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ENGINEERING SPECIFICATION
FIRE DETECTION AND ALARM SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

A. This section of the specification includes the furnishing, installation, and connection of the microprocessor-controlled fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciators, power supplies, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.

C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

E. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be installed in compliance with the UL listing.

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2. SCOPE:

A. A new microprocessor controlled fire detection and alarm system shall be installed in accordance with the specifications and drawings.

B. Basic Performance:

1. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D).

2. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z).

3. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

1.3. SUBMITTALS:

A. General:

All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent equipment (compatible UL Listed) from other manufacturers may be substituted for the specified equipment.

B. Shop Drawings:

Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, and complete wiring point-to-point diagrams.

C. Manuals:

Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s) including technical data sheets (with model numbers to be used indicated).

D. Certifications:

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.4. GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.5. POST CONTRACT MAINTENANCE:

Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the major equipment manufacturer for a period of five (5) years after guaranty expiration.

As part of the submittal work, include a quote for a maintenance contract to provide all maintenance tests and repair as required after the warranty period. Include also a quote of hourly rates, response time and technician travel costs. Submittals which do not include a complete statement of maintenance costs will not be accepted.

1.6. PERFORMANCE CRITERIA / APPLICABLE PUBLICATIONS:

The publications and/or standards listed below form a part of this specification. The publications are referenced in text by the basic designation only.

A. National Fire Protection Association (NFPA) - USA:

No. 70 National Electrical Code (NEC)
No. 72 - 1993 National Fire Alarm Code
No. 101 Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:

No. 50 Cabinets and Boxes
No. 268 Smoke Detectors for Fire Protective Signaling Systems
No. 864 Control Units for Fire Protective Signaling Systems
No. 268A Smoke Detectors for Duct Applications.
No. 521 Heat Detectors for Fire Protective Signaling Systems.
No. 228 Door Closers/ Holders for Fire Protective Signaling Systems.
No. 464 Audible Signaling Appliances.
No. 1971 Visual Signaling Appliances.
No. 38 Manually Actuated Signaling Boxes.
No. 346 Waterflow Indicators for Fire Protective Signaling Systems.
No. 1481 Power supplies for Fire Protective Signaling Systems.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.7. PERFORMANCE CRITERIA / APPROVALS:

A. Each system must have proper listing and/or approval from the nationally recognized agency responsible for the particular area.

UL Underwriters Laboratories Inc
FM Factory Mutual
ULC Underwriters Laboratories Canada
MEA Material Equipment Acceptance (NYC)
CSFM California State Fire Marshal

B. The Fire Alarm Control Panel shall meet the modular labeling requirements of Underwriters Laboratories Inc.. Each subassembly of the FACP, including all printed circuit cards, shall carry the appropriate and official UL modular label.

PART 2.0 - PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.

C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 76029.

4. Conduit shall be 3/4 inch (19.1mm) minimum.

5. Conduit shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where specified by the factory.

B. Wire:

1. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760). Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63mm) for notification device circuits.

2. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).

3. All field wiring shall be completely supervised.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. Shall be UL listed for their purpose and use.

D. The main fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.3. MAIN FIRE ALARM CONTROL PANEL

A. The main FACP shall be a Notifier Model System 500 and shall contain a microprocessor based central processing unit (CPU). The CPU shall communicate with and control slave microprocessor controlled modules which provide the interface to initiating device circuits; notification appliance circuits; building controls.

B. System Capacity and General Operation

1. The control panel shall include the following standard circuits:

- a. Form-C alarm and trouble relays.
- b. Two Style Y or Z Notification Circuits.
- c. Municipal Box connection.
- d. Reverse Polarity connection.

2. The control panel shall be capable of being configured for 4, 8, 12 or 16 initiating zones.

3. The control shall have the ability for eight optional control points for a maximum system capacity of 16 initiating and 12 output circuits.

4. The CPU shall provide the following operator controls and indicators:

AC POWER	(Green LED)
SYSTEMS ALARM	(Red LED)

SUPERVISORY	(Yellow LED)
SYSTEM TROUBLE	(Yellow LED)
SIGNALS SILENCED	(Yellow LED)
ANNUNCIATOR/MODULE TROUBLE	(Yellow LED)
POWER TROUBLE	(Yellow LED)
ACKNOWLEDGE	(Momentary Switch)
SIGNAL SILENCE	(Momentary Switch)
SYSTEM RESET	(Momentary Switch)
LAMP TEST	(Momentary Switch)
Notification CKT 1 ALARM	(Green LED)
Notification CKT 1 TROUBLE	(Yellow LED)
Notification CKT 2 ALARM -	(Green LED)
Notification CKT 2 TROUBLE	(Yellow LED)
ALARM RELAY ON	(Green LED)
ALARM RELAY TRBL/DISABLE	(Yellow LED)
REMOTE SIG/CITY TIE ON	(Green LED)
REMOTE SIG/CITY TIE TRBL	(Yellow LED)

5. The system shall be fully field programmable, configurable and expandable without the need for special tools or PROM programmers. Programming shall not require replacement of memory ICs.

6. All programming shall be accomplished through front control panel indicators and switches. Systems which require complicated diode matrixes or laptop computers are not considered suitable substitutes.

7. All programs shall be stored in non-volatile memory and shall be retained with the unlikely loss of both primary and secondary power.

8. Entry into program mode shall require a special programming key and a special password.

9. Notification and relay circuits shall be programmable to activate on alarm from a single initiating zone or combination of initiating zones. Systems which are limited in programming, such as general alarm, are not acceptable substitutes.

10. The FACP shall have the following programmable functions:

- a. Signal silence inhibit, 30 seconds to 5 minutes.
- b. Automatic silence select, 5 to 20 minutes.
- c. Presignal delay select 1 to 3 minutes.
- d. Positive Alarm Sequence, per NFPA 72 3-8.3.
- e. Trouble Reminder.

C. Central Processing Unit Module

The Central Processing Unit (CPU) module shall communicate with, monitor, and control all other modules in the panel. Removal, disconnection, failure, or change of type of any control panel module shall be detected and reported by the CPU as a module trouble. The CPU shall contain and execute all custom programs for specific action to be taken if a fire situation is detected in the system. Such programs shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs. CPU switches may be used to disable or enable any initiating zone, notification circuit or relay in the system.

D. Initiating Zone Module

1. The Initiating Zone Module shall provide eight fully supervised Style B (Class B) Initiating Device Circuits (IDC).

2. IDC circuits shall be capable of monitoring and powering two wire smoke detectors or may monitor normally open dry contact devices.

3. The Initiating Zone Module shall provide red ALARM and yellow TROUBLE LED's for each IDC circuit.

4. Custom label inserts shall be available for individually written (or typed) descriptions of each IDC zone.

5. The Initiating Zone Module shall include removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use with up to 12 AWG (3.25 mm) wiring.

6. Smoke detector alarm verification shall be available as a programmable option for each IDC circuit.

7. Each IDC zone shall be capable for operation as Standard Fire, Tamper/Supervisory, Waterflow, or a low priority "Non" alarm zone. Systems which require add on or special modules to perform these operations are not considered equals.

8. Each IDC shall be capable of providing the following programmable remote system operations: ACKNOWLEDGE, SILENCE, or RESET.

9. The Initiating Zone module shall have the ability to wired Style D (Class A) with a simple to install add on module. When connected, it shall support any combination of Style B or Style D circuits.

E. Notification Circuit Module

1. The Notification Circuit Module shall provide four fully supervised Style Z (Class A) Notification circuits.

2. Each Notification Circuit Module shall support 3.0 amps per circuit and 6.0 amperes maximum per module.

3. Each Notification Circuit shall not activate on either manual or automatic commands in the event of a short circuit condition.

4. The Notification Circuit Module shall have an expansion printed circuit board to extend it's capacity to eight notification circuits.

5. The module shall provide eight green ON/OFF LED's and eight yellow TROUBLE LED's. These LEDs will indicate the status of the individual circuits.

6. Each Notification Module circuit shall be capable of operation in Steady, March Time or Temporal Code (NFPA 72 A.2.2.2.2).

7. The Notification Circuit Module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL listed for use with up to 12 AWG (3.25 mm) wiring.

8. An optional zone coder shall be available for programmable coded outputs. Options shall include the following programmable features, up to 99 rounds, delay, pulse time, digit pause, and round pause.

F. Control Relay Module

1. The Control Relay Module shall provide four Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC.

2. Relay circuits shall be capable of activation from any one zone

or groups of zones.

3. An expansion board shall be available to extend the capacity of the control relay module from four to eight circuits.

4. The module shall provide green ON/OFF and yellow disabled LED's for each zone.

5. Each control relay may be programmed to deactivate on depression of the signal silence switch.

6. The Control Relay module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use with up to 12 AWG wiring.

G. Timed Control Module

1. The timed control module shall be provided with Releasing Service for 2 or 4 fully supervised (Class A or B) Releasing Device Circuits.

2. An expansion printed circuit board may be provided for this module to extend its capability to 6 or 8 such releasing circuits.

3. The module shall provide cross-zone capability, Halon Release Abort Circuit and Warning Indicating Circuit. It may be programmed for manual release from any alarm initiating circuit, and shall include an internal programmable timer and time display.

4. The module shall be programmable to meet IRI requirements. It may also be programmed to provide pre-signal functions with an internal programmable timer and display.

H. Universal Digital Alarm Communicator Transmitter (UDACT). The UDACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station.

1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet (1828.8 m) from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.

2. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to three different telephone numbers.

3. The UDACT shall be completely field programmable from a built-in keypad and 4 character red, seven segment display.

4. The UDACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.

5. Communication shall include vital system status such as:

- Independent Zone (Alarm, trouble, non-alarm, supervisory)
- Independent Addressable Device Status
- AC (Mains) Power Loss
- Low Battery and Earth Fault
- System Off Normal

- 12 and 24 Hour Test Signal
- Abnormal Test Signal (per UL requirements)
- EIA-485 Communications Failure
- Phone Line Failure

6. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 2,040 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

I. Stand Alone Voice Evacuation Control Panel

1. A stand alone Voice Evacuation Control Panel shall be available from the same manufacturer of the main fire alarm system.

2. This Voice Control Panel shall work stand alone or as a slave to the Main Control Panel.

3. Shall have as minimum requirements:

a. Integral 25 Watt, 25 Vrms audio amplifier.

b. Speaker circuit that can be wired both Class A or B.

c. Integral Digital Message Generator with a capacity of up to 60 seconds. The Digital Message Generator shall be capable of primary and secondary messages (30 seconds each). These messages shall field programmable without the use of additional equipment.

d. Built in alert tone generators with steady, slow woop, high/low and chime tone field programmable.

e. Integral Diagnostic LEDs for Power, System Trouble, Message Generator Trouble, Tone Generator Trouble, and Alarm.

4. The Voice Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generators.

5. Speaker outputs shall be fully power-limited.

J. Enclosures:

The control panel shall be housed in a UL-listed cabinet suitable for surface mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish. An optional semi-flush trim ring shall be available for finished installations.

K. Power Supply:

1. The Main Power Supply for the Fire Alarm Control Panel shall provide all control panel and peripheral device power needs, as well as 2.0 amperes of 24 VDC power for Notification devices.

2. Provisions will be made to allow the audio visual power to be increased as required by adding an additional 3.0 amp expansion power supply. All power supplies shall be designed to meet 1995 UL and NFPA requirements for power limited operation on all notification and initiating circuits.

3. The power supply shall provide an integral battery charger for use with batteries up to 60 AH. Batteries larger than 25 require the BB-55 battery cabinet.

4. The Main Power Supply shall continuously monitor all field wires for Earth Ground conditions, and shall have the following LED indications: Ground Fault LED, Battery Fail LED and AC Power Fail LED.

L. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.

1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.

2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.

3. The FCPS shall include an attractive surface mount backbox.

4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per 1993 NFPA requirements.

5. The FCPS include power limited circuitry, per 1995 UL standards.

M. Specific System Operations

1. Walk Test Operation

a. Walk Test mode shall test Initiating Device Circuits and Notification Device Circuits from the field without returning to the panel to reset the system.

b. Upon activation of an Initiating device, all outputs normally activated by the tested zone shall activate for approximately four seconds. Only circuits were selected for walk test shall participate in the test.

c. Inducing a trouble into the initiating circuit shall activate the controlled outputs and remain activated until the trouble is cleared.

2. Alarm Verification Operation

When an alarm condition is detected on an Initiating Device Circuit which has been programmed for Alarm Verification, the system will automatically enter the ALARM verification mode. If the alarm condition is still present after a preset time period of 13 seconds, then the system will automatically enter the alarm mode.

3. Waterflow Operation

All Initiating Device Circuits shall be programmable to provide Waterflow detection. If an alarm occurs on a Waterflow zone, all Notification Appliance Circuits which are "Mapped" to that zone will not be affected by the silence switch.

4. Supervisory Operation

An alarm on a Supervisory circuit shall activate all programmed (mapped) outputs, activate a common Supervisory LED, and activate the zone which is in alarm.

5. Signal Silence Operation

All Notification Appliance Circuits of the system shall be

capable of being programmed to deactivate with depression of the Signal Silence switch.

6. Releasing Service

The control panel shall have the ability to be configured for releasing service and include selectable time delays, abort and manual release circuits.

7. Pre-signal Operation

The control panel shall have the capability of operation in a pre-signal mode, with selectable time delays and manual evacuation control.

8. The control panel shall include a Positive Alarm Sequence (PAS) option per NFPA 72 3-8.3. Selectable PAS delay shall include 1, 2, and 3 minutes.

9. Two Stage Alert/Evacuation Option

The control panel shall have the capability to perform two-stage alert/evacuation signaling per U.S. and Canadian requirements.

2.4. BATTERIES:

A. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

2.5. SYSTEM COMPONENTS:

A. Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.

2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.

3. Shall be flush or surface mounted as show on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.

2. Strobe intensity shall meet the requirements of UL 1971.

3. The flash rate shall meet the requirements of UL 1971.

C. Manual Fire Alarm Stations

1. Manual fire alarm stations shall be non-code, non-breakglass type, equipped with key lock so that they may be tested without operating the handle.

2. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.

3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side.

4. Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7 mm) in size or larger.

D. Conventional Photoelectric Area Smoke Detectors

1. Photoelectric smoke detectors shall be a 24 VDC, two wire, ceiling-mounted, light scattering type using an LED light source.

2. Each detector shall contain a remote LED output and a built-in test switch.

3. Detector shall be provided on a twist-lock base.

4. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.

5. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall flash every 10 seconds, indicating that power is applied to the detector.

6. The detector shall not go into alarm when exposed to air velocities of up to 3000 feet (914.4 m) per minute.

7. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

8. All field wire connections shall be made to the base through the use of a clamping plate and screw.

E. Conventional Ionization Type Area Smoke Detectors

1. Ionization type smoke detectors shall be a two wire, 24 VDC type using a dual unipolar chamber.

2. Each detector shall contain a remote LED output and a built-in test switch.

3. Detector shall be provided on a twist-lock base.

4. It shall be possible to perform a calibration sensitivity and performance test on the detector without the need for the generation of smoke.

5. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs) over 360 degrees, on the detector, which may be seen from ground level. This LED shall flash every 10 seconds, indicating that power is applied to the detector.

6. The detector shall not alarm when exposed to air velocities of up to 1,200 feet (365.76 m) per minute. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

7. All field wire connections shall be made to the base through the use of a clamping plate and screw.

F. Duct Smoke Detectors

Duct smoke detectors shall be a 24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite

supply/return air ducts(s), with properly sized air sampling tubes.

G. Projected Beam Detectors

1. The projected beam type shall be a 4-wire 24 VDC device.

2. The detector shall be listed to UL 268 and shall consist of a separate transmitter and receiver capable of being powered separately or together

3. The detector shall operate in either a short range (30' - 100') or long range (100' - 330') mode.

4. The temperature range of the device shall be -22 degrees F to 131 degrees F.

5. The detector shall feature a bank of four alignment LEDs on both the receiver and the transmitter that are used to ensure proper alignment of unit without special tools.

6. Beam detector shall feature automatic gain control which will compensate for gradual signal deterioration from dirt accumulation on lenses.

7. The unit shall be both ceiling and wall mountable.

8. The detector shall have the ability to be tested using calibrated test filters or magnet activated remote test station.

H. Automatic Conventional Heat Detectors

1. Automatic heat detectors shall have a combination rate of rise and fixed temperature rated at 135 degrees Fahrenheit (57.2 Celsius) for areas where ambient temperatures do not exceed 100 degrees (37.7 Celsius), and 200 degrees (93.33 Celsius) for areas where the temperature does not exceed 150 degrees (65.5 Celsius).

2. Automatic heat detectors shall be a low profile, ceiling mount type with positive indication of activation.

3. The rate of rise element shall consist of an air chamber, a flexible metal diaphragm, and a factory calibrated, moisture-proof, trouble free vent, and shall operate when the rate of temperature rise exceeds 15 degrees F (9.4 degrees C) per minute.

4. The fixed temperature element shall consist of a fusible alloy retainer and actuator shaft.

5. Automatic heat detectors shall have a smooth ceiling rating of 2500 square feet (762 square meters).

I. Waterflow Switches:

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.

2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.

3. All waterflow switches shall come from a single manufacturer and series.

4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.

5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

J. Sprinkler and Standpipe Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.

2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.

3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.

4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4 inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.

5. The switch housing shall be finished in red baked enamel.

6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.

7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

8. An optional remote 80 character, backlit LCD, display shall be available. The LCD shall support up to 16 zones of programmable text messages. Each zone message may be up to 40 characters long. The LCD shall also include the following FACp control switches: System reset, signal silence and acknowledge. The system shall support a minimum of one LCD display.

9. The LED type annunciator shall provide the following operations:

a. The Annunciator shall provide alarm and trouble indications for each zone circuit using a red and yellow, long-life LED's. The annunciator shall also have an "ON-LINE" LED, common trouble LED, local piezo electric signal, local acknowledge/ lamp test switch and custom zone/function identification labels.

b. Wiring to the annunciator shall be supervised.

c. The annunciator shall be flush or surface mountable, as indicated on the drawings.

d. The annunciator shall provide alarm resound, with flashing of new conditions.

10. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual pull stations shall be suitable for surface mounting on matching backbox, or semiflush mounting on standard single gang box, and shall be installed not less than 42 inches or more than 48 inches above the finished floor.

3.2. TEST:

Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.

C. Verify activation of all flow switches.

D. Open initiating device circuits and verify that the trouble signal actuates.

E. Open and short Notification appliance circuits and verify that the trouble signal actuates.

F. Ground device circuits and verify response of trouble signals.

G. Check proper operation of all alarm notification devices.

H. Check installation, supervision, and operation of smoke detectors.

I. Verify that each initiating device alarm signal is properly received and processed by the fire alarm control panel (Walk Test).

J. Conduct tests to verify trouble indications for common mode failures, such as alternating current power failure.

3.3. FINAL INSPECTION:

A. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.4. INSTRUCTION:

A. Provide instruction as required to the building personnel and fire and

safety personnel. "Hands-on" demonstrations of the operation of the system shall be provided.