation information required to support the final device installation, termination, testing and operation from the access control system installation Contractor.
- E. The final access control system, device termination, mounting, programming and testing is by a separate TriMet Contract. This separate access control system installation contract is in coordination with the project construction contract.

### **3.02 FIELD QUALITY CONTROL**

- A. Manufacturer Services: Furnish services of technician to supervise installation, adjustments, final connections, system testing, and to train TriMet personnel.

### **3.03 CLOSEOUT ACTIVITIES**

- A. Demonstrate normal and abnormal modes of operation and required response to each.
- B. Provide 4 hours of instruction each for two persons.
  - 1. Conduct instruction at project site.

**END OF SECTION**



**SECTION 28 2300**  
**VIDEO MANAGEMENT & SURVEILLANCE SYSTEM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Qualifications, documentation requirements and equipment for implementation of a Video Management & Surveillance System as specified herein.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0519, Low-Voltage Electrical Power Conductors and Cables
- B. Section 28 0500, Common Work Results for Electronic Safety and Security

**1.03 REFERENCES**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most recent edition adopted by Authority Having Jurisdiction, including all applicable amendments and supplements.

**1.04 ABBREVIATIONS**

- A. The following abbreviations will pertain to various parties noted in this specification and the drawings:
  - 1. GC: General Contractor
  - 2. SI: Security Integrator (Lenel VAR)
  - 3. EC: Electrical Contractor
  - 4. DH: Door Hardware Vendor/Contractor
  - 5. PPB: Portland Police Bureau
  - 6. TriMet: System Owner

**1.05 SYSTEM OPERATION**

- A. Cameras will be IP, PoE cameras.
  - 1. Cameras will be furnished as follows:
    - a. TriMet
      - 1) Cameras:
        - (a) Contractor Furnished, Contractor Installed (CFCI)
        - (b) Contractor shall provide all wiring (CAT cable, conduit and boxes necessary to properly install the cameras.
      - 2) Recording System(s):
        - (a) Owner Furnished, Owner Installed
          - (1) All licensing for cameras to be provided by TriMet.
    - b. PPB - Owner Furnished, Owner Installed (OFOI)
      - 1) Cameras:
        - (a) Owner Furnished, Owner Installed (OFOI)
        - (b) Contractor shall provide all wiring (CAT cable, conduit and boxes necessary to properly install the cameras.
      - 2) Recording System(s):
        - (a) Owner Furnished, Owner Installed
          - (1) All licensing for cameras to be provided by PPB.
- B. Cameras will be wired to patch panels provided by Div. 27, and connected by Owner to their furnished switches in the MDF/IDF rooms.
  - 1. Patch cables to be provided by Owner and cross-connected between patch panels and switches.

**1.06 SUBMITTALS**

- A. Shop Drawings:
  - 1. Floor Plans:
    - a. Indicate location on floor plans of each camera location.
      - 1) Provide detail call-out with detail indicating:

- (a) Camera Plan View with indicated field of view (FOV)
- (b) Camera mounting detail
- (c) Wiring Diagram
- (d) Functional Description describing camera operation, and specifically any unique operation.

Indicate Rack Connections

- 1) Provide detail call-out indicating:
  - (a) Scaled drawings for rack mounted components (patch panels, and indicate port assignment for each camera.
- 2. Riser Diagram
  - a. Indicate wiring types to each camera location.
- B. Product Data: Clearly mark specific model being provided if more than one (1) model is indicated on data sheet.
- C. Test Reports: Indicate satisfactory completion of required tests and inspections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Project Record Documents: Record actual locations of access authorization equipment.
- F. Operation Data: Operating instructions.
- G. Maintenance Data: Maintenance and repair procedures.

## 1.07 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of experience and with service facilities within 50 miles of the project.
- C. Installer Qualifications: Company specializing in installing the products specified in this section with minimum five years documented experience installing and servicing the Lenel OnGuard Platform. The Contractor shall have at least two Lenel Certified Master Level Application Engineers on staff in Oregon.
- D. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and matching existing system.

## PART 2 PRODUCTS

### 2.01 VIDEO SYSTEM MANUFACTURERS

- A. TriMet's Video Management system will be expanded to be the video management and recording system for this project.
  - 1. Software and hardware for the video management and recording shall be provided and installed by TriMet.
    - a. Software licensing shall be by TriMet.
  - 2. Cameras
    - a. Cameras models indicated below are based on Hanwha Techwin.
    - b. All cameras shall be provided by the same manufacturer.
  - 3. Acceptable Alternate Manufacturer's:
    - a. Sony
    - b. Axis
    - c. Approved Equal
  - 4. If an alternate camera manufacturer is selected by the SI: the SI shall clearly detail any differences between the specified model and the model being provided.
    - a. The differences shall clearly indicate if it is a diminishment or enhancement of the specified model.
  - 5. Provide mounting accessories required for each location.
    - a. Coordinate with Architect for approval of exterior camera locations prior to installation.

- B. Fixed Dome Camera, Single-Sensor, Exterior: XNV-6081R
- C. Fixed Dome Camera, Single-Sensor, Interior: XND-6081RV
  - 1. Use for ceiling surface mount or wall mount applications
- D. Fixed Dome Camera, Single-Sensor, Interior: XND-6081RF
  - 1. Use in hard ceiling or acoustical tile ceiling applications.

## **2.02 POWER SUPPLIES**

- A. Cameras will be PoE powered via switches provided by Owner and installed by Owner (OFOI).
- B. Contractor shall terminate all CAT 6a cables for cameras (TriMet and PPB) to patch panels provided under Division 27.
  - 1. Provide two (2) CAT 6a cables per camera location indicated.
  - 2. Provide CAT 6a Patch Cords with male connectors on both ends us sufficient length to reach between patch panel and OFOI data switch.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. The cabling, raceway, backboxes and device/component mounting provisions are installed as part of the project work.
- C. Cable specifications, quantity and routing is provided from a pre-qualified installation Contractor. This access control system installation Contractor is independent of the project direct contract work. The project contract work is responsible for coordination and schedule of obtaining all required installation information required to support the final device installation, termination, testing and operation from the access control system installation Contractor.
- D. The final access control system, device termination, mounting, programming and testing is by a separate City of Beaverton Contract. This separate access control system installation contract is in coordination with the project construction contract.

### **3.02 FIELD QUALITY CONTROL**

- A. Manufacturer Services: Furnish services of technician to supervise installation, adjustments, final connections, system testing, and to train City of Beaverton personnel.

### **3.03 CLOSEOUT ACTIVITIES**

- A. Demonstrate normal and abnormal modes of operation and required response to each.
- B. Provide 4 hours of instruction each for two persons.
  - 1. Conduct instruction at project site.

**END OF SECTION**



**SECTION 28 4600**  
**FIRE DETECTION AND ALARM**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Expand the existing fire alarm system to add alarm initiation and evacuation notification devices as indicated.
  - 1. Recalculate voltage drop and signal level for the extended circuiting.
  - 2. Recalculate the system battery capacity to account for the added load.
  - 3. Provide a new Notification Appliance Circuit (NAC) assembly as required. Locate with the existing facility NAC assemblies for ease of maintenance. Extend the existing 120 Volt power circuitry as required.
  - 4. Provide additional signal circuit conductor size and battery capacity as required.
- B. Provide Notification Appliance Circuit (NAC) panels as required to drive new notification devices as required for a complete and operable system.
- C. Replace or Provide Notification Appliance Circuits and components as required to support the project work. The project work is required to integrate into the existing annunciated fire detection and alarm system for the Ruby North, maintenance building.
- D. The integrated project work Fire Alarm System shall fully comply with the local fire code currently enforced at the project location. If any conflict occurs between government adopted code rules and these contract documents, the codes are to govern.
- E. The vendor is advised the Drawings are diagrammatic in nature and do not intend to show all details. Vendor is expected to provide all miscellaneous parts and labor required to install a complete workable system.
- F. The vendor is responsible for providing and installing the expansion of the fire detection and alarm system that must be approved by the Fire Marshal or other code authorities. The requirements shown in this section and the Contract Drawings are minimum requirements. The Fire Marshal or other Code authority may require additional detection and/or alarm systems. Any additional required systems are the responsibility of the vendor.
- G. Provide additional Notification Appliance Circuit (NAC) Remote Power Supplies (6 Amp Circuits) for additional Bell/Strobes as required.
- H. Inter-tie FACP connection of additional modules for system signaling/ communications.
- I. Provide new Pull Stations, Strobes, Bells and other devices as required.
- J. Provide emergency stand-by batteries, sized per NFPA with battery calculations to be submitted to AHJ/ Fire Marshal.
- K. Provide all new project provided conduit and wiring per NEC 2014-Art.760 and NFPA-72-2014.

**1.02 REQUIREMENTS**

- A. In addition to those listed in Section 2 60500, Common Work Results for Electrical:
  - 1. NFPA Codes, Standards and Manual (latest issue enforced):
    - a. 71 - Central Station Signaling System
    - b. 72 - Protective Signaling Systems, 2014
    - c. 72E - Automatic Fire Detectors
    - d. 90A - Air Conditioning & Ventilating Systems (specifically Chapter 4 "Controls")
    - e. NEC - National Electrical Code (NFPA 70) 2014
    - f. UL 864 listing
- B. Other Codes and Standards:
  - 1. Local rules and interpretations required by the Authority Having Jurisdiction.
  - 2. Americans with Disabilities Act (ADA) requirements.

### **1.03 ADDITIONAL REQUIREMENTS**

- A. Submit shop drawings to the "Authority Having Jurisdiction" (AHJ) as defined in NFPA 72 for approval. The AHJ for this project is the City of Portland, Oregon local Fire Marshal having jurisdiction. Six copies of the above shop drawings with approval indicated shall be included with the submittal required by Section 01 3300, Submittals and Section 26 0500, Common Work Results for Electrical. Include all voltage drop (10% maximum) calculations, battery calculations, functional matrix, and Fire Alarm Riser Diagram, including type and size of conductors. Drawings must be signed by an approved NICET member or a Professional Engineer for submission to the Fire Marshal and AHJ.
- B. Schedule periodic inspections by the AHJ during the course of the installation and make any corrections, deletions, relocations or additions to the system as required for acceptance of the completed system by the AHJ.

### **1.04 RELATED SECTIONS**

- A. Section 01 3300, Submittals
- B. Section 01 7823, Training and Operations & Maintenance Manuals
- C. Section 01 4500, Quality Control Requirements
- D. Division 21, Fire Protection
- E. Section 26 0500, Common Work Results for Electrical
- F. Section 26 0533, Raceways, Boxes, and Conduits for Electrical
- G. Section 26 0529, Hangers and Supports for Electrical Systems

### **1.05 QUALITY ASSURANCE/QUALITY CONTROL**

- A. Comply with the requirements of Section 01 4500, Quality Control Requirements and Section 26 0500, Common Work Results for Electrical except as modified herein.
- B. Comply with the provisions of NEMA and UL, as applicable.
- C. Comply with all applicable NFPA standards as applicable.
- D. Comply with all requirements of the Fire Marshal and AHJ.

### **1.06 SYSTEM DESCRIPTION**

- A. The system is an Electrically-supervised, closed circuit, continuous non-code sounding, zoned type fire alarm system operating on 24 VDC with individual trouble and alarm annunciation and with battery standby emergency power.
- B. Provide smoke detectors, strobe lights (synchronized), combination bell/strobe lights, bells, control signal transmitters and communications connections as indicated on the plans, as specified herein, and as required by the AHJ. Provide connections to all new automatic sprinkler system water flow valve switches and gate valve position tamper switches and fire doors.
- C. Actuation or operation of any initiation device shall lock in the alarm at the main control and:
  - 1. Cause alarm bells to sound continuously and visual alarm indicators to flash at a synchronized rate of 1 to 3 flashes/second within the building where the alarm condition originated.
  - 2. Cause the sounding of the exterior horns and/or bells.
  - 3. Flash the zone annunciation on the main control panel.
  - 4. Cause auxiliary relay equipment in main control unit to operate (Pilot duty only) contacts for use in shutting down the HVAC equipment and closing smoke doors on a zone basis.
  - 5. Transmit a coded signal to a private/ central alarm monitoring company. A drill switch is to be provided at the FACP.
- D. Existing FACP at the Ruby North Building is an addressable NOTIFIER fire alarm system.



## **1.07 SUBMITTALS**

- A. Submit shop drawings and product data in accordance with Section 01 3300, Submittals.
- B. Shop Drawings: Shop Drawings shall be prepared by persons from the Fire Alarm Vendor with the following qualifications:
  - 1. Trained and certified by Fire Alarm Systems Manufacturer and VESDA manufacturer in fire alarm system design.
  - 2. Fire alarm certified by NICET, minimum Level IV Designer and Level III on-site Technician.
- C. Submit manufacturer's descriptive literature. Indicate system components, size of components and installation instructions.
- D. Submit schematic and one-line wiring diagram showing system component locations.
- E. Submit Operations and Maintenance Manuals in accordance with Section 01 7823, Training and Operations & Maintenance Manuals.
- F. Submit Fire Marshal approved shop drawings per 1.03 for engineer's review.

## **1.08 WARRANTY**

- A. Contractor shall replace and repair, to the satisfaction of the Resident Engineer, any parts of the installation which may fail within a period of 12 months after the certificate of final acceptance, provided that such failure is due to defects in material or workmanship, or failure to follow the Specifications and Drawings.

## **PART 2 PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURER**

- A. Catalog numbers of Detection Systems are used to identify quality, appearance and operation of system components.
- B. Approved equal in accordance with Section 01 6023, Substitution Request Form and Section 01 1113, Federal Buy America Requirements
- C. Fire Alarm Vendor Qualifications:
  - 1. General: The Fire Alarm system expansion shall be installed by a certified installer and mechanics, all of whom are properly trained and qualified for this work. Conform to all codes and manufacturers recommendations.
  - 2. The vendor shall design, supervise, program and commission the installed system and shall provide warranty service.
  - 3. Fire Alarm Vendor shall be an experienced firm regularly engaged in the design, installation and testing of pre-action detection and activation systems, inclusive of design and installation of Air Sampling Smoke Detection Systems in strict accordance with all applicable standards.
  - 4. The vendor shall have the ability to provide any replacement part on site within 48 hours.
  - 5. The vendor shall be able to provide a fully equipped and qualified, factory trained repair technician at the jobsite within eight hours of a request for emergency service. This service shall be available 24 hours per day during the term of the warranty.

### **2.02 REMOTE DETECTOR INDICATORS**

- A. Where indicated on Drawings and with all duct type detectors, provide LED annunciation on a single gang, stainless steel plate, lettered "Alarm Indicator". Where multiple indicators are mounted, the HVAC equipment shall be identified with a nameplate on each indicator plate. Provide with remote test feature.
- B. Remote detector indicators shall be ceiling mounted on second level below the associated supply fan or as indicated on Contract Drawings.

### **2.03 SPRINKLER SYSTEM CONNECTIONS**

- A. Automatic sprinkler system water flow indicators and tamper switches are provided under Division 21. Contractor shall furnish and install all raceway, wire and make connections as required to tie into the associated fire alarm system zone. Contractor shall verify that sprinkler water flow indicators are equipped with pneumatic retard feature to prevent false alarms due to water pressure fluctuations. Division 26 subcontractor shall furnish and install all raceway, wire and connect to the Fire Alarm Control Panel.
- B. Automatic sprinkler system gate valves are provided under Division 21. Valve position tamper switches are fitted to these valves. Contractor shall furnish and install all raceway, wire and make connections as required to tie the valve position tamper switches into the appropriate circuit of the fire alarm system. Division 26 subcontractor shall furnish and install all raceway, wire and connect to the Fire Alarm Control Panel.

### **2.04 FIRE ALARM SIGNALING UNITS**

- A. Provide fire alarm evacuation notification devices. Wire as a primary signaling notification device. Adjustable candela. Provide synchronized visual alerting module.

### **2.05 SMOKE DOOR/SHUTTER RELEASE MECHANISMS**

- A. Magnetic holder type, combination door closer/holder as furnished under hardware division or separately mounted device. Electrical characteristics of door holder mechanisms shall be coordinated for proper operation of magnetic release from fire alarm system. Manual override release shall be possible at any time.

### **2.06 FAN SHUTDOWN**

- A. Provide fan shutdown circuitry as required. Relays shall be provided and connected under Section 2 62913, Motor Controllers as applicable.

### **2.07 SPRINKLER SYSTEM MONITORING**

- A. The Contractor shall be responsible for coordinating the Fire Alarm System with the sprinkler system contractor.
- B. Provide detection and annunciation as required by the AHJ to supervise OSY and gate valve positions and air pressure for dry systems.
- C. Provide detection and annunciation of water flow, or pressure activated alarms.

### **2.08 EQUIPMENT LABELING**

- A. All equipment shall be listed and labeled by UL.

### **2.09 SUPERVISORY FUNCTIONS**

- A. Supervise the 120 VAC circuits supplying the FACP.
- B. Supervise the initiating circuits, the central station protective signaling circuit, audible alarms circuits, and strobe circuits against grounds, open and short circuits. These devices shall be wired class "B".
- C. Any equipment trouble or malfunction shall sound a local buzzer and turn on an externally visible light (LED) in the FACP.
- D. Upon application or reapplication of 120 VAC power, the fire alarm system shall automatically, without any operator intervention, initialize all circuitry and shall be in a normal operating condition.

### **2.10 LOCKS**

- A. Locks for cabinets and enclosures shall be keyed per Resident Engineer instructions.

### **2.11 KEYED SILENCING SWITCH**

- A. A supervised key operated switch in an enclosure shall be mounted adjacent to the FACP for silencing alarms.

## **2.12 END OF LINE DEVICES**

- A. Appropriate end-of-line devices shall be provided as required for the various zones.

## **2.13 POWER SUPPLIES AND ACCESSORIES:**

- A. Notification Appliance Circuit (NAC) Power Supply: Similar to Notifier Cat.#FCPS-24S8, Remote Power Supply. Use NAC for expander power circuits to increase power in Strobes and Bells in facilities. 24VDC, 3A maximum per circuit. (4) Class A (Style Z) or B (Style Y) circuits. Includes a System Sensor for Sync-Generator.
- B. Provide sealed lead-acid type batteries. Batteries shall be dated and carry a minimum five-year warranty.

## **PART 3 EXECUTION**

### **3.01 APPROVED EQUIPMENT AND PERMIT**

- A. Obtain a permit from the local AHJ prior to installation of equipment as required.

### **3.02 INSPECTION BY AUTHORITY HAVING JURISDICTION (AHJ)**

- A. Schedule periodic inspections as required by the AHJ during the installation of the system. Make any corrections, deletions, relocations or additions to the system as required for acceptance by the AHJ at no additional cost to the owner. Inform the Resident Engineer in advance of all AHJ inspections.

### **3.03 CIRCUITRY**

- A. All wiring shall be contained in steel raceways. Wiring insulation shall be one of the types required by NEC and shall be consistently color coded throughout the system. Permanent wire markers shall be affixed to all conductors at terminations and splices. Numbering system shall be consistent with shop drawings. Color schedule shall be reviewed by the Resident Engineer prior to delivery of wire to the project. All terminations shall be T&B "Sta-Kon" (or equivalent) self insulated, flanged or forked tongue lugs where connected at screw type terminals. Wiring in main control cabinet shall be neatly arranged and bundled with Ty-wraps (or equivalent). Connections at junction boxes shall be accomplished with the use of terminal blocks only.

### **3.04 AUXILIARY CONTROLS**

- A. Conductors and power supplies of sufficient size shall be installed to minimize voltage drop consistent with the proper operation of all devices.
- B. Destructible link smoke dampers shall not be connected to the fire alarm system. Fan Shutdown Control Circuits and Smoke Removal Circuits need not be electrically supervised (subject to NFPA 72A and 72E requirements) and may be incorporated into the fire alarm raceway system, except that limited energy circuits shall be routed separately from line voltage circuits as required by NEC.

### **3.05 AIR DUCT SMOKE DETECTORS**

- A. For conformance with NFPA 90A Chapter 4 "Controls", provide one duct smoke detector downstream from the filters in each system of 2000 CFM or greater in supply fans. In fan systems of over 15,000 CFM rating, provide Duct Smoke Detectors in the return and the supply. Coordinate installation with Division 23 and sheet metal installer. Provide remote indicator lights where the detector is located above a suspended ceiling or in an area that is not readily accessible.

### **3.06 FAN SHUTDOWN**

- A. Provide all raceways, conductors and wiring of fan shutdown circuits to all required motor starter control circuits per Sections 26 29 13. These circuits are not shown on the Drawings, but shall be furnished and installed.

### **3.07 SMOKE DOOR RELEASE MECHANISMS**

- A. Provide circuits for smoke door and heat release mechanisms. These circuits are not shown on the Drawings, but shall be furnished and installed.

### **3.08 MOUNTING METHODS**

- A. Conduit, panels, devices and boxes shall be secured by means of expansion shields in concrete, machine screws on metal surfaces and wood screws on wood construction. Attachment with devices driven in by power charge or nail type nylon anchors are not acceptable. Mount all devices and equipment.

### **3.09 TESTING**

- A. The completed system shall be tested and, after one subsequent week (minimum) "on line" operation, demonstrated to operate satisfactorily in the presence of the Resident Engineer and the AHJ. Approval of the AHJ shall be evidenced in writing and a copy forwarded to the Resident Engineer in accordance with Sections 0 13300, Submittals and 26 0126, Acceptance Testing.
- B. Acceptance Testing shall be in accordance with NFPA 2014. Submit report of acceptance testing for engineer's review

### **3.10 INSTRUCTION**

- A. The Contractor shall after one week (minimum) written notification to the Resident Engineer conduct an instruction session during which all maintenance and operational aspects of the system will be described and demonstrated to personnel selected by the Owner. The session shall be conducted by a contractor's representative or vendor thoroughly familiar with the characteristics of the system. O&M manual information regarding the system shall be turned over to the Engineer prior to scheduling the instruction session, in accordance with Section 26 0500, Common Work Results for Electrical, Section 01 7823, Training and Operations & Maintenance Manuals and Section 01 3300, Submittals.

### **3.11 OPERATION AND MAINTENANCE MANUALS**

- A. Provide per Section 01 7823, Training and Operations & Maintenance Manuals. Submit per Section 01 3300, Submittals.

### **3.12 AS-BUILT DRAWINGS**

- A. Provide record drawings in accordance with Section 01 7839, Project Record Documents, and Section 26 0500, Common Work Results for Electrical. As-built drawings shall clearly indicate:
  - 1. Actual routing of all raceways.
  - 2. Actual cable type, numbers, colors and routing.
  - 3. Actual system wiring diagrams, connection diagrams and interface of all components in the systems.
  - 4. Final voltage drop and battery calculations.

**END OF SECTION**