28 00 00. ELECTRONIC SAFETY AND SECURITY

28 10 00. ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION

28 10 05. SECURITY SYSTEM for Security and/or CCTV: The following situations, but not limited to, for installing security and/or CCTV may be required by OSU Department of Public Safety (DPS):

- Building perimeter security and access control
- High monetary value property owned by or loaned to The Ohio State University (OSU)
- Property with significant historical, cultural or artistic value
- Intellectual Property storage
- Where dictated by law or regulations
- Where currency is counted or exchanged (these areas shall include CCTV into the security plan)
- Any areas where external threats are perceived to be likely (Duress alarms must include CCTV into the security plan)

Security systems shall be installed and connected to the campus-wide Access Control and Alarm Monitoring System (ACAMS), which provides alarm signal to the Department of Public Safety (DPS) Communication & Security Technology Division. Requirements for area security systems must be discussed at the initial planning conference with the DPS. Reference Appendix Y for the basic security planning design requirements. All security plans shall be reviewed and approved by DPS and Facilities Operations and Development’s (FOD’s) Lock & Key Services (LKS).

28 10 10. ACCESS CONTROL and ALARM MONITORING SYSTEM (ACAMS): The system shall be based upon, and connected to, the University’s existing campus-wide Access Control and Alarm Monitoring System (ACAMS). The system is applicable to all Columbus campus buildings, excluding the University Hospitals and regional campuses. All Columbus campus buildings shall require 24 hour remote monitoring and reporting, and shall use this ACAMS system, and shall report to DPS Communications & Security Technology Division Central Alarm Center and the Facilities Operations and Development Service Center. The ACAMS system is not supported on the regional campuses. Other requirements for security systems at the regional campuses shall be determined in coordination with DPS.

.1 MINIMUM REQUIRED INFRASTRUCTURE for LIFE SAFETY: Whether or not there is any access control specified or not, provide the initial basis of an Access Control and Alarm Monitoring Systems (ACAMS). Specify and provide as a minimum all of the following infrastructure for Life Safety, including:

.1.1 Minimum (1) Lenel Intelligent System Controller with a 3300 board, including the following:

.1.1.1 Host communications on path #1, TCP/IP.
.1.1.2 Host communications on path #2, voice grade dial-up using Securcomm Uniflex DC336 modem.
.1.1.3 Communication jacks within the controller for path #1 and path #2.

.1.2 Quantity as required Lenel Input Control Module(s) using an 1100 board.

.1.3 Lenel manufacturer’s battery backups for the above.

.1.4 NetShelter, to house the following:

.1.4.1 Office of the Chief Information Officer (OCIO) primary fiber-to-wire media converter.
.1.4.2 OCIO primary Ethernet switch.

.1.4.3 Door Tamper switches, front & rear, report to Lenel.
.1.4.4 Dedicated 20A/120V power and duplex outlet to serve the OCIO’s primary Ethernet switch. Note: do not tie into existing circuits.
.1.4.5 Door locking device shall be equipped with approved cylinders and interchangeable core per Division 08 of these standards.

.1.5 Fire Alarm System auxiliary points to be monitored shall include:

.1.5.1 Fire Alarm (Detection) System Common Alarm
.1.5.2 Fire Alarm (Detection) System Common Trouble Signal
.1.5.3 Fire Alarm (Detection) System Common Supervisory Signal
.1.5.4 Fire Suppression System Common Alarm
.1.5.5 Fire Suppression System Common Trouble Signal
.1.5.6 Fire Suppression System Common Supervisory

.1.6 HVAC system auxiliary points to be monitored shall include:
.1.6.1 HVAC System Common Loss of Heat Alarm.
.1.6.2 HVAC System Common Loss of Cooling Alarm.
.1.6.3 HVAC Loss of Critical Environments Alarm (if any critical environments apply).

.1.7 Emergency Generator auxiliary points to be monitored shall include:
.1.7.1 Emergency Generator Is Running Alarm.

.1.8 This minimum infrastructure must be specified to be consistent with all of the requirements of the below Standards, paragraphs .2 through .11, inclusive.

.2 FIELD HARDWARE: The new field hardware shall be manufactured by Lenel Systems, International, Inc., Corporate Headquarters, 1212 Pittsford-Victor Rd., Pittsford, NY 14534-3820, and shall include:

.2.1 Quantity 1 or more, Intelligent System Controller(s) (ISC's), LNL-3300 board using a LNL600-ULX enclosure , minimum one per building, and/or additional one per individual business group if necessary to segregate different costs or different application requirements within any single building. Do not share ISC's between buildings. The primary Intelligent System Controller (ISC) must be mounted within the Main Distribution Frame (MDF) room.

The lock for the 600 shall be purchased by the contractor through the Facilities Operations and Development’s Lock & Key Services, and shall be field installed by the Facilities Operations and Development’s Lock & Key Services. Approved lock cylinders and cores shall be per Division – 08 of these standards, part number Best 5E7D1 series Cam Lock, and appurtenances.

.2.1.1 Host Dual Path communication shall be included and enabled:
   A. Host Communication Path #1 shall be TCP/IP communications using Ethernet over the campus-wide OCIO (fiber-based) data communications network, 10/100 BaseT Connecting to the micro serial device in the main Lenel panel.
   B. Host Communication Path #2 shall be Dial-up (modem) communications over the campus-wide OCIO (copper wire based) voice communications network.
   C. Within each Intelligent System Controller, provide data jacks for connection of the communications network wiring.

.2.2 Quantity as required, Input Control Modules (ICM's), Output Control Modules (OCM's), Dual Reader Interface modules (DRI's), Magnetic-swipe Access Readers, Keypads, and/or Proximity Access Readers. Single Reader Interface modules (SRI's) are prohibited.

.2.3 Provide lithium battery for backup of local event memory and local databases.

.2.4 Provide 12-VDC lead-acid battery for 4-hour backup for local controller and local module operation.

.2.5 Door hardware operation shall remain exclusively on commercial power, and shall 'not' be battery backed-up. Door hardware shall be configured to close and lock upon loss of commercial power, unless rated as a fire door, which will then be required to latch but remain unlocked upon loss of commercial power. Refer to and coordinate with, Division 8, Doors and Windows, Section 08 70 00 - Hardware, of these Building Design Standards plus the Facilities Operations and Development’s Lock & Key Services concerning door hardware and access control.

within new field hardware to be compatible with existing host computer software revisions as currently installed within the existing host-computer.

.4 ADDITIONAL EQUIPMENT: Provide additional equipment within the communications Main Distribution Frame (MDF) room, as follows:

.4.1 NET-SHELTER ENCLOSURE: Provide a wall-mounted rack NetShelter enclosure, with adjustable front vertical mounting rail, adjustable mounting depth, glass front door, front and back doors open 180 degrees, double-hinged design on each door, integrated cable access holes, lockable doors, multi-purpose mounting rails, powder coat black paint finish, and ventilated. Enclosure shall be equivalent to American Power Conversion Corp. (APC) NetShelter WX Wall-Mount Enclosure 13U Glass Door, Black, APC part number AR100. Enclosure shall include and house the following hardware:

.4.1.1 OCIO FIBER-to-WIRE MEDIA CONVERTER: For connection to OCIO fiber data communications network, 10/100 BaseT (specific media converter to be provided by OCIO).

.4.1.2 OCIO PRIMARY ETHERNET SWITCH: For connection to OCIO data communications network, 10/100 BaseT, rack mount, (specific switch to be provided by OCIO).

.4.1.3 Provide door tamper switches on front & rear doors, and report as an alarm to the Lenel system.

.4.1.4 Provide a dedicated, 20A-120vac circuit breaker, wiring shall be in conduit, with duplex outlet within the NetShelter enclosure. The power shall be dedicated to the devices housed in the net shelter exclusively. Provide/install a circuit breaker lockout.

.4.1.5 The door locks for the NetShelter shall be purchased by the contractor through Facilities Operations and Development's Lock & Key Services, and shall be field installed by Facilities Operations and Development’s Lock & Key Services. Approved lock cylinders and cores shall be per Division- 08 of these standards, part number Best 5E7M1 series Cam Lock, and appurtenances.

.4.1.6 The NetShelter Enclosure must be mounted within the Main Distribution Frame (MDF) room with the approval of its location from OCIO.

.5 LENEL AUTHORIZED VAR: The system shall be furnished and installed by a contractor that is certified by Lenel as an Authorized OnGuard® Value Added Reseller (VAR) of Lenel systems, for sales, installation, and service for the Columbus, Ohio area at the time of award of the subcontract for the system. All warranty service shall be by this same contractor.

.6 CARD READERS and CARDS: University standard card readers and cards are magnetic-swipe, using BUCK-ID card or University Hospital ID card, all using Wiegand communications protocol. Proximity readers, which are more expensive to purchase and maintain versus magnetic-swipe readers, shall be used only with the approval of Facilities Operations and Development’s Lock & Key Services and for specific operational and/or safety requirements only. Cards for proximity readers, which are more expensive to purchase and maintain versus magnetic-swipe cards, are separately available for premium charge through University BUCK-ID Services. Costs for proximity cards shall remain the responsibility of the Using group.

.6.1 Required to use LNL 1320 dual reader interface

.6.2 MAGNETIC-SWIPE CARD READERS: Lenel LNL2010W.

.6.3 MAG-SWIPE CARD READERS with KEYPAD: Lenel LNL2020W.

.6.4 KEYPAD, only: Lenel LNL834S121NN, LNL826S121NN or LNL-CK with a LNL2010W

.6.5 All keypad installations will require LED indicator panel part number RP9 display with red and green indicators and a local sounder.

.6.6 PROXIMITY READERS: Proximity readers shall be used only with the approval of Facilities Operations and Development’s Lock & Key Services and for specific operational and/or safety requirements only.

.6.6.1 PROXIMITY READER: HID Corporation, ProxPro II #5455B (N-00_04).
.6.6.2 PROX READER with KEYPAD: HID Corporation, ProxPro #5355A (K-00_09).

.6.6.3 HID Corporation (An ASSA ABLOY Group company),
9292 Jeronimo Road, Irvine, CA 92618-1905, USA,
Phone: 949 598 1600 or 800-237 PROX, Fax: 949 598 1690

.7 MONITORING CONTACTS: Door monitoring contacts, and wiring and conduits thereto, shall be concealed and invisible when the door is closed. Externally applied door monitoring contacts, externally applied conduit or Wiremold, and wire without conduit are prohibited.

.8 AUXILIARY POINTS to be MONITORED/ALARMED: Provide monitoring and alarming of the following minimum auxiliary points, including:

.8.1 ACAMS system auxiliary points to be monitored:
.8.1.1 Door Tamper Switches from any-and-all enclosures for ACAMS controllers, ACAMS modules, and the NetShelter enclosure.
.8.1.2 Power Failure Status, for Commercial 120-VAC power, from any-and-all power supplies for ACAMS controllers and ACAMS modules.
.8.1.3 Power Failure Status or Low-Battery Status, for 12-VDC, Lead-acid Battery Backup, from any-and-all power supplies for ACAMS controllers, and ACAMS modules.

.8.2 Fire Alarm system auxiliary points to be monitored:
.8.2.1 Fire Alarm (Detection) System Common Alarm
.8.2.2 Fire Alarm (Detection) System Common Trouble Signal
.8.2.3 Fire Alarm (Detection) System Common Supervisory Signal
.8.2.4 Fire Suppression System Common Alarm
.8.2.5 Fire Suppression System Common Trouble Signal
.8.2.6 Fire Suppression System Common Supervisory

.8.3 Building Automation System auxiliary points to be monitored:
.8.3.1 HVAC system Common Loss-of-Heat Alarm.
.8.3.2 HVAC system Common Loss-of-Cooling Alarm.
.8.3.3 HVAC system Common Loss-of-Critical-Environments Alarm (if any critical environments apply).

.8.4 Emergency Generator points to be monitored: It is important to never exceed 500-hours run time on any emergency generator within any 12-month period, to minimize operating hours, maximize generator life, and to avoid additional EPA permits for the generator.
.8.4.1 Emergency Generator Is Running Alarm. Provide a remote annunciator panel, required by NFPA 110-5.6.6 Remote Controls and Alarms, located next to the fire alarm system’s remote annunciator panel as approved by the Division of Emergency Management & Fire Prevention.

.9 CABLE AND WIRE:

.9.1 All fiber optic cable shall be specified and provided consistent with all requirements of Appendix M, The Ohio State University Communications Wiring Standard.

.9.2 All TCP/IP communications wire and all Dial-up communications wire shall be specified and provided consistent with all requirements of Appendix M, The Ohio State University Communications Wiring Standard, 'and' consistent with all requirements of the manufacturers.

.9.3 All communications wiring between the Intelligent System Controller and all downstream modules, shall be specified and provided consistent with all requirements of all sections of Division
26 and 27 specifications, 'and' consistent with all requirements of the manufacturers. All communications on the ACAMS system using RS-485 communications protocol must use 2-pair twisted/shielded wiring, Belden #9842 or Belden equivalent.

.9.3.1 Belden #9842, or Belden equivalent
.9.3.2 Numbers of pairs - 2.
.9.3.3 Total numbers of conductors - 4.
.9.3.4 AWG - 24.
.9.3.5 Outer Jacket PVC - polyvinyl chloride.
.9.3.6 NEC/UL specification CM, NON-plenum.
.9.3.7 Outside diameter, .340 inches.
.9.3.8 (24 AWG stranded (7x32) tinned copper conductors, twisted pairs, polyethylene insulated, overall 100% Beldfoil® shield plus a 90% tinned copper braid shield, 24 AWG (7x32) tinned copper drain wire, PVC jacket.)

.9.4 All power wiring, and all control wiring to-and-from controllers, modules, readers, powered latches, etc., shall be specified to be in conduit and shall be provided consistent with all requirements of all sections of Division 26 specifications, 'and' consistent with all requirements of the manufacturers.

.10 EXCEPTIONS: Temporary independent security systems outside the University ACAMS system require approval from DPS and FOD's LKS to meet the following requirements: -

.10.1 Call-in alarms from Remote Central Station providers within OSU Police primary jurisdiction shall identify OSU DPS as their primary point of contact for all incoming alarms: fire, intrusion, duress, etc. -

.10.1.1 Approval excludes service or maintenance calls for independent security systems.

.10.2 Alarm Subscribers / Remote Central Station providers shall annually submit an up-to-date copy of the “OSU DPS Alarm Registration” form to OSU DPS. The form can be found on the Department of Public Safety's website https://dps.osu.edu -or by calling 614-292-2121.

.11 PROHIBITIONS:

.11.1 Single Reader Interface modules (SRI's) are prohibited.
.11.2 Externally applied door monitoring contacts, externally applied conduit or Wiremold, and wire without conduit are prohibited.

.11.3 Splicing of power and control wiring and cables and the use of wire nuts are prohibited.

Commentary: Splicing of wire and cables and the use of wire nuts often cause ground faults and are difficult to trace.

28 23 23 VIDEO SURVEILLANCE SYSTEMS / CLOSED CIRCUIT TV (CCTV)

.1 The system shall be based upon, and connected to, the University's existing campus-wide video surveillance system.

.1.1 All security equipment shall be reviewed for system compatibility by DPS and in consultation with the project team.

.1.2 All security equipment shall report all signals to DPS. Any signal sent out beyond DPS will be monitored and approved by DPS.
.1.3 Locations of security cameras indicated in the project documents are schematic only, final field locations of security cameras shall be approved by DPS prior to installation.

**Commentary:** Final security camera locations are to be functional. Coordinate with other trades to avoid conflict with, but not limited to, light fixtures (obstructions and glare), exposed ductwork, architectural clouds, and FFE, etc.

28 30 00. ELECTRONIC DETECTION AND ALARM

28 31 00. FIRE DETECTION AND ALARM

.1 GENERAL: Design the fire detection and alarm system to minimize risk to the University’s Customers (students, patients, residents, researchers, staff, and visitors), minimize risk to the University’s property, reduce the University’s support costs, and allow for cost-effective future expansion by the University. Design a complete system including:

- Control panels,
- Annunciators,
- **Initiating devices:**
  - Manual pull-stations,
  - Automatic smoke detectors,
  - Automatic heat detectors,
  - Automatic rate-of-rise detectors,
  - Automatic flow and tamper switches, and
  - Other initiating devices (dry contacts, etc.) as required
- **Notification appliances:**
  - Horns: Horns shall be allowed only with existing horn systems when the renovation project is limited in scope. The use of horns requires early project review for approval by Facilities Operations and Development’s Technical Services Group and Division of Emergency Management and Fire Prevention;
  - Speakers,
  - Strobes,
  - Other notification appliances (dry contacts, etc.) as required;
- Other device types:
  - Electromagnetic Fire & Smoke Barrier Door Holder releases,
  - Fire Exit/Security Egress Doors with Electrically Locking /Unlocking Door Hardware provide Fire Alarm Input. The building’s fire alarm system shall provide normally closed contacts which open on alarm.

**Commentary:** The input disables the electrical locking device (fail safe) upon a fire alarm.

Fan Shutdown Relays, and any other items as required for a complete system.

.1.1 **SINGLE SYSTEM FUNCTIONS:** Within any single building, design a complete system that integrates the existing and new systems into a single Fire Alarm Control Panel (FACP) system at one common location. For systems that are to be integrated with existing systems request the University Project Manager confirm with Facilities Operations and Development’s Fire System Shop that the existing system is operating normally, prior to and following construction. Integrate and update to current technology the following into one system:

- Existing common alarms from existing systems,
- New common alarms from new systems,
- Existing common trouble signals from existing systems,
New common trouble signals from new systems (all trouble and alarm resets are to be located at one point),
Single-button building system, common alarm silence, silences existing and new systems in parallel, and
Single-button building system, common reset, resets existing, and new systems in parallel.
All panels shall be by the same manufacturer.

The A/E shall review with Facilities Operations and Development’s Technical Services Group the acceptable Fire Alarm System manufacturers for a project.

**Commentary:** Examples of acceptable basis of design fire alarm system manufacturers: OSU Wexner Medical Center: SimplexGrinnell 4100ES; Student Life Residence Halls: Siemens Fire Finder XLSV; Academic and Facility Operations & Development buildings: Notifier ONYX Series NFS2-640.

*The installation of voice fire alarm systems on all campuses is intended to enhance the Department of Public Safety’s ability to communicate in an emergency.*

.1.2 **COMPLIANCE:** All new systems shall be Underwriters’ Laboratory (UL) listed as compliant with National Fire Protection Association (NFPA) Standards 72 A, B, C, D, and E, most current edition, and shall be installed in accordance with the Ohio Building Code (OBC) and the Ohio Fire Code (OFC). Initiating devices for ventilation systems shall be installed in compliance with NFPA Standard 90A. Initiating devices for water flow shall comply with NFPA 13 (Sprinkler Systems) and NFPA 101 (Life Safety Code) and other appropriate or pertinent NFPA Standards regarding the installation, locations, and sensitivity of flow alarms and annunciation. Each piece of equipment shall be approved, listed, and labeled with the UL label.

.1.2.1 Transient Voltage Surge Suppression (TVSS) shall be specified for all new fire alarm systems and existing systems that do not have TVSS installed. Verify that adding TVSS to existing fire alarm control panels will not void the UL Listing.

.1.3 The following requirements take precedence over the requirements in NFPA 72 and the OBC:

A. All fire alarm systems shall also be capable of functioning as an emergency communication system (ECS).

B. The emergency communication system (ECS) must provide an automatic voice message in response to the receipt of a signal indicative of a fire emergency. The Fire Alarm Voice Evacuation Standard Message shall be: (Pre-alarm tone Slow Whoop) ---- “May I have your attention please, a fire alarm has been reported in the building please exit the building by the nearest exit or stairwell, do not use the elevator.”

C. Manual control with the capability of making live voice announcements must also be furnished to provide occupants notification on either a selective or all-call basis.

D. With the exception of mass notification, a fire alarm and emergency communication system are not permitted to be integrated with other building systems such as building automation, energy management, security, and so on. Fire Alarm and emergency communication systems must be self-contained, standalone systems able to function independently of other building systems.
E. Fire alarm and emergency communication system control equipment that is installed in non-high-rise buildings, is desired to be located within a room separated from the remainder of the building by not less than a one-hour fire resistance-rated fire barrier. The room should be provided in a location approved by the Division of Emergency Management & Fire Prevention Representative, the University Architect and University Engineer after consultation with the local fire department. Note that not all existing buildings nor Student Life buildings will be required to meet this requirement.

F. Provide IP RS-232 / RS-485 interface connection at the FACP for the emergency communication system.

.1.4 TECHNOLOGY: Each system shall have indicator’s showing zone location, zone alarm, zone trouble, and system trouble. The new systems shall be analog addressable with adjustable pre-alarm level, with analog addressable notification devices, and addressable appliances. Panels, devices, and appliances shall be based upon EEPROM memory (electrically erasable programmable read only memory) or “flash” memory, for address, sensitivity, and pre-alarm levels, and shall be programmable in the field by the University. (Panels, devices, and appliances limited to PROM memory, EPROM memory, or RAM memory are not acceptable).

ALTERNATIVE: Upon written exception from the University Architect, you may design an addition to, or expansion of, any existing system using technology matching the existing hardware. All other performance requirements, with the exception of analog addressable technology, shall be included.

.1.5 ACCEPTANCE BY THE UNIVERSITY
A. Acceptance by the University: The system must be scheduled by Emergency Management & Fire Prevention to be demonstrated in the presence of the State of Ohio Fire Marshal (the authority having jurisdiction), A/E, Project Manager, the University’s Director of Maintenance, and their designated representatives, Fire System Shop. During acceptance, the contractor shall demonstrate the following to the University's designees:

1. Alarm Verification: - Report by device - Pinpoint location Device type identification and address
2. Alarm/Trouble per device and component
3. Full field programmability via a laptop Windows-based personal computer:
   - Address verify and change,
   - Sensitivity verify and change,
   - Pre-alarm level verify and change,
   - Field changes shall upload to central panels
   - Field changes shall download from central panels
5. Single-button building system, common reset, resets existing and new systems in parallel.
6. Battery power capacity.

B. System will not be accepted until all components and functions are demonstrated to be in full operation for a minimum of seven (7) consecutive days without trouble conditions, before claiming substantial completion.

.1.6 WARRANTY:
A. Provide full 2-year parts and labor warranty for the entire system including batteries.
B. Warranty period shall commence at date of signed University Acceptance.

Date of manufacture, date of shipment, date of delivery, date of installation, etc. shall not constitute date of warranty commencement for the purpose of the project.
C. For small renovation projects provide the standard 1-year parts and labor warranty.

.1.7 TRAINING FOR DAILY OPERATION: The following training for daily operations shall be specifically included:
One full instructor-day, minimum 8-hours, divided into two 4-hour training modules covering the same
instruction, of on-site instruction for the daily operation of the system, to be attended by the University’s
designated Operations personnel. All training shall be scheduled by the contractor in coordination with
Facilities Operations and Development, Training Officer, and their designated representatives. All training
shall be video recorded. The A/E shall consult with Facilities Operations and Development’s Fire System
Shop and Technical Services Group on the appropriate level of training requirements for each project.

.1.8 TOOLS: Provide OEM hardware tools and documentation, OEM software tools and documentation and
password.

.1.9 TRAINING FOR SYSTEM MAINTENANCE: For New Fire Alarm System Models or significant changes to
existing models that require manufacturer certification training to be authorized to work on the system:

Commentary: The University desires to become self-sufficient and skilled to perform regular preventive
maintenance, annual system inspections, remedial maintenance, and small renovations.

The A/E and PM shall consult with Facilities Operations and Development’s Fire System Shop and
Technical Services Group on the appropriate level of training requirements for each project.

In addition to the above training for daily operation, _ an allowance  may be established
_ _ for system maintenance training, including the OEM manufacturer’s certification
standards for:

OEM training on the use of the _OEM hardware and software tools, and OEM
certificate of “Authorized Warranty Service Technician” or equivalent.
All training and diagnostics shall be identical to that as provided and available to the
factory authorized service representatives. The training shall allow the University to
perform all maintenance and inspection functions. The hardware tools shall include
EEPROM programmers using industry standard laptop personal computers. The
software tools shall perform on industry standard Windows-based laptop computers,
using industry standard MS-Windows operating systems. The training shall be
conducted by the manufacturer’s trainers, and shall include classroom hands-on
training.

Commentary: Training budget to consider travel allowance for two (2) University
employees - including per diem expenses for hotel room(s), meals and incidentals based
on Federal Government GSA rates (www.gsa.gov) in addition include an allowance for
a rental car.
.1.10 ANNUAL INSPECTIONS: The system, devices, and applications, along with OEM training of the University’s Operations personnel, shall allow the University to perform the “One Person Walk Tests” by area, location, device, address, or system. The tests shall include:

A. Full System
B. Area
C. Alarm/Trouble
D. Silent/Audible Modes
E. Printed Record of All Tests
F. Audible Appliance Type & Identification
G. Auto “Timed-Out” With Warning

.2 SYSTEM TYPE AND FUNCTIONS: System shall be analog, addressable, adjustable pre-alarm level, non-coded, continuous alarming type. An alarm shall continue to notify until the initiating device has been restored, and the single-button common building system reset switch has been operated.

.2.1 WIRING AND POWER: This Standard requires the following:

.2.1.1 All wiring for the Fire Alarm Systems shall be color coded.
.2.1.2 Each wire shall have a numbered tag at both ends.
.2.1.3 All fire alarm wiring shall be run in a ¾” minimum conduit size and conduit system separate from all other systems. Conduit compression couplings shall be required to be used for all fire alarm system conduits. The use of full wall flexible conduit shall be limited to short lengths where fire alarm appliances are mounted on suspended acoustical ceilings, tamper and flow switches and Type LA Liquatite Flexible Conduit for wet, oily conditions (e.g. fire pump motor leads) both types shall be UL listed for use in accordance with the NEC.

Commentary: Provide compression couplings per all U.L. Listed tested assemblies and as a requirement to reduce the opportunity for water to entry the conduit system and cause damage to fire alarm panels.

.2.1.4 All Power-Limited Fire Alarm Circuit (PLFA) system wiring shall be stranded and/or solid copper, minimum 75 degree C insulation, Type FPLP, FPLR, and XHHW-2 for Utility Plant applications, and shall be used for initiating and communicating devices as permitted by National Electrical Code (NEC -760). All Non-Power-Limited Fire Alarm (NPLFA) circuits shall be stranded and/or solid copper Type THW or XHHW and XHHW-2 for Utility Plant applications as permitted by National Electrical Code (NEC-760). The A/E is required to witness the wire type on site prior to the wire being pulled.
.2.1.5 Nylon insulation jacketed cables are prohibited. THHN/THWN cables are prohibited for use in fire alarm systems.
.2.1.6 Flame retardant PVC jacketed cables are required. Cable must have resistance to flame spread and reduce smoke generating properties.

Commentary: Purpose of the rating is to lessen the transmission of fire and visible smoke to unaffected parts of the building.

.2.1.7 Cabling for the floor’s fire alarm system devices: The cable shall not penetrate floors or ceilings (i.e. cable may only be used within a single floor).
.2.1.8 Grounding: All fire alarm systems shall be grounded. The grounding shall be connected to the building’s electrical grounding system. Refer to Building Design Standards 26 20 06.
.2.1.9 Network Riser cable shall have a two-hour fire-resistive rating. The A/E shall review the method to be used to achieve the rating with Facilities Operations and Development’s -Technical Services Group.
.2.1.10 Final connection between equipment and the wiring system to be made under the direct supervision of a representative of the manufacturer.

.2.1.11 All wires shall be terminated with ring or split terminal crimp on connectors.

.2.1.12 All fire alarm system wiring shall be plenum rated.

.2.1.13 Firefighters two way communication, when required shall be by a Distributed Antenna System for Firefighter RF Radio System.

.2.1.14 Splicing of power and/or control wiring and the use of wire nuts is prohibited.

.2.1.15 Cable Taps: Use numbered screw terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made. Use split terminal crimp on connectors.

.2.1.16 Wiring within enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system’s wiring diagrams.

.2.1.17 Network Access Control (NAC) Panels are to be wired as a circuit to the Fire Alarm Control Panel with 2-hour Fire Rated Cable. Buildings with multiple Fire Alarm Control Panels and/or Transponder Panels shall be wired as a circuit to the Command Center’s Fire Alarm Control Panel with 2-hour Fire Rated Cable.

.2.2 Multi-conductor Non-Power-Limited Fire Alarm Cables are permitted to be installed as wiring within buildings for the following locations:

A. Space used for Environmental air-handling purposes.

B. In exposed or fished in concealed spaces.

C. Where passing through a floor or wall in metal raceway.

D. In rigid non-metallic conduit, such as over hung ceilings and for wiring in ducts and plenums. This does not include habitable rooms or areas of buildings, in which the main purpose is not air handling, or the joist and stud spaces of dwelling units. It shall be used or permitted on Fire Alarm circuits operating at 150 Volts or less. All initiating devices, all notification appliances, and all panels shall be under constant electrical supervision. An open or ground in any wire shall cause a trouble alarm to operate. The systems shall include battery standby power. Systems 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 battery for one minute, the fire door relays shall release to conserve battery power. Locate trouble alarms in a public area.

.2.2.1 Batteries:

A. Batteries shall be sealed lead acid with a nominal life expectancy of 5 years, minimum. Batteries shall be manufactured in the USA, stamped with ship date from the manufacturer and stamped with the date of system activation. Batteries shall not be stored in excess of one month without having a continuous trickle current applied to maintain charge. A/E and University Representative shall witness the fact that the batteries are being charged.

B. Batteries shall not be shipped and installed in the panels until the system pre-test is to be done by manufacturer’s technician.

C. Perform and record a battery load test after Fire Life Safety Inspection is completed and submit this information to the A/E.
D. At the end of the two (2) year warranty period all batteries will be retested by the manufacturer and witnessed by Facilities Operations and Development’s Fire System Shop representative. The batteries that have amp-hour capacity below 80% of the original manufactured ratings shall be replaced, material and labor, at no additional cost to the University.

E. Provide battery-charging circuitry for each standby battery in the system. The charger shall be automatic in design, adjusting the charge rate to the condition of the batteries. All system battery charge rates and terminal voltage shall be read using the fire alarm control panel LCD display in the service mode, indicating directly in volts and amps. Meters reading in percentage are not acceptable.

.2.2.2 All field wiring for Fire Alarm Control Panel and accessory control panels shall enter a 4 x 4 duct (min.) located to the side or bottom of the panels. No connections other than through the side or bottom of panels and through the 4 x 4 duct shall be permitted.

.2.2.3 CLASS of CIRCUITS:
   A. Initiating Device Circuits shall be Class A.
   B. Signaling Line Circuits shall be Class A.
   C. Notification Appliance Circuits shall be Class A.

.2.3 INDIVIDUAL INITIATION CIRCUITS: Design the initiation circuits to be zoned and separated as follows:
   A. Manual devices (all pull-stations) shall report independently from automatic devices (smoke detectors).
   B. Sprinkler flows shall report independently from other devices.
   C. All other devices shall be zoned as required per codes and application.
   D. Address assignments on any single circuit shall not exceed 75% of the address capacity of the circuit, to allow for future expansion.
   E. Power draw and/or voltage drop on any single circuit shall not exceed 75% of the power and/or voltage limitation of the circuit, to allow for future expansion.

.2.4 MANUAL DEVICES: Manual devices (all pull-stations) shall be addressable, surface mounted or semi-flush mounted as conditions dictate. New stations shall be double-action, with a key reset. Within any single building, new stations shall be keyed alike, such that a single key will function for both existing and new stations. The contractor shall include necessary labor and materials to unify key requirements within any single building. New stations shall be so arranged that they cannot be reset to normal without the use of a local key. The use of a local key shall not include code wheels, or code devices.

.2.5 AUDIBLE Notification Appliances: Speakers and horns, shall be located so that their operation will be heard clearly in all areas regardless of the ambient level. Alarm appliances shall be designed for parallel connection, Class A, style-D type circuit, DC operation.
   A. Notification devices on any single circuit shall not exceed 75% of the capacity of the circuit, to allow for future expansion.
   B. Power draw and/or voltage drop on any single circuit shall not exceed 75% of the power and/or voltage limitation of the circuit, to allow for future expansion.
   C. Where emergency communication systems are provided, fire alarm speakers must be installed in elevator cars and exit stairways; however, they must only be activated to broadcast live voice messages (e.g., manual announcements).
The automatic voice messages shall be broadcast through the fire alarm speakers on the appropriate floors, but not in stairs or elevator cars.

2.5.1 Visible Notification Appliances: All audible alarms shall be equipped with a flashing strobe light. It is also required that the strobe shall be equipped with synchronized light bursts. Visible notification appliances are to be installed in public and common areas including public rest rooms, reception areas, building core areas, conference rooms, open office areas, mechanical rooms and so on and shall be part of an audible/visual device. Visible notification appliances are not permitted to be installed in exit enclosures or elevators (e.g., exit stairs). Visible notification appliances shall be of the same manufacturer and capable of being synchronized.  

Commentary: There may be occasions where an independent speaker is required (e.g., elevators, stairways). Synchronization of visible notification appliances is an important consideration for additions to buildings and when partially updating an existing fire alarm system. Verify that the new visible notification appliances can be synchronized with the existing visible notification appliances.

2.6 ANALOG ADDRESSABLE DEVICES

2.6.1 HEAT DETECTORS: Heat detectors shall be field-restorable, and may be either fixed temperature or rate-of-rise type, as the need requires. The selection and location of these detectors shall include consideration for ambient temperatures, and area to be covered. The devices shall be analog, addressable, and shall permit the University to adjust address, sensitivity, setpoint, and pre-alarm levels.

2.6.2 SMOKE DETECTORS: Smoke detectors shall be two-wire and multi-sensor detectors with both photoelectric and thermal inputs, subject to the approval of the University. The devices shall be analog, addressable, and shall permit the University to adjust address, sensitivity, and pre-alarm levels. Examples of acceptable sensitivity test methods are as follows:

A. Analog Addressable systems: Access the system’s “Test” function at the main control panel and request a test report for detector address, sensitivity and pre-alarm setting.

B. Non-Addressable systems: Place a test magnet on the detector and the detector shall then respond with a series of coded beeps and/or flashes that indicate a certain sensitivity range.

C. When smoke detection is installed in rooms having high voltage equipment, the smoke detection shall not be installed directly above high voltage equipment.

D. Existing smoke detectors scheduled for demolition that contain radioactive material cannot be disposed as demolition waste. Contact the Hazardous Waste Supervisor for the Office of Environmental Health and Safety (EH and S) for specific instructions regarding proper storage, to make arrangements to obtain containers, as well as pickup and disposal arrangements. There is no charge for these services; seven days advanced notice is required to schedule with EHS (separate notice for container delivery and also for pickup).

E. Aspirating Smoke Detection Systems: Review the appropriate use and application of this type of system with the University Architect and University Engineer.

F. Provide addressable module for non-addressable devices as required.
.2.6.3 LED’s FOR HIDDEN DETECTORS: When detectors and flow switches are installed hidden from plain view, remote LED notification lights must be installed at the ceiling line to show the location of the hidden detectors.

.2.7 REMOTE MONITORING: The University has centralized the monitoring of all security and other critical alarms. The Access Control and Alarm Monitoring System (ACAMS) uses a proprietary remote monitoring system based upon Lenel Intelligent System Controller equipment. The remote monitoring communication panels are located at the buildings. The System shall be installed and comply with Section 28 10 10 of this Standard. All Columbus campus buildings, excluding the University Hospitals and regional campuses, shall require 24-hour remote reporting and monitoring, and shall use this system, and shall report to DPS Communications & Security Technology Division Central Alarm Center and the Facilities Operations and Development Service Center. The regional campus buildings shall report to their respective security centers. The fire alarm system shall report the following (via dry contact output) to the remote monitoring system:
   A. Common Building Fire Detection Alarm
   B. Common Building Fire Detection Trouble
   C. Common Building Fire Suppression Alarm
   D. Common Building Fire Suppression Trouble

The Designer shall make certain that the existing and new Fire Alarm System are integrated into the Lenel Intelligent System Controller (LISC) as one common building Fire Alarm System. The Lenel Intelligent System, also reports Building Intrusion Detection Alarms and troubles. The Designer shall follow the guideline and direction of Section 28 10 10 of this Standard.

.2.7.1 ADDITIONAL REMOTE MONITORING FOR STUDENT LIFE BUILDINGS: All Student Life buildings shall be monitored by the Student Life Building Automation System, where it is applicable, in addition to remote monitoring by Lenel. Note that Lenel is not available on the regional campuses:
   A. Common Building Fire Detection Alarm
   B. Common Building Fire Detection Trouble
   C. Common Building Fire Suppression Alarm
   D. Common Building Fire Suppression Trouble

.3 ADDITIONAL COMPONENTS:

.3.1 CONTROL UNITS: Control unit shall be installed in a suitable steel cabinet with hinged cover, secured with lock and key. The control cabinet shall include:

   .3.1.1 Line terminals for 120-volt single-phase power.
   .3.1.2 Single-button building system, common alarm silence switch, silences existing, and new systems in parallel.
   .3.1.3 Single-button building system, common reset switch, resets existing, and new systems in parallel.
   .3.1.4 Remote signaling relays shall function with the Fire Alarm Control Panel (FACP) for:
      A. Release of fire doors,
      B. Shutdown of ventilation systems,
      C. Remote annunciation
      D. Elevator recall

Commentary: Elevator smoke detector recall shall not be a standalone function, but shall function with the FACP that reports alarms and troubles to OSU Department of Public Safety (DPS).
.3.1.5 Power to the control unit shall be limited to not more than 75 percent of the supply circuit capacity (power and/or voltage) rating.

.3.2 ANNUNCIATORS: Annunciators and remote annunciators shall be equipped with identical displays. All annunciators and remote annunciators shall be fully supervised by the system, and the system shall audibly and visually indicate the fault of either component. Remote annunciators shall be a UL listed component as a UL listed control unit. Annunciator signals shall remain locked in until the annunciator is manually reset from the remote single-button building system common reset. Include annunciators to provide location/address identification where any of the following conditions exist:

.3.2.1 Automatic devices are connected to the fire alarm system.
.3.2.2 A building has four or more fire zones. Each area on a floor separated by a firewall shall be considered a zone.
.3.2.3 Type: Lighted window type, operated from the zone controls of the fire alarm panel. Separately wired annunciator circuits are not approved. Signals on the annunciators shall remain locked in until manually reset.
.3.2.4 Location: Locate annunciator at the control panel and at other locations in the building that serve as the immediate access for the Fire Department to that building. The A/E shall consult with the Division of Emergency Management & Fire Prevention and Facilities Operations and Development’s Technical Services Group for the purpose of determining the building entrances that will customarily be used by the Fire Department. At the determined building entrance provide a Security LockBox. Contractor to purchase Security LockBox from Facilities Operations and Development’s Mechanical Electrical Shop.
.3.2.5 For additions to existing systems, the added annunciation shall be located at the same location as the existing annunciator panels.

.3.3 SPARE MATERIALS, SERVICE STOCK: 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 (horns/strobes, speaker/strobes, relays, bases, etc.) shall be furnished to the University by the contractor. Quantities shall be the larger of:

.3.3.1 No less than 1 of each item, or
.3.3.2 Minimum 10 percent of each item, whichever is the greater quantity.
.3.3.3 Deliver spare materials to the Fire System Shop.

.3.4 AS-BUILT DRAWINGS: Provide a set of as-built drawings, plastic covered, of the fire alarm system indicating wiring layout, and manufacturer’s device data sheets in a three ring folder. Provide a two or three-compartment steel wall pocket mounted on the wall - next to the fire alarm panel and place the drawings and folder there. Provide an additional set of record fire alarm drawings and data sheets in a folder to FOD’s Fire System Shop. Include the fire alarm drawings and manufacturer’s data sheets - in the operation & maintenance manuals, and in PDF format as well. Provide a copy of the original software program and all updates of the program to Facilities Operation and Development’s Fire System Shop on a USB Flash Drive or other agreed method.

.4 SPECIAL REQUIREMENTS FOR FIRE ALARM SYSTEMS INSTALLATION AND REVIEW.

.4.1 Architect/Engineer shall make certain that device locations (Address or Location(s)/Life Safety) are shown and listed for review on the drawings. A/E shall provide the fire alarm system riser diagram and function matrix on the Bid drawings. A/E shall include the room number locations for the fire alarm control panel, annunciator panel, and PAD, NAC and Transponder panels, and Lenel panel. A/E shall review all fire alarm shop drawing submittals and after corrections have been made submit to the Authority Having Jurisdiction. A/E shall coordinate room numbers with the University Project Manager and shall include the following statement in the specifications:
“Prior to final programming of Fire Alarm System room numbers shall be verified for correctness.”

.4.2 Program buttons on all main Fire Alarm panels shall be programmed as required.

.4.3 Specify that room(s)/area(s) with multiple devices have higher priority.

.4.4 Specify that the Contractor shall provide a copy of Fire Alarm program in every installation on a USB Flash Drive or other agreed method to the Architect/Engineer as part of closeout documents.

.4.5 Record Documents including Controls, Fire Alarm Riser Diagram for the building’s complete fire alarm system, etc. shall be on AutoCAD and shall be submitted to the University at substantial completion of the project and before the final payment shall be made by The University.

.4.6 Fire Alarm Systems shall be capable of providing a single BACnet communications output with IP Connection, but do not provide this equipment unless specifically requested by Facilities Operations and Development’s Fire System Shop.