



Addendum

Project: Ozark Center Virginia Street

Issue Date: December 1st, 2015

Addendum: 003

NOTICE TO BIDDERS

The General Contractor is hereby instructed to include in the bid for the above project the following changes or corrections to the plans and specifications.

Item 1: Refer Plans and Specs

Add: Specification Section 281300, Access Control:

See e-mail for Drop Box link for PDF.

Add: Specification Section 283111, Digital, Addressable Fire Alarm System:

See e-mail for Drop Box link for PDF.

Replace Sheets E101 Power Plan and E301 Fire Alarm & Communications Plan

See e-mail for Drop Box link for PDFs.

Change: Specification Section 09000, Finish Materials – Building Interior

Paragraph 2.2 –Walls, WT-1: Tile size to change from 6"x8" to 3"x6".

"WT-1: Glazed Wall Tile to be American Olean Bright & Matte Light Smoke 0004, **3"x6"** Field Tile. Grout color to be determined. Use Schluter Schiene #E 100 EB Brushed Stainless Steel profile on all outside edges. Refer to finish plan A103 & Millwork Elevations Sheet A601 for installation."

New wall tile size confirmed by Product Representative:

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Change: Sheet A103 Finish Floor Plan, Room Finish Legend FC-6.

FC-6 to be changed from plywood to Existing Concrete Flooring to Remain. Patch and repair as required for installation of new base cabinets. Pattern distinguishes that the new Vinyl Plank Tile will end at the edge of the new base cabinets.

Change: Addendum 001, Item 8, second addition:

Change Wall Access Panels from Bilco B Series to Access Doors and Panels, Elmdor (3) 16"x16" Elmdor Drywall Access Doors, lockable.

Add: Sheet M101, Note 8, Relief Hood

"Vault 150 relief ventilator shall be equal to "Cook" model GR 24x24 with 14" roof curb, bird screen and barometric relief damper"

--- End of Addendum 003 ---

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 PURPOSE

- .1 To establish the technical, functional, jurisdictional, or regulatory and quality requirements for security and access control systems; which are required to be purchased from vendors. Approved technical specifications define the supply and installations of all security and access control systems and identify approved manufacturers and models.

- .2 The security system shall consist of implementing an integrated networked Access Control and Video Assessment System (ACAMVAS) that shall control personnel access, provide real time intrusion detection alarm monitoring and provide alarm driven video surveillance for the designated buildings and operations in accordance with the requirements and specifications prescribed in these documents and the approved drawings. The security system shall include the following, where applicable:
 - .1 Seamless integration of a digital video management system that will allow system operators to control and maintain the security of the facilities from multiple designated client workstations.
 - .2 Installation and/or replacement of door and locking hardware to enable proximity card/tag reader access at designated doors. The doors designated with proximity card/tag reader access shall also allow manual unlocking using the master key system.
 - .3 Supply and installation of intrusion detection alarms at designated facilities.
 - .4 Supply and installation of interior and exterior motion detection devices to provide alarm coverage at designated facilities.
 - .5 Seamless integration of video surveillance systems that provides alarm driven assessment for the intrusion detection equipment at designated facilities.
 - .6 Supply and install proximity reader access for vehicle barriers at designated facilities.
 - .7 Supply and installation of all control, signal, lighting and power distribution cabling as required for the security equipment including any trenching work required for the completion of the installation.

- .8 Commissioning and testing of the systems and equipment installed as required to meet manufacturers' specifications and documented installation procedures, and to the satisfaction of the Owner.
- .9 Training of the Owner's personnel to: fully operate, and perform routine maintenance on the systems and equipment installed.
- .10 Provide all associated documentation for the security system upgrades.

1.2 REFERENCE STANDARDS

- .1 Underwriters' Laboratories of Canada (ULC)
- .2 American National Standards Institute (ANSI) Standards
- .3 Ontario Building Code
- .4 CANASA (Canadian Alarm and Security Association)
- .5 CFAA (Canadian Fire Alarm Association)

2 PRODUCTS

2.1 SECURITY COMPONENTS

- .1 Listed below are the security components that shall be supplied and installed.
A detailed specification of each of the security components included in this list is also included.

2.2 ACCESS CONTROL AND ALARM MONITORING SYSTEM

- .1 General System Specifications

The access control and alarm monitoring system shall be the RBH Access Technologies AxiomV Enterprise system and meets the following design and performance specifications:

- .1 The system shall be a modular, networked access control and alarm monitoring system, comprised of proven commercial off the shelf components, capable of handling large proprietary corporations with multiple remote sites, alarm monitoring, video imaging, badging, paging integration, CCTV integration, interactive guard tour, mapping, visitor management, email notification, third party monitoring, BAS integration and asset management. The system shall assure long time performance, cost effective upgrade capability and allow for easy expansion or modification of inputs, outputs and remote control stations.
- .2 The system control at the central computer location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the requirements. Reconfiguration shall be accomplished online through system programming, without hardware changes.
- .3 The Access Control Software system shall utilize Microsoft SQL Server 2000/2005/2008 for data storage and be written expressly for Microsoft SQL Server 2000/2005/2008.
- .4 The system shall have the capability to be networked via a LAN/WAN connection utilizing industry standard TCP/IP communication protocol. The system shall provide encryption via the TCP/IP connection
- .5 The system shall incorporate the use of bi-directional 485 communications and/or Class "A" TCP/IP redundant connections for redundancy and reliability.
- .6 The system shall incorporate "High Availability" Communications so that multiple communication paths are available to all controllers. High availability shall be defined as, "an existing alternate controller shall take over communications in the event the main controller fails. The controller must be located in a separate location to the first."
- .7 The system shall support both manual and automatic responses to alarms entering the system. Each alarm shall be capable of initiating a number of different actions, such as camera switching, activation of remote devices and door control.
- .8 The system shall provide unlimited levels of emergency codes to allow the system to operate in different security levels depending on local threat level e.g. code black = bomb threat and building locks down.
- .9 The system shall provide both supervised and non-supervised alarm point monitoring. Upon recognition of an alarm, the system shall be capable of

switching CCTV cameras and automatically creating a popup window for video for the associated alarm. The system shall be capable of arming or disarming alarm points both manually and automatically, by time of day, and by day of week.

- .10 Access control functions shall include validation based on time of day, day of week, holiday scheduling, site code verification, automatic or manual retrieval of card/tagholder photographs, and access validation based on positive verification of card/tag, card/tag/PIN, card/tag and video.
- .11 The system programming shall be user friendly, and capable of being accomplished by personnel with no prior computer experience. The programming shall be menu driven and include online "Help" with the use of F1 hotkey to automatically call the proper help information to the screen. The software shall utilize drop boxes for all previously entered system required data.
- .12 After installation, the Owner shall be able to perform basic hardware configuration changes. These hardware configuration changes shall include, but not be limited to, door open time, door contact shunt time, point and reader names, when and where a card/tagholder is valid, and the ability to add or modify card/tag databases as desired without the services of the Manufacturer or Manufacturers Dealer.
- .13 Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components. All equipment shall have unplugable connectors for easy replacement.
- .14 All control components shall include the ability to download operating parameters to any control panel, thus allowing the control panel to provide full operating functions independent of any other system component.
- .15 The system shall be designed in such a way that it does not require enrolment of authorized personnel at each building.
- .16 The system shall provide seamless integration to multiple manufacturers of DVR's and NVR's at the same time.
- .17 The system shall provide seamless integration with external building control systems (BAS) , personal safety systems, remote paging and email systems.
- .18 All system events, operator actions and maintenance information shall be stored on the computer hard disk to maintain a permanent record of system activity. The system shall have the capability for manual and automatic

back-up of set-up and system events to either local removable media (optical/magnetic) or remote network resource.

.19 All workstations shall be configurable to act as Alarm monitoring centre for the system. All alarms shall be configurable by schedule and workstations will have the ability to acknowledge and clear alarms as a two step process.

.20 All workstations shall have the ability to define alarm routing with an unlimited number of Routing levels available to the system.

.2 Interactive Mapping and Graphics

The system shall support an unlimited number of user programmable colour graphic map displays capable of showing the floor plan, location of alarm device, and alarm instructions. Floor plans shall be created in an approved format and shall be capable of being imported from other systems. All of the graphic maps shall be displayed on the CPU monitor. Systems requiring separate display monitors or PC's shall not be acceptable. Maps shall be interactive with dynamic realtime status so that the operator can control all device functions from the map.

.3 Information Storage

All programmed information as well as transactional history shall be automatically stored onto the hard disk for later retrieval.

.4 Information Backup/Retrieval

The CPU shall be capable of transferring all programmed data and transactional history to thumb drive or any logical disk drive. All programmed data shall be restorable from disk in case of system hardware failure.

.5 Communication Rates

The system shall have bi-directional communications and communicate up to 2.5mb/s.

.6 Printers

The system shall support all system printers configured under and supported by the Windows operating system.

.7 Pointing Device

The system shall use the pointing device configured under and supported by the Windows operating system.

.8 Communication Ports

The system shall support an unlimited number of either serial or TCP/IP ports.

.9 Workstations

The system shall support an unlimited number of active remote workstations. These stations shall be capable of monitoring alarms and changing the database and retrieving transaction records in real time without affecting the other stations.

.10 Networking

The system shall operate with the standard Windows networking software.

.11 Database

The database shall be Microsoft SQL Server 2000/2005/2008.

.12 Software Capacities

.1 The System server shall have the following minimum requirements. Windows 2000, WIN XP Pro, Server 2003, Server 2008, Windows 7 Business, with 2.2ghz clock speed, 2gig Ram, 40 gig hard drive, CD Rom, Pointing device and video graphics card with 512 on board ram.

.2 System software and language development software shall be existing, industry accepted, and of a type widely used in commercial systems. The solutions operating system requirements shall be as identified in 2.2.3. The application software shall have been written in a standard, industry accepted language. All System functions shall be accessible via Windows operating systems compliant menu accessed screens. Systems requiring command string control or complex syntax shall not be acceptable. Systems shall not be dependent upon external input other than keyboard.

.3 The system software shall include the following features and be configured as a minimum:

- Unlimited reader expansion
- Unlimited card/tagholders in software
- Unlimited simultaneous client PCs

- Unlimited time zones
- 365 user-definable holidays
- Unlimited Access levels
- Access levels for each card/tagholder
- Unlimited alarm input points
- Unlimited output control points
- Unlimited operator passwords with definable privilege levels
- Audible alarm annunciation at the CPU
- Unlimited colour graphic maps displayed on the CPU monitor
- TCP/IP or RS232 interface capability to a CCTV system, which provides automatic, alarm actuated camera switching.
- True 32/64 bit operation
- Operator activation/cancellation dates
- Employee activation/cancellation dates
- Optional Video Imaging/Badging & bar code imprinting

.13 System Administrators shall have the following abilities as a minimum:

- To change any station settings from whatever station they are working on.
- To establish Station Names. Station names shall be user-definable.
- The Station Status dialog shall be available. It shall display a list of stations and their on-line/offline status, along with the names of the logged-on operators.
- Report Printers: Reports as requested by the operators are sent to printers that may reside anywhere on the network.

.14 Alarm Window Description

The system shall facilitate the processing of alerts by using a pop-up alarm window. The Window shall list the system alarms and allow the operator to acknowledge and clear by right-clicking on the event. The alarm window shall indicate time of alarm and response time by the operator. The alarm shall incorporate programmable instruction messages to instruct the operator what he is to do. The alarm will also have an operator action window to log an action into history for the alarm.

.15 Bulk Acknowledgment of Alarms

The system shall provide a means to bulk-acknowledge alarms, so that all alarms can be acknowledged with a single operator action.

.16 Station Routing

The system shall support the routing of alarms to any or all stations. Time schedules can be used to determine which station an alarm is routed to at what time. An alarm may be routed to one station or group of stations during a time schedule and re-routed to another station or group of stations during another time schedule.

.17 Operator Routing

The system shall support the routing of alarms to particular operators, regardless of which station the operator is logged onto.

.18 Menu Configurations

The system software shall allow for the configuration and programming of the controller panel through the use of a simple graphical user interface (GUI). All devices and functions shall be right click configurable for easy operation.

.19 Memory

Memory within each controller panel shall be automatically configured by the system.

.20 Database Updates

The system software shall download/upload information to the controller panels automatically while the controller panels are in communication with the host CPU. A data download may also be initiated manually.

.21 Reporting

The system software shall have the capability to report selectable data by type and by time zone. The system software shall allow the user to generate a report to screen, to printer or to save to a file. The reports shall be exportable to over 30 different file formats. The system shall incorporate the use of an automatic report generator.

.22 Workstations

The system software shall have the capability to report selectable data by type and by time zone to any combination of the system workstations simultaneously.

.23 Serial Ports

All serial ports shall be configured from an easy to follow menu. Systems requiring in depth knowledge of the operating system or CMOS setup for port configuration shall not be acceptable.

.24 Time Zones

a) The system software shall have the capacity for a minimum of 255 user-definable time zones. Each time zone shall allow for a minimum of 16 individual time intervals.

b) The time zones shall be assignable to:

- Card/tagholders
- Outputs
- Alarming reporting functions
- TCP/IP and RS232 message ports
- Doors
- Reports
- Printer operation
- Workstations

.25 Holidays

The system software shall support a minimum of 365 holidays. Holidays shall be considered H1 or H2 designation so that there are three distinct holiday times. A

holiday shall be capable of starting at any time/hour during a 24-hour day. Systems requiring holiday start time of midnight shall not be acceptable.

.26 Door Descriptions

Each door in the system shall be identified using logical tagging format and approved by the Owner. Each door description shall be assigned user-definable text of up to 50 characters.

.27 Access Control Modes

Each door may be programmed to switch automatically based on a user defined time schedule between the following modes of operation:

- "CARD/TAG ONLY"
- "CARD/TAG + PIN"
- "PIN ONLY"
- "HIGH SECURITY"
- "TWO PERSON"
- "FREE ACCESS"

.28 Duress

If the reader is operating in the "CARD/TAG + PIN" mode or "PIN ONLY" mode, a duress feature shall allow an alternate code to be entered into the keypad for access. The system shall generate an alert and may be linked to control relays for notification of the alarm.

.29 Door Alarms

Each door may be programmed to generate "FORCED DOOR" and "DOOR HELD OPEN " alarms. These alarms shall have the ability to have a user-definable time delay.

.30 Door Alarm Annunciation

In addition to generating an alarm message, the following conditions may activate an output for annunciation:

- FORCED DOOR

- DURESS
- DOOR HELD OPEN (DOOR AJAR)
- VOID CARD/TAG
- DENIED CARD/TAG
- ANTI-PASSBACK VIOLATION
- INPUT DOOR ALARM
- TAMPER
- ALARMS

.31 Alarm Description

Each alarm point may be defined with a plain text description of up to 50 characters.

.32 Alarm Enabling

Alarm points shall be enabled during user-definable time zones and may be manually enabled/disabled from any workstation.

.33 Additional Alarms

The system must also generate alarms for the following:

- Enclosure tampering
- Controller panel communication loss
- Channel 1 Fail /Channel 2 Fail
- Battery Failure
- AC Failure
- Reader Fuse
- Auxiliary Fuse
- Lock Fuse
- Alarm tampering (supervised)

.34 Alarm Supervision

When using supervised alarm points, the system must monitor for "OPEN", "SHORT", in addition to "NORMAL/ABNORMAL" conditions.

.35 ASCII Output:

Alarm points shall output an ASCII via RS232 or TCP/IP text command for integration to any other IP commandable device. This command/output shall be an optional, user-definable and transmitted on alarm points going into abnormal state, returning to a normal state, or both.

.36 Outputs

.1 Shunt relays: User definable outputs may be assigned as shunt relays, allowing access doors to be monitored by third party alarm systems.

.2 Relay "on" time: Outputs assigned to control doors shall be user-definable from 1-127 seconds or minutes.

.37 Encryption

The passwords shall be encrypted in the operator database using encryption, to facilitate confidentiality of individual operator passwords.

.38 Operator Access Levels

The system shall provide unlimited operator access levels for the system. All operator actions will be recorded within the system database.

.39 Password Security

The Operator password shall be encrypted to prevent operators from seeing passwords. Passwords shall be up to 20 alphanumeric characters, and be case sensitive. Operators must have the right to edit their own password for secrecy.

.40 Partitioning

The System shall incorporate true database partitioning by operator. An operator shall logon anywhere on the system and have the same functionality at any workstation. Operators will be limited to see and control of the system by their operator Access level.

.41 Operator Access Levels

The system shall have the ability to define unlimited user roles. As a minimum, the user roles shall be:

- General Administrator
- Supervisor
- General User

Privilege levels shall be assignable to, but not limited to the following menu functions:

- View
- Edit
- Edit of any field within the menu
- Select

.42 Operator Activity

All operator activity including specific changes to the database shall be stored for later retrieval and Operators shall be assigned a time zone for the purpose of logging in.

.43 Audit Trail of Database Changes

- .1 The system shall record changes to the database, including the date, time, operator name and description of the record changed.
- .2 The audit trail event messages shall record additions, deletions and revisions. The record shall contain a date/time stamp for the change, the logged on operator's name, the table name, a character identifying the change, and a description based upon the Name field from the record, such as the user name, operator name, panel name, reader/door name.
- .3 The system shall do a full restore or partial depending on operator selection of the data or history files during the back-up process.
- .4 The system shall allow for viewing of the audit trail.
- .5 The system shall NOT allow The Audit Trail table to be edited.

.44 Employee Definitions

.1 Card Entering:

Card entering shall be easy so that minimal training is required. Card input and changes shall be allowed through direct interface with the event viewer screen. Cards shall have the ability to have multiple access levels or assigned special access levels. Cards may be inactivated from the system while the data remains for reactivation at a later date.

.2 Card/tag Data:

The system software shall allow for card/tag numbers up to 18 digits.

.3 Employee records:

Employee records shall consist of a minimum of the following:

- Card/tag Number
- Issue level
- Two (2) groups of access level and time zone
- User-definable PIN code
- Facility code
- Anti-passback location and status
- Expiration date
- High Security
- Lock/Unlock privilege
- Code Links
- Track status
- Last door accessed
- 22 user definable searchable text and data fields
- Duration use
- Escort

- Extended shunt (for ADA compliance)
- Passback override

.4 Batch Loading:

The system software shall allow groups of card/tags to be input through the use of a card/tag number range or by a batch load employee field.

.45 Reports

.1 Data Storage:

All programmed and transactional history is automatically stored to the hard disk for later retrieval.

.2 System Function:

The system software shall be capable of generating reports without affecting the real-time operation of the system.

.3 Media:

Reports shall be generated from the hard disk, or removable media and exportable to over 30 file formats.

.4 Search Criteria:

The database shall be structured such that the operator shall determine the search parameters based on variables available on the individual report menu. Systems requiring the user to type complicated search strings shall not be acceptable.

.5 Report Types:

User-definable data reports shall be available for the following information:

- Card/tagholder data
- Door groups
- Time zones
- Doors

- Inputs
- Relays
- Links
- Controller panels
- Operators
- System hardware configuration
- System settings configuration

.6 Transaction Reports:

Transaction reports shall be available for the following:

- Card/tag transactions
- Alarm transactions
- Event transactions
- Operator activity
- Time and Attendance

.7 Report Scheduling:

The system software shall have the ability to batch reports to any of: screen report, report to a network printer or save a report to a file without operator initiation.

.46 System Guides

.1 On Line Help:

The system software shall have on line help available at any point requiring operator input. The help screen shall be accessible by using the standard Windows help systems. These help screens shall contain context sensitive information that shall allow the operator to enter correct data without consulting the manual. The help menu shall be accessible to the exact point in software by using the "F1" hotkey.

.47 System Status

.1 Real Time Status:

The operator shall be able to monitor via graphical screens, the status of the following in real time:

- Inputs
- Outputs
- Doors

.2 Alarm Monitor:

A screen shall be available to monitor alarms and view, at minimum, 99 of the most recent events. The operator shall also have the ability to view additional detail of any event through the use of a single keystroke or click of the mouse.

.48 Graphics

.1 Graphics File Format:

The floor plans shall be configured in AutoCAD, JPEG or Bitmaps.

.2 Programming:

The system software shall be able to import floor plans produced in AutoCAD.

.3 Operation:

Upon activation of a selected input or door alarm the map shall pop-up and display the alarmed device with an alarmed icon. The operator shall be able to click on the map and clear the alarm or control the device from the graphical interface. Mapping shall be realtime and interactive.

.49 Video Badging

- .1 The system shall have the capability to permit Video Imaging and Badging, which shall, when used in conjunction with the system software, function as an integrated Video Imaging/Badging and access control system. The system shall utilize a single PC to input data for both access and video Badging. The system shall not require the operator to enter data more than once. Badge information including name, card/tag number, signature, fingerprint, user

text, bar coding and up to five data fields shall be available for each card/tag. The system shall provide for user definable backgrounds. These backgrounds may be a "captured" image or a colour background. The system shall be capable of supporting Windows 2000/XPPROWIN7PRO compliant video printers.

- .2 Badges may be created in both horizontal and vertical configurations. In order to change a card/tagholder's badge, a new background may be selected from the background table. A new picture capture is not required. The system shall allow any input or reader to be programmed such that an event at that location is captured by a remote camera and displayed while being stored in the database for later viewing or printing. Events at the reader shall display in real time and store a "split screen" showing the stored card/tagholder image next to the "captured" image. Camera control shall be accomplished via an RS232 interface from the system to a video switcher. The programming of the camera switcher for the individual inputs and readers shall not require exiting from the access control program.
- .3 Additional Badging and/or alarm PC stations may be added via a local area network (LAN).

.50 Video Imaging

- .1 The system shall have the capability to import images of employees and store them in the database. These images may be recalled and displayed by the operator.
 - The system shall have the ability to capture pictures and save from IP Video Cameras.
 - The system shall provide for the backing up and restoral of captured pictures.

.51 DVR and NVR Integration

- .1 The system shall integrate seamlessly via TCP/IP to multiple manufacturers DVR's and NVR's simultaneously. The operator shall have the option to associate any camera with a device and through a common video window, control, and operate any device with real time viewing. Video shall be accessible from any device via a right mouse click. Video history of any event shall be accessible via a right mouse click. The video window shall automatically pop-up upon activation of the associated device's alarm. Video shall be common to all manufacturers systems so that the operator only sees one view.

.52 Interactive Guard tour:

The system shall incorporate an interactive guard tour module to provide real time status of the Guards progression. Failure to complete a tour shall activate alarms on site and off-site for lifesafety operations.

.53 Asset Management:

The system shall incorporate an asset management module so that owners are assigned to equipment or vehicles to prevent theft. Upon alarm the system shall notify via alarm, CCTV interface, and email status the improper event.

.54 System Tools

1.Copy Wizard

The system shall provide a copy wizard to quickly copy any device parameter to any other single or group of devices.

2.Back-up Scheduler

The system shall have a backup scheduler for automatic backup of data

3.Custom Cardholder fields

The system shall have the ability to custom design the cardholder data by adding new fields at will.

.55 Biometric/Fingerprint Enrollment

The software shall have an integrated tab in the cardholder screen to enable the operator to enroll fingerprints/ biometrics directly from the software. Programs that open third party software are unacceptable.

3 UNC500 TCP/IP CONTROLLER

- 3.1.1 The controller panel shall be a 32 bit microprocessor controlled solid-state electronic device and shall include a real time clock/calendar on board. Boards shall be made of gold plated construction (Copper or leaded will not be accepted) and incorporate flashware technology. Communication shall Two channel TCP/IP standard LAN/WAN windows environment protocol. A subset of the system database sufficient to support access and alarm functions for its designated readers and points shall be stored at the controller panel. In event of communication loss, the controller panel shall continue to function without degradation of

operation and shall provide storage of a least 10,000 events. These stored events shall be uploaded to the CPU automatically upon restoration of the communications. The system shall be capable of performing all system functions indefinitely without the computer.

- 3.1.2 The controller must be FCC, CE, RoHS and UL listed.
- 3.1.3 The controller must have 8mb Ram available on board
- 3.1.4 The controller must have 65,000 offline event buffer
- 3.1.5 The controller must have 3 programmable RS485 ports
- 3.1.6 The controller must have 2 on board weigand reader ports to accept any weigand format and 5 weigand formats simultaneously.
- 3.1.7 The controller must have 8 fully supervised inputs capable of individual configuration for EOL (single and dual EOL) , N.O, N.C. operation.
- 3.1.8 The controller must have 8 outputs. 4-form 'C' relay outputs rated at 10A-30VDC and 4- open collector 100ma outputs.
- 3.1.9 The controller must have two on board TCP/IP LAN connections capable of configuration in LAN switch mode or dual LAN operation for Class 'A' Communication configurations.
- 3.1.10 The Controller must have separate tamper input
- 3.1.11 Input voltage 12vdc or 30w P.O.E. maximum current draw 500ma
- 3.1.12 The controller must have internal charging circuit for 12vdc gell cell standby battery. The controller shall be capable of recharging a standby battery from either P.O.E. source or 12v local power supply.
- 3.1.13 The controller shall be configurable in the following methods. Edge device, Wallmount controller or Rackmount.
- 3.1.14 Edge device deployment shall be POE and operate continuously even if POE is lost. Edge controller shall operate 1 or 2 doors as desired.
- 3.1.15 Rackmount configuration shall be 2 UNC500 controllers or 4 doors in a standard 1U-19inch rack configuration. LAN connections shall be front facing as standard Network configuration. All device connections shall be independent and removable from the rear of rack for quick disconnect and easy troubleshooting. All rackmount cabinets shall have optional rails for slide out configuration. All rackmount cabinets shall have top removable panel to access control panels.

- 3.1.16 The controller when configured in switch mode shall allow LAN looping from one standard windows device to another as any standard network switch allows without the use of external switches or special LAN cabling.
- 3.1.17 The controller must accept and control up to 7 slave reader controllers and 16 I/O controllers simultaneously.

4 NC100 CONTROLLER:

- 4.1.1 The controller panel shall be a 32 bit microprocessor controlled solid-state electronic device and shall include a real time clock/calendar on board. Boards shall be made of gold plated construction (Copper or leaded will not be accepted) and incorporate flashware technology. Communication shall be bi-directional with speeds up to 2.5mb/s. A subset of the system database sufficient to support access and alarm functions for its designated readers and points shall be stored at the controller panel. In event of communication loss, the controller panel shall continue to function without degradation of operation and shall provide storage of a least 10,000 events. These stored events shall be uploaded to the CPU automatically upon restoration of the communications. The system shall be capable of performing all system functions indefinitely without the computer.
- 4.1.2 The controller panel shall be capable of operating over a LAN/WAN using Ethernet TCP/IP. The individual controller panels can be networked together along with the CPU to provide fast, real time updates and uploads/downloads using Ethernet TCP/IP.
- 4.1.3 The controller panel shall be capable of communicating via a RS232 link directly to the system CPU. No additional interface equipment shall be required. The distance between control panels shall be up to 4000 feet.
- 4.1.4 The controller panel shall have an LED display to indicate the following: power, battery backup, AC status, Auxiliary Status and the transmitting and receiving of programmed data.
- 4.1.5 The controller panel shall include, as standard, at least four (4) hours of battery backup for the controller panel. The controller shall use a battery save circuit to sve batteries in the event of undue extended poewer fail. The controller panel shall include internal auto recharge battery backup to maintain system operation. Upon power loss mag locks, electric door strikes, etc shall be fail secure.
- 4.1.6 The controller panel shall support four(4) reader controllers with 2 reader ports on each reader controller. Reader ports shall read any weigand input and up to 5 formats simultaneously. Reader ports shall allow for a keypad to be used in conjunction with the reader and utilize user-definable PIN codes. Systems requiring additional ports for the

addition of a keypad are not acceptable. The controller panel shall be able to support multiple card/tagcard/tag/tag technologies (Proximity, Magnetic Stripe, Wiegand, etc.) concurrently without additional software or hardware.

- 4.1.7 Links are defined as any action causing any reaction on the system. Each controller shall be capable of initiating 'Links' regardless of the computer status.
- 4.1.8 Readers shall have the ability to initiate s swipe and or 4 swipe commands based on user card programming to initiate a different sequence of events depending on the need.
- 4.1.9 Each controller panel shall, without additional hardware, monitor at least eight (8) alarm inputs.
- 4.1.10 Each controller panel shall, without additional hardware; control four (4) user-definable form "c" relay outputs and four user definable transistor outputs for a total of 8.

5 RBH-IOC-16 Input Output Controller

- 5.1.1 Additional inputs and outputs shall be available by adding IO boards. Each expansion board shall have a minimum of sixteen (16) supervised inputs or outputs. The inputs shall incorporate full supervision of 7 circuit types and the outputs shall be form "C". Up to sixteen (16) expansion boards shall be available for each controller panel.
- 5.1.2 The IO board shall be independently powered and have its own back up power supply and charging circuit for a minimum 4 hour standby operation.

6 RBH- ENCL2 Wall Cabinets

- 6.1.1 The controller panel enclosure shall have a hinged cover with key lock. A control panel input point shall monitor an enclosure tamper switch.
- 6.1.2 The cabinet shall be 22" X 18" X 4" with ½ and ¾ inch knockouts. The back of the cabinet shall have key mounts for easy mounting.
- 6.1.3 The cabinet shall hold any two of the following controllers UNC500, NC100, RC2, IOC16

7 NC100 Controller Panel Firmware Features

- 7.1.1 The controller panel shall have the ability to store up to 7000 card/tagcard/tag/tag/pin codes expandable to 500,000 and buffer up to 10,000 transactions expandable to 500,000.
- 7.1.2 The controller panel shall be capable of storing up to eight (25) custom card/tagcard/tag/tag formats and reading 5 formats simultaneously. The controller panel shall be able to read the format of most Magnetic Stripe, Bar Code, Proximity or Wiegand Effect encoded card/tagcard/tag/tags and shall allow an operator to specify parity, start sentinels, stop sentinels, field separators, facility code bits, issue level bits, and card/tagcard/tag/tag number bits.
- 7.1.3 The controller panel shall be capable of reading card/tag numbers up to eighteen (18) digits.
- 7.1.4 The controller panel shall have the capacity to store up to 128 time zones with each time zone consisting of up to 16 intervals of time. Each interval of time shall consist of a range of days (seven days of the week, in addition to a Holiday Schedule) as well as a range of time. The controller panel shall automatically manage time zones based upon its internal clock.
- 7.1.5 The controller panel shall allow for the definition of up to 365 Holidays. Holidays shall be defined according to day of year and time of day. All holidays shall be automatically incorporated into Time Zone definitions.
- 7.1.6 Each card/tag reader/keypad shall have the ability to independently operate in up to six different modes: Card/tag reader only, PIN only, Common Code only, Card/tag Reader plus PIN, High Security and Free Access. These modes of operation shall be programmed from the system host computer and shall automatically change by time zone assignment.
- 7.1.7 The system shall support interlock groups for Man –trap operation.
- 7.1.8 The controller panel shall allow for the support of anti-passback operation, in which card/tagholders must follow a proper in/out sequence.

8 Card/tag Readers & Card/tags

- 8.1.1 The system shall employ a proximity access control/identification technology that utilizes radio frequency (RF) circuits in microchip form. The microchips are encoded and transmit the encoded information when activated.
- 8.1.2 The readers shall be any weigand output or equivalent proximity/iclass/mifare type. It shall read the identification number of the card/tag or tag when presented to the surface of the reader without physical contact.

- 8.1.3 Single piece window/door frame reader, which shall mount directly on a standard 1.75" (4.5cm) metal mullion/door frame. The reader can be mounted indoors or outdoors on virtually any surface, including metal. The reader shall operate between 5 volts and 14 volts DC to allow for ease and flexibility in installation. Read range with a standard proximity card/tag shall be up to 4" (up to 10cm) when installed according to manufacturer's specifications. Maximum dimensions of the reader shall be 5.5" (14.0cm) High x 1.6" (4.1cm) Wide x 0.75" (1.9cm) Thick.
- 8.1.4 A single piece wall switch reader, which shall mount directly on a standard metal or plastic single-gang electrical box, or on a flat wall or metal surface, and shall operate indoors or outdoors. The reader shall operate between 5 volts and 14 volts DC to allow for ease and flexibility in installation. Read range with a standard proximity card/tag shall be up to 4" (10cm) when installed according to the manufacturer's specifications. Maximum dimensions of the reader shall be 4.6" (11.7cm) High x 2.9" (7.6cm) wide x 0.5" (1.3cm) Thick.
- 8.1.5 A single piece reader, which shall mount to any surface, including metal, or can be concealed behind most building materials, except metal. Read range with a standard proximity card/tag shall be up to 7" (17cm) when installed according to manufacturer's specifications. Maximum dimensions of the reader shall be 4.6" (11.7cm) High x 5.5" (14cm) Wide x 1.4" (3.6cm) Thick.
- 8.1.6 A medium range reader, which shall mount to most surfaces, except directly on metal, or can be concealed behind most building materials, except metal. Read range with a standard proximity card/tag shall be up to 21" (42cm) when installed according to manufacturer's specifications. Maximum dimensions of the reader head shall be 8.8" (22.4cm) High x 8.8" (22.4cm) Wide x 1.14" (2.9cm) Thick.
- 8.1.7 The card/tag or tag shall be read when presented in any orientation or at any angle to the surface of the reader within the proper read range
- 8.1.8 The reader shall power the card/tag or tag, process the encoded data, and output the data to the access system in less than 110 milliseconds.
- 8.1.9 There shall be no removable plate or cover, which allows access to the reader electronics.
- 8.1.10 A red/green LED on the front surface of the reader shall indicate to the user that the card/tag or tag was read (internal/reader controlled) and an access decision was made (system controlled). The LED may be configured in either single line mode or dual line mode (allowing an "off" state) as required by the host system, and the reader may be switched between modes by presenting a programming card/tag to the face of the reader.
- 8.1.11 The reader shall have an audio "beep" tone feature to indicate to the user that the card/tag or tag was read (internal/reader controlled) and an access decision was made (system controlled). The audio tone must be independently controllable and not tied to the status or

colour of the LED. The internal control of the LED and beeper may be enabled/disabled via programming card/tags so as not to require the setting of switches internal to the reader.

- 8.1.12 The reader shall have a built-in diagnostics, which indicate to the installer that upon power up the reader has performed an internal test and is functioning properly.
- 8.1.13 The reader shall have a built-in diagnostic feature, which allows a single technician to test the continuity of the data lines independent of the door controller. The reader may be placed into the line diagnostic mode via a programming card/tag, and the technician can then measure the pulses at the end of the line without the need of a second technician at the reader presenting card/tags.
- 8.1.14 Electrical connections between the reader and the controller shall be via colour coded, multiconductor; #22 AWG shielded cable. No coaxial cable or special connectors shall be required. The output shall be in the form of Wiegand data stream.
- 8.1.15 Wiring from the reader assembly to the system interface or CPU shall be run inside metal conduit or EMT, as may be required by electrical codes. All junction boxes are to be concealed and normally accessible to the public. Utilization of PVC conduit is not acceptable.
- 8.1.16 Accidental or intentional transmission of radio frequency signals into the reader shall not compromise the system.
- 8.1.17 The reader shall function in the access control system's normal or anti-passback mode without changes to the reader.
- 8.1.18 The reader operating temperature range shall be -40° to +50° C
- 8.1.19 Damage or vandalism to the reader shall not damage any other part of the system.
- 8.1.20 Tampering with the reader shall have no effect on the door security.
- 8.1.21 The system readers shall have the capability to accept codes from any of the following proximity devices:
 - 8.1.22 A standard molded plastic credit card/tag sized card/tag having maximum dimensions of 3.41" (8.7cm) x 2.14" (5.4cm) x 0.09" (0.23cm), and a weight of not more than 0.48 oz. (13.5g). A punched slot shall be provided for a strap or clip. The card/tag shall be capable of having multi-colour custom graphics and permanently marked numbers printed directly onto both sides.
 - 8.1.23 A tag having maximum dimensions of 2.2" (5.6cm) x 1.3" (3.3cm) x 0.25" (0.6cm), and weight of 0.36 oz. (9.9g). A brass eyelet shall be provided for attachment to a key ring.

- 8.1.24 A credit card/tag sized card/tag made of PVC, having maximum thickness of .036", and the capability of accepting direct print video imaged graphics and photographs and able to carry a high coercivity magnetic stripe.
- 8.1.25 A credit card/tag sized card/tag having maximum thickness of .048", and capable of accepting a photograph and graphics via a customer laminated flap.
- 8.1.26 The card/tag shall be a polycarbonate-based card/tag that cannot be run through direct card/tag printers. The card/tag shall be a PVC dual technology card/tag that employs proximity sensor technology. It shall comply with ISO standards for thickness (30 mil).
- 8.1.27 The card/tag or tag shall be made of robust ABS plastic to provide maximum protection for the circuitry inside and provide minimal flexing which could cause damage to the card/tag.
- 8.1.28 The presence of small metal objects, such as keys or coins near the card/tag or tag shall not alter the code read by the reader, nor prevent the code from being read by the reader.
- 8.1.29 The card/tag shall be of a proprietary format to be controlled by the Owner.
- 8.1.30 Card/tags or tags shall be sequentially numbered. The user may specify codes or numbers.
- 8.1.31 The card/tag must have the ability to have the encoded number permanently marked on the outside surface.
- 8.1.32 The card/tag or tag shall be a passive device with no internal battery, but shall contain a semiconductor element, which is energized when brought within the operating range of the reader causing transmission of the code from the card/tag or tag to the reader. Card/tags requiring an internal battery or energy cell shall not be acceptable.
- 8.1.33 Card/tags and tags may be used interchangeably and shall be compatible with all readers in the system, regardless of the reader's physical size or style, and without any code matching or memory devices in the reader.
- 8.1.34 The card/tag and tag operating temperature range shall be -40° to +50° C

9 Fingerprint/Biometric Readers and Software Integration

- 9.1.1 The fingerprint reader shall be RBH-BIO
- 9.1.2 The software shall have an integrated tab in the cardholder screen to enable the operator to enroll fingerprints/ biometrics directly from the software. Programs that open third party software are unacceptable.

- 9.1.3 The capture template will allow the capture of a primary and secondary finger as a backup.
- 9.1.4 The authentication will be automatically downloaded to the reader upon successful capture of the fingerprint without intervention by the operator. The download shall be by TCP/IP communications to the fingerprint readers.
- 9.1.5 The fingerprint must be saved as an algorithm to protect individual privacy.
- 9.1.6 The fingerprint algorithm shall be saved within the normal AxiomV database for automatic backup and restore capabilities. External backup systems for fingerprint are not acceptable.
- 9.1.7 The fingerprint reader shall be configurable to operate in any of the following modes. Finger only, card plus finger, Finger plus PIN code.
- 9.1.8 The reader shall have a weogand output to connect to the door control panel

10 ACS VMS INTEGRATION

- 10.1 Integration must be through TCP/IP (relay and or RS232 connections are not acceptable).
- 10.2 All devices within the ACS system must have a tab to associate a video camera from the VMS system to the device. This association must allow the camera to be called into the ACS GUI upon the following conditions. A) Any Incoming event from specified device B) Any incoming alarm from the specified device. The camera if PTZ must also be called to its predesignation preposition.
- 10.3 The ACS must be able to connect to the VMS system and display the VMS's default video window as a native VMS viewing client.
- 10.4 The ACS must have the ability to pop-up any video event designated for pop-up without operator intervention.
- 10.5 The ACS must have the ability to manually call video by clicking on the event anywhere it appears in the ACS.
- 10.6 The ACS must have the ability to dynamically place the cameras from the VMS system on its maps and call video from the maps directly.
- 10.7 The ACS must have the ability to report all events tagged with video and play back directly from the report within the ACS GUI.

11 Alarm Keypads

- 11.1.1 The system shall incorporate alarm keypads that link directly to the system for advanced alarm operation. Integration to third party alarm systems are not acceptable. Operators can arm, disarm, send messages and monitor any alarm on the keypad. In addition the keypads shall have entry exit zones and the ability to initiate commands on the system by entering a code or command. The keypads will have the ability to arm or disarm any group of inputs on the system creating a seamless alarm intrusion panel.
- 11.1.2 . Alarm Monitoring Integration:
- 11.1.3 The system shall allow for annunciation of intrusion detection alarms. Intrusion detection alarms shall report just like any other access control alarm and shall have the same annunciation and display properties as access control alarms.
- 11.1.4 Alarms from the alarm keypad shall be displayed in the alarm monitoring window and any signal can be sent out via TCP/IP or RS232 message port.
- 11.1.5 7BThe system shall support an Alarm Details description that shall show the 'Alarm Description', 'Time/date', 'Controller', 'Device', and 'Area' associated with the alarm. The information shall also display the user.
- 11.1.6 The system shall support tracing of intrusion detection devices and areas.
- 11.1.7 The system shall be able to report status information for the intrusion detection devices.
- 11.1.8 On alarm, the system shall automatically switch to the map that displays the alarm, the icon that represents that alarm point will flash and an audible alert will be generated on the computer sound system. The operator shall have to acknowledge the alarm before processing the alarm.
- 11.1.9 In operator alarm mode processing, the system shall allow the operator to:
- 11.1.10 clear alarm, tamper, and diagnostic alarms
 - 11.1.11 observe CCTV camera views, individually or in groups, that are associated with an alarm (requires video switcher option)
 - 11.1.12 In operator normal mode processing, the system shall allow an operator to:
 - 11.1.13 view a list of activity information, and select and tag any event
 - 11.1.14 view site maps
 - 11.1.15 perform a test of testable devices/sensors
 - 11.1.16 change the state of sensors to access or secure

- 11.1.17 review the last 1000 events/actions performed on the system
- 11.1.18 In maintenance processing, the system shall allow the maintenance technician to:
- 11.1.19 assign passwords and function access to individual users
- 11.1.20 examine the input/output point states
- 11.1.21 adjust the sensitivity of the sensors
- 11.1.22 access the operating system to diagnose system problems
- 11.1.23 set the calendar clock's date and time (in Windows)
- 11.1.24 change the format of the displayed date (in Windows)
- 11.1.25 set the communication parameters for system devices
- 11.1.26 shut down the system

12 INSTALLATION

- 12.1.1 The contractor shall install all system components in accordance with the manufacturer's instructions, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Power, control, signal and communications, and data transmission lines plus all required grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.
- 12.1.2 All products, software, programming tools, etc. shall be registered to The Owner and will be surrendered upon successful completion of the project.
- 12.1.3 All low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be plenum rated where required by code. Cable shall not be pulled into conduits or placed in raceways, compartments, outlet boxes, junction boxes, or similar fittings with other building wiring.
- 12.1.4 All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors, except fiber optics, which serve as

communications circuits from security console to field equipment, and between field equipment, shall have surge protection circuits installed at each end.

- 12.1.5 No wiring or cabling shall be exposed; all wiring and cabling must be fully enclosed in threaded metallic conduit, which shall be installed underground, in walls or metal structures unless physically impossible. Any conduit that is exposed shall be fully enclosed within an expanded metal protective cage that is vandal resistant and is equipped with a tamper alarm. All equipment mounting is to be such that the equipment cannot be removed or tampered.

END OF SECTION

SECTION 283111 – DIGITAL, ADDRESSIBLE FIRE ALARM SYSTEM

PART 1 GENERAL

1.1. DESCRIPTION:

- A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, 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 Local 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.
 - 1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.
- 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. Underwriters Laboratories Inc. (UL) - USA:
 - No. 38 Manually Actuated Signaling Boxes
 - No. 50 Cabinets and Boxes
 - No. 864 Control Units for Fire Protective Signaling Systems
 - No. 268 Smoke Detectors for Fire Protective Signaling Systems
 - No. 268A Smoke Detectors for Duct Applications
 - No. 346 Waterflow Indicators for Fire Protective Signaling Systems
 - No. 464 Audible Signaling Appliances
 - No. 521 Heat Detectors for Fire Protective Signaling Systems
 - No. 1971 Visual Notification Appliances
- 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. VOICE PANEL DESCRIPTION:

- A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled voice evacuation control panel.
- B. The voice evacuation panel shall comply with NFPA 72 requirements.
- C. 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.

1.3. SCOPE:

- A. An intelligent, microprocessor-controlled, fire alarm detection system shall be installed in accordance to the project specifications and drawings.
- B. A microprocessor-controlled voice evacuation control panel shall be installed in accordance with the project specifications and drawings.
- C. Basic Performance:
 - 1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
 - 2. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style A) as part of an addressable device connected by the SLC Circuit.
 - 3. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuit.
 - 4. All circuits shall be power-limited, UL864 9th edition requirements.
 - 5. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm when wired NFPA Style 6/7.
 - 6. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.
 - 7. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.
 - 8. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

D. BASIC SYSTEM FUNCTIONAL OPERATION

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

- 1. The system Alarm LED on the FACP shall flash.
- 2. A local sounder with the control panel shall sound.
- 3. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
- 4. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm

1.4. SUBMITTALS

A. General:

- 1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
- 2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.5. 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. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.6. MAINTENANCE:

- A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:
1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
 2. Each circuit in the fire alarm system shall be tested semiannually.
 3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 (2002 Edition) Chapter 10.

- B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.7. POST CONTRACT EXPANSIONS:

- A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.
- B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable monitor modules, and addressable control modules equal in number to one tenth of the number required to meet this specification (list actual quantity of each type).
- C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional FACP hardware is required, include the material and labor necessary to install this hardware.
- D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the FACP and at each intelligent addressable device. Do not include the cost of conventional peripherals or the cost of initiating devices or notification appliances connected to the addressable monitor/control modules.
- E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.8. APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

- A. National Fire Protection Association (NFPA) - USA:
 - No. 13 Sprinkler Systems
 - No. 70 National Electric Code (NEC)
 - No. 72 National Fire Alarm Code
 - No. 101 Life Safety Code
- B. 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 the installation shall be in compliance with the UL listing.
- C. Local and State Building Codes.
- D. All requirements of the Authority Having Jurisdiction (AHJ).

1.9. APPROVALS:

- A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

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

PART 2 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

- A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.
- B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- 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. Where required, all wiring shall be installed in conduit or raceway. 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, per NEC Article 760.
- 4. Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- 5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
- 6. Conduit shall be 3/4-inch (19.1 mm) minimum.

B. Wire:

- 1. All fire alarm system wiring shall be new.
- 2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
- 3. All wire and cable shall be listed and/or approved by a recognized testing agency for use

- with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).
 5. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. Shielded wire shall not be required.
 6. All field wiring shall be electrically supervised for open circuit and ground fault.
 7. The fire alarm control panel shall be capable of T-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the amount of T-taps, length of T-taps etc., is not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

D. The 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. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

1. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72), and California Code. Main panel notification circuits (NACs 1 & 2) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

2.3. MAIN FIRE ALARM CONTROL PANEL:

A. The FACP shall be a NOTIFIER NFW2-100 (FireWarden-100-2) and shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. Operator Control

1. Acknowledge Switch:

- a. Activation of the control panel Acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition
- b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

2. Alarm Silence Switch:

Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software

shall include silence inhibit and auto-silence timers.

3. Alarm Activate (Drill) Switch:

The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

4. System Reset Switch:

Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

5. Lamp Test:

The Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.

C. System Capacity and General Operation

1. The control panel shall provide, or be capable of, expansion to 198 intelligent/addressable devices.
2. The control panel shall include Form-C Alarm, Trouble and Supervisory relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include programmable Notification Appliance Circuits (NACs) capable of being wired as Class B (NFPA Style Y) or Class A (NFPA Style Z).
3. The fire alarm control panel shall include an operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color-coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.
4. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes. The control unit will support the ability to upgrade its operating program using FLASH memory technology. The unit shall provide the user with the ability to program from either the included keypad, a standard PS2-style PC keyboard or from a computer running upload/download software.
5. The system shall allow the programming of any input to activate any output or group of outputs. Systems which have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or REQUIRE a laptop personal computer are not considered suitable substitutes.
6. The FACP shall provide the following features:
 - a. Drift compensation to extend detector accuracy during the accumulation of dust and foreign material.
 - b. Detector sensitivity test, meeting requirements of NFPA 72, Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
 - c. The ability to display or print system reports.
 - d. Alarm verification.
 - e. Positive Alarm Sequence (PAS presignal), meeting NFPA 72 (2002 Edition) 6.8.1.3 requirements
 - f. Rapid manual station reporting.

- g. Non-alarm points for general (non-fire) control.
 - h. Periodic detector test, conducted automatically by the software.
 - i. Walk test, with a check for two detectors set to same address.
7. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72), and California Code. Main panel notification circuits (NACs 1 & 2) shall also automatically synchronize the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

D. Central Microprocessor

- 1. The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
- 2. The microprocessor shall contain and execute all specific actions to be taken in the condition of an alarm. Control programming shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
- 3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.
- 4. A special program check function shall be provided to detect common operator errors.
- 5. An auto-programming capability (self-learn) shall be provided to quickly identify devices connected on the SLC and make the system operational.
For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download. This program shall also have a verification utility which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in compliance with the NFPA 72 requirements for testing after system modification.

E. Local Keyboard Interface

- 1. In addition to an integral keypad, the fire alarm control panel will accept a standard PS2-style keyboard for programming, testing, and control of the system. The keyboard will be able to execute the system functions ACKNOWLEDGE, SIGNALS SILENCED, DRILL and RESET.

F. Display

- 1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
- 2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
- 3. The display shall contain an alphanumeric, text-type display and dedicated LEDs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND conditions.
- 4. The display keypad shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
- 5. The display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, DRILL (alarm activate), and SYSTEM RESET.

G. Signaling Line Circuit (SLC)

1. The SLC interface shall provide power to and communicate with up to 99 intelligent detectors (ionization, photoelectric or thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. The CPU shall receive information from all intelligent detectors to be processed to determine whether normal, alarm, or trouble conditions exist for each detector. The software shall automatically compensate for the accumulation of dust in each detector up to allowable limits. The information shall also be used for automatic detector testing and for the determination of detector maintenance conditions.
3. The detector software shall meet NFPA 72 requirements and be certified by UL as a calibrated sensitivity test instrument.

H. Serial Interfaces

1. The system shall provide a means of interfacing to UL Listed Electronic Data Processing (EDP) peripherals using the EIA-232 communications standard.
2. One EIA-232 interface shall be used to connect an UL-Listed 80-column printer. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D. Power to the printer shall be 120 VAC @ 60 Hz.

- I. The control panel will have the capability of Reverse Polarity Transmission or connection to a Municipal Box for compliance with applicable NFPA standards.

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

1. The DACT shall be an integral component of the fire alarm control panel requiring no interconnecting wiring, plug-in module or supervisory circuitry.
2. The DACT 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 two different telephone numbers.
3. The DACT shall be completely field programmable locally from the control panel keypad or via PC software connected to the panel serial port. The DACT shall support upload/download of programming parameters from a remote location over a phone line using upload/download PC software
4. The DACT 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 DACT shall support independent zone/point reporting when used in the Contact ID

format. In this format, the DACT shall support the transmission of up addressable points with the system. This format shall enable the central station to have exact details concerning the location of the fire for emergency response.

7. AN IP Communicator option shall be available to interface to the UDACT and be capable of transmitting signals over the internet/intranet to a compatible receiver.

K. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall provide for the viewing of all indicators.
4. The cabinet shall accept a chassis containing the PCB and to assist in quick replacement of all the electronics including power supply shall require no more than two bolts to secure the panel to the enclosure back box.

L. Voice Evacuation Control Panel

1. The FACP shall be a NOTIFIER NFV-25/50 (FireVoice 25/50) and shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall distribute and control emergency voice messages over the speaker circuits.
2. The system shall provide the capability to interface to distributed voice evacuation control panels from the same manufacturer.
3. Shall have as minimum requirements:
 - a. Integral 25 Watt, 25 Vrms audio amplifier with optional converter for 70.7-volt systems. The system shall be capable of expansion to 50 watts total via the insertion of an additional 25-watt audio amplifier module into the same cabinet.
 - b. Speaker circuit that can be wired both Class A or B.
 - c. Integral Digital Message Generator with a memory capacity for up to 60 seconds of messaging. The Digital Message Generator shall be capable of producing five distinct messages (12 seconds each). These messages shall field programmable without the use of additional equipment.
 - d. Built in alert tone generators with steady, slow whoop, high/low and chime tone field programmable.
 - e. The Voice Control Panel will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Microphone Trouble, Message Generator Trouble, Tone Generator Trouble, and Amplifier Fault.
 - f. The Voice Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generation.
 - g. Speaker outputs shall be fully power-limited.
 - h. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.
 - i. The Voice Control Panel will provide full supervision on both active (alarm or music) and standby conditions.
 - j. An optional zone splitter version shall be available that permits splitting speaker circuits into 8 specific zones.
 - k. An optional distributed amplifier unit shall be available that permits splitting speaker circuits into up to a total of 24 zones when two distributed amplifiers are combined

with the master unit.

4. Speakers:
 - a. All speakers shall operate on 25 or 70 VRMS with field selectable output taps from 0.5 to 2.0 Watts.
 - b. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).
 - c. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
 - d. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

- M. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24-volt power supply or as a booster for powering Notification Appliances.
 1. The FCPS shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24-volt power. It shall include an integral charger designed to charge 18.0 amp hour batteries.
 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 control relay. Four NAC outputs, wired NFPA Style Y or Z, shall be available for connection to the Notification devices.
 3. The FCPS shall optionally provide synchronization of all connected strobes or horn strobe combinations when System Sensor, Wheelock, or Gentex devices are installed.
 4. The FCPS shall function as a sync follower as well as a sync generator.
 5. The FCPS shall include a surface mount backbox.
 6. The Field Charging Power Supply shall include the ability to delay the reporting of an AC fail condition per NFPA requirements.
 7. The FCPS shall provide 24 VDC regulated and power-limited circuitry per UL standards.

- N. Power Supply:
 1. The main power supply for the fire alarm control panel shall provide up to 6.0 amps of available power for the control panel and peripheral devices.
 2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
 3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
 4. The main power supply shall continuously monitor all field wires for earth ground conditions.
 5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

- O. Speakers:
 1. All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.
 2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).
 3. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
 4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

P. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of Section A listed above for audibility.
2. Shall meet the requirements of Section B listed above for visibility.

Q. 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, at a sound level of at least 90 dBA measured at 10 feet from the device.
3. Shall be flush or surface mounted as shown on plans.

R. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, 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.

S. Horn/Strobes:

1. Operate on 24 VDC
2. Have two selectable tone options of temporal 3 and non-temporal continuous pattern.
3. Have at least 2 audibility options
4. Maximum Pulse Duration: 0.2 second.
5. Strobe Intensity: UL 1971.
6. Flash Rate: UL 1971.
7. Strobe Candela Rating: Determine by positioning selector switch on back of device.

T. 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.

U. 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 at least 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.

V. 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.

W. 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.

X. 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 detectors 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.

Y. 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).

Z. Waterflow Indicator:

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.

AA. 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.
 - a. This unit shall provide for each zone: alarm indications, using a red alarm and yellow trouble long-life LEDs and control switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.
 - b. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.

BB. Specific System Operations

1. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 2 minutes.
2. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.

3. Point Read: The system shall be able to display the following point status diagnostic functions:
 - a. Device status
 - b. Device type
 - c. Custom device label
 - d. Device zone assignments
4. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
5. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 1000 events. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety.
6. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. The fire alarm control panel shall include Silent and Audible Walk Test functions - Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system. The operation shall be as follows:
 - a. The Silent Walk Test will not sound NACs but will store the Walk Test information in History for later viewing.
 - b. Alarming an initiating device shall activate programmed outputs, which are selected to participate in Walk Test.
 - c. Introducing a trouble into the initiating device shall activate the programmed outputs.
 - d. Walk Test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for Walk Test shall continue to provide fire protection and if an alarm is detected, will exit Walk Test and activate all programmed alarm functions.
 - e. All devices tested in walk test shall be recorded in the history buffer.
9. Waterflow Operation

An alarm from a waterflow detection device shall activate the appropriate alarm message on the control panel display; turn on all programmed Notification Appliance Circuits and shall not be affected by the Signal Silence switch.
10. Supervisory Operation

An alarm from a supervisory device shall cause the appropriate indication on the control panel display, light a common supervisory LED, but will not cause the system to enter the

trouble mode.

11. Signal Silence Operation

The FACP shall have the ability to program each output circuit (notification circuit or relay) to deactivate upon depression of the Signal Silence switch.

12. Non-Alarm Input Operation

Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.

2.4. SYSTEM COMPONENTS:

A. Addressable Manual Fire Alarm Box (manual station)

1. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

B. Intelligent Photoelectric Smoke Detector

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

C. Advanced Multi-Criteria Intelligent Detector

1. The intelligent multi criteria IntelliQuad detector shall be an addressable device combining four sensing elements in a single sensing device providing the ability to detect all four major elements of a fire. The detector design shall allow sensitivity setting between 1% to 4% per foot obscuration.
2. The detector shall include a photoelectric sensing element, thermal sensing element, IR (Infrared) sensing element and CO (carbon monoxide) sensor.

D. Intelligent Ionization Smoke Detector

1. The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

E. Intelligent Thermal Detectors

1. Thermal detectors shall be intelligent addressable devices. Thermal detectors shall be available with a rating of 135 degrees Fahrenheit (58 degrees Celsius) fixed, fixed 135 degree F with a rate of rise feature at 15 degrees F (9.4 degrees C) per minute, and a high

temperature thermal rated at 190 degrees F (88 degrees C). It shall connect via two wires to the fire alarm control panel signaling line circuit.

F. Intelligent Duct Smoke Detector

1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

G. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.
4. For multiple dry contact monitoring a module shall be available that provides 10 Style B or 5 Style D input circuits.

H. Two Wire Detector Monitoring

1. Means shall be provided for the monitoring of conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally open contact alarm initiating devices (pull stations, heat detectors, etc).
2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable module. The module will supervise the IDC for alarms and circuit integrity (opens).
3. The monitoring module will be compatible, and listed as such, with all 2-wire smoke detectors on the supervised circuit.
4. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
5. The monitoring module shall be capable of mounting in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or in a surface mount backbox.
6. For multiple 2-wire smoke detector circuit monitoring a module shall be available that provides 6 Style B or 3 Style D input circuits.

I. Addressable Control Relay Module

1. Addressable control relay modules shall be provided to control the operation of fan shutdown and other auxiliary control functions.
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control relay module will provide two dry contact, Form-C relays. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.
4. The control relay module shall be suitable for pilot duty applications and rated for a

minimum of 0.6 amps at 30 VDC.

J. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.

K. Isolator Module

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Style 6 (Class A) or Style 4 (Class B branch). The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

L. Serially Connected Annunciator

1. The annunciator shall communicate with the fire alarm control panel via a two wire EIA 485 (multi-drop) communications circuit.
2. The annunciator shall require no more than four wires for operation. Annunciation shall include: intelligent addressable points, system software zones, control relays, and notification appliance circuits. The following operations shall also be provided:
 - a. Up to 32 annunciators, each with up to 64 points may be installed on the system.
 - b. The annunciator shall include a single electrical key switch to disable all switch functions.
 - c. The annunciator shall provide alarm and trouble resound, with flash for new conditions.
 - d. This unit shall provide for each zone: alarm indications, using a red alarm and yellow trouble LEDs, and switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.
 - e. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.
3. This system shall provide a means of interfacing to graphic style annunciator.
4. The graphic annunciator interface will possess the capability of individually annunciating each individual addressable device in the system.

M. Alphanumeric LCD Type Annunciator:

1. The alphanumeric display annunciator shall be a supervised, remotely located backlit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
2. The LCD annunciator shall display all alarm and trouble conditions in the system.
3. An audible indication of alarm shall be integral to the alphanumeric display.
4. The display shall be UL listed for fire alarm application.
5. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.
6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.

N. Door Holders:

1. Door Holders will be available in 120 VAC and 24 VDC models.
2. 120 VAC models will be transient-protected against surges up to 600 volts.
3. Door holders will be designed for Fail Safe operation (power failure release door to close).

O. Elevator Recall:

1. Smoke detectors will be installed in the elevator hoist shaft. An alarm from such devices will signal the elevator to initiate emergency procedures. All lift call buttons; door buttons and signals will become inoperative in the lift bank serving the machine room. Lifts will immediately be sent to the main floor of egress (ground level) where they will be decommissioned until the alarm condition has been cleared or manually taken over by Fire Department personnel.
2. Smoke detectors will be installed in each elevator lobby. These detectors will function to signal the elevator to recall to the primary floor of egress (ground level) in the event of an alarm. Detectors on the first floor will signal the elevator to recall to the secondary floor of egress.

2.5. SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General

1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.
2. Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm control panel signaling line circuits.
3. Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.
4. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
5. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a

- minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.
6. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
 7. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
 8. Detectors shall provide address-setting means using decimal switches.

2.6. BATTERIES:

- A. Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for required standby time (24 or 60 hours) followed by 5 minutes of alarm.
- B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
- C. If necessary to meet standby requirements, external battery/charger systems may be used.

PART 3 - 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 fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

- 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 flow valve and verify proper supervisory alarm at the FACP.
- C. Verify activation of all waterflow switches.
- D. Open initiating device circuits and verify that the trouble signal actuates.

- E. Open and short signaling line circuits and verify that the trouble signal actuates.
 - F. Open and short notification appliance circuits and verify that trouble signal actuates.
 - G. Ground all circuits and verify response of trouble signals.
 - H. Check presence and audibility of tone at all alarm notification devices.
 - I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
 - J. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
 - K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
 - L. When the system is equipped with a Voice Evacuation Control panel, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying voice messages.
- 3.3. FINAL INSPECTION:
- A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.
- 3.4. INSTRUCTION:
- A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
 - B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

END OF SECTION