SECTION 283110

ANALOG, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1: GENERAL

1.1 Scope

This specification document provides the requirements for the installation, programming and configuration of a complete Fahrenheit IFP-50 digital protocol addressable fire alarm system. This system shall include, but not be limited to, system cabinet, power supply, built in Signaling Line Circuit (SLC), 80 character LCD annunciator, built in dual line digital communicator associated peripheral devices, batteries, wiring, conduit and other relevant components and accessories required to furnish a complete and operational Life Safety System.

1.2 Work Included

1.2.1 General Requirements

The contractor shall furnish and install a complete 24 VDC, electrically supervised, addressable fire alarm system as specified herein and indicated on the drawings. The system shall include but not be limited to all control panels, power supplies, initiating devices, audible and visual notification appliances, alarm devices, and all accessories required to provide a complete operating fire alarm system.

1.2.2 Labeling

All fire alarm system equipment shall be listed for its intended purpose and be compatibility listed to assure the integrity of the complete system.

1.3 Standards

The fire alarm equipment and installation shall comply with the current provisions of the following standards and shall be listed for its intended purpose and be compatibility listed to insure integrity of the complete system.

1.3.1 National Electric Code, NFPA 70Article 760

1.3.2 National Fire Protection Association Standards:

NFPA 13	Installation of Sprinkler Systems
NFPA 15	Water Spray Fixed

Systems NFPA 16	Deluge Foam Water
Systems NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code

1.3.3 Local and State Building Codes

1.3.4 Local Authorities Having Jurisdiction

1.3.5 Underwriters Laboratories Inc.

All equipment shall be approved by Underwriters Laboratories, Inc. for its intended purpose, listed as power limited by Underwriters Laboratories, Inc., for the following standards as applicable:

UL 864 UOJZ Control units for Fire Protective Signaling Systems
Local Signaling Unit
Central Station Signaling Protected Premises Unit
Remote Signaling Protected Premises Unit.
UL 864 SYZV Releasing Device Control Unit (Water Release Only)
UL 268 Smoke Detectors for Fire Protective Signaling systems.
UL 268A Smoke Detectors for duct applications
UL 217 Smoke Detectors for Single Stations
UL 521 Heat Detectors for Fire Protective signaling systems.
UL 228 Door Holders for Fire Protective signaling systems.
UL 464 Audible signaling appliances
UL 1638 Visual signaling appliances
UL 38 Manually Activated Signaling Boxes
UL 346 Waterflow indicatorsfor Fire Protective signaling systems.
UL 1481 Power Supplies for Fire Protective Signaling systems.

1.3.6 Americans with Disabilities Act (ADA).

All visual Notification appliances and manual pull stations shall comply with the requirements of the Americans with Disabilities Act.

1.3 General Requirements

1.3.1 Submittals

The contractor shall submit three (3) complete sets of documentation within thirty (30) calendar days after award of the purchase order. Indicated in the document will be the type, size, rating, style, catalog number, manufacturers names, photos, and /or catalog data sheets for all items proposed to meet these specifications. The proposed equipment shall be subject to the approval of the Architect/Engineer and no equipment shall be ordered or installed on the premises without that approval.

NOTE: DOCUMENTATION - Submittal of shop drawings shall contain at least three (3) copies of the manufacturer specification and installation instruction sheets. All equipment and devices on the shop drawings to be furnished under this contract shall be clearly marked in the specification sheets.

Suppliers qualifications shall be submitted indicating years in business, service policies, warranty definitions, NICET certification, completion of factory training program and a list of similar installations.

Contractor qualifications shall be supplied indicating years in business and prior experience with installations that include the type of equipment that is to be supplied.

The contractor shall provide hourly Service Rates, performed by a factory certified technician for this installed Life Safety System with the submittal. Proof of training and authorization shall be included with the submittal. These hourly service rates shall be guaranteed for a 1-year period.

1.3.2 Contract close-out Submittals

Deliver two (2) copies of the following to the owner's representative within Thirty (30) days of system acceptance. The closeout submittals shall include:

Installation and Programming manuals for the installed Life Safety System.

Point to point diagrams of the entire Life Safety System as installed. This shall include all connected Smoke Detectors and addressable field modules.

All drawings must reflect device address as verified in the presence of the engineer and/or end user.

1.3.3 Warranty

Warranty all materials, installation and workmanship for a one (1) year period, unless otherwise specified. A copy of the manufacturer warranty shall be provided with the closeout documentation.

1.3.4 Products

This Life Safety System Specification must be conformed to in its entirety to ensure that the installed and programmed Life Safety System will accommodate all of the requirements and operations required by the building owner. Any specified item or operational feature not specifically addressed prior to the bid date will be required to be met without exception.

Submission of product purported to be equal to those specified herein will be considered as possible substitutes only when all of the following requirements have been met:

1- Any deviation from the equipment, operations, methods, design or other criteria specified herein must be submitted in detail to the specifying Architect or Engineer a minimum of ten (10) working days prior to the scheduled submission of bids. Each deviation from the operation detailed in these specifications must be documented in detail, including page number and section number, which lists the system function for which the substitution is being proposed.

2- A complete list of such substituted products with three (3) copies of working drawings thereof shall be submitted to the approved Architect and/or Consulting Engineer not less than ten (10) working days prior to the scheduled submission of bids.

3- The contractor or substitute bidder shall functionally demonstrate that the proposed substitute products are in fact equal in quality and performance to those specified herein.

1.3.5 General Equipment and Materials Requirements

All equipment furnished for this project shall be new and unused. All components shall be designed for uninterrupted duty. All equipment, materials, accessories, devices and other facilities covered by this specification or noted on the contract drawings and installation

specification shall be best suited for the intended use and shall be provided by a single manufacturer. If any of the equipment provided under this specification is provided by different manufacturers, then that equipment shall be “Listed” as to its compatibility by Underwriters Laboratories (UL), if such compatibility is required by UL standards.

1.3.6 Satisfying the Entire Intent of these Specifications

It is the contractor’s responsibility to meet the entire intent of these specifications. Deviations from the specified items shall be at the risk of the contractor until the date of final acceptance by the architect, engineer, and owner’s representative. All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the electrical contractor.

PART 2: SPECIFICATIONS

2.1 General

2.1.1 Control Panel

The fire alarm control panel (FACP) shall be the Fahrenheit IFP-50 addressable control panel. The FACP must have a 2.5 amp power supply and be capable of expansion to a maximum of 50.5 total amps via bus connected expander modules that supervise low battery, loss of AC and loss of communication.

The FACP must be capable of supporting 50 addressable points. The communication protocol on the SLC loop must be digital. The use of shielded cable or twisted pair is not required.

The panel must have a built in 80 character LCD annunciator with the capability of having an additional eight supervised remote annunciators connected in the field.

The FACP must have Day/Night sensitivity capabilities on detectors and be capable of supporting
100 analog addressable points. The FACP must support a minimum of two programmable notification circuits.

The FACP must have a built in UL approved digital communicator. The communicator must allow local and remote up/downloading of system operating options, event history, and detector sensitivity data. The FACP must automatically test the smoke detectors in compliance with
NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.

The FACP must compensate for the accumulation of contaminants that affect detector sensitivity (Drift Compensation). The FACP must have a maintenance alert feature (differentiated from trouble condition). The panel shall indicate a “Maintenance Alert” which means that the detector is still in an operational condition but should be cleaned before it enters a “Trouble” condition in which it will no longer function properly.

The FACP shall have a Jumpstart feature that can automatically enroll all properly connected and addressed accessories into a functional system without further programming. This is required by UL 864. Panels that do not have this feature will not be acceptable.

The main communication bus (SBUS RS485) shall be a class B configuration with a total Bus length of 6,000 feet. This communications bus must be fully supervised.

2.1.2 System Wiring

The SLC and Data Communication Bus shall be wired with standard NEC 760 compliant wiring. No twisted, shielded or mid capacitance wiring is required for standard installations. All FACP screw terminals shall be capable of accepting 14-18 AWG wire.

2.1.3 Signaling Line Circuits

The SLC shall be capable of a wiring distance of 10,000 feet from the SLC driver module and be capable of supporting 50 detectors and 50 modules. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 3 seconds. The SLC shall be capable of functioning in a class A or class
B configuration.

2.1.4 SLC loop devices

Devices supported must include photoelectric, ionization smoke detectors, heat detectors, contact monitoring modules and relay output modules. There is to be no limit to the number of any particular device type up to the maximum of 50 detectors and 50 modules that can be connected to the SLC.

2.1.5 Addressable detector functions

The products of combustion detectors must communicate analog values using a digital protocol to the control panel for the following functions:

Automatic compliance with NFPA 72 standards for detector sensitivity testing

Drift compensation to assure detector is operating

correctly Maintenance alert when a detector nears the

trouble condition Trouble alert when a detector is out of

tolerance

Alert control panel of analog values that indicate fire.

2.1.6 Programmable Notification Circuits

The FACP shall support two programmable notification circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door

holder power. These circuits can be configures as 2 Class B outputs or 1 Class A output.

2.1.7 Built-in Annunciators

The main control must have a built in annunciator with an 80 character LCD display and feature LED's for General alarm, Supervisory, System trouble, System silence, and Power. When in the normal condition the LCD shall display time and date based on a 200-year clock which is capable of automatic daylight savings time adjustments. The annunciator must be able to Silence, Acknowledge, and Reset alarms through the use of the built-in keypad. The annunciators must be able to program up to 20 levels of user codes that will allow the limitation of operating system programming to authorized individuals.

2.1.8 Remote Annunciators

The fire system shall be capable of supporting up to eight remote LCD and eight LED remote annunciators. LED Remote annunciators shall have individually mapped LED's and reset and silence inputs. The reset and silence inputs must use the same firefighters key as the remote LCD annunciators. Remote annunciators shall be capable of operating at a distance of 6,000 feet from the main control panel on unshielded non-twisted cable.

2.1.9 The fire system shall be able to support up to eight I/O modules on the SBUS that shall be used to drive remote LED graphic style displays and accommodate up to eight dry contact type switch inputs. The I/O modules shall each drive up to 40 LEDs without requiring external power connections. The I/O module inputs shall be supervised and shall be suitable for alarm and trouble circuits as well as reset and silence switches.

2.1.10 Serial/Parallel interface

The fire system shall be capable of supporting up to two serial / parallel interfaces that are capable of driving standard computer style printers. The interface shall be programmable as to what information is sent to it and shall include the ability to print out Detector Status, Event History and System Programming.

2.1.11 Distributed Power Module

The fire system shall be capable of supporting up to eight Power Modules that provide 6 additional amps of power each. Each Power Module shall support 4 or 6 notification circuits not to exceed 6 amps total including the notification circuits. The notification circuits shall be capable of being programmed as described in paragraph 2.1.6 of this document.

2.1.12 Digital Communicator

The digital communicator must be an integral part of the control panel and be capable of reporting all zones or points of alarm, supervisory, and trouble conditions as well as all system status information such as loss of AC, low battery, ground fault, and loss of

supervision to any remote devices with individual and distinct messages to a receiving point. The communicator must also be capable of up/downloading of all system programming options, Event History, and Detector Sensitivity compliance information to a PC on site or at a remote location. The communicator shall have an answering machine bypass feature that will allow the panel to respond to communication even on phone lines that have other communication equipment present. The communicator must be capable of reporting via SIA and Contact ID formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage.

2.1.13 Dry Contacts

The FACP shall have three form "C" dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, supervisory, notification, pre-alarm, waterflow, manual pull, aux. 1 or aux. 2 conditions. The trouble contact shall be normal in an electrically energized state (fail-safe) so that any total power loss (AC and Backup) will cause a trouble condition. In the event that the microprocessor on the FACP fails the trouble contacts shall also indicate a trouble condition.

2.1.14 Ground Fault Detection

A ground fault detection circuit shall be employed which can detect a ground fault on both the positive and negative side of each circuit. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground faults shall not interfere with normal operation, such as alarm, or other trouble conditions.

2.1.15 Over current Protection

All low voltage circuits will be protected by microprocessor controlled power limiting or have self-restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

2.1.16 Test Functions

A "Lamp Test" mode shall be a standard feature of the fire alarm control panel and shall test all LED's and the LCD display on the main panel and remote annunciators.

A "Walk Test" mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for six seconds. The FACP will then automatically perform a reset and confirm normal device operation. The event

memory shall contain the information on the point tested. the zone tripped, the zone restore and the individual points return too normal.

A "Fire Drill" mode shall allow the manual testing of the fire alarm system notification circuits. The "Fire Drill" shall be capable of being controlled at the main annunciator, remote annunciators and via a remote contact input.

A "Disable Mode" shall allow for any zone, point, group, or nac circuit to be Disabled without affecting the operation of the total fire system.

2.1.17 Remote Input Capabilities

The control panel shall have provisions for supervised switch inputs for the purpose of Alarm reset and Alarm and Trouble silence.

2.1.18 Notification Appliance Mapping Structure

All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 125 output groups. Each of these groups shall have the ability to be triggered by any of the panels 125 zones. A group may be triggered from a zone individually, or may contain a global trigger for manual pull stations, fire drills and two different system alarms. Additionally each zone will individually control the cadence pattern of each of the groups that it is "Mapped" to so that sounders can indicate a variety of conditions. The zone shall be capable of issuing a different cadence pattern for each of the groups under its control. The mapping structure must also allow a group to be designated to "ignore cadence" for use with strobes and other continuous input devices. Zones shall have eight different output categories; Detector alarm, Trouble, Supervisory, Pre-alarm, Waterflow, Manual pull, Zone auxiliary one and Zone Auxiliary two. Each of the categories shall have the ability to control from 1 to 8 output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California code, Zone 1 coded, Zone 2 coded, Zone 3 coded, Zone 4 coded, Zone 5 coded, Zone 6 coded, Zone 7 coded, Zone 8 coded, Custom output pattern 1, Custom output pattern 2, Custom output pattern 3, Custom output pattern 4 and Constant. In addition, synchronization is built-in for Amseco, Gentex, System Sensor, and Wheelock devices. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules.

2.1.19 On board programmer

The FACP shall have an on board programmer which will allow for all system functions and options to be programmed. Any panel that does not have this capability will not be accepted.

2.1.20 Downloading Software

The fire alarm control panel must support up/downloading of system programming from a PC under Windows or NT environments. The FACP must also be able to upload the detector sensitivity test results and a 1000 event system event buffer to the PC.

Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator and shall not require an external modem to be connected to the panel.

The downloading software shall contain a code that will block unauthorized persons from accessing the panel via direct connection or over the phone lines.

2.1.21 Facility Management Software

The FACP must support a facility management capable of providing off site access to FACP data that is necessary to manage fire system operation. A software package capable of uploading the detector sensitivity test results and the 1000 event system event buffer to the PC shall be required as part of the bid package. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator. The facility management package must be separate from the downloader package and must not be capable of affecting programmed system options.

2.1.22 English language descriptions

The FACP shall provide the ability to have a text description of each system device input zone and output group on the system. The use of individual lights to provide descriptions will not be acceptable.

2.2 SYSTEM OPERATION

2.2.1 Alarm

When a device indicates an alarm or supervisory condition the control panel must respond within 3 seconds. The General Alarm or Supervisory Alarm LED on the annunciator(s) shall light and the LCD shall prompt the user as to the number of current events. All notification circuits associated with the alarm or supervisory condition shall activate. If the digital dialer is being utilized it shall transmit a signal to the digital alarm receiving unit. The alarm shall also cause the appropriate door holders and air handlers to shut down. If employed all elevators shall

return to the main level or an alternate level when required by the elevator specification or building code. The alarm information must be stored in event memory for later review. Event memory shall be available at the main and all remote annunciators. The alarm memory must be capable of storing up to 1000 events.

When the alarmed device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed.

Exception: When detectors are utilized in single station or multi-station applications

they may be self- restoring.

An alarm shall be silenced by pressing Silence at the main panel or a code or Firefighter key at the remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

2.2.2 Troubles

When a device indicates a trouble condition, the control panel System Trouble LED should light and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the device in trouble is restored to normal, the control panel shall be automatically reset, The trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced by pressing Silence at the main panel or a code or Firefighter key at the remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

2.2.3 Supervision methods

The SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring, and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

PART 3: SYSTEM COMPONENTS

3.1 System Cabinet

3.1.1 Mounting

The system cabinet shall be red and configured for surface mounting.

3.1.2 Audible System Trouble Sounder

An audible system trouble sounder shall be an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

3.2 Power Supply and Charger:

The entire system shall operate on 24 VDC, filtered switch mode power supply with the rated current available of 2.5 Amps. The FACP must have a battery charging circuit capable of complying with the following requirements:

Sixty (60) hours of battery standby with five (5) minutes of alarm signaling at the end of this sixty (60) hour period (as required per NFPA 72 remote station signaling requirements) using rechargeable batteries with automatic charger to maintain standby gel-cell batteries in a fully charged condition.
OR
Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this twenty-four (24) hour period (as required per NFPA 72 central station signaling requirements) using rechargeable batteries with automatic charger to maintain gel-cell batteries in a fully charged condition.

The power supply shall comply with UL Standard 864 for power limiting.

The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC failure. A "Battery Test" will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.

In the event that it is necessary to provide additional power one or more of the model 5496 or RPS-1000 Distributed Power Modules shall be used to accomplish this purpose.

3.2.1 Connections and Circuits

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Electrical Code (NEC) and the local authority having jurisdiction (AHJ).

The circuit and connections shall be mechanically protected.

A circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked "FIRE ALARM CIRCUIT CONTROL".

Part 4: ACCESSORY COMPONENTS

4.1 The FACP shall support a the following devices on the RS-485 data bus:

5824	Printer Interface Module
RA-100	LCD Remote Annunciator
RA-1000	LCD Remote Annunciator
5865-3	LED Remote Annunciator
5865-4	LED Remote Annunciator with reset and silence switches
5880	LED I/O module
5496	Intelligent Distributed Power Module
RPS-1000	Intelligent Distributed Power Module
5883	Relay Interface Board

4.2 The FACP shall support the operation of 50 detectors and 50 addressable modules total

devices without regard to device type. The following devices shall be supported:

IDP-Photo	Addressable Photoelectric Smoke detector
IDP-Photo-T	Addressable Photoelectric Smoke detector with Thermal
IDP-Ion	Addressable Ionization Sensor
IDP-Heat	Addressable Heat Sensor
IDP-Heat-ROR	Addressable Heat with Rate of Rise
IDP-Heat-Ht	Addressable Heat High temp 190°
IDP-Acclimate	Addressable Multi Criteria Smoke detector with thermal
IDP-6AB	6” detector base
SSDNR	Addressable Photoelectric duct Detector Housing
IDP-Relay	Addressable Relay Module
IDP-Relay-6	Addressable Multi Relay Module
IDP-Monitor	Addressable Input Module (Class A or
B) IDP-Minimon	Mini Input Module
IDP-Monitor-2	Addressable Dual Input Module
IDP-Monitor-10	Addressable Multi Input Module (10)
IDP-Control	Addressable Notification Module
` IDP-Control-6	Addressable Notification Multi Module
(6) IDP-Zone	Two Wire Smoke Detector Module
IDP-Zone-6	6 Multi Smoke Detector Module
IDP-Iso	Isolation Module
IDP-Beam	Addressable Beam Detector
IDP-Beam-T	Addressable Beam Detector with Test feature
SSB224RB	Detector Relay Base
SSB501BHT	Detector Sounder Base
SSRTS451KEY	Remote Test Switch For Photoelectric Duct Detector
IDP-Pull-SA	Addressable Single Action Pull Station
IDP-Pull-DA	Addressable Dual Action Pull Station

The FACP shall support these other Silent Knight devices via addressable input, addressable Notification, or Addressable Output Modules.

PS-SATK	Single Action Manual Pull Station – Key Reset
PS-DATK	Dual action Manual Pull Station – Key Reset

4.3 Furnish and install, where shown on the drawings, the following devices:

4.3.1 Manual Fire Alarm Stations

Manual Fire Alarm Stations shall be non-coded, break glass, single or double action type, with a key operated test reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal except by use of a key. The reset key shall be so designed that it will reset the manual pull station and open the FACP cabinet without

use of another key. An operated station shall automatically condition itself so as to visually detected, as operated, at a minimum distance of fifty feet, front or side. Manual stations shall be constructed of die cast metal with clearly visible operating instructions on the front of the station in raised letters. Stations shall be suitable for surface mounting on matching back box, or semi-flush mounting on a standard single gang box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) dependent on Manual Station accessibility or per local requirements. Manual Stations shall be installed in conjunction with an Addressable Input Module (IDP-Montor or IDP-Minimon). Manual Stations shall be Silent Knight Models PS- SATK, PS-DATK, or IDP-Pull (Monitor included) and Underwriters Laboratories listed.

4.3.2 Remote Power Supplies

The Remote Power Supplies for Notification appliances shall be the Silent Knight Model 5496. The Model 5496 Intelligent Power Supply shall reside on the main S-Bus and be programmed through the IFP-50 control. The 5496 shall support 6amps of 24 volt DC power to the four notification circuits.

The Model RPS-1000 Intelligent Power Supply shall reside on the main S-Bus and be programmed through the IFP-50 control. The RPS-1000 shall support 6 amps of 24 volt DC power to the six Flexput® circuits.

Any combination of up to eight 5496 and RPS-1000 can be supported on the IFP-50 panel.

4.3.3 Notification Devices

The visual and audio/visual signaling devices shall be compatible with the IFP-50, 5496, or RPS-1000 as stated in the installation manuals and be Listed with Underwriters Laboratories Inc. per UL 1971 and/or 1638. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition. The notification appliance (combination audible/visible units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The visible signaling appliance shall maintain a minimum flash rate of 1Hz or greater regardless or power input voltage. The appliance shall also be capable of meeting the candela requirements of the blueprints presented by the Engineer and ADA. The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount a single gang or double gang box or double workbox with the use of an adapter plate. The unit shall have an input voltage range of 19-30 volts with either direct current or full wave rectified power.

4.3.4 Smoke Detectors

All existing detectors shall be the Silent Knight Model IDP-Photo Addressable Photoelectric Smoke Detector, the IDP-Ion Smoke detector, or the IDP-Heat (heat) detector. The base shall be the Silent Knight model IDP-6AB. The smoke detectors shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The sensitivity of the detector shall be capable of being measured by the control panel without the need for external test apparatus.

4.3.5 Heat Detectors

Furnish and install analog/addressable heat detectors, Silent Knight model IDP-Heat. The combination heat detector and twist lock base shall be U.L. listed compatible with the Silent Knight IFP-50 fire alarm control panel. The base shall permit direct interchange with the Silent Knight IDP-Ion Ionization smoke detector and the IDP-Photo photoelectric smoke detector. The base shall be appropriate twist lock base IDP-6AB. The heat detector shall have a flashing status LED for visual supervision. When the detector is actuated, the LED will produce quick flashes or latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The vandal security-locking feature shall be used in those areas as indicated on the drawings. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

4.3.6 Duct Detectors

All Duct Detectors shall be Silent Knight Model SSDNR housing with the Model IDP-Photo smoke detectors. The optional SSRTS451KEY Remote Test Switch may be included with the SSDNR unit.

Part 5: WIRING

5.1 Installer's Responsibilities

The installer shall coordinate the installation of the fire alarm equipment. All conductors and wiring shall be installed according to the manufacturer's recommendations. It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

5.2 Installation of System Components

System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).

All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per National Electrical Code, Articles 760.

SECTION SIX: WARRANTY AND FINAL TEST

6.1 General

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year months from the date of final acceptance.

6.2 Final Test

Before the installation shall be considered completed and acceptable by the awarding authority, a test of the system shall be performed as follows:

The contractor's job foreman, a representative of the owner, and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.

At least one half of all tests shall be performed on battery standby power. Where application of heat would destroy any detector, it may be manually activated.

The communication loops and the indicating appliance circuits shall be opened in at least two (2) locations per circuit to check for the presence of correct supervision circuitry.

When the testing has been completed to the satisfaction of both the contractor's job foreman and owner, a notarized letter cosigned by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.

The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.

Prior to final test the fire department must be notified in accordance with local requirements.

6.3 As Built Drawings, Testing, and Maintenance Instructions

6.3.1 As Built Drawings

A complete set of reproducible "as-built" drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

6.3.2 Operating and Instruction Manuals

Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the

owner upon completion. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

END OF SECTION 283110