

SECTION 283105**FIRE ALARM SYSTEM****PART 1 GENERAL****1.01 SCOPE**

- A. Furnish and install all items of equipment and accessories necessary for and wire complete all operations associated with extending the existing ADT Fire Alarm System as shown on the Drawings and as herein specified. ADT to provide programming for all new and existing devices.
- B. The complete installation shall conform to the applicable sections of NFPA-70, NFPA-72, NFPA101, Ohio Building Code and all Local Code Requirements and with particular attention to NFPA-70, Article 760.
- C. Equipment layout and accessories are based on products manufactured by the ADT to match the existing brand. Products manufactured by Simplex, Siemens or Notifier(NESCO) may be used, provided the equipment is within the same dimensional space limitations, the electrical ratings, characteristics and the functions specified are met or exceeded. ADT to determine and verify all additional items and services required for the project.
- D. The fire alarm system components needed to expand the existing fire alarm system have been purchased by the owner. See paragraph 1.04 for additional information.

1.02 QUALITY ASSURANCE

- A. Each and every item of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L" label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.
- B. All control equipment must have transient protection to comply with UL864 requirements.
- C. In addition to the UL-UOJZ requirement mentioned above, the system controls shall be UL listed for Power Limited Applications and all circuits must be marked in accordance with NEC article 760-23.

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code; 2008.
- B. NFPA 72 - National Fire Alarm Code; 2007.
- C. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; 2006.

1.04 GENERAL

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the drawings. Wire, connect, and leave the system in first class operating condition. Include sufficient control panels, (annunciator), automatic fire detectors, smoke detectors, alarm indicating appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.
- B. The Fire Alarm System shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory. All programming to be done by ADT.

- C. To accommodate job site changes, initiation circuits shall be individually configurable on site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non latching circuit or an alarm verification circuit.
- D. To accommodate job site changes, alarm signal circuits shall be individually configurable on-site to provide, upon activation, a fast march time.
- E. To accommodate job site changes, all hard-wired initiation and control circuits shall be individually configurable, on-site, in any combination, to provide either initiating circuit, alarm signal circuit, or auxiliary control circuit operation.
- F. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.
- G. The system to be electrically supervised against open circuits and grounds on the wiring to the alarm initiating devices
- H. An open or ground in the system shall cause an internal trouble signal to sound continuously until the system is restored to normal or until the signal is silenced by means of a cut-off switch on the control unit. When the cut-off switch is moved to the "off" position, a pilot light shall remain illuminated and audible trouble signal shall be cut off. When the system is restored to normal operation, the trouble signal shall sound again and shall be silenced only by restoring the cutoff switch to its normal position. Open and grounded circuits in the system shall not cause the sounding of false alarms.
- I. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout differentiates alarm signals from all other printed indications.
- J. Wiring/Signal Transmission:
 - 1. Transmission shall be addressable signal transmission, dedicated to fire alarm service only.
 - 2. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
- K. FACP shall have the capability to provide Remote Access through a Dial-Up Service Modem using the public switched telephone system of a private switched telephone system.
- L. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.
- M. The fire alarm system components needed to expand the existing system are as follows. Obtain from the owner and install for a complete operating system:
 - 1. Eight Zone Initiating Card
 - 2. Fire Control Power Supplies

1.05 SYSTEM OPERATION

- A. During normal condition, the green AC power indicator control panel front shall be lit and all alarm (red LED's) and trouble indicators (yellow LED's) should be off.
- B. Should an abnormal condition be detected, the red system alarm LED and the associated zone alarm shall light. The panel audible signal shall pulse for alarm conditions and sound steadily until the alarm is acknowledged or silenced.
- C. Pressing the appropriate acknowledge button shall acknowledge the alarm or trouble condition and turn off the audible tone off and switch operation of associated LED(s) from flashing to steady. The acknowledge functions may be passcode protected if the user has insufficient privilege to acknowledge such conditions. A message shall indicate insufficient privilege but

allow the user to view the zones without acknowledging them. Should the user have sufficient privilege to acknowledge, a message will be displayed informing the user that the condition has been acknowledged.

1. New alarms will resound the audible tone and flash their associated LED's.
 2. After all the points have been acknowledged, the LED's shall glow steady and the panel audible signal will be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated.
- D. Alarm Silencing -- press the "Alarm Silence" button to cause all alarm signals to cease operation.
- E. System Reset
1. Press the "System Reset" button to return the system to its normal state. Display messages shall provide the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-arming the system. Should an alarm condition continue, the system will remain in an alarmed mode.
- F. Priority of Signals: Alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Supervisory and Trouble events have second-, and third-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
- G. Noninterfering: The activation of device does not prevent the receipt of signals from subsequent activations.
- H. Transmission to Remote Central Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under another contract.
- I. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and any required remote annunciators, indicating the zone of device.
- J. DRILL: A manual evacuation (drill) switch shall be provided on the control panel to initiate an alarm.
- K. MANUAL CONTROL: Manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble. The "off normal" status shall be clearly identified in plain-language on the control panel alphanumeric display.
1. Manual Bypass Control: The ability to perform a manual bypass of selected automatic functions shall be provided.
 2. Circuit Enable/Disable Control: The system shall have provisions for disabling and enabling each circuit individually for maintenance or testing.
- L. GENERAL ALARM: A system general alarm shall include:
1. Indication of alarm condition at the FACP and any required remote annunciator(s).
 2. Identification of the device that is the source of the alarm at the FACP and any required remote annunciator(s).
 3. Operation of audible and visible notification appliances throughout the building until silenced at FACP. Audible Alarm Notification shall operate [Temporal Code][Steady][March Time].
 4. Closing doors normally held open by magnetic door holders.
 5. Unlocking designated doors.
 6. Shutting down supply and return fans serving zone where alarm is initiated.
 7. Closing smoke dampers on system serving zone where alarm is initiated.
 8. Initiation of smoke control sequence.
 9. Notifying the local fire department.

10. Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified sensors are activated.
- M. Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:
 1. Activate the system supervisory service audible signal and illuminate the LED at the FACP and the graphic annunciator.
 2. Pressing the Supervisory Acknowledge key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
 3. Record the event in the FACP historical log.
 4. Transmission of supervisory signal to remote central station.
- N. Operation of any smoke detector heat detectors, or duct smoke detectors shall cause immediate and continuous operation of indicators at the fire alarm control panel. All audio/visual signal devices shall operate. These operations shall also shut down the air handling units.
- O. When a smoke detector sends an alarm or trouble signal to the FACP due to a smoke condition, the thermal detection portion of the activated smoke detector shall be capable of reporting an upgraded alarm condition to the FACP when the temperature reaches a predetermined set point.
- P. In the event of operating power failure, an open or grounded circuit in the system, a trouble signal and trouble lamp shall be activated until the system is restored to normal.
- Q. All air handling units and return air fans shall shut down when smoke is detected by duct mounted smoke detectors. Shutdown shall be achieved by relay closure signaled by the fire alarm control panel.
- R. Tamper switches and flow switches are located approximately on the Drawings. Coordinate exact location with existing conditions in field.
 1. Waterflow and tamper switches shall be supervised for alarm and trouble conditions. Waterflow switches shall initiate as a supervisory alarm.
- S. Smoke detectors located in elevator lobbies and elevator machine rooms shall be connected to its associated elevator control panel and to the fire alarm control panel. Activation of any of these devices shall send signal to the elevator controller for seizure purposes. Elevator to be recalled to grade level access floor, unless fire is on that floor, in which case the elevator shall be recalled to the basement floor.
- T. The incoming 120 V. power to the system shall be supervised so that any power failures must be audibly and visually indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel.
- U. The remote annunciator panel shall audibly and visually announce both alarm and trouble as well as visually indicate the affected device. This panel is to be locked so that the staff can not acknowledge the alarm from this panel, but must go to the main FACP to acknowledge alarms.

PART 2 PRODUCTS

2.01 CONTROL PANEL

- A. Expand the existing Unimode Fire and Life Safety Manager Series Fire Alarm Control Panel to accept all new devices and functions. Construction shall be modular with solid state, microprocessor based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Although the keypad/keyboard can be used for control of the entire system, it shall only be used for maintenance purposes. Keyboards or keypads shall not be visible nor required to operate the system during fire alarm conditions.

- B. A local audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound differently during each keypress to provide an audible feedback (chirp) to ensure the key has been pressed properly.

2.02 Primary Keys & Panel Display

- A. The Control Panel's display shall be backlit for enhanced readability. To conserve battery standby power, display shall not be lit during an AC power failure unless an alarm condition occurs or there is keypad activity. The display shall support both upper and lower case letters. Lowercase letters shall be used for softkey titles and prompting the user. Uppercase letters shall be used for System Status Information. A cursor shall be visible when entering information.

2.03 Voice Communication Unit (Voice alarm System and Public Address System Functions) shall include the following:

- A. Power supply to provide 24 volt D.C. filtered and regulated power for control functions within the control panel and for supervision of alarm initiating and indicating circuits.
- B. Selector modules to be provided when required to divide the output of the power module into circuits as required. Circuits to be by floor, elevators and stairwells.

2.04 In addition, the Control Panel shall include, but not be limited to the following features:

- A. Surface mounting
- B. Double supervision with additional switch, pilot light and trouble tone. Double electrical supervision is whereby the supervisory power supervises the alarm circuits and the alarm power supervises the supervisory circuit.
- C. Visual annunciation of ground fault, trouble signal silenced, operating power, supervisory power, alarm signal circuit fault, trouble ring back alarm acknowledgment, and system reset.
- D. Visual annunciation of both alarm and trouble condition for each zone
- E. Provisions for testing each zone individually and testing and resetting the system.
- F. Provisions for connecting to and operating a smoke detection system.
- G. See drawings for equipment to be shut off by fire alarm system.
- H. The system shall include battery standby power. System shall indicate a trouble alarm upon loss of battery standby power, and shall close a separate dry contact output. When commercial AC power is restored, the systems shall automatically revert to AC power, without operator intervention. Batteries shall be sized to provide a minimum of 24 hours of monitoring, plus 5 minutes of 100% full alarm output. Recharging systems shall be sized to recharge all batteries to 100% capacity within 12 hours. When the system is operating on the batteries after one minute has expired the fire door relays shall release to conserve battery power.
- I. The control panel cabinet shall be a lockable steel type with hinged door. All operations required for testing or care and maintenance shall be performed from the front of the cabinet.
- J. Provide relays for connection to an external remote monitoring location for the following items: FIRE DETECTION ALARM, FIRE DETECTION TROUBLE, FIRE SUPPRESSION ALARM AND FIRE SUPPRESSION TROUBLE.

2.05 REMOTE LCD ANNUNCIATOR

- A. Existing Remote LCD Annunciator(s) is to be reused. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the FACP.
- B. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.
- C. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.

2.06 SMOKE DETECTOR AND BASE

- A. The Photoelectric type detector shall be a plug-in unit which mounts to a twist-lock base, and shall be UL approved.
- B. The base will contain electronics that communicate the detector status (normal, alarm, trouble) to the control panel. Upon removal of the head, a trouble signal will be transmitted to the control panel. Detectors shall not require resetting or readjustment to restore to normal operation.
- C. The detectors shall be of the solid state photoelectric type and shall contain no radioactive material. They will use a pulsed infrared LED light source and be sealed against rear air flow entry. The base shall contain a magnetically actuated test switch.
- D. The detector shall be compatible with other addressable detectors, addressable manual stations, and addressable Interface adapter Modules on the same circuit. The detector shall also fit into a non-addressable base that is capable of being monitored by an addressable Interface Module.
- E. Detectors located at elevators shall have a relay base. See drawings for locations.

2.07 ADDRESSABLE DUCT DETECTOR

- A. The detector shall be compatible with the Fire Alarm Panel and obtains its operating power from the supervisory current in the fire alarm detection loop.
- B. Detectors shall be of the solid state photoelectric type and shall operate on the light scattering, photodiode principle. Detectors shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.
- C. The detector head shall be directly interchangeable with an ionization detector type. The detector may be reset by actuating the control panel reset switch.
- D. Detector construction shall have a mounting base with a twist-lock detecting head that is lockable. The locking feature must be field removable when not required. Contact between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel. Detector design shall provide compatibility with other normally open fire alarm detection loop devices.
- E. Where duct detectors are out of sight, provide a test switch. Locate switch on wall or ceiling near the location of the detector.
- F. For maintenance purposes, it shall be possible to clean the duct sampling tubes by accessing them through the duct housing's front cover. For testing and measuring air flow the duct housing shall have two test ports

- G. To minimize false alarms, voltage and RF transient suppression techniques shall be employed, as well as smoke signal verification circuit and an insect screen.
- H. Auxiliary SPDT relays and/or remote LED alarm indicators and key operated test stations shall be installed where required and indicated.

2.08 HEAT SENSORS

- A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as noted.
- B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermister based, rate-compensated, self-restoring and shall not be affected by thermal lag.
- C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and] programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.
- D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.09 CIRCUIT INTERFACE MODULES

- A. Circuit Interface Modules: For monitoring one or more system components that are not otherwise equipped for communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of evacuation indicating appliances and AHU systems.
- B. Circuit Interface Modules shall be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required.
- C. There shall be the following types of modules:
 - 1. Type 1: Monitor Circuit Interface Module:
 - a. For conventional 2-wire smoke detector and/or contact device monitoring with wiring supervision. This module will communicate status (normal, alarm, trouble) to the FACP.
 - b. For conventional 4-wire smoke detector with wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.

2.10 AUDIBLE/VISUAL ALARM SIGNALS

- A. Audible/visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate horns. The unit shall be complete with a tamper resistant, Pyramidal shaped clear Lexan lens with "Fire" lettering visible from a 180 deg. field of view. The front panel or bezel, is constructed of UL Listed Noryll, with audio and Visual Devices side by side. Integral Xenon strobe shall provide a minimum light output of 100 candela at 24VDC at a 1 to 1.5 flashes per second rate. Xenon strobes shall provide a 4 wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including backbox. Audio/visual unit shall be UL listed for its intended purposes and meet ADA Requirements. All visual signals shall be synchronized.

2.11 VISUAL ALARM SIGNAL

- A. The unit shall be complete with a tamper resistant, Pyramidal shaped clear Lexan lens with "Fire" lettering visible from a 180 deg. field of view. Integral Xenon strobe shall provide a minimum light output of 100 candela at 24 VDC at a 1 to 1.5 flashes per second rate. Xenon

- c. Single-button building system, common reset, resets existing and new systems in parallel.
2. System will not be accepted until all components and functions are demonstrated to be in full operation.

3.05 TRAINING AND SPARE PARTS

- A. TRAINING FOR DAILY OPERATIONS: Provide one full instructor-day, minimum 8-hours, of on-site instruction for the daily operation of the system, to be attended by the Owner's designated Operations personnel. All training shall be scheduled by the contractor in coordination with the Owner's Department of Physical Facilities, Training Officer, and his designated representatives.
- B. ADDITIONAL SUPPORT DURING WARRANTY: In addition to the warranty for labor and materials as specified in General Terms and Conditions and Special Terms and Conditions, and Division 26 Specifications, the following shall be additionally included:
 1. Two full person-days, minimum 16-hours, of on-site support for the system during warranty.
- C. TRAINING FOR SYSTEM MAINTENANCE: In addition to the above Training for Operation, and Additional Support During Warranty, the contractor shall include the following Training for System Maintenance, including the OEM manufacturer's standards for:
 1. OEM hardware tools and documentation.
 2. OEM software tools and documentation.
 3. OEM certificate of "Authorized Warranty Service Technician" or equivalent.
- D. All training and diagnostics shall be identical to that as provided and available to the factory authorized service representatives. The training shall allow the Owner to perform all maintenance and inspection functions. The hardware tools shall include EEPROM programmers using industry standard IBM-compatible desktop PC's. The software tools shall perform on industry standard MS-Windows operating systems. The training shall be conducted at the Owner's Physical Facilities Training Center, conducted by the manufacturer's trainers, and shall include classroom hands-on training with instructor, travel included, for minimum of five instructor-days, minimum 40 hours, of instructional time. All Training for System Maintenance shall be coordinated with the Owner.

3.06 ANNUAL INSPECTIONS

- A. ANNUAL INSPECTIONS: The system, devices, and appliances, along with OEM training of the Owner's Operations personnel, shall allow the Owner to perform the "One Person Walk Tests" by area, location, device, address, or system. The tests shall include:
 1. Full system
 2. Area
 3. Alarm/Trouble
 4. Silent/audible Modes
 5. Audible Appliance Type & Identification
 6. Auto "Timed-Out" With Warning
 7. Printed Record of all Tests

3.07 SPARE PARTS

- A. SPARE PARTS: Spare initiating devices (smoke detectors, heat detectors, rate-of-rise detectors, manual pull stations, flow switches, valve tamper switches, contact monitoring units, bases, etc.) and notification appliances (horn, strobes, relays, bases, etc.) shall be furnished by the contractor in a quantity of 10% of total used and no less than one (1) of each item used.
- B. The following fire alarm components are spare and have been purchased by the owner:
 1. Eight Zone Initiating Card

2. Audio Visual Zone Card
3. Control Relay Zone Card
4. Master Power Supply

END OF SECTION