This master should be used by designers working on Port of Portland construction projects at PDX. Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

SECTION 284600 -– PDX FIRE DETECTION AND ALARM

1. GENERAL
	* + 1. DESCRIPTION
				1. Provide expansion and modifications to the existing Edwards EST3 fire alarm system and FireWorks network. Performance of the system modifications shall meet all performance aspects of the existing Edwards EST3 system in addition to the requirements stated within these specifications or shown on the drawings.
				2. Providing all system design, permits, labor, equipment, materials, installation, programming, testing, commissioning, and other services required to furnish a fully functional, code-compliant fire alarm system that is tested and accepted by the authority having jurisdiction (AHJ) and in accordance with the contract documents.
			2. REFERENCES
				1. Abbreviations and Acronyms:

ADA: Americans with Disabilities Act

AED: Automated External Defibrillators

AHJ: Authority Having Jurisdiction

AAN: Audio Annunciation Network

EOL: End of Line

EFSO: Emergency Fuel Shutoff

EPO: Emergency Power Off

FAAP: Fire Alarm Annunciator Panel

FACU: Fire Alarm Control Panel

FAN: Fire Alarm Network (connecting FACUs)

FASSP: Fire Alarm System Service Provider

FWN: FireWorks Network (connecting servers and clients)

HVAC: Heating Ventilating and Air Conditioning

LCD: Liquid Crystal Display

LED: Light Emitting Diode

NAC: Notification Appliance Circuit

NRTL: Nationally Recognized Testing Laboratory

PDX: Portland International Airport

SLC: Signal Line Circuit

* + - * 1. References:

ANSI: American National Standards Institute

Edwards: EST3 Seismic Application Guide

FCC: Federal Communications Commission

FCC Part 15: Radio Frequency Devices

IBC: International Building Code

OSSC: Oregon Structural Specialty Code

ISO: International Organization for Standardization

NICET: National Institute for Certification in Engineering Technologies

NFPA: National Fire Protection Association

NFPA 3: Standard for Commissioning of Fire Protection and Life Safety Systems

NFPA 70: National Electrical Code

NFPA 72: National Fire Alarm and Signaling Code

NFPA 101: Life Safety Code

NFPA 170: Standard for Fire Safety and Emergency Symbols

UL: Underwriters Laboratories

UL 268: Smoke Detectors for Fire Alarm systems

UL 864: Standard for Control Units and Accessories for Fire Alarm Systems

Port of Portland:

Fire Alarm Device Schedule

Fire Alarm Standard Symbols

* + - 1. RELATED WORK SPECIFIED ELSEWHERE

Edit as applicable to the project.

* + - * 1. Section 019100, General Commissioning Requirements
				2. Section 087100, Door Hardware
				3. Section 092900, Gypsum Board
				4. Section 142423, Hydraulic Elevators
				5. Section 212000, Fire Suppression Systems
				6. Section 230900, Instrumentation and Controls for HVAC
				7. Section 260500, Common Work Results for Electrical
				8. Section 260533, Raceway and Boxes for Electrical Systems
				9. Section 271000, Structured Cabling
				10. Section 280513, Conductors and Cables for Electronic Safety and Security
				11. Section 280553, Identification for Fire Alarm Systems
				12. Section 281300, Security Access Control System
			1. SYSTEM DESIGN REQUIREMENTS

Edit the items in the following subparagraphs as appropriate.

* + - * 1. The contract documents indicate the general nature or requirements of the fire alarm system, but do not necessarily show all components required. The Contractor shall provide a complete fire alarm system design and installation, as required, to meet applicable codes, appeals, and requirements under this section. The system shall consist of, but not be limited to the following components as required:

UL-listed, electrically operated and supervised, stand-alone FACUs (if applicable) with a connection to the existing PDX FACU and FireWorks network.

Remote booster power supplies, as required, to minimize NAC voltage drop.

Voice evacuation amplifiers to interface with the existing audio source unit in the communications center at PDX.

Manual pull stations at all building exits.

Single-coil fire alarm speakers.

Audible/visual alarm devices.

Smoke and Heat Detectors:

Area and duct smoke detection shall be provided in accordance with NFPA 72 requirements. In addition, smoke detection shall be provided at ducts and at the ceiling in all new spaces and rooms or where indicated on the drawings.

Heat detectors shall be provided in areas where smoke detection is not appropriate due to ambient and environmental conditions.

Provide interface with clean agent fire suppression system or pre-action fire sprinkler systems as specified in Division 21.

Monitor modules, installed in a fail-safe manner, required to power and/or interconnect devices supplied under other divisions, including but not limited to:

Elevator shunt trip power.

Monitor end switches (if applicable) or status of HVAC dampers after activation.

Fire suppression supervisory and flow switches.

Fuel shutoff switches.

Automated external defibrillators (AED).

Foreign fire alarm detection and suppression systems (e.g., fire alarm system at passenger boarding bridges).

Monitor all heat trace controller alarm/trouble outputs where heat trace is used for the fire sprinkler system. Report as supervisory signal at the FACU and FWN. Provide an individual monitoring module for each heat trace controller.

Control modules required to power and/or interconnect devices supplied under other divisions, including but not limited to:

Elevators for recall operation and power shutdown.

HVAC system to shut down air handling units.

HVAC system to release fire/smoke dampers.

Interrupt power to magnetic locks at emergency exits.

Force relays in the baggage system to initiate energy management and shutdown mode by fire alarm sprinkler zone.

Conduit and cabling.

Fiber communications network interconnections between new and existing FACUs, unless otherwise approved by the Port. FACU network connections shall be a 12‑strand fiber optic cable, minimum.

Provide a dedicated conduit raceway system for the fire alarm fiber communication cabling, provide all hardware, jumpers and FODU required for a complete fire alarm fiber distribution system.

The FODU shall be installed in an enclosure with fiber jumpers protected, or routed in conduit to the FACU.

New or replacement FAN and AAN segments shall be routed panel-to-panel, and shall not utilize a hub-and-spoke topology, unless approved by the Port.

* + - * 1. Automatic Operation Functions:

Upon activation of any fire alarm initiating device, fuel shutdown switch, AED enclosure door switch, standalone fire suppression system, or sprinkler system water flow switch, the following shall automatically occur:

The alarm condition shall be annunciated visually by a flashing red “Common Alarm” LED in the FACU. The FACU LCD shall indicate the appropriate circuit and device in the alarm.

The alarm shall be graphically displayed on the FireWorks network.

Upon activation of any duct smoke detector or area smoke detector, initiate shutdown of the HVAC system(s) and close fire smoke dampers within the HVAC zone of origin to prevent smoke from spreading through the HVAC system.

Upon activation of a sprinkler valve supervisory switch or other supervisory condition, the following sequence shall be initiated:

The supervisory condition shall be annunciated visually by a flashing supervisory LED in the FACU. The supervisory condition shall be differentiated from a trouble condition on the circuit. The FACU LCD shall indicate the appropriate circuit and device in a supervisory condition.

The supervisory condition shall be graphically displayed on the FireWorks network.

Upon activation of a combination of fire sprinkler system water flow and any fire alarm initiating device within the same fire sprinkler system zone of origin, the system shall respond automatically as follows:

Activate all alarm notification appliances within the fire sprinkler zone of alarm origin. The alarm signals shall sound continuously until manually silenced by authorized personnel. It shall be possible to acknowledge the alarm at the FACU, FAAP, or FireWorks without silencing the alarm notification appliances.

Release power to secured egress doors as necessary to facilitate the evacuation of the fire sprinkler zone of alarm origin. Reapply power to secure doors immediately upon a return to normal of both alarm conditions.

Automatic alarm responses shall not depend on manual intervention by system operators, or on the performance of the FireWorks network or any component attached to it.

If communication between the FAN and FWN is interrupted for any reason, the FACUs shall continue to function in a stand-alone capacity, activating fire alarm notification appliances and other programmed operations.

Upon activation of a fire alarm initiation device located in an elevator lobby, machine room, or elevator shaft, initiate elevator control functions, capture the elevators cab(s), and return them to the enplaning level (Primary Elevator Recall), unless the fire is on the enplaning level, then the elevators shall be returned to the deplaning level (Alternate Recall).

Activation of a top of shaft or machine room initiating device shall cause the fireman’s hat light to flash in the elevator cab; any other activation of lobby initiation devices shall cause the fireman’s hat light to illuminate continuously.

Any activation of the recall function shall be accompanied by a continuous tone emanating from the elevator cab control panel. Upon activation of the recall function, the elevator shall remain in the recalled state until the associated FACU is reset and the proper elevator key is used to release the cab(s) to normal service.

Upon activation of either recall function, the elevator shall remain in this recalled state until the associated FACU is reset and the proper elevator key is used to release the cab(s) to normal service. Any activation of the recall function shall be accompanied by a continuous tone emanating from the elevator cab control panel.

Baggage Handling System (BHS) Interface:

Initiate shutdown of the baggage handling system within the fire sprinkler zone of origin by triggering the BHS energy management zone as required:

In secured areas: Upon activation of a fire sprinkler system water flow in the fire sprinkler zone of origin.

In non-secured areas: Upon activation of a combination of a fire sprinkler system water flow and an area smoke detector, heat detector or manual pull station within the same fire sprinkler system zone of origin.

Additionally, in Checked Baggage Resolution Area (CBRA):

Upon activation of an area smoke detector, heat detector or manual pull station in the room, Mobile Inspection Tables (MIT) carts are to continue to operate and park in a designated area that does not block the egress path, as determined by the baggage handling system.

Upon activation of a fire sprinkler system water flow:

Mobile Inspection Tables (MIT) carts are to cease operation in place immediately upon activation of water flow in the CBRA fire sprinkler zone.

Initiate shutdown of the incoming, unscreened sections of the BHS into CBRA. All unaffected screened sections shall continue to operate.

* + - * 1. Manual Operation Functions:

At any time, even without an alarm condition on an initiating circuit, the operator shall have the following manual capabilities at the FACU using the user interface located behind a key-locked cover:

Initiate the general alarm signal.

Silence the local audible signal. This shall also cause the LED(s) to cease flashing and to be on continuously.

Silence the alarm signals.

Disable the central station (Remote Station) transmitter.

Reset the FACU after all initiating devices have been restored to normal.

Disconnect any individual initiating or indicating circuit from the alarm sequence. This action shall light a “Disconnect” LED and cause a trouble condition.

Perform a complete operational test of the system microprocessor with a visual indication of satisfactory communications with each board.

Test all panel LEDs for proper operation without causing a change to the condition on any zone.

It shall be possible to command test, reset, and silence the alarm from both the FACU and the main operating console.

* + - * 1. System Supervision Functions:

Upon application of primary power or reapplication following a power failure, the FACU shall automatically energize all circuitry and shall automatically be in a normal supervisory condition.

In the normal supervisory condition, only the green “Power” LED indicating the presence of primary power, and the green “Run” LED indicating the normal operation of the microprocessor and memory data, shall be illuminated. All initiating devices and notification appliance circuits shall be electrically supervised.

Upon power failure, the system shall sound an audible trouble signal. Standby power shall be automatically provided by the system’s batteries. The system’s batteries and power supply shall be sized to provide 4 hours of supervisory operation with the capability of sounding the general alarm for at least 15 minutes at any time during the 4 hours following the loss of AC power. Following restoration to normal AC power, the trouble indicators shall be automatically reset.

An open circuit in an initiating loop shall cause the common trouble LED at the FACU to be lighted. The trouble audible at the FACU shall sound.

Other circuit faults in the system shall light the common trouble LED and sound the audible trouble signal at the FACU. The LED assigned to the specific fault shall light at the FACU. Individual LEDs shall be provided for central station (Remote Station) disconnect, initiating device or notification appliances circuit disconnect, a ground fault on any extended system wiring, low battery voltage, and fault on any initiating or signaling circuit.

Operation of a momentary “Silence” switch shall silence the audible trouble signal, but the visual “Trouble” LEDs shall remain on until the malfunction has been corrected and the system reset. To prevent the system from being inadvertently left in an abnormal condition, the “Silence” function shall be such that a new trouble condition will re-initiate the sequence above.

* + - 1. SUBMITTALS

Edit or delete the following items as appropriate.

* + - * 1. Pre-Design Narrative:

Prior to commencement of design and preparation of shop drawings, submit a pre-design narrative. Include at a minimum:

Review of existing Fire Alarm System Maintainable Drawings in the proposed area of work. Identify any deficiencies or errors within the area of work in this contract.

Review of existing test reports in the proposed area of work. Identify any deficiencies that may impact the work of this contract.

Proposed points of connection to the existing AAN, FAN, and FWN, including block diagrams showing proposed topologies.

List of all devices and equipment shown on the drawings as existing to remain or to be relocated, that are obsolete. Include quantities, literature for proposed replacements, and budget costs.

List of all required inter-system connections such as HVAC control, elevator, baggage handling system, etc., and summary description of the means of integration.

* + - * 1. Product Data: Submit a bill of materials for all products utilized. For each type of product, include furnished options and accessories.

Include construction details, material descriptions, dimensions, profiles, and finishes.

Include rated capacities, operating characteristics, and electrical characteristics.

* + - * 1. Fire Alarm Shop Drawings:

Following approval of the pre-design narrative, prepare and submit shop drawings of the system design utilizing AutoCAD or Revit with the Port’s standard fire alarm legend and current project backgrounds provided by the Port or the Contractor. Drawings shall be in accordance with the latest version of the Port’s CAD and BIM Standards Manual, available for download on the Port’s public website at [www.portofportland.com](http://www.portofportland.com).

Comply with recommendations and requirements in the “Documentation” section of the “Fundamentals” chapter in NFPA 72.

Shop drawings shall indicate, but not be limited to, the following:

Floor plans to indicate fire alarm devices and equipment locations. Show address of all addressable devices, size and route of cable and conduits, and point-to-point wiring diagrams. Floor plans shall be legible and drawn at a scale of 1/8" = 1'-0" minimum. Coordinate with FASSP for drawing scale and drawing numbers.

Schematic and riser diagrams.

Voice/alarm signaling-service equipment amplifier power calculation and single-line connection diagram.

Include calculations for determining the requirements for:

Spacing and sensitivity of detectors.

Spacing and intensities for strobe signals and sound-pressure levels for audible appliances.

Voltage drop for NACs: Provide actual voltage measurements as a basis of calculating voltage drop on existing NACs.

Battery sizing.

Audio loss calculations for speaker circuits.

Sequence of operation in the form of a cross-functional matrix describing all programed functions for each individual alarm initiating device. For example, indicate specific HVAC unit(s) to be shut down, specific baggage handling control system zone(s) to be shut down, etc

Shop drawings shall be prepared by persons with the following qualifications:

Trained and certified by manufacturer in fire alarm system design.

NICET Level IV Fire Alarm certified engineering technician.

* + - * 1. Preliminary Test Plan (PTP):

Following approval of the shop drawings and product data, prepare and submit a preliminary testing plan. The PTP shall include the following, at a minimum:

A narrative description of the scope of work and the equipment to be tested.

A copy of the approved shop drawings.

A list of the equipment provided by others that is to be monitored or controlled by the fire alarm system including, but not limited to:

Access controlled egress doors.

AED enclosure doors.

Baggage handling system equipment.

Clean agent releasing systems.

Emergency fuel shutoff switches (EFSO).

Elevators.

HVAC equipment such as air handling units and fire/smoke dampers.

Passenger boarding bridge fire alarm devices.

Sprinkler risers and heat trace controllers.

A preliminary test script for the known device types included in the scope narrative, shop drawings, and list of equipment provided by others.

A preliminary schedule showing the durations of fire alarm system testing activities including:

Pre-testing.

Submittal and review of the final acceptance test plan.

Final acceptance testing to be witnessed by the Port and its representatives.

AHJ witness testing.

* + - * 1. Final Acceptance Test (FAT) Plan and Testing Forms:

Following approval of the PTP, prepare and submit a final acceptance test plan and testing forms.

FAT plan and forms shall be in accordance with all NFPA 72 requirements. Integrated testing shall be in accordance with NFPA 3 and NFPA 4. The test forms shall include all applicable information as described in the sample forms included in NFPA 72, Chapter 7. Following are the Port’s additional submittal requirements:

Record or red-line drawings showing the as-built condition of the system.

As-installed FireWorks graphic screens.

Detailed test scripts describing all steps to be followed for each test. Include the following, at a minimum:

Verification of all device locations, device tags or labels, and device address labels.

Verification of proper annunciation of all initiating devices at the FACU and on FireWorks graphical displays.

Verification of all initiating device and SLC functions including but not limited to alarm, trouble and supervisory notification.

Verification of all notification appliances and NAC functions including but not limited to audible and visual signals, as well as circuit supervision.

Verification of all control output functions such as HVAC shutdowns, baggage handling system shutdowns, emergency door release, elevator recall, etc.

Calculations used to determine the number of existing system devices to be tested above and beyond the devices installed or modified by the project in accordance with NFPA 72 under chapter 14 “Reacceptance Testing.”

* + - * 1. System Record of Completion: Following execution of the FAT and correction of any identified deficiencies, submit completed testing forms indicating 100 percent passing results and including signatures or initials by testing personnel and witnessing personnel.
				2. Operation and Maintenance Data:

In addition to items specified in Section 013300, include the following:

Equipment tested.

Required frequency of testing and inspection of installed components.

Requirements and recommendations related to results of maintenance.

Manufacturer’s user training manuals.

Updated shop drawings indicating as-built conditions.

Bill of materials.

Abbreviated operating instructions for mounting at FACU and FAAP.

Certificate of completion.

Software and firmware operational documentation:

Program Software Backup: Electronic SDU and FireWorks project files.

Device address list.

Screenshots of software application and modified graphic screens in electronic PDF format.

* + - * 1. PDX Maintainables Fire Alarm Drawings (AutoCAD or Revit): Upon completion of the work, submit updated sheets to the PDX Maintainable Fire Alarm drawing set showing all changes to the system.
			1. CODES AND APPROVALS
				1. Obtain necessary approvals from local authorities for materials to be supplied, methods of installation, and system operations as required herein and by the local authorities.
				2. All electronic equipment shall conform to the requirements of FCC regulation Part 15, Section 15 governing radio frequency electromagnetic interference and be so labeled.
			2. QUALITY ASSURANCE
				1. All fire alarm components and services under this contract shall be furnished by Convergint Technologies. No substitutions will be permitted.
				2. All components shall be listed by a qualified testing agency both in individual components and as a system and installed in accordance with NFPA and OSSC requirements.
				3. Installation shall be supervised or installed by personnel with a minimum NICET Level 2 certification. Personnel shall be trained and certified by and in good standing with the manufacturer.
				4. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL.
1. PRODUCTS

Per Port’s Contract Review Board Rules adopted Oct. 25, 2022, the Edwards System Technology EST3 point addressable fire alarm system and FireWorks graphically interfaced Fire Life Safety detection system as provided by Convergint Technologies are approved “No Substitution” exemptions when used at the PDX airport. Exemptions expire December 31, 2027.

* + - 1. GENERAL
				1. All fire alarm system components furnished under this contract shall be fully addressable and compatible with the existing Port fire alarm system and shall integrate directly with the FACUs currently installed. All devices shall report fully through the FACU to the Fireworks graphic monitoring system through the FACU network or FireWorks network with no compromise to the operation, as determined by the Port. Features such as detector sensitivity analysis, status indication, device reporting, and device programming shall be fully functional as intended by the manufacturer.
			2. MANUFACTURER
				1. All fire alarm products shall be manufactured by Edwards System Technology, no substitutions, unless otherwise noted.

Edit or delete the following items as appropriate.

* + - 1. FIRE ALARM CONTROL PANEL (FACU)
				1. The FACU shall be on the Edwards EST3 platform, no substitutions. The FACU shall include the following options:

Central Processor: 3-CPU3.

Display Module: 3-LCD.

In addition to the standard control switches, provide Setup, Test, Manual Evacuation Alarm, and Acknowledge switches. Provide LEDs for “Power,” “Run,” “Trouble,” “Disconnect,” “Low Battery,” and “Ground Fault.”

Control Display Module: 3-12SG

Power Supplies: 3-PPS, 3-PPS/M, 3BPS, or 3-BPS/M

Signature Driver Controllers: 3-SSDC2/3-SDDC2

Network communications card: 3-FIBMB2.

Maintenance-free, sealed lead acid batteries with adequate capacity to provide the indicated operation.

Seismic Battery Hold-Down: BC-1EQ, 3-CABEQ, 3-RCCEQ50, or 3-RCCEQ65.

* + - * 1. Provide an alarm silence switch in the FACU to override the piezo alarm while conducting testing and inspection services. Switch in silence position shall be monitored as a trouble alarm.
				2. Enclosure:

Visual indicators of FACU status shall be visible without opening the key-locked cover.

Locks: BHMA A156.11, E07121. Lock cylinders and keying where noted:

Equip locks with cylinders with full size interchangeable core pin tumbler inserts. Furnish only temporary inserts for the construction period. Permanent inserts will be furnished and installed by the Port.

* + - 1. FIRE ALARM ANNUNCIATOR PANEL (FAAP)
				1. Description: Remote annunciator functions shall match those of FACU for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
				2. Mounting: Flush cabinet, NEMA 250, Type 1.
				3. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.
				4. Enclosure:

Visual indicators of FACU status shall be visible without opening the key-locked cover.

Locks: BHMA A156.11, E07121. Lock cylinders and keying where noted:

Equip locks with cylinders with full size interchangeable core pin tumbler inserts. Furnish only temporary inserts for the construction period. Permanent inserts will be furnished and installed by the Port.

* + - 1. INITIATING DEVICES – DETECTORS
				1. Multicriteria Smoke Detector:

Smoke Detector:

Model: Edwards SIGA-OSHD, no substitutions.

Duct Smoke Detector:

Model: Edwards SIGA-SD, no substitutions.

Remote Alarm LED: Edwards SIGA-LED, no substitutions.

Test Station: Edwards SIGA-DTS, no substitutions.

* + - * 1. Heat Detector:

Fixed Temperature:

Model: Edwards SIGA-HFD, no substitutions.

Rate of Rise Temperature:

Model: Edwards SIGA-HRD, no substitutions.

Rate Compensation Heat Detectors:

Model: 302 series, or pre-bid approved equal.

* + - * 1. Detector Bases:

Standard Base:

Model: Edwards SIGA-SB, no substitutions.

Detector Base with Isolator:

Model: Edwards SIGA-IB, no substitutions.

* + - * 1. Beam-Type Smoke Detectors:

Provide projected beam-type smoke detectors. The beam detectors shall be four-wire 24 VDC and powered from the control panel four-wire smoke power source. This unit shall consist of a separate transmitter and receiver capable of being powered separately or together. This unit shall operate in either a short range of 30 to 100 feet or a long range of 100 to 300 feet. The detector shall feature a bank of four alignment LEDs on both the receiver and transmitter that are used to ensure proper alignment without the use of special tools.

The beam detector shall feature automatic gain control that compensates for gradual signal deterioration from dirt accumulation on lenses. Ceiling or wall mount as shown on the drawings. Testing shall be carried out using calibrated test filters. Provide a key-activated remote test station.

Provide monitor modules for alarm and trouble and control relay module for reset.

* + - 1. MANUAL PULL STATIONS
				1. Intelligent, Single Action Pull Station:

Model: Edwards SIGA-270, no substitutions.

* + - * 1. Intelligent, Double Action Pull Station:

Model: Edwards SIGA-270, no substitutions.

* + - * 1. Pull Station, Outdoor Application:

Model: Edwards MPSR1-SHTW-GE, no substitutions.

* + - 1. SIGNAL MODULES
				1. Single Input Module:

Model: Edwards SIGA-CT1, no substitutions.

* + - * 1. Dual Input Module:

Model: Edwards SIGA-CT2 or SIGA-MCT2, no substitutions.

* + - * 1. Single Input Signal Module:

Model: Edwards SIGA-CC1 or SIGA-MCC1, no substitutions.

* + - * 1. Dual Input Signal Module:

Model: Edwards SIGA-CC2 or SIGA-MCC2, no substitutions.

* + - * 1. Monitor Module:

Model: Edwards SIGA-MM1 or SIGA-WTM, no substitutions.

* + - * 1. Control Relay Module:

Model: Edwards SIGA-CR, SIGA-CRH or SIGA-MCR, no substitutions.

Per Port’s Contract Review Board Rules adopted Apr. 2, 2019, the Eaton (previously Cooper-Wheelock) fire alarm notification appliance panels and notification appliances interfaced with Port’s fire alarm system are approved “No Substitution” exemptions when used at the PDX airport. Exemptions expire March 31, 2023.

* + - 1. NOTIFICATION APPLIANCES
				1. All notification appliances which are supplied for the requirements of this specification shall be UL-listed for fire protective service and shall be capable of providing the “Equivalent Facilitation,” which is allowed under the Americans with Disabilities Act Accessibility Guidelines (ADA[AG]) and shall be UL 1971 and ULC S526-listed.
				2. Remote Booster Power Supplies:

Model: Eaton, Wheelock PowerPath series, no substitutions.

Inputs:

120VAC with built-in battery charger and sealed lead acid, gel, or AGM type backup battery.

Capable of 2 Class A or 2 Class B NACs.

Outputs:

Capable of 4 Class B or 2 Class A NACs. NAC outputs shall be 24VDC, 3 amps, power limited.

Supervision:

Compatible with 12V or 24V FACU.

Automatic switchover to standby battery when AC fails.

Thermal and short-circuit protection with auto reset.

AC fail, battery presence and low battery conditions.

Enclosure:

Minimum 14-gauge steel.

Locks: BHMA A156.11, E07121. Lock cylinders and keying where noted:

Equip locks with cylinders with full size interchangeable core pin tumbler inserts. Furnish only temporary inserts for the construction period. Permanent inserts will be furnished and installed by the Port.

* + - * 1. Self-Synchronized Strobes:

Model: Eaton Eluxa model ELSTW (wall) and ELSTWC (ceiling), no substitutions.

Characteristics: The strobe housing shall be white with red lettering. Strobes shall be synchronized to meet the requirements of ADA and NFPA standards. Strobes shall have lens markings oriented for wall mounting. Ceiling-mounted strobes shall have lens markings with correctly oriented lettering.

* + - * 1. Speakers:

Model: Eaton Eluxa speaker model ELSPKW (wall) and ELSPKWC (ceiling), no substitutions.

Characteristics: Speaker housings shall be white.

* + - * 1. Speaker/ Strobes:

Model: Eaton Eluxa combination speaker-strobe model ELSPSTW (wall) and ELSPSTWC (ceiling), no substitutions.

Characteristics: Speaker/strobes housing shall be white with red lettering. Strobes shall be synchronized to meet the requirements of ADA and NFPA standards. The strobe shall have lens markings oriented for wall mounting. Ceiling-mounted speaker/strobes shall have lens markings with correctly oriented lettering. Removal of an installed speaker/strobe to change the lens markings will not be acceptable.

* + - 1. AUDIO AMPLIFIERS
				1. 40 Watt Zoned Amplifier w/Class A/B

Model: Edwards 3-ZA40A/B, no substitutions.

* + - * 1. 95 Watt Zoned Amplifier w/Class A/B

Model: Edwards 3-ZA95, no substitutions.

* + - 1. FIBER OPTIC CABLING
				1. Fiber optic cabling shall meet requirements of Section 271000, Structured Cabling.
1. EXECUTION
	* + 1. GENERAL
				1. Work shall be performed in accordance with the requirements of NFPA 70 and NFPA 72.
				2. Fire alarm devices shall be accessible for periodic maintenance unless otherwise approved by the Port.
				3. Systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems may be installed within a common conduit raceway system, in accordance with the manufacture’s recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
				4. No wiring except life safety system circuits and system power supply circuits shall be permitted in the FACU enclosures.
				5. Devices containing end-of-line resistors shall be appropriately labeled. Devices shall be labeled such that removal of the device is not required to identify the EOL device.

Delete the article below for new construction work.

* + - 1. PROTECTION AND REMOVAL OF EXISTING EQUIPMENT
				1. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it “NOT IN SERVICE” until it is accepted. Remove labels from new equipment when putting into service, and label existing fire-alarm equipment “NOT IN SERVICE” until removed from the building.
				2. Equipment Removal: After acceptance of a new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring back to the source.
				3. Existing Fire Alarm Equipment to Remain: Provide protection for existing fire alarm equipment shown in the contract documents to remain. Where construction activities will create excessive dust, moisture, smoke, or other conditions that may damage equipment, consult with the Port to remove equipment temporarily or provide temporary protection such as plastic cover or bags.
			2. INSTALLATION AND PROGRAMMING COORDINATION
				1. The Contractor shall schedule all fire alarm system programming downloads with the Port. The Contractor shall coordinate program downloads associated with this project with the program download requirements of other concurrent work at Portland International Airport, including, but not limited to the ongoing fire alarm system testing and maintenance functions, to minimize disruptions to the system. The Contractor shall incorporate known room number changes or corrections in the programming downloads. All programming shall be reviewed and tested prior to downloading to the existing system.
				2. Fire alarm devices shall be installed and activated within 1 calendar week of system programming and downloading the program changes to the FACU network and FWN. If devices are not activated within 1 calendar week, the Contractor shall, at its own expense, restore the system programming to the previous condition. The Contractor shall track trouble conditions due to construction activities and provide a report to the Port upon request.
				3. Notify the Port prior to FACU modifications, shutdowns, or de-energizing or energizing any fire alarm circuit.

Work requiring de-energizing fire alarm circuits shall require 72 hours’ advance notification.

* + - * 1. Safety Fire Watch: If an area defined by four or more detectors is out of service for more than 4 hours, then a fire watch shall be provided by the Contractor until the fire detection system is back in service for the specific area. If large occupied areas of the facility are not being monitored by the fire detection system, then the fire watch shall be responsible for monitoring the entire affected area on a regular basis. The purpose of the fire watch will be to notify the PDX Communications Center in the event that a fire occurs in the space. The person providing the fire watch may be a construction worker assigned to or working in the area, and shall be provided 24 hours per day, 7 days per week through the duration of the interruption.
			1. INSTALLATION OF FIRE ALARM COMPONENTS
				1. Devices and appliances shall be mounted to or in an approved electrical box.
				2. Label system in accordance with Section 280553.
				3. FACUs, FAAPs, and Remote Booster Power Supplies:

Mount the FACU enclosure with the top of the cabinet 72 inches above the finished floor or center the cabinet at 63 inches, whichever is lower. The FACU shall be installed in accordance with the manufacturer’s guide for seismic applications, EST3 Seismic Application Guide.

Paint the handles of the dedicated circuit breakers feeding fire alarm panels red, and install handle locks.

Within the panel, non-power limited wiring shall be properly separated from power limited circuits.

* + - * 1. Manual Pull Stations: Mount stations so that their operating handles are between 42 inches and 48 inches above the finished floor.
				2. Notification Appliances:

Wall-mounted audio/visual devices shall be mounted so the entire lens is between 80 inches and 96 inches above the finished floor unless otherwise indicated on drawings.

Each speaker/strobe’s outputs shall be set to the wattage/candela value indicated for its specific location as shown on the drawings.

* + - * 1. Smoke Detectors:

Smoke and heat detector heads shall not be installed until after construction clean-up is completed. Detector heads installed prior to construction clean-up shall be cleaned by the manufacturer or replaced.

Detectors located on the wall shall have the top of the detector at least 4 inches and not more than 12 inches below the ceiling.

Install smoke detectors no closer than 3 feet from air handling supply air diffusers or return air openings.

Locate detectors no closer than 12 inches from any part of a lighting fixture.

* + - * 1. Duct Smoke Detectors:

Install sampling tubes so they extend the full width of ducts exceeding 36 inches.

Detectors shall be located to facilitate ease of maintenance.

All penetrations near detectors located on/in return ducts shall be sealed to prevent air entry.

* + - * 1. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
				2. Beam Smoke Detectors:

Install beam type smoke detectors in accordance with the shop drawings and the manufacturer’s recommendations.

Keep the centerline of the beam a minimum of 24 inches from obstructions.

Mount where accessible for maintenance.

* + - * 1. Heat Detectors: Heat detectors shall be installed in strict accordance with their UL listing, the requirements of NFPA 72 and applicable manufacturer’s recommendations.
				2. Control Relays:

Install the module within 3 feet from the device controlled.

Orient the device mounting for best maintenance access.

Provide a dedicated 24VDC circuit to feed all auxiliary relays required for inductive loads (auxiliary relays, door holders). Circuits shall be supervised via an end-of-line relay and addressable input module. Auxiliary relays shall not derive their power from the starter or load being controlled.

* + - * 1. Cable Installation:

FACU and FireWorks Networks (FAN and FWN) shall utilize NFPA 72 Class A wiring methods. AAN shall utilize NFPA 72 Class B wiring methods. Refer to Section 271000 for communication cabling requirements.

NACs shall be supervised and power limited. NACs shall utilize Class B wiring methods unless otherwise indicated. Initial circuit loading shall not exceed 70 percent to allow for future system expansion. An NAC expander output shall not be used to initiate another NAC expander.

SLCs shall be supervised and shall utilize NFPA 72 Class B wiring methods. SLCs shall be configurable for latched or non-latched operation and configurable to initiate alarm, supervisory, trouble, or monitor events.

No T-taps will be allowed unless approved by the Port. The connection of a Port-approved T-tap shall be made under a DIN rail-mounted terminal block in an electrical enclosure and clearly labeled to indicate the circuit being tapped. The location of the tap shall be clearly indicated on the shop drawings and on the updated Fire Alarm System Maintainable Drawings.

Terminations shall be made directly on the fire alarm device terminals. Connections shall be made directly to and from device terminal screws. Screw terminals shall have rising plates to terminate more than one wire, or each wire shall be terminated to individual screws or in a ring lug.

* + - * 1. Input Modules:

Install the module in a serviceable, conditioned location for best maintenance access. Clearly label module to indicate the device connected.

Monitored device and EOL resistors shall be shown in the shop drawings.

* + - * 1. Isolation Modules: Isolation modules shall be installed on new SLCs in accordance with NFPA 72 and manufacturer’s recommendation.
				2. Fiber Optic Cabling

Install in dedicated raceway system meeting the requirements of Division 26.

Fiber optic cabling and installation shall meet the requirements of Division 27.

* + - * 1. Pre-Action and Agent Release Systems: Coordinate with Division 21 and provide a complete installation and interface to the fire protection systems, including pre-action and agent release control panels.
			1. TRAINING
				1. Provide operation and maintenance training for Port personnel.
				2. Conduct a minimum of three maintenance training sessions (one for each shift). Maintenance training sessions shall include a walk-through of the completed facilities identifying the location, address, and means of access to every device monitored by the fire alarm system.
				3. Conduct training sessions for two operator levels.

Operator training. Provide a minimum of three refresher and system update training sessions (one for each shift) of on-the-job training.

Supervisor training. Provide a system update training session for supervisory functions.

* + - * 1. Training sessions shall be given by a fully qualified, trained representative of the equipment manufacturer who is thoroughly knowledgeable of the specific installation.
			1. FINAL ACCEPTANCE TESTING AND REPORTS
				1. Upon completion of the system’s installation and pre-testing, conduct a thorough installation and acceptance test of the system in accordance with the approved FAT Plan and Forms. Final acceptance testing shall be witnessed by the Port, or Commissioning Agent (CxAg), or Commissioning Authority (CxAu).
				2. Testing shall occur outside of standard business hours unless approved otherwise by the Port. Provide system record of completion with all signatures or initials once all deficiencies identified have been corrected.
			2. AHJ TESTING
				1. Following the approval of final acceptance test by the Port, provide additional witness testing by the AHJ as required to obtain a certificate of occupancy.
				2. Notify the Port when the AHJ testing is to occur.

END OF SECTION 284600