

APPENDIX O SHOP DRAWING AND SYSTEM GRAPHIC REQUIREMENTS FOR PERMIT APPLICATION is added as follows:

**APPENDIX O
SHOP DRAWING AND SYSTEM GRAPHIC REQUIREMENTS FOR
PERMIT APPLICATION**

SECTION O101

GENERAL

O101.1 Scope. All documents submitted for approval of any permit application shall bear the stamp, signature and registration number of the responsible design professional in accordance with the requirements below or as permitted by Denver Fire Department policy. In all cases, acceptance of any permit application shall be subject to the discretion of the *fire code official* for further review as necessary. Submitted drawings shall be of a minimum drawing sheet size of 24 inches by 36 inches and of sufficient detail and legibility to affect an adequate review of the scope of the work for which a permit is requested.

SECTION O102 Reserved.

SECTION O103

TECHNICAL REQUIREMENTS

O103.1 Sprinkler system shop drawings submittal.

1. Working plans shop drawings shall be submitted in accordance with Section O103.2.2, Items 1 through 20, Section 903 of the International Fire Code, and NFPA 13, Chapter 23. Shop drawings shall identify the flow and reduced pressures required by Section 903.3.5 used in the hydraulic calculations. Hydraulic calculations and equipment cut sheets are required. Drawings shall be stamped and signed by a Colorado licensed professional engineer. Denver Water flow test certificate or hydraulic model letter shall be provided with all submittals.
1. Pre-action sprinkler and clean agent suppression systems shall include the requirements for the suppression and detection system in a single permit application. Separate permits are required for fire detection and sprinkler/clean agent installations.
3. Submittal shall include central station monitoring company name and Denver Fire Department central station license number.
4. Upon submittal of sprinkler system shop drawings, an applicant may request issuance of a "conditional sprinkler installation permit" (conditional permit). Conditional permits shall not include installation of any fire pump or pump controller components or installation of sprinklers in fittings. Conditional permits are subject to payment of all Building Department permit fees associated with the total scope of work in addition to a \$250.00 Fire Department fee. Separate payment to the Fire Department is required at the time of permit issuance at the Fire Department walk-through counter. Work under a conditional permit is subject to subsequent plan review and field inspection for proper and code compliant installation. Corrections identified in the field or by design plan review shall be the responsibility of the contractor. Conditional permits shall only be issued to contractors with the appropriate Denver contractor and Fire Department licenses.

5. Dry sprinkler system designs shall include water delivery time calculations where required by NFPA 13, 8.2.3.

O103.2 Fire Department sprinkler system "walk-through" procedures. All applications shall be submitted at <https://www.denvergov.org/epermits> and will be reviewed within two business days. Review of the following permit applications shall be provided for the modification of existing wet fire sprinkler systems only. The maximum number of permits reviewed or issued for any single applicant shall be limited to two per day. Where shop drawings are required, they shall be stamped and signed by a Colorado licensed professional engineer responsible for the design and submittals shall be in compliance with the relevant codes adopted by the City and County of Denver except 20 or fewer sprinklers are permitted to be signed by a NICET III or higher.

O103.2.1 Projects qualifying for Fire Department sprinkler walk-through permits. The walk-through project scope is limited to; relocating, adding and plugging sprinklers in accordance with the following:

1. Tenant finish work on an existing sprinkler system involving both sprinkler relocations and additions in a light hazard occupancy for up to 75 sprinklers.
2. Tenant finish work on an existing sprinkler system involving both sprinkler relocations and additions to Ordinary Hazard Group 1 up to 30 sprinklers and Group 2 up to 20 sprinklers in other than Group H or high pile storage occupancies as defined in the Denver Fire Code.
3. Tenant finish in warehouses where tenant finish is within the office only, in accordance with Item 2 above.
4. Backflow preventors on pipe schedule systems or like for like replacements on hydraulically calculated systems (original system calculations shall be submitted for verification).
4. For tenant work on all light hazard existing sprinkler systems involving sprinkler relocations and additions, the contractor shall ensure that not more than two sprinklers are fed from any 1-inch outlet in the new construction area. A maximum of 20 added sprinklers are permitted per zone or floor level. Where the design requires more than two sprinklers to be fed from a 1-inch outlet, hydraulic calculations shall be provided to ensure the friction loss permits adequate flow for the required design area demand and such will require log-in type review. Full floor layout showing all sprinkler locations and pipe sizes shall be submitted.

O103.2.2 Plan submittal - Required information for sprinkler permit walk-through. Shop drawings showing all floors that are affected shall include the following information:

1. Name of owner and occupant
2. Location, including street address
3. Point of compass
4. Full height cross-section, or schematic diagram, if required for clarity, including ceiling construction and method of protection for nonmetallic piping
5. Location of partitions
6. Location of firewalls
7. Building construction type and occupancy classification
8. Location and size of concealed spaces, closets, attics, and bathrooms
9. Sources of water supply with pressure or elevation

10. Make, type, temperature, coverage characteristics, nominal orifice size and K-factor of sprinkler heads. Method of protection for nonmetallic piping.
11. Location of high-temperature sprinklers
12. Total area protected by each system on each floor
13. Pipe type and schedule of wall thickness
14. Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions)
15. Location and size of riser nipples
16. Type of fittings and joints and location of all welds and bends. The contractor shall specify on drawings any sections to be shop welded and the type of fittings or formations to be used
17. Type and locations of hangers, sleeves, braces and methods of securing sprinklers when applicable
18. Layout identifying sizes and locations of existing piping serving the affected floor or area
19. Pipe schedule system justification where such systems are permitted by NFPA 13.

O103.3 Fire Department Fire alarm system shop drawings submittal. Where shop drawings are required, they shall be stamped and signed by a Colorado licensed professional engineer. Drawings shall be submitted for permit application in accordance with this Section with the following information:

Upon submission of fire alarm shop drawings for review, an applicant may request issuance of a fire alarm “conduit only rough-in” installation permit without *approved* submitted plans. The contractor shall be responsible for all changes required by the subsequent plan review. A conduit only rough-in permit may only be issued to a contractor with a valid Denver electrical or electrical signal contractor’s license in accordance with this section. Only back boxes, conduit stubs and fire alarm raceway systems are permitted for installation with a conduit only rough-in permit. Conduit only rough-in permits are subject to payment of all Building Department permit fees associated with the total scope of rough-in work in addition to a \$250.00 Fire Department fee. Separate payment to the Denver Fire Department is required at the time of permit issuance at the Fire Department walk-through counter. Raceway systems shall only be installed by State and City licensed electrical contractors who are also licensed by the Denver Fire Department. Work under a conduit only rough-in permit is subject to subsequent plan review and field inspection for proper and code compliant installation. Corrections identified in the field or by design plan review shall be the responsibility of the contractor. Permits shall only be issued to contractors with the appropriate Denver contractor and Denver Fire Department licenses.

O103.3.1 Fire alarm shop drawings shall contain the following information:

1. Exact address, including building and unit numbers; location of work; name and address of responsible design agency.
2. Building occupancy classifications and occupant loads for each occupancy classification.
3. Manufacturers’ specification sheets for all equipment, equipment, appliances and devices.
4. Code reference used as a basis of design, including any administrative modifications or Board of Appeals decisions.
5. Identification of system as code-required, non-required code-compliant or user-defined.
6. Complete sequence of operation input/output matrix with initiating events (input) as the rows and response events (output) as the columns.

- a. Initiating events shall include (per zone(s) per floor):
 - 1) Manual initiation of alarm or supervisory features
 - 2) Automatic initiation by detection, e.g., smoke, heat, fire, other emergency alarms; devices activating specific mechanisms or life safety functions, such as individual smoke control components, elevator recall, opening protection, etc., shall be identified separately; devices in elevator shafts, elevator machine rooms, stair enclosures shall be identified separately.
 - 3) Manual initiation of special extinguishing systems; devices shall be identified separately per system per zone.
 - 4) Automatic initiation of fire suppression systems; flow switches and special suppression systems shall be identified separately.
 - 5) Functions monitored by the fire alarm system, including but not limited to:
 - a) Equipment/device/appliance/system trouble
 - b) Equipment/device/appliance/system supervisory shall be listed per zone
 - c) Equipment/systems monitored for integrity; identify each system separately
 - 1. Elevator shunt trip power
 - 2. RES system power
 - 3. FACP and ancillary equipment power
 - 4. Refuge area communication power
 - 5. Emergency firefighter communication system(s)
- b. Response events shall include:
 - 1) System alarm and system/component supervisory and trouble.
 - 2) Alarm notification including signal transmission to central station, interior and exterior appliances, voice evacuation, special suppression pre-discharge alarms, etc.
 - 3) Required safety functions including (not limited to):
 - a) Elevator recall (list groups or banks separately)
 - b) Smoke control fan activation (list each fan separately)
 - c) Damper activation (list smoke control and opening protection separately per zone per floor)
 - d) Activation of other opening protection (list separately per zone per floor)
 - e) Activation of all electronic access control functions controlled by the fire alarm (list per zone per floor)
 - f) HVAC system shutdown

- g) Power shunt; list each component/feature/system separately (entertainment visual and audio features and increasing general illumination levels may be listed together per fire area)
7. Identification of air-handling units with airflow exceeding 2,000 cfm (.94 cu m/s) and 15,000 cfm 7.08cu m/s).
 8. Identification of air-handling units used for smoke control.
 9. Voltage-drop calculations using either the component-by-component method or aggregating the entire load at the end of the circuit. The calculations shall use the listed UL max for new systems. The voltage on a circuit shall not drop below 16 volts at the last appliance. The “R” values used for conductors shall be in accordance with NFPA 70 (NEC) for uncoated copper conductors. Voltage-drop calculations for additional devices on existing system shall be done in the same manner with the same values, as the original calculations for the system.
 10. Battery calculations for control panels and power supplies. Calculation shall include 20 percent de-rating.
 11. Scale drawings of each area where work on the fire alarm system is proposed, including north arrow, building address and local street intersections. The drawings shall show the locations of all equipment, appliances, and devices including existing components and end-of-line resistors, room identification by number and function, attic and ceiling details for areas with automatic detection.
 12. Mounting heights of wall-mounted devices.
 13. Symbol list with quantities of each device. Symbols shall comply with NFPA 170.
 14. Power supply connection details. System single-line riser showing all devices.
 15. A separate single line drawing of the power supplies, pre-amps, amplifiers, interconnecting wiring, and methods used to provide survivability of the voice evacuation system.
 16. Fire alarm circuit identification, in accordance with NFPA 72, including wire color code.
 17. Interconnection wiring.
 18. Supervising station designation (Central, Proprietary, Remote).
 19. Full-scale drawings of annunciators, zone maps and firefighter’s smoke control panels.
 20. Reflected ceiling plan, where full smoke detection is provided.
 21. Conduit-fill calculations
 22. List of control unit bypass features
 23. Amplifier load calculations and audio circuit loading (not to exceed manufacturer's maximum circuit dB loss)
 24. Name, address and Denver Fire Department license number of the supervising station. Facilities monitoring radio communication systems shall meet connectivity requirements of Section 918.
 25. Fire and smoke construction ratings of walls and barriers
 26. Seal and signature of a Colorado registered professional engineer.

O103.4 Fire Department fire alarm system "walk-through" procedures. All applications shall be submitted at <https://www.denvergov.org/epermits> and will be reviewed within 2 business days. Review of the following permit applications shall be provided for the modification of existing fire alarm systems only. The maximum number of permits reviewed or issued for any single applicant shall be limited to two per day. Submittals shall be in compliance with the relevant codes adopted by the City and County of Denver. Fire alarm permit applications may be eligible for walk-through review in accordance with the following:

- a. Circumstances under which permit applications may be submitted:
 1. Devices and/or appliances connected to existing fire alarm systems. Installation shall be limited to a maximum of 24 new or relocated notification appliances on a single floor and 12 new or relocated initiating devices on an existing circuit.
 2. Addition of one power supply to support appliances identified in item #1 above.
 3. Transferring existing monitoring companies
 4. Removal and reinstallation of devices in the same location
 5. Installing a new replacement dialer or communicator or reprogramming same to new central station.
 5. Installation of emergency responder radio enhancement systems in non-highrise buildings.
 6. Conduit only permit requests where the final shop drawings are logged for review.
 7. Emergency fire alarm panel replacement for an existing system. An emergency panel replacement permit shall be acquired within one normal business day of the commencement of work. The proposed panel shall be compatible with the fire alarm system. A complete application in accordance with Section 907.1.2 shall be submitted within ten normal business days of the commencement of work. The emergency replacement panel is subsequently subject to the requirements for a planned replacement panel.

O103.4.1 Plan submittal - Required Information for fire alarm permit walk-through. A complete set of electronic plans shall be submitted through the online portal that includes the following (as applicable):

1. Completed permit application
2. Building code occupancy classification
3. Manufacturers' specification sheets and equipment listing sheets for new equipment and devices
4. Installation codes and standards used
5. Type of system and reason system is provided (required, non-required)
6. Sequence of operation
7. Identification of duct detectors in air-handling units exceeding 2,000 cfm (0.94cu m/s) (not required in VAV boxes less than 2000 cfm (0.94cu m/s) each, but aggregate air flow exceeding 2000 cfm (.94cu m/s) boxes served by central fan system)
8. Voltage drop calculations and battery calculations
9. Description of annunciation assignments (complete zone schedule)
10. Shop drawings, drawn to scale, including a drawing for each building level involved, with a north arrow for compass orientation and depicting all control and annunciation panels and peripheral

devices. Shop drawings shall bear the seal and signature of a professional engineer licensed by the State of Colorado. Where the scope involves 6 or fewer notification appliances and 4 or fewer initiating devices signature by a NICET III or higher is acceptable.

11. Plan for upgrading existing annunciator panel, if applicable
12. One-line diagram showing scope of work and identifying new devices
13. Site address, identification of each room's usage, and areas having automatic detection
14. Provide building details (i.e., attics, ceiling cavities, etc.)
15. Mounting heights for manual fire alarm boxes and strobes
16. Primary power supply connection details and symbol list

O103.5 Building plans for graphic map. Plans shall be of durable construction, easily readable in normal lighting, protected by a smooth, transparent, plastic surface and shall include every building level including mezzanines and roofs. Plans shall contain the following information as applicable:

1. Building name
2. Building address
3. Construction type(s)
4. Scale
5. North orientation arrow
6. **"You Are Here"** in contrasting and bold font
7. Latest date plans were drawn/revised
8. Floor plans
9. Concealed spaces below floors and above ceilings; e.g., crawl spaces and attics
10. Site plan
11. Adjacent streets
12. Local fire hydrants
13. Major uses, e.g., kitchens, restaurant, offices, gymnasium, parking, etc.
14. Areas of emergency function, e.g., areas of refuge, fire command center
15. Utility areas, e.g., electrical/telephone rooms/closets, water entry
16. All stair enclosures with distinct designation for each, matching floor signage
17. All elevators with distinct designation for each and associated machine rooms
18. All trash/linen chutes
19. All utility shafts including HVAC and light wells
20. All interior and exterior utility (communication, electricity, gas, water, etc.) shutoff locations
21. Locations of hazardous materials such as:

- a. Control areas
 - b. Fuel storage
 - c. Battery rooms
 - d. Medical gas rooms
 - e. Emergency and standby power equipment locations
 - f. Fuel fill location
 - g. Identify fuel type and tank size
22. Sprinkler zones
 23. All control valve locations including elevators and paint booths
 24. Standpipe outlet locations
 25. Special suppression systems; e.g., FM-200; UL-300; pre-action
 26. Specialized fire protection equipment; e.g., water tanks
 27. Fire pump location
 28. Fuel fill location for diesel pumps
 29. Identify fuel type and tank size as applicable
 30. Fire department connections
 31. Pump test headers
 32. Wall hydrants as applicable
 33. Smoke control zones
 34. Fire-resistance-rated construction, fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions
 35. All initiating devices including water flow
 36. Fire alarm zones
 37. NAC power extender locations
 38. Roof plan
 - a. Access
 - b. Vents
 - c. Occupied areas
 39. Stamp and signature of a professional engineer licensed by the State of Colorado
 40. Control areas in accordance with Section 5003.8.3 of the International Fire Code
 41. Other features required by the *fire code official*

O103.6 Shop drawing submittals (deferred submittal) for smoke control systems. Shop drawings shall be electronically submitted bearing the stamp and signature of a professional engineer licensed by the State of Colorado and containing the following:

1. Code reference used as a basis of design, including any Administrative Modifications or Board of Appeals decisions.
2. Plans identifying each smoke control zone including a listing of smoke control equipment (fans) associated with each respective zone. A combination of vertical (section) and/or horizontal (plan) views may be necessary to clearly depict each zone.
3. Certification of coordination of sprinkler, smoke control and fire alarm/detection zones.
4. Plans identifying control equipment including wiring diagrams and tubing schematics as applicable
5. Manufacturers' specification sheets for all equipment and devices associated with the smoke control system including, but not limited to, the following: Fans, dampers, louvers, CT switches, end-switches, pressure sensors, control tubing, etc. Fan and damper specifications shall include operating temperature to 250 degree ° F., minimum number of fan drive belts required for load and number of belts provided. 1.5 x the minimum drive belts required shall be installed.
6. Detailed description of the required testing criteria in Section 909.10.1.1. Printed reports must be maintained on site in the fire command center.
7. Final acceptance testing plan indicating systems testing. Refer to Section 909.10.1.

O103.6.1 Firefighter's smoke control panel (FSCP). Firefighter's smoke control panel submission shall bear the stamp and signature of a professional engineer licensed by the State of Colorado and shall incorporate the items below as well as a complete sequence of operation for all activation modes.

O103.6.1.1 The following features shall be incorporated and color-coded as follows:

1. General building layout (black lines on white background)
2. Exhaust systems – RED
3. Pressurization systems – GREEN
4. Ducts associated with smoke control elements but not active in smoke control mode – GREY
5. Dampers associated with smoke control elements that serve as containment in smoke mode – GREY
6. Garage supply and exhaust systems shall be energized manually to purge smoke (ON –AUTO only). System need not be connected to emergency power.
7. The status of smoke control equipment shall be indicated by LED lamps and appropriate legends. Fans, major ducts and dampers within the building that are components of the smoke control systems shall be clearly identified as to purpose (e.g., “**STAIR PRESSURIZATION FAN**”) on the FSCP. Lettering shall be 16 point Helvetica bold; equipment identification (e.g., “SPF-1”) shall be 12 point Helvetica bold.

O103.6.1.2 LED status indicators shall be provided for each component of the smoke control system as follows:

1. Fans operating, dampers open, power on – GREEN

2. Fans off, dampers closed – YELLOW
3. Fans and dampers fault status – YELLOW
4. Containment dampers associated with smoke control elements in closed position. – CLOSED – YELLOW, FAULT – YELLOW
5. Panel switch not in auto position – RED
6. Duct detectors as required in accordance with Section 907.3.1 of the International Fire Code, shall be identified – YELLOW
7. Provide lamp test with momentary contact push button(s) to illuminate all LED's simultaneously.
8. All status LED's shall be active all the time and will always indicate true equipment status.

O103.6.1.2.1 Monitoring for fault status for pressurization and smoke removal fans shall include:

- a. Loss of power to the fan or VFD/motor starter.
- b. Open electrical disconnect at pressurization and smoke removal fan, whether the fire alarm system is in alarm or not.
- c. Fan fails to move air by program or switch on FSCP.
- d. VFD/motor start failure

O103.6.1.2.2 When the fire alarm system is not in alarm, moving a switch on the firefighters smoke control panel out of the “auto” position shall, in addition to the fault light, cause a supervisory signal to the FACP.

O103.6.1.3 The FSCP shall provide control capability over all smoke-control system equipment within the building. Control switches are active only during an alarm condition except through a secured and supervised bypass method *approved* by the Fire Department.

1. ON-AUTO-OFF control over each individual piece of operating smoke control equipment that can also be controlled from other sources within the building. This includes; stairway pressurization fans, smoke exhaust fans, supply, return and exhaust fans, elevator shaft pressurization fans and other operating equipment used or intended for smoke control purposes.
2. OPEN-AUTO-CLOSE control over individual dampers relating to smoke control and that are also controlled from other sources within the building.
3. ON-OFF or OPEN-CLOSE control over smoke control and other critical equipment associated with a fire or smoke emergency and that can only be controlled from the fire-fighter's control panel.

Exceptions:

1. Complex systems, when *approved* by the *fire code official*, where the controls and indicators are combined to control and indicate all elements of a single smoke zone as a unit.
2. Complex systems, when *approved* by the *fire code official*, where the control is accomplished by a computer interface using plain English commands.

O103.6.2 Control action and priorities. The firefighter's control panel actions shall be as follows:

1. ON-OFF and OPEN-CLOSE control actions shall have the highest priority of any control point within the building. Once issued from the firefighter's control panel, no automatic or manual control from any other control point within the building shall contradict the control action. Where automatic means are provided to interrupt normal, non-emergency equipment operation or produce a specific result to safeguard the building or equipment (i.e., duct freeze stats, duct smoke detectors, high-temperature cutouts, temperature-actuated linkage and similar devices), such means shall be capable of being overridden by the firefighter's control panel. The last control action as indicated by each firefighter's control panel switch position shall prevail. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.

Exception: Power disconnects required by the NFPA 70 (NEC).

2. Only the AUTO position of each three-position fire-fighter's control panel switch shall allow automatic or manual control action from other control points within the building. The AUTO position shall be the normal, non-emergency, building control position. Where a firefighter's control panel is in the AUTO position, the actual status of the device (on, off, open, closed) shall continue to be indicated by the status indicator described above. When directed by an automatic signal to assume an emergency condition. All devices and indications shall assume the position required by the sequence of operations. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.
3. Manual operation of any control switch from the "AUTO" position shall command the selected equipment to assume the position/operation required. Indicator lights shall register the appropriate change in state. When returned to the "AUTO" position while still in alarm mode, the equipment shall return to the position required by the smoke control programming.

O103.6.3 System response time. Smoke control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. The total response time for individual smoke control systems to achieve their desired operating mode shall not exceed the following time periods:

Fan operating at desired state – 75 seconds

Damper position travel – 60 seconds

O103.7 Emergency responder radio enhancement system (RES) shop drawings: Shop drawings shall be submitted bearing the stamp and signature of a professional engineer licensed by the State of Colorado and containing the following:

1. Facility address and name where applicable
2. Name and address of system design and installation contractor with installation contractor DFD certificate number
3. Stamp and dated signature of a professional engineer licensed by the State of Colorado
4. Manufacturer cut sheets for all cables, connectors, terminations, amplifiers, UPS, batteries, and antenna
5. Manufacturer's installation instructions
6. Design calculations, (Link Budget) for signal levels at each terminal point and initial input signal strength

7. Wiring riser and distribution diagrams
8. Grounding details
9. Battery calculations
10. Location of all RES equipment
11. "North" reference arrow
12. Copies of FCC authorizations
13. Grid layout and test readings in accordance with Section 510.3.1.1

Exception: For buildings not classified as a high-rise, RES installation drawings may be processed on a walk-through basis.

O103.8 High-piled combustible storage installation drawings.

1. Two complete sets of scaled floor plans and vertical sections (as necessary) of the building showing locations and dimensions of use areas including office, battery storage, show rooms, etc. High-piled storage areas shall be depicted and identified including usable storage height for each area. Walls used to separate piles, rack systems, arrays, etc., shall be identified as well as their functions (e.g., fire wall, fire barrier, etc.) and ratings.
2. Scaled plans of all storage arrays identifying all aisles, cross-aisles, catwalks and similar access features.
3. Means of egress in sufficient detail to substantiate compliance of all components with Chapter 10 of the *International Building Code*. Floor plans shall be of sufficient clarity and scale to determine travel distance, dead-end corridors, aisle widths, etc.
4. Location of required fire department access doors. Height above adjacent floors, landings, grade planes, etc. shall be identified.
5. Typical scaled sections of each unique rack showing rack height, storage height, number of tiers within each rack, dimensions and locations of catwalks, bridges, pass-throughs, and transverse and longitudinal flues.
6. Fire sprinkler data sheets providing existing or new fire sprinkler design criteria.
7. Clearance between top of storage and the sprinkler deflectors for each storage arrangement.
8. Maximum pile volume for each storage array.
9. Completed Hazards Material Inventory Statement (HMIS) and Hazardous Material Management Plan.
10. Location and classification of commodities in accordance with Section 3203 of the International Fire Code.
11. Location of commodities which are banded or encapsulated.
12. Type and description of fire suppression and detection systems.
13. Location of all valves controlling the water supply for all standpipes and sprinklers (ceiling, in-rack, etc.).
14. A roof or reflected ceiling plan showing the types, locations and specifications of curtain boards, other draft curtains, and all active and passive smoke removal/exhaust systems.

15. A structural analysis including rack and pile stability under seismic loads shall be submitted. Analysis shall also account for occupancy, wind and snow loading in storage systems exposed to such. Analysis shall be in accordance with Chapters 16 and 22 of the *International Building Code* noting Technical Assistance in accordance with Section 104.7.2 of the International Fire Code may be required for specialized systems falling outside the applicability of these chapters. Installation and use of manufactured and pre-engineered storage systems shall also be in accordance with the systems listings, where applicable, and manufacturer specifications.
16. Any additional information required by the *fire code official* regarding required design features, commodities, storage arrangement, fire protection, access, egress, etc., within the high-piled storage areas.

O103.9 Fire Department “walk-through” for kitchen hood extinguishing system. Provide engineered plans for the suppression system that include the following information:

1. Systems shall be UL-300 listed and compliant with NFPA 96
2. Product cut sheets (panel, nozzles, cylinders, etc.)
3. All nozzle locations
4. Location of manual pull station 10 feet from hood and next to the exit door
5. Kitchen hood shall be zoned separately and annunciated separately to the building FACP where provided
6. One duct required for every 12 feet of hood
7. Nozzle types and flow point calculation
8. Shop drawings signed by professional engineer licensed by the State of Colorado

O103.10 Installation or alteration of conveyances submittal procedures. Provide shop drawings for the installation or alteration of any conveyance in accordance with Section 920. All drawing submittals shall include equipment manufacturer’s specification sheets for all components and a copy of the City-approved construction floor plan with the locations of all conveyances identified. Where inclined platform lifts and stairway chair lifts are specified, the City-approved construction plans shall include dimensions of the width of the associated stairway(s). All equipment is listed and labeled for the intended application. Prior to commencing work, a licensed elevator contractor is required to submit plans for approval to the Denver Fire Department, Fire Prevention Division (FPD) through the online portal.

O103.10.1 New Conveyance Installations. The following items must be included in the plan submittal to FPD:

1. A completed Conveyance Installation or Alteration Permit Application for the proposed equipment installation.
2. Drawings must be submitted electronically in PDF format containing the following information:
 - a. All drawings must bear the signature and seal of a Colorado registered architect and/or professional engineer responsible for the conveyance design.
 - b. Layout drawings shall be dimensional and indicate that the conveyance meets the requirements set out in the currently adopted ASME A17.1 or ASME A18.1. Any drawings not indicating the proper code edition will be returned to the contractor for correction and resubmittal.

- c. *Approved* layout drawings are the property of the building owner and shall remain on site at all times.
- d. Documentation stating that material for the car enclosure, enclosure linings and floor coverings (other than metal or glass) conform to the following:
 - 1) ASTM E 84, ANSI/UL 723, for car enclosure and the enclosure lining with a flame spread rating of 0 to 75, and smoke development of 0 to 450.
 - 2) ASTM E 648 with a critical radiant flux of not less than 0.45 W/cm² for floor covering and underlayment.

If, at the time of application, the interior car material is unknown, FPD may issue an initial Installation Permit to install the conveyance. An Alteration Permit must be obtained before the car interior is installed.

- e. Layout drawing shall include a page that details the following information in Table format.
 - 1) Applicable code reference (Current adopted code or standard ASME A17.1, A18.1, ASCE 21)
 - 2) Job/Contract number
 - 3) Rated capacity
 - 4) Rated speed
 - 5) Total travel
 - 6) Landings front/rear
 - 7) Suspension means type (wire ropes, coated steel belts)
 - 8) Suspension means size
 - 9) For elevators that travel 60 feet or more a communication system that conforms to ASME A17.1 currently adopted edition. If a Fire Command Center (FCC) is present, this communication system shall be located in the FCC. If an FCC is not provided, the location shall be field *approved*.
 - 10) Emergency/Standby power (Generator, specify quantity of elevators able to operate simultaneously)
 - 11) Identification if hoistway is pressurized
 - 12) Elevator designated as fire service access elevator
 - 13) Elevator platform sized to accommodate an ambulance stretcher in accordance with Section 3002.4 of the *International Building Code*.
 - 14) Top of car handrail provided

O103.10.2 All Elevators (including LU/LA's, dumbwaiters/material lifts) layout drawings shall also include the following project information:

- 1. Building name, address and conveyance State registration number.
- 2. Required clearances and basic dimensions.

3. Location of the Fire Command Center where required by this code.
4. Layout of the elevator annunciator panel where required by this code.
5. Layout of the car operating panel and hall call stations.
6. Quantity and designations of elevator(s) operational simultaneously on an emergency or standby power generator, where provided. All elevators must be manually transferrable to the emergency or standby power source.
7. Primary and alternate floor locations (as determined by FPD).
8. Conformance of the visual signal (flashing fire hat) to Section 907.3.3.5.
9. Conformance of the Fire Emergency Operation to Denver Building Code for pressurized shafts in accordance with Section 907.3.3.4 Exception.
10. Maximum bracket spacing (see ANSI A17.1 Section 2.23 or 3.23).
11. Estimated maximum vertical forces on the guide rails on application of the safety or other retarding device (see ANSI A17.1 Section 2.23 and 2.19.3 or 3.23).
12. In the case of freight elevators for Class B or C loading (see ANSI A17.1 Section 2.16.2.2), the horizontal forces on the guiderail faces during loading and unloading, and the estimated maximum horizontal forces in a post-wise direction on the guiderail faces on the application of the safety device (see ANSI A17.1 Section 2.23 or 3.23).
13. Size and linear weight kg/m (lb./ft) of any rail reinforcement, where provided (see ANSI A17.1 Section 2.23 or 3.23).
14. Total static and impact loads imposed on machinery and sheave beams, supports, and floors or foundations (see ANSI A17.1 Section 2.9).
15. Impact load on buffer supports due to buffer engagement at the maximum permissible speed and load (see ANSI A17.1 Section 8.2.3).
16. Total static and dynamic loads from the governor, ropes, and tension system.
17. Horizontal forces on the building structure stipulated by ANSI A17.1 Sections 2.11.11.8 and 2.11.11.9.
18. Rated speed and operating speed in the down direction.
19. Identification of welding in conjunction with work. Hot work permit is required (other than for tack welds) or may be included in elevator permit when *approved*; include in elevator permit scope.
20. Identification if hoistway is pressurized.

O103.10.2.1 Electric Elevators (including LU/LA's, dumbwaiters/material lifts):

1. Where compensation tie-down is applied (see ANSI A17.1 Section 2.21.4.2), the load on the compensation tie-down supports
2. Maximum upward movement (see ANSI A17.1 Section 2.4.6)

O103.10.2.2 Hydraulic Elevators (including LU/LA's, Dumbwaiters/Material Lifts):

LU/LA Elevators:

1. Net vertical load from the elevator system, which includes the total car weight and rated load; plunger, cylinder, and oil; and any structural supports
2. Outside diameter and wall thickness of the cylinder, plunger and piping, and the working pressure
3. Minimum grade of pipe (ASTM or recognized standard) required to fulfill the installation requirements for pressure piping, or in lieu of a specific grade of pipe, the minimum tensile strength of pipe to be used for the installation (see ANSI A17.1 Section 3.19)
4. Length of the plunger and cylinder
5. Clearance between the bottom of the plunger and the bottom head of the cylinder as required by ANSI A17.1 Section 3.18.3.3

O103.10.2.3 Escalators/Moving Walks. Layout drawings shall, in addition to other data, indicate the following:

1. Building name, address and State registration number
2. Whether escalator to be installed indoors or outdoors
3. Maximum speed (escalators 100 fpm; moving walks up to 180 fpm depending on angle of inclination)
4. Angle of inclination (escalators not to exceed 30 degrees; moving walks not to exceed 12 degrees)
5. Rise and length

O103.10.2.4 Vertical Platform Lift (VPL) and Inclined Platform Lift (IPL). Layout drawings shall, in addition to other data, indicate the following:

1. Building name, address and State registration number
2. Number for landings (stops)
3. Whether the lift is to be installed indoors or outdoors
4. Type of drive
5. Total travel (not to exceed 14 feet, VPL)
6. Speed (not to exceed 30 feet/min)
7. Capacity (not to exceed 750lbs)
8. Clear platform width and length (not to exceed 18sf for VPL and 12sf for IPL)
9. Type of lift controls
10. Power supply

O103.10.3 Altered Conveyances (all conveyances): Layout drawings shall contain the following information:

1. A detailed list of the components that are to be altered.
2. A scope of work shall be attached to the permit application form.

3. If the scope of work includes altering of Fire Emergency Operation, the elevator contractor shall provide documentation that the current fire alarm panel is capable of fire recall or that a permit to alter/install a new fire alarm panel has been issued.
4. If the scope of work includes the interior of the car enclosure, documentation as stated above shall be provided.
5. All drawings must bear the signature and seal of a Colorado registered architect and/or professional engineer responsible for the conveyance design.

O103.11 Emergency alarm systems and gas detection systems shop drawings submittal. Shop drawings shall be submitted for permit application in accordance with this Section.

O103.11.1 Emergency alarm shop drawings shall contain the following information:

1. Exact address, including building and unit numbers; location of work; name and address of responsible design agency.
2. Building code occupancy classification(s) for each area or room.
3. Manufacturers' specification sheets for all equipment, appliances and devices.
4. Code reference used as a basis of design, including any administrative modifications or Board of Appeals decisions. Type of system and reason system is being provided.
5. Installation codes and standards used.
6. Complete sequence of operation input/output matrix with initiating events (input) as the rows and response events (output) as the columns.
7. Voltage drop calculations for notification circuits and battery calculations for secondary power supply.
8. Scaled drawings of each area where work on the emergency alarm system is proposed, including north arrow, building address and local street intersections. The drawings shall show the locations of all equipment, initiating devices, notification appliances, signage, and room designations.
9. One-line diagram showing scope of work and identifying initiating devices, notification appliances, conductors, etc.
10. Symbol list with quantities of each device or equipment.
11. Primary power supply connection details and type of secondary power supply.
12. Description of connection to building fire or sprinkler alarm system.
13. Seal and signature of a Colorado registered professional engineer.

O103.12 Area of rescue assistance communication - Required Information for "walk-through." A complete set of electronic plans shall be submitted through the online portal that includes the following (as applicable):

1. Completed permit application
2. Building code occupancy classification
3. Manufacturers' specification sheets and equipment listing sheets for new equipment and devices

4. Installation codes and standards used
5. Type of system and reason system is provided (required, non-required)
6. Sequence of operation
7. Backup battery calculations
8. Shop drawings, drawn to scale, including a drawing for each building level involved, with a north arrow for compass orientation and depicting all call boxes, master stations and power supplies. Shop drawings shall bear the seal and signature of a professional engineer licensed by the State of Colorado.
9. One-line diagram.
10. Site address
11. Mounting heights for call boxes
12. Primary power supply connection details and symbol list

O103.13 Emergency and standby (required or optional) power generator shop drawings submittal. Shop drawings shall be submitted for permit application in accordance with this Section.

O103.13.1 Emergency and standby (required or optional) power generator shop drawings shall contain the following information:

1. Exact address, including building and unit numbers; location of work; name and address of responsible design agencies.
2. Building code analysis.
3. Code reference used as a basis of design, including any administrative modifications or Board of Appeals decisions. Type of generator system and reason system is being provided. Installation codes and standards used.
4. Manufacturers' specification sheets for all equipment (i.e., generator, vent piping, fill connection and piping, overfill spill containers, overfill prevention alarms and automatic shut off valve, etc.) including fuel tank(s), where applicable.
5. Provide size of fuel tank (i.e., useable capacity) and load duration calculations for the sizing of the proposed fuel tank.
6. Scaled drawings indicating the location (inside or outside the building) and layout of the proposed generator and supply tanks where applicable. The drawings shall locate the new generator in relation to existing buildings, property lines, street/alley right of way lines and transformers for exterior generators and the room construction for interior generators.
7. Provide engineered foundation plan/details for exterior generator including vehicle impact protection. For interior generators, provide a structural engineers' report for the floor support.
8. Provide normal and emergency venting with piping diagrams and elevations.
9. Provide fill pipe connection location with piping diagrams and elevations.
10. Provide overfill prevention including spill containers, audible/visual alarms and automatic shut off of the flow of fuel to the tank.

11. Provide engine exhaust systems including the exhaust termination outside the building for inside generators.
12. Provide an identified/labeled remote manual stop station outside the room housing the generator or external to the weatherproof enclosure if located outside.
13. Provide generator remote status panel. Indicate the proposed location of the remote status panel and the safety indicator functions. A graphic map to assist the responding fire fighters shall be provided adjacent to the remote status panel indicating the location of the generator, equipment served by the generator, location of emergency disconnect and remote manual stop station.
14. Seal and signature of a Colorado registered professional engineer or architect.