

**CSU HOUSING & DINING SERVICES TECHNICAL STANDARDS  
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

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**28 13 00 – ACCESS CONTROL**

A. Sole Source Products:

1. Software: Lenel OnGuard Compatibility
2. Panel: Lenel 3300 Controller, Lenel 1320 controller
3. Power Supply: Altronix AL600ULX
4. Power distributor: Altronix PD16W
5. Card Readers: HID Prox Pro II
6. Motion Detectors: Request to Exit (REX) Bosch DS150i
7. Door Contacts: GE Security Sentrol 1078/78c Magnetic Controls, 3/4" diameter
8. Maglocks: RCI Maglocks 8310 or 8320
9. Push to Exit: Securitron EEB
10. Automatic Operator (AO): LCN 4640 Auto Equalizer
11. AO Receiver/transmitter: BEA 10RD433 (REC), BEA 10TD433PB9V (Trans)

B. Required Products:

1. Panel Enclosures, Junction Boxes: Hoffman Enclosure A24N20Alp, Hoffman 8x8
2. Electronic Strikes: HES 9600, 1006, 4500c
3. Electronic Hinge: Command Access, size specified by door
4. AO remote button box: BEA 10BOX45rndsm
5. AO remote button: BEA 10PBR451

C. Code references:

1. IBC / IFC 1008.1.3.4 - 'Access Controlled Egress Doors'
2. NFPA 101 7.2.1.6.2 - Access-Controlled Egress Doors'

D. Coordination

1. Architect, Electrical Engineer and Contractor shall coordinate with the Housing Facilities Management – Access Control during design and construction phases to locate devices and assure access control work meets CSU Standards.
2. Finishes of access control hardware, including painted and plastic items shall be coordinated with project finishes for door frames, door hardware and other entry elements. Submit complete product finish information and proposed device finish schedule to the University Representative for review and approval.
3. Contractor shall complete system start-up and adjustment before submitting its notice of substantial completion. Inspection and approval by Housing Facilities Management – Access Control is required before any access control item will be permitted on the Pre-Acceptance Punchlist.

E. Submittals:

1. Manufacturer's technical product data for each hardware item.
2. Shop drawings, showing system design, layout, and wiring diagrams.
3. Hardware schedules.
4. Hardware templates to fabricators of other work receiving electro-mechanical hardware.

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5. Record drawings – electronic set (CAD, PDF) of complete as-built drawings identifying each component, system operation, and wiring diagram.

F. Panel Locations

1. Panels and power supplies shall be located in the MDF or IDF rooms on a dedicated 4' x 8' plywood wall backboard. Rack space may be used with written approval of CSU Telecommunications obtained through the University Representative. All high voltage wiring for power supplies or control units shall be in metal conduit. Pigtails are prohibited

G. Wiring Requirements:

1. Access control wiring for new construction shall be enclosed in metal conduit of minimum 3/4" diameter or cable trays approved for the project. For retrofit projects where conduit or cable tray installation is not feasible, access control wiring shall be suspended every 4 feet above drop ceiling by J-hooks. Whenever cable trays are used, wiring must be enclosed in metal conduit of minimum 3/4" diameter from the point it exits the tray to its final destination.

H. Card Readers:

1. All readers shall be mounted at 36" AFF to center on the latching side of the door. Readers at doors with automatic operators shall be located a minimum 24" clear of the door swing to provide safe clearance for persons with limited mobility. Readers shall be hard-wired to the panel with composite cable unless otherwise approved by Housing Facilities Management - Access Control. All doors shall have an 8x8 Hoffman junction box above the ceiling over the door to serve as a node for all door device conduits. Access to the junction box via suspended ceiling or ceiling hatch is required and shall be within the secure area. No junction boxes shall be installed outside the secure area without prior written approval by CSU Housing Facilities Access Control through the University Representative.

I. Electrified Door Hardware: (new construction) Double Doors with Mullions, including Mullions are not allowed.

1. Single doors with cylindrical locks HES 4500 24 VDC, HES 1006 24 VDC
2. Single doors with panic hardware HES 9600 24 VDC
3. Double doors with panic hardware RCI Double Maglock, 8320
4. At fire-rated doors, provide UL or WHI label.

J. Electro-Magnetic Locks:

1. Magnetic locks shall be installed with a fire relay according to code. Minimum holding force shall be 1,500 pounds. Shear locks are prohibited.

K. Key Switches:

2. Where an automatic door operator is coordinated with an electric strike, system design must provide mortise cylinder type key switch for two-position (on/off) operation to enable security personnel to electrically unlock or lock the door latching mechanism. A power cutoff switch (110V) shall be provided near control panel.

L. REX PIR or Switch Kit:

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- M. Use only if RX switch is not an option kit for specified lock or cannot be installed in electric lock mechanism.
- N. Motion Detectors (see sole source products)
- O. Door Contacts (see sole source products)

**28 16 00 – INTRUSION DETECTION**

- A. Security Alarm Systems: sole source, no substitutions.
  - 1. Colorado State University has adopted the BOSCH Network as its standard for security, panic and hold up alarm systems. The University uses a BOSCH D6600 receiver supporting a modem 3a2 communication format and Ram V server software. New construction projects requiring security, panic and/or hold-up alarm systems must use Bosch control equipment as specified below. The purpose for these requirements is for compatibility, serviceability and maintenance with the existing platform and the established Bosch Network.
  - 2. Security alarm control equipment:
    - a. Bosch D7212GV2 for systems from 1 to 40 zones.
    - b. Bosch D7412GV2 for systems up to 80 zones.
    - c. Bosch D9412GV2 for systems up to 246 zones.
    - d. Bosch D2212B where network connectivity is not available (by approval only) .
  - 3. Wireless equipment for 9000 series control panels:
    - a. Bosch D8125INV wireless Interface Module.
    - b. Inovonics FA400 wireless receiver.
    - c. Inovonics EN7280 EchoStream wireless receiver.
    - d. Inovonics FA and EchoStream devices.
  - 4. Network devices:
    - a. Bosch DX4020.
  - 5. Control panel optional hardware:
    - a. Bosch D8128D Octopopit zone expander.
    - b. Bosch D8129 Octorelay.
    - c. Bosch D8125 Popex zone expander.
    - d. Bosch D9127U Popit.
    - e. Bosch D1640 Transformer.

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- f. Bosch D8103 Universal Enclosure.
- g. Bosch D1255W Keypad.

**28 31 00 - FIRE DETECTION AND ALARM**

A. Codes and Standards:

1. Each and every item of the fire alarm system shall be new and listed as the product of a fire alarm system manufacturer under the appropriate category by Underwriters Laboratory, Inc. (UL) and shall bear the UL label on all devices.
2. The complete installation shall conform to the most recent applicable codes:
  - a. International Building Code (IBC).
  - b. International Fire Code (IFC).
  - c. National Electrical Code (NEC).
  - d. National Fire Alarm and Signaling Code - NFPA 72.
  - e. American National Standards Institute (ANSI).
  - f. Life Safety Code - NFPA 101.
  - g. Americans with Disabilities Act (ADA).
  - h. Other state applicable codes, as adopted by Colorado State Building Programs.
3. The complete installation shall conform to CSU design and technical standards.
4. The complete installation shall conform to the manufacture recommendations.
5. The complete installation shall conform to the shop drawings approved by CSU.

B. Quality Assurance:

1. Manufacturer's Qualifications: Firm regularly engages in the manufacture of fire alarm systems of types, sizes, and electrical characteristics compatible with the current campus systems, and whose products have been in satisfactory use in similar service for not less than 5 years.
2. Installers Qualifications: Firm with at least 5 years of successful fire alarm systems installation experience. Installers shall have at least 2 years documented fire alarm installation experience and a minimum of a NICET II certification for Fire Alarm Systems. All field wiring and installation shall be constantly supervised by NICET II or higher.
3. System Authority: The contractor is responsible for receiving written acceptance for both plan review and final acceptance by the following departments:
  - a. CSU Facilities Management - Fire Systems Group is responsible for the operation, service and maintenance of all fire alarm systems on the CSU campus and the integration of all building fire alarm systems to the campus-wide network, will be

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referred to as CSU Fire Systems throughout this document. CSU Fire Systems shall approve all drawings before the construction commences. (Email address [firealarms@colostate.edu](mailto:firealarms@colostate.edu)).

- b. Poudre Fire Authority (PFA), whose review and approval is required for all fire safety systems, will be referred to as Fire Department or PFA throughout this document.

4. Meetings:

- a. Technical code and design review meetings shall be required with CSU Fire Systems for project coordination and at 50% design, and any other meeting the CSU Project Manager feels would benefit the project.
- b. CSU Fire Systems shall be involved in any project meetings that involve PFA.

C. Products:

- 1. Fire Alarm Control Panels(FACP): Shall be sole sourced as Notifier, no substitutions. All devices connected to the FACP shall be listed by the manufacture to be compatible. Due to the wide number of variables, to determine what panel will be acceptable for the project please contact CSU Fire Systems at [firealarms@colostate.edu](mailto:firealarms@colostate.edu) for clarification.

- a. Notifier NFS2-3030 - Large Projects.
- b. Notifier NFS2-640 - Small and Medium Projects.

2. Mass Notification System:

- a. Shall be a combination Mass Notification and Fire Alarm System.
- b. Audio Amplifiers shall be a DAA2 Series amplifier.
- c. Digital Series Distribution Boards, shall not be used.

3. Manual Pull Stations:

- a. Shall be addressable and of double action type.
- b. Where conditions do not allow for addressable pull stations, pull stations shall have a monitor module to uniquely identify the device location. One monitor module per pull station.

4. Smoke Detectors:

- a. Smoke detectors shall be analog addressable and capable of alarm verification. Smoke detectors shall have environmental compensation and provide a trouble at the FACP when the sensor's value reaches a predetermined value.
- b. Smoke detector/control unit shall be arranged so that the detector causes a signal at the control unit when its sensitivity is outside its listed range.
- c. Photoelectric smoke detectors shall be the standard, this includes duct detectors. Ionization detectors are prohibited.

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5. Heat Detectors:
  - a. All heat sensors shall be of the addressable type unless environmental conditions prohibit their use.
  - b. If non-addressable detectors are used, an addressable module shall be located in an area not subject to the adverse environment.
  - c. Rate of rise detectors shall only be used with the pre-approval of CSU Fire Systems.
6. Duct Detectors:
  - a. Shall be sole sourced as System Sensor, no substitutions.
  - b. Shall have duct sampling tubes, remote indicator and test switch. Units shall be capable of being reset at the FACP. Remote test switch shall be magnet activated. No keyed units allowed.
  - c. Shall be addressable.
7. Notification:
  - a. All notification devices shall be System Sensor.
  - b. All audible notification shall be through 25 volt speakers, not horns.
  - c. All visible notification devices shall be marked with the word "ALERT".
  - d. All notification devices shall be white with red lettering.
  - e. All devices shall be of a ceiling mount type, in areas with high ceilings or convoluted ceiling (such as mechanical rooms) wall mounted devices shall be permitted.
8. Sprinkler flow switch:
  - a. Shall be of the delay type.
  - b. Zone flow switches shall be set for a 30 second delay before reporting. The main flow switch shall be set for a 60 second delay before reporting.
  - c. Each building with a fire suppression system shall have a main flow switch that tracks waterflow.
9. Automated External Defibrillator (AED) cabinet: Each AED shall be monitored through the fire alarm system. The cabinet and pull apart switch required for monitoring shall be provided by the contractor.
  - a. Cabinet shall comply with CSU implementation Specifications (Division 10 40).
  - b. Pull apart switch shall be George Risk Industries (GRI) model #4704-A.
10. Fire Alarm Network: The network monitoring equipment is provided by CSU Fire Systems and is charged to the project budget through the Project Manager. For university properties not located within the campus fiber network the contractor shall provide the necessary equipment and communication route to facilitate reporting to the nearest fire department. CSU Fire Systems will need to approve in writing of the fire alarm reporting method.

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D. Installation Details:

1. Fire Alarm Control Panel (FACP):

- a. The FACP shall at a height of no higher than 70" to the top of the cabinet.
- b. The FACP shall be fully programmable by CSU Fire Systems personnel and shall be supplied with all the necessary circuitry, passwords and software to facilitate local laptop programming.
- c. Audible appliances shall be silenceable at the FACP, but strobes shall continue to flash until a system is reset at the FACP or annunciator(s).
- d. An accessible 120 volt receptacle shall be installed within 6' of the FACP.
- e. Prior to programming the fire alarm system, the contractor is responsible for verifying with CSU Fire Systems that the panel firmware and/or software versions are consistent with the current CSU campus-wide system. Only the software/firmware versions which are approve by CSU Fire Systems shall be allowed.
- f. The FACP shall be located in an area accessible to personnel performing repairs and not subject to; water damage, high volumes of dust, and temperatures outside of the manufacturer recommendations. The FACP shall not be located in areas of high traffic as these areas would not be considered accessible.
- g. If the FACP is not visible from outside of the main entrance or where the building has more than one major entrance, either of which might be approached by the Fire Department in an emergency, a remote terminal mode annunciator(s) shall be located within sight of the entrance(s).
- h. All programming of the fire alarm system shall be coordinated with the CSU Fire Systems, including device labels and CBE zones.

2. Mass Notification Systems:

- a. All new buildings where a fire alarm control panel is required shall be provided with a combination Fire Alarm/Mass Notification System.
- b. Speakers instead of horns are to be used, with the exception of the outside horn/strobe above the FDC used to track water flow.
- c. Interior emergency voice/alarm systems shall have speakers installed in accordance with NFPA 72 Annex
  - i. Areas where voice intelligibility cannot be provided due to high ambient noise levels (i.e. mechanical spaces) shall be separately evaluated by the engineer to determine appropriate design requirements.
- d. To achieve intelligibility, design and installation of the system shall account for areas with audio systems and may need to include audio mute relays.
- e. One speaker circuit shall not be combined with more than two strobe circuits.
- f. The speaker circuits throughout the building are to be controlled in the same method.

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Either all on-board speaker circuits or all control modules, combination on-board circuits and control modules are not acceptable.

- g. A paging microphone shall be installed inside the FACP. A remote microphone shall be installed at each annunciator.
3. Duct Detectors:
- a. The use of duct detectors shall be minimized. Where feasible, area detectors shall be employed to accomplish the objective.
  - b. Fan shutdown and fire smoke damper actuation shall be wired through fire alarm system relay modules and heavy duty relays and not through relay contacts directly on the duct detector.
4. Remote Test Stations:
- a. Shall be mounted in common areas and visible without using a ladder or opening up an access panel. Common areas include hallways and mechanical areas. Remote test stations shall not be installed in bathrooms, offices or classrooms.
  - b. If wall mounted remote test stations shall be at a height of 7'0" above finished floor, and if ceiling mounted shall be no higher the 10'0" above finished floor.
5. Fan/Smoke Control Systems: Duct smoke detectors shall be installed to shut down any air handling system in excess of 2000 CFM (with the exception of fume hoods). If integrated into a smoke control system, each air handling system with such duct detection shall have the capability of being manually reactivated independently, and all manual override controls will be consolidated into a fan/smoke control panel located next to the FACP. The smoke control system will be compliant with and meet all of the applicable requirements of the IBC Section 909.
6. Detectors:
- a. a. Early warning detection shall be installed throughout the entire building, unless the building is to have a sprinkler system throughout, then only in the following areas or other areas required by code:
    - i. In electrical, telecom, laundry and computer rooms.
    - ii. In dwelling/sleeping units and corridors serving these areas.
    - iii. In other high risk areas defined by CSU Fire Systems.
    - iv. At the location of each fire alarm control unit(s). Control units include but are not limited to; the FACP, remote power supplies, network converters and audio amplifiers. In the case where ambient conditions prohibit the installation of automatic smoke detectors, automatic heat detection shall be permitted.
  - b. All janitor closets and kitchens shall have thermal detectors, not smoke detectors.
  - c. Relay based detectors shall not be used.
  - d. Detectors shall not be installed until final construction clean-up is complete. All detectors installed prematurely will be required to be replaced with new detectors at the expense of the installing contractor.



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7. Manual Pull Stations: A manual pull station shall be located at each exit or means of egress of every level of the building.
8. Elevators:
  - a. Shunt trip and Recall shall be activated only from fire alarm system relay modules, not contacts on the detectors.
  - b. A heat detector shall be install in each elevator pit within 2 foot of sprinkler head to send the elevator to the highest recall level. This detector shall activate elevator recall only, unless code also requires shunt trip.
  - c. The 120VAC power to the elevator shunt trip shall be supervised in compliance with AMSE A17.1.
9. Door holders:
  - a. Shall be non-supervised and release upon AC power loss or after a maximum 30-second delay.
  - b. Door holders shall be wired through fire alarm system relay modules.
10. Control Units:
  - a. All remote power supplies, transponders, audio amplifiers and riser boxes shall be installed in either mechanical, electric or telecom rooms where feasible or other locations approved in writing by CSU Fire Systems.
  - b. All remote power supplies shall be individually monitored for trouble conditions.
  - c. The first remote power supplies shall be trigger by dedicated notification circuit, each subsequent power supply shall be triggered by the sync circuit from the previous power supply.
  - d. Primary and secondary power supplies shall be capable of operating the system under quiescent load for a minimum of 24 hours and then shall be capable of operating the system during a fire or other emergency condition for a period of 15 minutes at maximum load. These numbers shall include a 20 percent safety margin to the calculated amp-hour rating.
11. Fire Suppression:
  - a. If the building is to be installed with a suppression system, the tamper switches shall be programmed as a tracking supervisory.
  - b. An outdoor water flow horn/strobe device shall be located above the Fire Department Connection (FDC):
    - i. The outdoor horn/strobe shall sound only upon detection of water flow. It shall silence automatically when the water flow ceases.
    - ii. The outdoor horn/strobe shall be located in a manner where it is easily visible to the responding fire trucks. PFA will give the final approval.
  - c. Each building shall have a main flow which shall be dually monitored for building alarm and water flow tracking. Water flow tracking shall not be accomplished by individual

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sprinkler zones.

- d. Each tamper valve shall be individually monitored.
  - e. Hood Systems: Shall be monitored by the fire alarm system and shall be programmed as directed by CSU Fire Systems.
12. Rescue Assistance Systems: Shall be monitored by the fire alarm system for power, call made, and trouble conditions.
13. Automated External Defibrillator (AED): Each AED in the building shall be monitored by the fire alarm system and shall report as tracking supervisory signal.
14. Bi-Directional Amplifier Systems:
- a. If required by PFA, it is the responsibility of the contractor to provide and install a Bi-Directional Amplifier System for emergency communications.
  - b. Trouble conditions shall be individually monitored through the fire alarm system.
15. Fiber Converter Cabinet:
- a. One loop of the SLC shall be provided into the fiber converter cabinet at the location specific by CSU Fire Systems.
  - b. The fire alarm contractor shall coordinate which SLC addresses that can be used to monitor the fiber converter cabinet with CSU Fire Systems. These addresses shall be programmed by the fire alarm contractor and reflected on the as-built drawings.
  - c. A dedicated 120 volt circuit shall be provided to the fiber converter cabinet.
16. Wiring/Conduit:
- a. All cable and wiring shall be installed in a minimum of ¾" red EMT conduit by a Colorado licensed electrician and in compliance with CSU Electrical Standards. Upon direction of the CSU Project Manager and if acceptable by the manufacture of the conduit, in areas with exposed EMT it shall be permitted to paint the conduit to match the environment, as long as all junction box covers are red and labeled with circuits. In residential wood construction ¾" red ENT will be allowed.
  - b. Use only solid copper conductors, which are UL listed for installation and location, and approved for fire alarm use.
  - c. Visual notification circuits shall be white sheath fire alarm cable, audible notification circuits and the SLC shall be red sheath fire alarm cable. Single conductors, such as THHN, are not acceptable.
  - d. Install wire, cables, and conduit in accordance with the manufacturer's recommendations and in compliance with the NEC.
  - e. A 1" minimum EMT conduit for fiber optic cable installed with pull string, sweep bends only and no LB connectors shall be routed from the top right of the FACP to the top right fiber cabinet. In addition a ¾" EMT conduit shall be routed from the fiber cabinet to the telephone Main Distribution Frame (MDF) or to a location specified by CSU Fire Systems.
  - f. T-tapping of the SLC is acceptable only within junction boxes. T-tapping of notification

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circuits is not acceptable. All connection locations shall be indicated on as-built blueprints and coincide with labels on junction box covers.

- g. Indicating Device Circuits (IDC), Signaling Line Circuits (SLC) and Notification Appliance Circuits (NAC) associated with the fire alarm system shall have “Class-B” addressable performance characteristics as described in NFPA 72. Wire sizes shall be a minimum of 16 AWG on the SLC and 14 AWG on all other circuits.
- h. Contractor shall not pull wire through existing raceways with live circuits without prior approval from CSU Fire Systems and shall only be pulled through existing fire alarm conduit and not share a conduit with other control or communications circuits.

17. Junction Boxes:

- a. All junction boxes 8” x 8” or larger shall be provided with labeled terminal strips with all wires labeled and landed on corresponding terminals. Only one conductor per terminal shall be allowed.
- b. Only one extension ring is allowed on any junction box.

18. Identification/Labeling:

- a. All new and reused junction boxes shall be red and labeled “FA” and with the circuits that are enclosed within the junction box. This is the only case where it will be acceptable to use a felt tipped marker.
- b. All initiating and notification devices shall be labeled:
  - i. Notification appliances shall be labeled with circuit(s). (ex. NAC 1, NAC 2, S1-1, S1-2, S2-1, V-1)
  - ii. Where used, End-Of-Line Resistors shall be labeled “EOL” on the device.
  - iii. Each initiating, monitoring and control device shall be labeled with the device address and if applicable the function the device serves.
- a. The FACP shall be labeled with electrical panel location, panel number, and circuit number. Any circuit breaker associated with the fire alarm system shall be painted red.
- b. All Remote Power Supplies and Audio Amplifiers shall be labeled with the unit number, electrical panel location, panel number and circuit number.
- c. All electrical circuits that are controlled by the fire alarm system shall be labeled on the device with electrical panel location, panel number and circuit number.
- d. Labels shall be at least 3/8” high lettering, black on a white background printed from a label maker or on a permanently mounted professional name badge.
- e. Labels shall be in a place where they are visible from the ground. Where a device is located above the ceiling a label shall also be located on the ceiling grid.

19. No device, detector, panel or J-box shall have maintenance access blocked by pipes, ducts, conduits, and cable trays or installed in any manner that they cannot be easily serviced. Inaccessible or blocked access, as determined by CSU Fire Systems, shall be remediated at contractor cost.

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20. Delivery, Storage, and Handling:

- a. Store fire alarm equipment in a clean, dry place. Only new equipment is to be installed, do not install damaged equipment or components; replace with new.
- b. All equipment, installed or not, needs to be protected from weather, dirt, fumes, water, construction debris and physical damage. Equipment subject to adverse conditions, as determined by CSU Fire Systems, will need to be replaced at the expense of the contractor.

21. Extra Material:

- a. Contractor shall provide spare/replacement detectors amounting to 10 percent of the quantity installed by the project, but not less than two of each type of detector.
- b. Contractor shall provide spare/replacement detector bases amounting to 10 percent of the quantity installed by the project, but not less than one of each type of detector base (including duct detector housings).
- c. Contractor shall provide spare/replacement modules amounting to 10 percent of the quantity installed by the project, but not less than two of each type of module.
- d. Contractor shall provide spare/replacement notification appliances amounting to 10 percent of the quantity installed by the project, but not less than two of each type of notification appliance.

22. Painting/Patching: Contractor shall paint exposed conduit to match adjacent surfaces. All surfaces or finishes damaged as a result of work shall be properly patched, painted, and/or repaired by trained craftsmen of the trade involved.

23. Graphic Map:

- a. A graphic map shall be located at the FACP and at any annunciator(s).
- b. All graphics shall include initiating devices, room numbers, indication of north and the current building footprint. In residential buildings graphic maps located in hallways and common areas, shall not include the room numbers of dwelling units. Room numbers of dwelling units shall only be included on graphic maps located in staff areas or other such limited access areas.
- c. The graphic map shall be updated for any additions and/or changes that are made to the fire alarm system or to the building footprint.
- d. Graphic maps shall be installed prior to CSU Test and Verification.

24. Impairments, Fire Watch and Shut Down Requirements:

- a. In any case where a fire alarm or fire suppression system will be impaired, an outage will need to be requested and approved. Outage requests are to be completed through CSU Facilities Management and will need to be requested a minimum of 48 hours in advance. This includes disabling detectors because of welding, brazing, painting, sanding and other such activities.
- b. Except for replacement of control equipment or remote power supplies, at no time during construction shall the notification devices be disabled.

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- c. In any case where a functioning fire alarm system or portion of the system is out of service, a fire watch and safety plan will need to be conducted in accordance to FM Global standards as facilitated by CSU Fire Systems. The contractor will be responsible for any portion of the building with an impaired fire alarm or fire suppression system as a result of construction.
  25. Deviations: If the contractor believes that a specific situation requires a deviation from these standards, a request will need to be made in writing clearly stating the situation and the proposed solution. All requests will need to be approved by CSU Fire Systems in writing prior to the deviation being made. All unapproved deviations from these standards will need to be corrected at the expense of the contractor prior to final inspection.
- E. Plan Review and Submittals:
1. A plan review shall be completed by PFA and CSU Fire Systems for each phase of the fire alarm and fire suppression design. Fire Alarm drawings shall be separate from other building drawings. See Division 01- General Requirements regarding responsibility for review fees.
  2. Paper drawings and electronic AutoCAD files must be submitted to CSU Fire Systems within thirty (30) days after the award of a contract. Drawings and electronic files shall be received by the CSU project manager and distributed to the following:
    - a. CSU Fire Systems (1 paper set and electronic file). Electronic AutoCAD files emailed to [firealarms@colostate.edu](mailto:firealarms@colostate.edu)
    - b. CSU Design and Construction (1 paper set and electronic file).
    - c. PFA (current requirements).
  3. Shop Drawings shall include the following:
    - a. A floor plan that indicates the use of all rooms.
    - b. Location of initiating devices.
    - c. Location of alarm notification appliances, including candela ratings and speaker tap for notification appliances.
    - d. Location of fire alarm control unit, transponders, and notification power supplies.
    - e. Annunciator(s).
    - f. Power connection.
    - g. Battery calculations.
    - h. Conductor types and sizes.
    - i. Voltage drop calculations.
    - j. Manufacturers' data sheets indicating model numbers and listing information for equipment, devices and materials.
    - k. Details of ceiling height and construction.
    - l. The interface of fire safety control functions and external equipment, an input/output

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matrix and a sequence of operations.

- m. One line diagram for the complete system including device addresses and room numbers.
4. All changes, including device address deletions, additions or other changes shall be coordinated with CSU Fire Systems and approved in writing prior to the changes being made.
5. No changes to the program can be made later than five (5) days prior to the CSU test and verification, unless otherwise arranged with specific written acknowledgement by CSU Fire Systems. The Contractor will be responsible for all costs associated with the additional work.
6. Updated paper drawings and AutoCAD files shall be received no later than five (5) days prior to the CSU test and verification and distributed to CSU Fire Systems. Two (2) sets of as-built drawings shall be received by the CSU project manager during the same time frame, which will be distributed to the following:
  - a. CSU Fire Systems (1 paper set and electronic file). Electronic AutoCAD files emailed to [firealarms@colostate.edu](mailto:firealarms@colostate.edu)
  - b. PFA (1 set) - This set will remain on-site to be used during final inspection.
7. As-Built/Record Drawings Shall include the following:
  - a. Updated floor plan that indicates the use of all rooms and details of ceiling height and construction.
  - b. Updated location of initiating devices and monitoring devices.
  - c. Updated location of alarm notification appliances including; candela ratings, speaker wattage, and end-of-line resistors.
  - d. Updated location of fire alarm control unit, transponders, and notification power supplies.
  - e. Updated annunciator location(s).
  - f. Electrical panel and circuit number for device that are interfaced or connected to the fire alarm system including; fire control units, transponders, amplifiers, remote power supplies, damper motors, shunt trip breakers.
  - g. Updated battery, amplifier, and voltage drop calculations.
  - h. Updated conductor types and sizes.
  - i. Updated graphic map(s) shall be provided.
  - j. Manufacturers' data sheets indicating model numbers and listing information for equipment, devices and materials.
  - k. Details of ceiling height and construction.
  - l. Updated interface of fire safety control functions and external equipment, an input/output matrix and a sequence of operations.
  - m. Updated one line diagram for the complete system including device addresses and room numbers.

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- F. System Testing and Acceptance: Three different system tests will be completed on any and all fire alarm systems.
1. Preliminary testing: A preliminary test shall be completed by the installers to ensure proper operation of the fire alarm system without the assistance of CSU or PFA.
  2. CSU Test and Verification: This 100% system test, which entails testing and verifying every input and output, will be completed by CSU Fire Systems in the presence of the installation contractors per NFPA 72 testing procedures. All associated external equipment, including air handlers and fire smoke dampers, must be completely installed and programmed prior to the CSU Test and Verification so their functional interface and control by the fire alarm system can be tested.
    - a. Prior to scheduling this test the preliminary testing shall be completed.
    - b. Prior to scheduling this test the NFPA 72 Record of Completion shall be provided to CSU Fire Systems.
    - c. Prior to scheduling this test as-built drawings, updated AutoCAD files and O&M manuals shall be received by necessary parties.
    - d. The contractor shall submit a written request for this inspection to the CSU Project Manager and Facilities Dispatch at least five (5) business days in advance.
      - i. Occupied building may need to have final inspection scheduled during early morning or weekend hours so that the test does not interfere with normal building operations. Building proctor and CSU Project Manager will have the knowledge for when these tests will need to be completed.
      - ii. The Project Manager shall coordinate and schedule the inspection with CSU Fire Systems and the building proctor.
    - e. The Contractor shall have all subcontractors scheduled to be in attendance on the day of inspection that will be needed in order to complete a 100% system test.
    - f. In cases where a system was remodeled or added to, all new devices shall be 100% tested and a representative quantity of existing devices shall be re-tested to ensure proper operation of the system. CSU Fire Systems will designate a reasonable quantity of existing devices in conjunction with NFPA 72.
    - g. The contractor shall furnish all test equipment necessary to complete the testing.
  3. PFA Test and Verification:
    - a. Prior to scheduling the Final Acceptance Test the NFPA 72 Record of Completion shall be completed and signed off by CSU Fire Systems. All associated sub-contractors, the Notifier factory representative, CSU Fire Systems and PFA shall be present for this final acceptance test.
    - b. In cases where a system was remodeled or added to, all new devices shall be 100% tested and a representative quantity of existing devices, as determined by NFPA 72 and PFA, shall be re-tested to ensure proper operation of the system.
    - c. The contractor shall furnish all test equipment necessary to complete the testing.

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G. Warranty and Training:

1. The contractor shall guarantee all equipment and wiring free from inherent mechanical, electronic or electrical defects for a period of 3 years from the date of acceptance as set forth in the general conditions.
2. The contractor shall guarantee an on-site response, if requested by CSU Fire Systems, for all warranty related issues of no longer than 24 hours. Work to correct the warranty issue shall begin no later than 48 hours starting from the initial on-site response, unless approved in writing by CSU Fire Systems.
3. Any part of the warranty shall not be made void due to any required inspection, operation or programming of the system performed by CSU Fire Systems during the warranty period.
4. Failure to comply with all contractual obligations resulting in costs incurred by the University shall result in those costs being transferred to the appropriate contractor for payment.
5. Contractor shall be financially responsible for all fees incurred to the university and all lost research due to false alarms as a result of construction or contractor error, from the beginning of construction until final inspection form is signed.
6. The Contractor shall conduct training as required for CSU Fire Systems technicians on all normal maintenance, operation and troubleshooting procedures down to circuit board level of equipment included in the contract (up to eight hours per new system and up to four hours for remodeled systems). This training will consist of a project walkthrough with person from the installing company most familiar with the field wiring and installation.
7. For all projects installing a NFS2-3030 FACP the contractor shall also sponsor one CSU Fire Systems technician for one week of factory training. The contractor shall coordinate with CSU Fire Systems to determine what type of factory training is needed. Training may either be at the factory or in Colorado and will need to be scheduled within 4 months of completion of the project and training complete within 1 year.

H. Existing Buildings:

1. Building Upgrades: All buildings involved in a major remodel shall be upgraded to meet all the current standards set forth within this document, the extent of which shall be reviewed and approved by CSU Fire Systems.
2. New Additions:
  - a. All new additions shall be constructed to meet all the current standards set forth within this document.
  - b. All major additions shall have the entire building upgraded to meet all the current standards set forth within this document subject to the review and approval of CSU Fire Systems.
3. Fire Alarm System Replacement:
  - a. If feasible, the system replacement shall meet all the standards set forth within this document. This determination will be made by CSU Fire Systems.
  - b. At a minimum, all new fire alarm control panels are required to be compatible with a



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combination Fire Alarm/Mass Notification System so that the system is more readily convertible to a combination system during future upgrades.