

PROJECT MANUAL FOR THE CONSTRUCTION OF:

PROJECT:

2013 BOND PROGRAM

HAMILTON ELEMENTARY SCHOOL (13160D)
WASS ELEMENTARY SCHOOL (13167E)

BID PACKAGE NO. 31

OWNER:

TROY SCHOOL DISTRICT
4400 Livernois
Troy, Mi. 48098

TMP PROJECT NOS.:13160D, 13167E

DATE: DECEMBER 16,2020

ISSUED FOR BIDS

ARCHITECT

TMP ARCHITECTURE, INC.
1191 West Square Lake Road
Bloomfield Hills, Michigan 48302-0374

PH (248) 338-4561
FX (248) 338-0223
Email info@tmp-architecture.com

CONSTRUCTION MANAGER

BARTON MALOW COMPANY
26500 American Drive
Southfield, Mi. 48034

PH (248) 436-5000
FX (248) 436-5001
Email info@bartonmalow.com

MECHANICAL & ELECTRICAL ENGINEER

PETER BASSO ASSOCIATES, INC
5145 Livernois, Suite 100
Troy, Michigan 48098

PH (248) 879-5666
FX (248) 879-0007
Email info@pbanet.com

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ROLLER SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes manual roller shades.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood blocking and grounds.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.
- C. Full size sample for verification purposes of each type of window shade showing all components, materials, and finishes to be exposed to view. Prepare samples from same materials to be used for fabricating units.
- D. Samples for Verification:
 - 1. Complete, full-size operating unit not less than 16 inches (400 mm) wide for each type of roller shade indicated.
 - 2. Shade Material: Not less than 3 inches (80 mm) square, with specified treatments applied. Mark face of material.
 - 3. Valance: Full-size unit, not less than 12 inches (300 mm) long.
- E. Window Treatment Schedule: Include roller shades in schedule using same room designations indicated on Drawings.
- F. Product Certificates: For each type of roller shade product, signed by product manufacturer.
- G. Product Test Reports: For each type of roller shade product.
- H. Qualification Data: For Installer.
- I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.

2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 3. Operating hardware.
- J. Warranty: Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed installation of roller shades similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
1. Provide a list of three institutional-quality window shade projects successfully completed within the last five years. For each project include the following:
 - a. Project/building name and location.
 - b. Description of scope.
 - c. Representative's name and phone number.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Corded Window Covering Product Standard: Provide roller shades complying with WCMA A 100.1.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide MechoShades as manufactured by MechoShade Systems, Inc or equal products by one of the following:
1. Draper Shade and Screen Co., Inc.
 2. Solarfective Products, Ltd.
- B. Refer to roller shade schedule in Part 3.

2.2 ROLLER SHADES

- A. Shade Band Material - Translucent
1. Translucent Shades shall be light filtering, flame retardant, fade and soil resistant and washable.
 - a. Construction: 100% thermoplastic olefin
 - b. Openness Factor: 3 percent.
 - c. Meets Government Spec. #CCC-C-521-E.
 - d. Type I product
 - e. Weight: Must be a minimum of 6.4 oz. per square yard.
 - f. Color: As selected by Architect from manufacturer's full range.
 - 1) Design Intent: Grey and white.
 2. Provide EcoVeil 1550 Series ShadeCloth as manufactured by MechoShade Systems or equal products by one of the following:
 - a. Draper Shade and Screen Co., Inc.
 - b. Solarfective Products, Ltd.
- B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with removable spline fitting integral channel in tube Provide capacity for one roller shade band per roller, unless otherwise indicated on Drawings.
- C. Direction of Roll: Regular, from back of roller.
- D. Mounting Brackets: Galvanized or zinc-plated steel.
- E. Roller Shades, Non-Pocket-Style:
1. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as indicated on Drawings or in a window treatment schedule; removable design for access.
 2. Top/Back Cover: L shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.

- F. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide exposed-to-view, external-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- G. Shade Operation:
 - 1. Manual: Provide with spring roller continuous loop bead chain, clutch, and cord tensioner and bracket lift operator.
 - a. Position of Clutch Operator: Left or Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated on Drawings or in a window treatment schedule.
 - b. Clutch: Capacity to lift size and weight of shade; sized to fit roller or provide adaptor.
 - c. Lift Assist Mechanism: Manufacturer's standard spring assist for balancing roller shade weight and lifting heavy roller shades.
 - d. Loop Length: Length required to make operation convenient from floor level.
 - e. Bead Chain: Nickel-plated metal or stainless steel.
 - f. Operating Function: Stop and hold shade at any position in ascending or descending travel.
- H. Valance: Style matching hem; as indicated by manufacturer's designation color or as indicated in a window treatment schedule.
- I. Mounting: As indicated on Drawings, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

2.3 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- G. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range.

2.4 WARRANTY

- A. Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Connections: Connect motorized operators to building electrical system.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

3.6 ROLLER SHADE SCHEDULE

- A. Type A Shade Band Material: Translucent
Operation: Manual
Installation: Non-pocket style

END OF SECTION

FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections include the following:
 - 1. Division 26 Section "Electrical General Requirements."

1.2 SECTION INCLUDES

- A. Fire alarm and smoke detection systems. Removal and reinstallation of existing National Time & Signal pull stations, in full compliance with all applicable codes and guidelines. The features and system capacities contained in this specification shall be furnished as part of this project.
- B. The system as described shall be installed, tested, and delivered to the Owner in first class condition. The system shall include all the required hardware and software to accomplish the requirements of this specification and the contract documents, whether or not specifically itemized herein.
- C. All equipment furnished shall be new and include the latest state of the art products from a single manufacturer, engaged in the manufacturing and sale of fire detection devices for over ten years. The equipment manufacturer shall have an installed base of existing systems as a reference.

1.3 REFERENCES

- A. NFPA 72 - National Fire Alarm Code.
- B. NFPA 101 - Life Safety Code.
- C. U.L. 1971 - Standard for Safety Signaling Devices for the Hearing Impaired.

1.4 REGULATORY REQUIREMENTS

- A. System: UL (FPED) and FM listed.
- B. Conform to requirements of NFPA 101.
- C. A.D.A. Federal guidelines.
- D. Conform to State of Michigan Fire Code.
- E. Conform to International Building Code.

1.5 SUMMARY

- A. This Section includes **the removal and reinstallation of fire alarm pull stations at Hamilton and Wass Elementary Schools. Work required due to window replacement, pull stations are mounted on window mullions. Extend circuiting as required.**
- B. Related Sections include the following:

1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

1.6 SYSTEM DESCRIPTION

- A. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.
 1. Interface with existing fire alarm system where indicated.
- B. Fire alarm system shall consist of the following:
 1. All new fire alarm control panel, devices, and wiring.
 2. System smoke detection above all control panels and notification appliance power supply panels.
 3. System smoke detection as required at air handling units, smoke rated transfer openings, and smoke damper locations.
 4. System smoke detection in areas identified on plans.
 5. All flow and tamper switches to monitor fire sprinkler and standpipe systems and report appropriate alarm and supervisory signals.
 6. Manual fire alarm boxes at each building exit (prior to entering exit stairwells at each floor).
 7. Audible and visual notification appliances in all public and common areas of the building.

1.7 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72.
- B. Comply with NFPA 70.
- C. A complete functional system meeting the requirements of this specification, including alarm initiating devices and notification appliances at locations and ratings to meet the requirements of the Authorities Having Jurisdiction and all applicable codes shall be provided.
- D. Coordinate and avoid conflicts with casework, markerboards, feature walls, and other areas where fire alarm devices would interfere with furnishings, finishes, etc.
- E. Fire alarm system vendor shall provide sound pressure level calculations demonstrating compliance with NFPA 72 and establish quantities and tap settings of audible devices.
- F. No additional charges for work or equipment required for a code compliant system approved by the Authority Having Jurisdiction will be allowed.
- G. Obtain and refer to mechanical drawings for smoke damper locations, smoke rated transfer openings, and air handling equipment CFM's. Provide smoke detection as required by applicable codes.
- H. Premises protection includes Education Type building use group.

1. Refer to drawings for complete code analysis including construction type, use groups, special occupancy types, rated walls, smoke barriers and partitions, etc.
- I. System functional performance shall be as indicated on the fire alarm matrix on the drawings.

1.8 SYSTEM DESCRIPTION

- A. General: Complete, zoned, noncoded, addressable, microprocessor-based fire detection and alarm system with manual and automatic alarm initiation, addressable analog initiating devices, and automatic alert.
- B. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel (FACP).
- C. Resident software shall allow for full configuration of initiating circuits so that additional hardware shall not be necessary to accommodate future changes.
- D. Resident software shall allow for configuration of notification appliance and control circuits so that additional hardware shall not be necessary to accommodate changes.
- E. The system shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history.
- F. Signal Transmission: Notification appliance circuits shall be NFPA Style Y, Class B. Signaling line circuits shall be NFPA Style 4, Class B.
- G. Data Communication Transmission Between Control Units: Style 7, Class A.

1.9 SYSTEM FUNCTIONS

- A. Signal Initiation: The manual or automatic operation of an alarm-Initiating or supervisory-operating device shall cause the FACP to transmit an appropriate signal including:
 1. General alarm.
 2. System trouble.
 3. Valve tamper supervisory.
 4. Door release.
 5. Fan shutdown.
 6. Release electrically held door locks.
 7. A general alarm shall be initiated by:
 8. Water-flow alarm switch operation.
 9. Smoke detection. Alarm verification is required for all smoke detector zones.
 10. Manual station operation.
 11. Heat detector operation.

- B. General Alarm: A system general alarm shall:
1. Indicate the general alarm condition at the FACP.
 2. Identify the device that is the source of the alarm at the FACP.
 3. Display the alarm on an 80 character LCD display. The system alarm LED shall flash on the control panel until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the control unit. The display shall show the new alarm information.
 4. Sound a pulsing alarm tone within the FACP until the event has been acknowledged.
 5. Operate audible and visible alarm notification signals throughout the building.
 6. Sound a continuous fire alarm signal until silenced by the alarm silence switch at the FACP.
 7. Flash all visible alarm notification appliances continuously until the System Reset Switch is operated. Any subsequent zone alarm shall reactivate the alarm notification appliances.
 8. Close fire and smoke doors normally held open by magnetic door holders.
 9. Stop supply and return fans serving zone where alarm is initiated.
 10. Close smoke dampers on system serving zone where alarm is initiated.
 11. Transmit the alarm to the proprietary supervising station.
- C. A supervisory alarm shall be initiated by:
1. Sprinkler valve tamper switch operation.
- D. Loss of primary power at the FACP shall sound a trouble signal at the FACP and shall indicate at the FACP when the system is operating on an alternate power supply.
- E. Circuit Supervision: Circuit faults shall be indicated by means of both a zone and a trouble signal at the FACP.
- F. Annunciation: Manual and automatic operation of alarm and supervisory initiating devices shall be annunciated on the FACP, indicating the location and type of device.
- G. FACP Alphanumeric Display: Shall display plain-language description of alarms, trouble signals, supervisory signals, monitoring actions, system and component status, and system commands.
- H. Independent System Monitoring: Supervise each independent smoke detector, fire suppression system and duct detector, for both normal operation and trouble.
- I. Alarm Silencing: If the "Alarm Silence" button is pressed, all audio alarm signals shall cease operation.
- J. System Reset: The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied.
- K. Activation of an auxiliary bypass switch shall override the selected automatic functions.

- L. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble. The "off normal" status shall be clearly identified in plain-language on the FACP.
- M. Recording of Events: Record all alarm, supervisory, and trouble events in non-volatile memory.
- N. Smoke Sensor Sensitivity Adjustment:
 - 1. Authorized operation of controls at the FACP shall cause the selection of specific addressable smoke sensors for adjustment, display of their current status and sensitivity settings, and control of changes in those settings.
 - 2. Remote Controllability: Individually monitor sensors at the FACP for calibration, sensitivity, and alarm condition, and individually adjust for sensitivity from the FACP. The alarm decision for each sensor shall be determined by the control unit. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
- O. The actuation of the "enable one person test" program at the FACP shall activate the "One Person Testing" mode of the system which shall cause the following to occur:
 - 1. The city circuit connection shall be bypassed.
 - 2. Control relay functions shall be bypassed.
 - 3. The FACP shall show a trouble condition.
 - 4. The alarm activation of any initiation device shall cause the audible notification appliances to code a number of pulses to match the zone number.
 - 5. The FACP shall automatically reset after signaling is complete.
 - 6. Any momentary opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
 - 7. The system shall have the capacity of 8 programmable, passcode protected, one person testing groups, such that only a portion of the system need be disabled during testing.
- P. Power Requirements
 - 1. The FACP shall receive 120 VAC power via a dedicated 20A branch circuit breaker provided with a red lock-on device.
 - 2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
 - 3. All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.
 - 4. The incoming power to the system shall be supervised so that any power failure must be audibly and visibly indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present.

5. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the FACP and the command center.
- Q. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.

1.10 SUBMITTALS

- A. Bidders will be required to submit shop drawings and product data during the construction phase of each project. Provide the following submittals for review:
 1. Complete description data indicating UL listing for all network components. Include dimensioned plans and elevations showing minimum clearances and installed features and devices.
 2. Complete sequence of operation of all functions of the network that is project specific.
 3. A list of every address of every device connected to a panel that is provided for purposes of alarm initiating, status monitoring, supervised notification appliance circuits, and auxiliary control.
 4. A listing of the manufacturer's representatives responsible for installation coordination and service.
 5. Location of all controls, alarm actuating devices and notification appliance devices as shown on drawings.
 6. Wiring diagrams from manufacturer differentiating between factory-and field- installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Indicate components for both field and factory wiring. Provide complete diagrams for all components and interfaces including equipment supplied by others.
 7. Operation and maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1. Include data for each type product, including all features and operating sequences, both automatic and manual. Include recommendations for spare parts to be stocked at the site. Provide the names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.
 8. The manufacturer shall provide calculations for battery size as applicable. Battery size shall be a minimum 125% of the calculated requirement.
 9. Provide calculations for control modules indicating circuit loading with 20% spare capacity.
- B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of annotated Contract Drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, submit them for review. Make resubmissions if required to make clarifications or revisions to obtain approval. **Note: National Time & Signal (and the electrical contractor) shall include in their pricing submittals to the Bureau of Fire Services and all services, if required.**

1.11 PROJECT RECORD DOCUMENTS

- A. Submit as built drawings locating devices and conductor runs.

- B. Record of field tests of system.
- C. Submit manufacturer's certificate that system meets or exceeds specified requirements.

1.12 OPERATION, MAINTENANCE DATA, AND CALCULATIONS

- A. Provide to the Owner's representative operating instructions, maintenance, and repair procedures.
- B. After installation, include manufacturer representative's letter stating that system is operational.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage and handling of products will take place under the contract terms of each project in the construction phase of each project.

1.14 EXTRA MATERIALS

- A. Provide spare parts to the Owner's representative as noted below:
 - 1. Two keys of each type (for each project).
 - 2. Two smoke detectors (for each project).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **National Time & Signal. Expand the existing fire alarm system at Hamilton and Wass Elementary Schools as required to remove and reinstall fire alarm pull stations.**

2.2 FIRE ALARM CONTROL PANEL (FACP).

- A. General: Comply with UL 864, "Control Units for Fire-Protective Signaling Systems."
- B. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures. Accommodate all components and allow ample gutter space for interconnection of units as well as field wiring. Identify each enclosure by an engraved, red-laminated, phenolic resin nameplate. Lettering on the enclosure nameplate shall not be less than 1-inch high.
- C. Systems: Alarm and supervisory systems are separate and independent in the FACP. The alarm-initiating zone boards in the FACP consist of plug-in modules. Construction requiring removal of field wiring for module replacement is not acceptable.
- D. Control Modules: Types and capacities required to perform all functions of the fire alarm systems plus 20% for future expansion. Local visible, and audible signals notify of alarm, supervisory, and trouble conditions
- E. Zones: Provide for all alarm and supervisory zones indicated.
- F. Resetting: Provide the necessary controls to prevent the resetting of any alarm, supervisory, or trouble signal while the alarm or trouble condition still exists.
- G. Alphanumeric Display and System Controls: Arrange to provide the basic interface between human operator at FACP and addressable system components, including annunciation, supervision, and control. A display with a minimum of 80 characters displays alarm, supervisory, and component status messages and indicates control commands to be entered into the system

for control of smoke detector sensitivity and other parameters. Arrange keypad for use in entering and executing control commands.

- H. System power supplies including necessary transformers, regulators, filters and surge protection required for system operation.
- I. System processor, with internal operating system to process incoming alarm signals and issue output commands required as a result of the alarm signals and issue output. Total system response time shall not exceed 2.5 seconds on a system configured to the 3000 point capacity. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity. Systems with single watchdog circuits for all processors will not be accepted unless furnished with a standby CPU.
- J. A limited energy output circuit for operation of direct current (DC) audible or visual devices, leased line or city tie, shall be provided by a controllable signal module.
- K. Where control of operations requiring switching functions is indicated, there shall be provided a software controlled relay module.
 - 1. Motherboards shall be furnished as the system bus furnishing systems communications to the various plug in modules necessary for system operations.
- L. Remote Station Signal Transmitter: Electrically supervised, capable of transmitting contact I.D. and point annunciation signals over a communication means (Internet) to remote central station receiver (National Time & Signal). The electrical contractor/National Time & Signal shall coordinate all requirements (cat 6e cabling/connections and UPS for 24 hour back-up, plus other requirements for a complete system). Note: National Time & Signal shall be sub-contracted by the electrical contractor. Include all costs in bid.

2.3 REMOTE FIRE ALARM ANNUNCIATOR PANEL

- A. Provide remote annunciation and control using an 80 character, back-lit, alphanumeric, LCD readout. Alarm indication shall be identical to that at the main FACP including tone alert. Provide a minimum of four programmable control switches, alarm silence and system reset.
- B. Provide brushed aluminum trim plate.

2.4 EMERGENCY POWER SUPPLY

- A. General: Components include battery, charger, and an automatic transfer switch.
- B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm of supervisory mode for a period of 15 minutes.
- C. Magnetic door holders are not served by emergency battery power. Magnetic door holders are released after 15 seconds when normal power fails.

2.5 SMOKE DETECTORS, INTELLIGENT ADDRESSABLE

- A. Furnish and install where indicated on the drawings intelligent analog smoke detectors with features and characteristics as follows:
 - 1. Photoelectric detectors shall be listed for use as open area protective coverage, in duct installation and shall be insensitive to air velocity changes.

- a. The control panel shall provide a sensitivity readout for all detectors without removal from the pluggable base. Detectors not listed for sensitivity testing and logging from the control panel are not acceptable.
 - b. Detectors shall be operational with relay bases (as applicable), audible bases, and remote indicating LED's, programmable by the control panel and controlled by the detector electronics.
- B. Provide smoke detectors above fire alarm control panel, remote annunciator panels, and remote notification appliance power supply panels.
- C. Provide smoke detectors with auxiliary set of contacts where required.
- 2.6 THERMAL DETECTOR, INTELLIGENT ADDRESSABLE
- A. The intelligent thermal detectors shall be of the rate compensated fixed temperature type and shall be listed by Underwriters Laboratories, Inc. The intelligent thermal detectors shall be individually annunciated on the control panel. The intelligent thermal detectors shall contain an integral alarm lamp.
- 2.7 DUCT SMOKE DETECTORS
- A. The air duct detector shall be listed by Underwriters Laboratories, Inc. The air duct detector shall operate on a cross-sectional air sampling principle to overcome stratification and the skin effect. The air duct detector shall consist of a standard (intelligent/analog) photoelectric detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system. The air duct detector shall retain the features of the intelligent/analog photoelectric detector, and be installed in the ventilating duct as indicated in the manufacturer's instructions. Provide with addressable control module. Relay based duct detectors not acceptable.
- B. The duct mounted detector shall have an auxiliary set of contacts in order for the temperature controls contractor to tie in the starter of the fans. Contacts shall be rated 1A, 120V.
- 2.8 DUCT SMOKE DETECTOR REMOTE ALARM INDICATORS
- A. Provide remote alarm indicator station for duct smoke detectors located above ceilings or in other locations above 10 feet and/or not readily accessible.
- B. Provide LED alarm indicator designed for mounting in a single gang coverplate.
- 2.9 MANUAL STATIONS, INTELLIGENT
- A. Provide single action intelligent manual stations where shown on the drawings, to be flush or surface mounted as required.
- 1. The manual stations shall be addressable and identifiable by the fire alarm control panel.
 - a. Address assignments shall be set mechanically or electronically and reside within the station in non-volatile memory.
 - b. Reset keys shall match previous projects.
- 2.10 ADDRESSABLE INTERFACE MODULE
- A. Provide for integration of compatible two wire and shorting style contact devices into the analog signaling circuit. Intelligent analog signaling circuit interface module shall have the following capabilities:
- 1. Communication interaction with the analog signaling circuit having the capability of reporting alarm or trouble conditions from the devices monitored.

2. Compatibility with ionization, photoelectric, and linear beam style smoke detectors, heat detectors, and all listed contact type devices.
3. The module shall be addressable and identifiable by the control panel.
 - a. Address assignments shall be set mechanically or electronically and reside within the module in non-volatile memory.
4. Water Flow Switches: The water flow switches shall be provided by the mechanical contractor and wired by the electrical contractor. The switches shall be connected to the fire alarm system through the use of addressable interface modules.
5. Tamper Switches: The tamper switches shall be provided by the mechanical contractor and wired by the electrical contractor. The switches shall be connected to the fire alarm system through the use of addressable interface modules.
6. Provide addressable interface modules to uniquely identify each flow and tamper switch.

2.11 ADDRESSABLE CONTROL MODULE

- A. Provide for integration of auxiliary control functions into the analog signaling circuit. Intelligent analog signaling circuit control module shall have the following capabilities:
 1. Communication interaction with the analog signaling circuit having the capability of initiating a control function to an auxiliary device based on a specified event.
 2. Provide NO/NC contact pairs rated at 2 amps 120 VAC or 24 VDC.

2.12 NOTIFICATION APPLIANCES

- A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
 2. Finishes:
 - a. Wall mounted appliances: Provide red finish with white lettering.
 - b. Ceiling Mounted Appliances: Provide white finish.
- B. Voice/Tone Speakers:
 1. UL 1480 listed.
 2. High-Range Units: Rated 2 to 15 W.
 3. Low-Range Units: Rated 1 to 2 W.
 4. Matching Transformers: Tap range matched to the acoustical environment of the speaker location.
- C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output: 15, 30, 60, 75, 110, 135, 185 candela as required to meet NFPA 72 requirements.
2. Strobe Leads: Factory connected to screw terminals.

2.13 AUXILIARY DEVICES

- A. Door Release: Magnetic door holder with integral diodes to reduce buzzing, 24 VDC coil voltage.

2.14 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 2. Line-Voltage Circuits: No. 12 AWG, minimum

PART 3 - EXECUTION

3.1 WARRANTY

- A. All equipment and systems shall be warranted by the contractor for a period of two years following acceptance. The warranty shall include parts, labor, prompt field service, pick-up and delivery.
- B. Provide two years testing and maintenance, which shall consist of:
 1. Regularly and systematically examining all detectors, manual stations, panels, relays, pressure switches and accessories pertaining to the system.
 2. Regularly and systematically examine, adjust and clear all the electrical and mechanical components of water flow switches.
 3. Tests and written reports which certify that all initiating devices have been tested and which indicate the result of the inspection test as required by the authority having jurisdiction.

3.2 TESTS AND REPORTS

- A. The contractor shall perform all electrical and mechanical tests required by the equipment manufacturer's certification form. In addition, they shall measure and adjust each of the ionization detectors to the maximum stable sensitivity setting. This must be performed with the detector at its operational location and under normal operational environmental conditions in the area. Bench settings are not acceptable. All test and report costs shall be in the unit price established for each device. A checkout report shall be prepared by the installation technicians and submitted in triplicate, one copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:
 1. A complete list of equipment installed and wired.

2. Indication that all equipment is properly installed and functions and conforms with these specifications.
 3. Test of individual zones as applicable.
 4. Serial numbers, locations by zone and model number for each installed detector.
 5. Voltage (sensitivity) settings for each ionization and photoelectric detector as measured in place with the HVAC system operating.
 6. Response time on thermostats and flame detectors (if used).
 7. Technician's name, certificate number and date.
- B. After completion of all the tests and adjustments listed above, the contractor shall submit the following information to the Architect:
1. "As-built" conduit layout diagrams including wire color code and/or tag number.
 2. Complete "as-built" wiring diagrams.
 3. Detailed catalog data on all installed system components.
 4. Copy of the test report.
- C. Final tests and inspection shall be held in the presence of engineer. The contractor shall supply personnel and required auxiliary equipment for this test without additional cost.
- D. The completed smoke detection system shall be tested to insure that it is operating properly. Acceptance of the system shall also require a demonstration of the stability of the system. This shall be adequately demonstrated if the system operates for a ninety (90) day test period.
- E. Before final acceptance of work, the contractor shall deliver five copies of a composite "Operating and Shop Maintenance Manual." Each manual shall contain, but not be limited to: a statement of guarantee including date of termination and name and phone number of the person to be called in the event of equipment failure.
- F. Individual factory issued manuals shall contain all technical information on each piece of equipment installed. In the event such manuals are not obtainable from the factory, it shall be the responsibility of the contractor to compile and include them. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals.

3.3 INSTALLATION

- A. Control and other panels shall be mounted with sufficient clearance for observation and testing.
- B. All fire alarm junction boxes must be clearly marked for easy identification as indicated in 16195. All wiring shall be in conduit unless noted otherwise on the contract documents or in the specifications. Flexible connectors shall be used for all devices mounted in suspended lay-in ceiling panels. All conduit, mounting boxes, junction boxes and panels shall be securely hung and fastened with appropriate fittings to insure positive grounding throughout the entire system.
- C. Fire alarm pull stations and horns installed in finished areas shall be mounted semi-flush and may be surface mounted in non-finished areas. Smoke detectors and thermal detectors shall be mounted on a recess mounted junction box in finished areas and to surface mounted junction boxes in non-finished areas.

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- D. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be permitted in fire alarm conduits. Wiring splices are to be avoided to the extent possible, and if needed they must be made only in junction boxes and shall be crimp connected. Transposing or changing color coding of wires shall not be permitted. Wire nut-type connections are not acceptable. All conductors in conduit containing more than one wire shall be labeled on each end with "E-Z markers" or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on all equipment panels. All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.
- E. Install manual station flush mounted with operating handle 48 inches maximum above floor. Install audible and visual signal devices no more than 96 inches above highest floor level within the space or 6 inches below the ceiling, whichever is lower.
- F. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- G. Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, panels, duct smoke detectors, and other auxiliary supervised devices.
- H. Automatic Detector Installation: NFPA 72.
- I. All gymnasiums and locker rooms fire alarm devices shall be provided with protective wire guards.
- J. Fire alarm system cable shall be plenum rated, with red outer coloring. All cable drops to devices shall be in conduit (concealed in walls). Cabling installed in open ceiling spaces shall be type FPLP, low smoke, fire resistant, with red coloring. Cabling shall be per manufacturer's recommendation, and shall be able to power the strobes and horn/strobes together, or independently.
- K. Install fire alarm cable in ceiling spaces to avoid damage. Use bridle rings and other similar means of support (lay-in ceiling areas).
- L. Cabling to the Fire Alarm Control Panel and drops to devices shall be in recessed conduit.
- M. Fire alarm cabling in exposed ceiling spaces and above drywall ceiling areas shall be in conduit. Conduit used for fire alarm system shall have couplings and junction boxes painted red.

END OF SECTION