SECTION 13000

FIRE MONITORING SYSTEM / BUILDING MANAGEMENT CONTROL SYSTEM (BMCS)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Providing all materials and labor for the design, engineering and installation of a new addressable automatic fire detection and alarm system, hereafter referred to as the system, in the McCarran International Airport. Work shall include all areas of the project.

B. The new fire alarm system installed for these areas shall be an extension of the existing Honeywell fire alarm system installed throughout the Airport. All new devices and equipment shall be compatible with the existing system.

C. System concept drawings are included with this package. These show the general layout of the building and general device locations. These drawings and specifications do not necessarily contain all information required for installation of the system, but are intended to be used as a guide for the purpose of designing the system and preparing bids. As such, they indicate:

1. Requirements for approximate device locations.

2. Types and minimum installation criteria of initiating devices.

3. Locations of new fire alarm system control panel equipment and annunciators.

4. Locations of equipment to be interfaced to, monitored and/or controlled by the new fire alarm system.

5. Minimum circuit routing information.

D. Provide a complete fire alarm system for the areas shown on the design plans and as stated in this specification, including all necessary upgrades as required by the Clark County Fire Marshal. This shall include, but not necessarily be limited to the following components:

1. Dual-action manual fire alarm stations.

2. Smoke detectors.

3. Fire monitoring panel (FMP).

4. Addressable interface units for sprinkler water flow and supervisory switches.

5. Battery emergency power supply.

6. Conduit/raceway.

7. Junction/Pull Boxes.

8. Wiring.

E. The Fire Monitoring Systems (FMS) shall be arranged as follows:

1. The actuation components which are manual stations, sprinkler water flow and supervisory switches and smoke detectors as specified.

2. The connections to the actuation components and their readouts shall be in the existing Fire Monitoring Panel (FMP).

3. The interface with the existing Building Management and Control System (BMCS) also shall be located in the FMP.

4. The FMS shall be supervised from the operator's console at the BMCS in the Airport Control Center (ACC).

5. This system shall be integrated into the existing BMCS located in the Main Terminal.

F. CONTRACTOR is responsible for obtaining all applicable Fire Marshal approvals of plans and specifications for the Fire Monitoring Systems.

G. This section also includes the complete installation, modification of the Airport Life Safety System.

H. CONTRACTOR shall coordinate the Fire Alarm System with Honeywell per this specification section. The Fire Alarm System must be designed and installed by Honeywell to match and comply with existing Honeywell Fire Alarm System and meet latest applicable Codes and Standards and Clark County Fire Department. This shall include all upgrades required by the Clark County Fire Marshal. The fire alarm system shall also include all conduit, wire, devices, panels etc. for a complete operational system.

I. CONTRACTOR shall coordinate with Honeywell for all new tie-in to existing Airport Building Management Control System to insure that lighting panels shown on lighting plans and all mechanical equipment shown on the Mechanical plans are controlled in accordance with Airport BMCS requirements. This shall include but not be limited to lighting control, valve control, damper control, duct detectors, interlock with the Fire Alarm System, Fire Department control as necessary. This shall also include design, any necessary HVAC control panels, conduits, wiring, necessary permits, approvals, and final acceptance.

J. Related Sections:

1. Section 09900 – Painting
2. Section 13930 – Wet-Pipe Fire Suppression Systems
3. Section 16050 – Basic Electrical Requirements
4. Section 16130 – Raceway and Boxes

1.2 SYSTEM DESCRIPTION

A. New addressable fire alarm system devices and equipment, along with modifications to existing equipment, shall be provided and installed to serve the new areas. The existing Honeywell fire alarm system shall be expanded to serve these new areas. The existing Fire Department Response Point annunciators shall be expanded to serve these new areas. The graphic display in the 4th Floor Control Center at the Main Terminal shall also be expanded to serve these areas.

B. Provide and install new fire detection and alarm system equipment under this project consisting of:

C. New fire alarm system control and remote interface panels as necessary to distribute fire alarm circuits and controls within the building. New panels shall be interfaced with the existing fire alarm control panels within Terminal 1.

D. New emergency voice communication panels and/or equipment to accommodate audible circuits within the buildings.

E. New addressable type smoke detectors throughout Levels 1 and 2 as shown.

F. New addressable type in-duct smoke detectors in all air handling units over 2,000 cfm, at the main supply air ducts, and where smoke/fire dampers are installed. Where complete area detection of the space served by the air-handling unit or fire/smoke damper is provided, in-duct type smoke detectors are not required. This work shall include all materials and wiring for installation of the in-duct detector and associated control wiring for fan shutdown or damper closure.

G. New addressable manual fire alarm stations throughout the complex in accordance with NFPA 72 and NFPA 415 requirements. Manual stations shall be provided at each exit from the building, at entrances to each exit stair and at other locations to limit travel distances to no more than 200 feet.

H. Devices, equipment and wiring as necessary to monitor the activation of sprinkler system supervisory and alarm devices including waterflow switches, valve supervisory switches, and supervisory air switches.

I. Voice communication speakers and fire alarm strobes throughout the new areas. New fire alarm strobes shall be installed in all public and back-of-house areas. Fire alarm strobes to match existing.

J. Modifications to existing graphic annunciators and control panels within the Response Point location to depict fire alarm and smoke control system status and controls, as required by the Clark County Fire Department.

K. Test and adjust all equipment and systems.

L. Prepare and submit shop drawings, permit drawings, record drawings and other submittals required herein.

M. Warranty all new equipment and systems for one year after final acceptance of the system by OWNER.

N. Obtain, secure, and pay for all permits, plan check approvals, and inspections necessary to perform the work. This shall include any necessary off-hour costs for inspections and witnessing of tests.

O. Provide testing of all devices, and repair as necessary, during the warranty period up to and including the first annual tests, as required in NFPA 72 - 1996 as a minimum.

1.3 QUALIFICATIONS

A. All work shall conform to the requirements of the applicable portions of Factory Mutual guidelines and the National Fire Protection Association (NFPA) Standards, Guides and Recommended Practices listed herein. The latest editions of these standards shall be used, unless otherwise directed by local authorities.

1. NFPA 70, National Electrical Code.

2. NFPA 72, National Fire Alarm Code.

B. All work and materials shall conform to all Federal, State and local codes and regulations governing the installation, including the current editions of the Clark County Building and Fire Prevention Codes, as modified or interpreted by the County Officials to permit use of current NFPA standards.

C. All devices, systems, equipment and materials furnished and installed shall be new and listed by Underwriters Laboratories Inc. (ULI) for their intended use. All equipment shall be installed in accordance with the manufacturer's recommendations and the ULI listing limitations.

D. All devices, systems, equipment and materials furnished and installed shall be of types or models approved and required by NFPA Standards or ULI listing for use in systems and occupancies of this type.

E. CONTRACTOR shall be responsible for filing of all documents, paying all fees and securing all permits, inspections and approvals necessary for conducting this work. This shall include any costs associated with plan check, off-hour inspections, and fees associated with witnessing of fire alarm tests. Plan check drawings submitted to the County for permit approval shall include all necessary information, including any stamps or seals required for approval.

1.4 SUBMITTALS

A. Product Data: Submit a detailed equipment list, identifying types, models and quantities of all materials, devices and equipment proposed. This submittal shall include manufacturers' data sheets showing the types and models of all equipment, devices, material and wire proposed. Evidence of ULI listings and local approvals shall be submitted with the data sheets. The submittal shall include, but not be limited to, the following:

1. Fire alarm control equipment and annunciators, including all components, modules, and enclosures.

2. Detectors, auxiliary function relays and solenoids, and notification appliances.

3. Standby batteries.

4. Any other materials, devices or equipment to be provided.

B. Samples: Submit samples of all proposed alarm initiating devices, audio/visual notification devices, wire, and cable to OWNER for approval.

C. Shop Drawings: Prior to installation submit four full sets of blueline shop drawings, one set of reproducible (sepia) shop drawings, five full sets of data sheets, and installation manuals/instructions detailing the manufacturer's installation recommendations for all equipment to be installed for approval. CONTRACTOR to obtain approval of shop drawings and equipment submittals from OWNER prior to submitting to the Fire Department. Failure to comply shall result in CONTRACTOR absorbing any additional costs associated with re-submittals. Installation prior to receipt of approved shop drawings shall be at the risk of CONTRACTOR. The shop drawings shall consist of the following:

1. A drawing legend sheet identifying:

   a) All symbols used on the drawings, by type of device or equipment, manufacturer, and manufacturer's part number. This information shall correspond to the manufacturer's catalog data sheets required elsewhere in this section.
   b) All conventions, abbreviations and specialized terminology used on the drawings, as necessary to understand and interpret the information contained therein.
   c) All color codes and conduit, conductor/ circuit and device numbering systems.
   d) A complete drawing list/index identifying all drawings in the shop drawing package by title, drawing number and Specification cross-reference.

2. Clean architectural floor plans drawn to scale and a system riser diagram with a title block on each drawing. The floor plan drawings shall indicate:

   a) Location of all devices, equipment, risers and electrical power connections. Addressable systems shall indicate device addresses for all addressable components shown on each drawing.
   b) Number, size, and type of conductors and conduit.
   c) Point-to-point wiring connections showing individual circuits and circuit/conduit routing. This information shall be depicted in sufficient detail to readily locate specific conduits, raceways and circuits in the field and to identify the specific conductors/circuits contained therein. All penetrations of fire-rated barriers shall be individually noted.

d) Typical wiring diagrams for all alarm initiating devices and notification appliances, showing the size and type of conductors, wiring terminations and terminal identifications.
e) When remote transmitting panel power is derived from "local" source of building emergency power, the shop drawings shall show wire routing and point of connection (location) to the building "E" circuit.
f) Provide details showing elevations from finished floor for all devices.

3. Conduit fill calculations, in chart form, indicating the cross-section area percent fill for each type of wire/cable in each size of conduit used in the system. A maximum of 40 percent fill is allowed.

4. The riser diagram shall indicate:

a) Number, size, and type of riser conduits/raceways.
b) Number, size, and type of conductors in each riser.
c) Number of each type of device on each circuit on each floor.

5. Detailed wiring diagrams for all alarm control panels, control panel modules, power supplies, electrical power connections, auxiliary function relays and solenoids, and annunciators, identifying all required terminations, including terminal identifications. All unsupervised connections and terminations shall be noted "unsupervised."

6. Depict and identify all circuit boards, modules, power supplies, standby batteries, wiring harnesses, terminal strips and connections thereto, including spare zones and circuits. Where multiple components of a similar type are provided, a unique component number shall identify each.

7. Include front-view details of all control panels and annunciators, depicting and identifying all indicators, controls and zone labels, including proposed nomenclature.

8. Depict the required information to relative scale, actual size or larger, showing proper special relationships between components, and reflect the corresponding system components as they are to be installed.

9. Standby battery capacity calculations. Battery calculations shall list the type of devices and modules, quantities, unit and extended amperage draw for quiescent and alarm conditions, total amperage draw and battery amp/hour rating. For design criteria, the calculated load shall be the design load, including spare capacity. In addition, the battery capacity used to meet the calculated load shall be a maximum of 80 percent of the amp/hour rating listed by the manufacturer.

10. Voltage drop calculations shall list the percentage of drop for compliance with the local authority requirements.

11. A complete zone/address list identifying each signal initiating zone, annunciator zone, notification signaling zone, remote signaling and auxiliary function zone and the specific devices associated with each zone.

12. A Cause and Effects Matrix defining the system operation. This matrix shall cross-reference each signal initiating zone to its corresponding annunciator zones, notification signaling zones, remote signaling zones, and auxiliary functions zones, and indicate system operation in the event of each type of trouble condition recognized by the system.

D. Operation and Maintenance Manual: The maintenance manual shall contain:

1. A detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations.

2. A detailed description of the operation of the system, including operator responses. The approved sequence of operation shall be placed in, or adjacent to, the operator's control panel.

3. A detailed description of routine maintenance required or recommended or as would be provided under a maintenance contract including a testing and maintenance schedule and detailed testing and maintenance instructions for each type of device installed.

4. Manufacturers' data sheets and installation manuals/instructions for all equipment installed with detailed troubleshooting instructions for each specific type of trouble condition recognized by the system, including opens, grounds, parity errors, "loop failures," etc. These instructions shall include a list of all trouble signals annunciated by the system, a description of the condition(s) which will cause those trouble signals, and step-by-step instructions describing how to isolate those problems and correct them (or call for service, as appropriate).

5. A list of recommended spare parts.

6. Service directory which includes the main 24-hour emergency service number and at least three alternate numbers which are monitored on a 24-hour basis.

7. Small scale (11 inches by 17 inches) record drawings of the system.

E. Record Drawings: Shall be provided and maintained on the site an up-to-date record set of approved shop drawing prints which shall be marked to show each and every change made to the fire alarm system from the original approved shop drawings. This shall not be construed as authorization to deviate from or make changes to the approved shop drawings. This set of drawings shall be used only as a record set. These drawings shall be made available to OWNER, or their representative, upon request.

1. Upon completion of the work, the record set of prints shall be used to prepare complete, accurate final record drawings reflecting any and all changes and deviations made to the fire alarm system.

2. Upon completion of the work, two sets of blueline record drawings shall be submitted to OWNER for review.

3. Following OWNER's review and acceptance of the blueline record drawings, and before final approval, one (1) set of reproducible mylar record drawings, one copy on diskette, and four (4) additional sets of blueline record drawings shall be delivered to OWNER.

4. The record drawings are required to show and to identify quantities of junction boxes, spare conductors, color coding of conductors, splices, device backboxes, and terminal strips. These drawings shall include a schedule of all connections/terminations, indexed by junction box, device backbox and terminal strip and shall reference wire identification taped numbers as installed.

1.5 TRAINING

A. Conduct two (2) training sessions as required, but not less than four (4) hours each, to familiarize OWNER's personnel with the features, operation, and maintenance of the modified systems. Training sessions shall be scheduled as agreeable to OWNER.

B. Training shall include all system operational functions needed by building and security personnel. This shall include, but will not be limited to:

1. Alarm acknowledgement.

2 Interpretation of the scheme used to provide identifiers.

2. System reset.

4. Basic troubleshooting.

1.6 SPECIAL TOOLS

A. Three (3) complete sets of any special tools or keys necessary for normal operation and maintenance of the system shall be provided under this work.

1.7 SYSTEM OPERATION

A. The activation of any sprinkler waterflow switch, area smoke detector, manual fire alarm station, heat detector, special suppression system, or any other fire alarm device shall:

1. Cause an audible alarm to sound and a visual signal to illuminate at the main fire alarm control panel and remote annunciator(s).

2. Initiate the building audible evacuation signals throughout the fire area as applicable.

3. Illuminate the building visual evacuation signals in conjunction with the building audible evacuation signals by activating visual strobe circuits in the respective areas.

4. Transmit a signal to the building's security system to release locked egress doors.

5. Activation of area smoke detectors associated with hold-open doors shall also release their respective magnetic hold open doors.

6. Activation of a smoke detector within the retail spaces shall also cause the retail smoke control system to start.

7. In addition to the operation of sequences above, elevator lobby, shaft and elevator machine room smoke detectors shall also activate the elevator recall system, as required for primary floor elevator recall. Activation of the primary floor lobby smoke detector shall initiate the alternate floor recall relay.

8. The activation of any in-duct smoke shall also shutdown the respective fan or air-handling unit, through the associated addressable control relay; and/or close the associated fire/smoke damper.

9. Activation of a fire alarm device within any area served by a pressurized stairwell shall also cause the stairwell pressurization systems to start.

10. Activation of any alarm shall also cause the exterior emergency egress lighting to illuminate.

11. Activation of any heat detector within elevator machine rooms and hoistways shall also activate the power shunt for the respective elevator(s).

B. The activation of any valve supervisory switch, fire pump status indicator, or any other supervisory device shall:

1. Cause an audible alarm to sound and a visual signal to illuminate at the main fire alarm control panel and remote annunciator(s).

C. System trouble signals shall:

1. Cause an audible alarm to sound and a visual signal to illuminate at the main fire alarm control panel and remote annunciator(s), indicating the type of trouble and area of trouble.

2. Trouble signals shall be distinctively different than alarm or supervisory signals.

PART 2 PRODUCTS

2.1 GENERAL

A. The system shall utilize analog point-addressable, multiplex technology providing a discrete system "address" for each individual initiating device.

B. All equipment and system components furnished and installed shall be new and listed by ULI for their intended use. The equipment and system components shall be installed in accordance with the applicable codes and standards, the manufacturers' recommendations and within the limitations of the ULI listings. All equipment and system components shall be compatible with the existing Honeywell fire alarm system serving Satellite D. Evidence of ULI listing is required.

C. System components shall be modular in design to ensure future expansion capability of the system. Spare capacity shall pertain to quantities of devices, circuits, power supplies, amplifiers, conductor capacities (size) and lengths.

D. The system shall have spare installed capacity enabling it to support a 30 percent increase in the number of initiating devices, and in the number of control and notification appliances. Spare circuit capacity shall be evenly distributed throughout the system.

E. Alarm Verification: The system shall have the ability to incorporate an alarm verification function in the control panel. Alarm verification shall not be programmed into the initial installation, but shall be available for future use if required and approved by the Clark County Fire Department. Alarm verification shall be arranged on a per smoke detector or per circuit (zone) basis, or it may be accomplished on a multiple (zone) or system basis, provided the retard duration of the verification procedure is not more than 30 seconds. The system shall be arranged such that the "retard-reset" period shall be 30 seconds. Alarm verification shall not be utilized in circuits applied for cross zoning use. Alarm verification shall not be provided for manual fire alarm stations or waterflow alarm switches. Appropriate "warning" signage shall be placed on the inside face of all control panels, remote transmitting panels, and fireman's command panels.

F. Electromagnetic Interference: All fire alarm control equipment, devices and wiring shall be protected against unwanted radiated electromagnetic interference (EMI) and radio frequency interference (RFI) which can interfere with normal system processing and possibly cause unwanted alarms.

2.2 SYSTEM CONFIGURATION

A. Initiating Device Circuits:

1. Fire alarm initiating device circuits, including circuits monitoring manual fire alarm stations, smoke and heat detectors, waterflow switches and devices used for detecting activation of special fire suppression systems shall be Style "A" or "B" (Class B) as described in Table 3-5.1 of NFPA 72.

2. Supervisory initiation circuits, including circuits monitoring valve supervisory switches, fire pump functions, air pressure supervisory switches, magnetic contacts, electrical power supervision and low battery supervision shall be Style "A" or Style "B" as described in Table 3-5.1 of NFPA 72.

B. Signaling Line Circuits:

1. Circuits connecting remote annunciation devices with the control panel or circuits, and addressable circuits shall be Style "4" (Class B) as described in Table 3-6.1 of NFPA 72.

2. The main system riser between remote transmitting panels and the control panel(s), shall be Style "4" (Class B) as described in Table 3-6.1 of NFPA 72.

C. Notification Appliance Circuits:

1. Notification appliance circuits shall be Style "Y" (Class B) to meet the requirements of Table 3-7.1 of NFPA 72.

2.3 POWER SUPPLIES

A. Except where otherwise required by local code, all AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of Section 1-5.2.3 of NFPA 72.

B. All new portions of the system shall be designed and equipped on standby (rechargeable) battery power, either directly or by provision of an uninterruptable power supply or supplies.

C. Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any alarm, trouble or operator acknowledgement signals.

D. Operation of any portion of the system on secondary power shall annunciate as a trouble signal, identifying the inoperable power supply(ies).

E. Standby batteries shall have sufficient capacity to maintain all portions of the system in a normal, non-alarm condition for a minimum of 4 hours, after which it shall be capable of operating all notification appliances simultaneously for a minimum of 15 minutes.

F. All standby batteries shall be continuously monitored by the system. Low battery and disconnection of battery power supply conditions shall immediately annunciate as a trouble signal, identifying the deficient batteries.

G. All power supplies, including any UPS, shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 24 hours maximum.

H. All batteries shall be maintenance-free type. Wet cell lead acid standby batteries are prohibited.

I. Design load connected to any power supply, amplifier and batteries shall not exceed 80 percent of its rated capacity.

2.4 ANNUNCIATION

A. The system shall be designed and equipped to receive, monitor and annunciate signals from devices and circuits installed throughout the building.

B. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device.

C. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet.

D. Alarm, trouble, and supervisory signals shall initiate recognizably different audible outputs. Trouble and supervisory signals may initiate the same audible output if distinction is by visible annunciation.

E. Integral audible devices shall continue to sound until silenced by a system operator actuating a switch designated for that purpose.

F. Receipt of subsequent alarm or supervisory signals shall cause the integral audible devices to resound.

G. The system shall be designed and equipped to provide inputs and outputs as described in these specifications.

H. The system shall recognize and annunciate the following signals:

1. Fire alarms.

2. Supervisory signals.

3. Trouble conditions.

4. Operator acknowledgement of annunciated signals.

5. Smoke detection system reset.

I. All alarm signals, supervisory alarm signals and trouble conditions shall be annunciated by the control panel(s) and by each remote annunciation device. Operator acknowledgement of smoke detection signals and system reset shall be annunciated by the control panel(s).

J. Fire Alarm Signals: Activation of the following devices shall be recognized and annunciated by the system as fire alarms:

1. System type smoke detectors, including in-duct smoke detectors.

2. Waterflow switches.

3. Devices monitoring actuation of special suppression systems.

K. Supervisory Alarm Signals: The following conditions shall be recognized and annunciated by the system as supervisory alarms:

1. Valve supervisory switch actuation.

2. Fire pump and emergency generator common signals.

3. Devices monitoring condition or supervision of special suppression systems.

4. Air supervisory switches associated with dry-pipe sprinkler systems.

L. Trouble Signals: The system shall also recognize and annunciate the following trouble conditions:

1. Initiating device circuit trouble conditions per Table 3-5.1 of NFPA 72.

2. Signaling line circuit trouble conditions per Table 3-6.1 of NFPA 72.

3. Notification appliance circuit trouble conditions per Table 3-7.1 of NFPA 72.

4. Power supply trouble conditions as required by these specifications.

5. Remote annunciation device trouble conditions as required by these specifications.

6. A smoke detector, with automatic drift compensation feature, requiring maintenance when it reaches 80 percent of its threshold limit for a period of 24 hours.

M. Operator Acknowledgement Signals: Silencing of integral audible devices required by these specifications shall be recognized and annunciated by the system as operator acknowledgement of the signal(s) displayed.

2.5 FIRE ALARM CONTROL PANEL(S)

A. New and/or existing fire alarm control panels shall be designed and equipped to provide the following. These panels shall be interconnected with the existing Honeywell fire alarm system serving Terminal 1. New panels, or expansions to the existing panels shall be provided to incorporate the necessary circuits and controls for the new system.

1. Single channel, one-way emergency communication capability on either an automatic or operator selectable zone-by-zone or "all-call" basis via new fire alarm speakers. Equipment shall be arranged so that speaker zones can be selectively addressed, individually, in any combination of individual zones or on "all-call" basis for "public address" paging, digitized voice message, or tone generator signals.

2. Standby power supplies capable of supporting all dependent devices and equipment as required by these specifications.

3. The system control unit shall have provisions for an alarm verification feature for alarm signals received from smoke detectors or smoke monitoring heads.

4. Devices or controls to effect reset of the system.

5. The control panel(s) shall not be capable of being reset until all alarm conditions have been cleared.

B. The Fire Alarm Control Panel (FACP) shall be provided with a Speaker Circuit Control Panel, consisting of:

1. The speaker circuit control panel shall include visual indication of active or trouble status for each speaker circuit in the system.

2. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

3. A trouble indication shall be provided if a speaker circuit is disabled.

4. Speaker circuit control switches shall provide on, off and automatic positions and indications.

5. A switch shall be provided for manual activation of amplifiers, tone generators, and digital voice modules (DVM's).

6. A single "all call" switch shall be provided to activate all speaker circuits simultaneously.

7. Visual indicators for active and trouble conditions shall be supervised.

8. A push-to-talk microphone shall be provided for manual voice messages.

9. Digitized voice messages under automatic operation of the voice alarm system.

C. Provide all electrical work for connection to the building’s emergency power system.

2.6 REMOTE TRANSMITTING PANELS

A. Remote transmitting panels, if required, shall interface local initiating and notification appliance circuits or addressable circuits with the control panel(s) via the signaling circuit riser(s).

B. Operating (electrical) power shall be derived from the control panel(s) via a supervised circuit, or shall incorporate integral power supplies meeting the requirements of these specifications.

C. Locations where remote transmitting panels are installed shall be provided with area smoke detection as required by NFPA 72.

D. Remote transmitting panels shall be provided within the building, as required for system layout in accordance with the system requirements for a complete and operable system. Remote transmitting panels shall be installed in secure locations, such as mechanical, telephone equipment and electrical rooms.

E. Remote transmitting panels shall be capable of degrade mode operation in the event communication is lost between the primary and remote panels.

F. Provide all electrical work for connection to the building's emergency power system.

2.7 ANNUNCIATION DEVICES

A. Provide graphic annunciators at the Response Point location as indicated on the plans to display fire alarm and waterflow conditions as required by the Clark County Fire Department. Existing annunciators may be expanded to accommodate the new devices and system, or new annunciators shall be provided. Layout and design of the graphic annunciator shall be reviewed and approved by the Fire Department prior to fabrication.

B. Provide new graphic annunciators at the Response Point Location as indicated on the plans to display and provide controls for any and all retail area smoke control systems and any and all stairwell pressurization systems. Provide on/off/auto switches for each system fan and dampers to allow for controls for each retail area and stairwell pressurization system. Provide status LED's for each device and zone.

2.8 SMOKE DETECTORS - AREA TYPE

A. Spot-type smoke detectors shall be installed as shown; in elevator machine rooms; within elevator lobbies; at the top of each elevator shaft; within electrical and telephone equipment rooms; within retail spaces, throughout all public areas; at hold-open doors; and at locations where remote transmitting panels are installed; ceiling or wall mounted in conformance with the requirements of NFPA 72. Smoke detectors shall be arranged to annunciate by detector, via an integral addressable element.

B. These detectors shall be system operated, analog photoelectric or ionization type plug-in detectors which mounts to a twist-lock base. The detector shall contain an alarm indicating LED, which will blink to signal activation of the detector. The detector head shall be equipped with a mesh insect screen to prevent foreign objects from entering the sensing chamber. The initial sensitivity voltage shall be factory set by the manufacturer.

C. Each spot-type smoke detector shall be monitored individually, via an integral, addressable element. The use of addressable zone modules to monitor spot smoke detectors is not acceptable.

D. Spot-type smoke detectors shall have provisions for calibrated sensitivity testing consistent with the requirements of NFPA 72.

E. Protect smoke detectors and smoke detector bases from dust, dirt, and paint contamination during construction. Detector covers shall be removed upon completion of the work in the area(s) in which they are installed.

F. Holes in the back of detectors and detector backboxes shall be covered with gaskets, sealant or equivalent, and detectors shall be mounted so that airflow from inside the detector backbox or from the periphery of the detector housing shall not prevent the entry of smoke during a fire or test condition.

G. Smoke detectors shall be of the low-profile type.

2.9 SMOKE DETECTORS - IN-DUCT TYPE

A. In-duct type smoke detectors shall be installed in all air handling systems over 2,000 cf., and at fire/smoke dampers within the building, installed in conformance with the requirements of NFPA 72, NFPA 90A, local requirements and in accordance with the detector manufacturer's installation instructions. In-duct smoke detectors shall be suitable for the full range of air velocity conditions in the air-handling systems in which they are installed.

B. In-duct smoke detectors shall be of the analog, addressable type, consisting of a plug-in type detector head in a duct-mounted housing equipped with air-sampling tubes providing air flow through the detector housing. The detector housing shall accommodate either ionization or photoelectric-type detector heads interchangeably. In-duct smoke detectors shall be listed or approved for that application. In-duct smoke detector operating voltage shall be 24 VDC.

C. Each in-duct smoke detector shall be monitored individually via an integral addressable element.

D. These detectors shall be arranged to initiate shutdown of their associated fan and air-handling unit, close their associated fire/smoke damper, or initiate smoke control functions on alarm from their associated addressable control relays.

E. Provide necessary interlock wiring to fan and air-handling unit starters and motor control centers for shutdown of fans, smoke control, or damper control circuits when smoke is detected.

2.10 SPRINKLER SUPERVISORY AND ALARM EQUIPMENT

A. New waterflow indicators with retard mechanism shall be monitored under this contract to indicate waterflow in each sprinkler system zone.

B. Valve supervisory switches shall be monitored under this contract for valves controlling the water supply to the sprinkler systems.

C. Each waterflow switch and valve supervisory switch shall be individually addressed with addressable monitor modules.

D. Adjustments necessary for proper operation shall be provided and coordinated under this work.

E. Air supervisory switches associated with dry-pipe sprinkler systems shall be monitored under this contract.

F. Fire pump status indicators (pumps running, loss of power and phase reversal) shall be monitored under this contract.

2.11 ADDRESSABLE CIRCUIT INTERFACE MODULES

A. Provide, install, and test addressable circuit interfaces to miscellaneous supervisory devices, such as suppression systems, waterflow and valve supervisory devices, and smoke control systems. Addressable modules shall also be provided to monitor existing circuits and devices being reused by the new system, such as manual fire alarm station circuits and waterflow switch circuits.

B. All circuit interfaces used for supervisory and control functions shall be mounted within 3 feet of the monitored switch or circuit.

C. Circuit interface modules shall also be used for control of various circuits, such as elevator recall and fan/damper controls. These modules shall be provided with DPDT dry contacts for proper interfacing. Where contact ratings are not sufficient to control the required circuit, provide additional relays controlled by the addressable module for proper circuit ratings.

D. Addressable Circuit Interface Modules shall be provided where required, in sufficient quantities, for a complete and operational system, whether specifically indicated or not.

2.12 MANUAL FIRE ALARM STATIONS

A. Manual fire alarm stations shall be of the double-action, non-coded type. They shall consist of a housing, fitted with a pull-down lever, which when operated, locks in position after releasing a spring-loaded contact switch to effect activation of an alarm circuit. Resetting the station after operation shall require the use of a special tool or key. The manual station shall be suitable for surface, flush or semi-flush mounting. Manual stations shall be semi-flush mounted in all back-of-house areas unless mounted on concrete or masonry surfaces where surface mounting is permissible. Where mounted in back-of house areas, manual fire stations will be protected from physical damage by steel brackets or other approved means, which shall not be attached to the station itself.

2.13 AUDIBLE/VISUAL SIGNALING DEVICES

A. General: Signaling devices shall consist of a fire alarm speaker and separate visual signaling device assembled in a common enclosure, or installed in separate enclosures provided proper coverage is provided. Audible signaling devices shall be installed and spaced so as to produce a sound output on alarm, which is clearly audible above the ambient noise level throughout the building. In no case shall the audible alarm be less than 15 db above the ambient room noise level, nor less than 80db.

B. Fire Alarm Speakers:

1. New fire alarm speakers and circuits shall be installed to provide the required audible signals.

2. Shall operate on either 25 VRMS or 70.7 VRMS with field selectable output taps from 0.25 to 2.0W.

3. Speakers shall produce a nominal sound output of 88 dB at 10 feet (3m).

4. Frequency response shall be a minimum of 400 HZ to 4,000 HZ.
5. Mount on removable adapter plates on conduit boxes.

6. Speakers located outside shall be of weatherproof type with metal housing.

7. Each new speaker circuit shall have minimum of thirty (30) percent spare capacity.

C. Visual Signaling Appliances:

1. New visual signaling appliances (strobes) shall be provided for this project. New strobes shall match existing strobes in Satellite D.

2. Visual signaling appliances shall consist of a vibration resistant solid state flasher assembly which, upon activation, illuminates a lens labeled "Fire".

3. When visual signaling appliances are mounted on the wall, the word "Fire" shall read from top to bottom.

4. Visual signaling appliances shall be installed in all public areas, public restrooms, corridors, lounges, elevator landings, concourse and holding areas, and other locations as required by the Fire Department, located in accordance with ANSI standards.

5. Visual signaling appliances shall be listed in accordance with UL 1971.

6. Visual signaling appliances shall provide a signal output intensity of not less than 15/75 candela.

7. Combination units shall be in accordance with the requirements for fire alarm speakers and visual signaling appliances respectively if used.

8. Mounting heights and locations shall be in accordance with applicable code, ANSI requirements and the Americans with Disabilities Act (ADA) requirements.

2.14 SPARE PARTS

A. As part of this contract, provide the following spare parts:

1. Manual fire alarm stations, automatic detection devices, and addressable circuit modules - Two percent of the installed quantity of each type, but not less than 2.

2. Audible and visual devices - Two percent of the installed quantity of each type, but not less than 2 of each type.

3. Fuses - Five each for each type, rating and size of fuse used in the system.

4. Keys - A minimum of three sets of keys shall be provided and appropriately identified.

2.15 CONDUCTORS AND CONDUIT

A. Except as otherwise required by the Clark County Electrical code and/or these Specifications, fire alarm circuit wiring shall conform to the requirements of Article 760 of NFPA 70.

B. Fire alarm circuit wiring shall be installed in a ULI listed metal conduit or raceway. Minimum conduit size shall be 1/2-inch.

C. All cable runs shall be continuous between devices, without splices, wherever feasible. All other connections shall be to terminal blocks. Wires connected together shall have the same color insulation. All connections shall be accessible for inspection and servicing and shall be clearly identified on the record drawings.

D. Wire and cable shall be sized, twisted and shielded as recommended by the fire alarm system manufacturer, and Article 760 of NFPA 70.

E. All conduit shall be grounded by approved ground clamps or other means.

F. Where conduit is imbedded in plaster, a type suitable for this use shall be installed. All joints in such imbedded conduit shall be liquid and gas-tight. Continuous run of conduit without joints is preferred for imbedding.

G. All electrical enclosures, raceways and conduits shall contain only those electrical circuits associated with the fire detection and alarm system and shall not contain any wire that is unrelated to the system.

H. All wiring which is not enclosed by conduit shall be supported and anchored with nylon straps or clamps. The use of staples is prohibited.

I. Wire that has scrapes, nicks, gouges or crushed insulation shall not be used.

J. The use of aluminum wire is prohibited.

K. All electrical circuits shall be numerically identified at both ends with wire taped numbers.

L. All system conductors, except grounding conductors, shall be solid copper.

M. All end-of-line resistors shall be mounted on terminal blocks.

N. All devices installed in areas subject to moisture shall be provided with weatherproof enclosures. Provide NEMA 4 or equivalent.

2.16 WARRANTY

A. All materials and workmanship during the installation period and for a period of one year, beginning with the date of final acceptance by OWNER, shall be provided with a warranty. CONTRACTOR shall be responsible during the design, installation, testing and warranty periods for any damage.

B. During the warranty period, inspect and test the new portion of the fire alarm system in conformance with NFPA 72. All devices shall be tested at minimum intervals as required by these standards, with a written report after each test.

C. Provide emergency repair service for the new portion of the system, at no cost to OWNER, within four hours of a request for such service by OWNER during both the installation and the warranty periods. The service shall be provided on a 24-hour per day, seven days per week basis.

PART 3 EXECUTION

3.1 INSPECTION

A. The job site supervisor shall examine daily all areas in which the work will be performed on the day prior to beginning work. The supervisor shall immediately report unsatisfactory working conditions to OWNER for resolution. The supervisor shall not proceed with the work until all unsatisfactory working conditions have been corrected.

3.2 INSTALLATION

A. All holes or damage made in any wall, ceiling or floor shall be patched, restoring the walls, ceilings, floors to their original condition, fire resistance and integrity.

B. All piping and conduit shall be installed at a height so as not to obstruct any portion of a window, doorway, stairway or passageway and shall not interfere with the operation of any existing mechanical or electrical equipment.

C. System riser(s) shall be installed in mechanical raceways or conduit, located to avoid physical harm. They shall be routed through protected spaces, such as electrical closets, avoiding locations such as loading docks and less than 7 feet above the floor. Outgoing and return loops of signaling line circuits shall be separated by at least one-hour fire-resistive construction.

3.3 CONCEALMENT

A. All wire, cable, conduit, raceways, junction boxes and device backboxes shall be concealed in walls, ceiling spaces, electrical shafts or closets in all finished areas. Conduit, raceways, junction boxes and device backboxes may be exposed in unfinished back-of-house areas or mechanical equipment rooms.

B. Accessible conduit, raceways, junction boxes, and other associated items related to the conduit network shall be provided with red bands every 10 feet with junction box covers labeled as fire alarm, unless specifically instructed otherwise.

3.4 TESTING

A. Provide written certification that all equipment:

1. Has been inspected and tested by a manufacturer's certified representative.

2. Is installed in accordance with the manufacturer's recommendations and ULI listings.

3. Is in proper working order.

3.5 ACCEPTANCE TESTING

A. Upon completion of each installation phase, perform and document on an approved format, system tests as required herein. All acceptance tests shall be performed in the presence of OWNER or his designated representatives.

B. All conductors, including shielding conductors, shall be tested for continuity, shorts to ground and shorts between pairs.

C. All remote transmitting panel monitor points shall be functionally tested and monitor point identifications verified.

D. All alarm initiating devices shall be functionally tested.

E. All supervisory functions of each initiating device and signaling line circuits shall be functionally tested.

F. All building control functions (i.e. elevator recall, smoke control, door releasing, etc.) initiated by the fire alarm control panel shall be tested.

G. Receipt of all alarm and trouble signals, initiated during the course of the testing, shall be verified at each annunciation device.

H. Correct labeling of all annunciation device LED's OR LCD's shall be verified.

I. The system CPU and annunciators shall be load tested for 4 hours on standby battery power.

J. All remote transmitting panels shall be load tested for 4 hours on standby battery power.

K. Any additional tests, required by the referenced codes, Standards, or Clark County, shall be performed. Documentation of such tests shall include:

1. The date and time of each test.

2. A reference set of record drawings, numerically identifying the individual components and circuits tested, test locations, and indicating the measured sound level in each location.

3. A description of each test performed.

4. A checklist of each device and circuit tested, indicating the results of each test.

5 The names and signatures of the individuals conducting and witnessing each test.

6. A complete printout of the system program produced by the system printer. This printout shall be produced and dated upon completion of all required testing/verification, including any modifications necessary prior to final acceptance testing.

3.6 FINAL INSPECTION AND TESTS

A. Make arrangements with OWNER and local agencies having jurisdiction for final inspection and witnessing of the final acceptance tests.

B. If after being advised that the work is completed and ready for test, the work has not been completed or the final acceptance tests are unsatisfactory, CONTRACTOR shall be responsible for all expenses for re-inspection and witnessing the retesting of the work.

END OF SECTION