

# Polk County Fire District No. 1



## Oregon Fire Code Application Guide

Polk County Fire District No. 1: 503-838-1510

Polk County Building Codes Division: 503-623-9237

City of Independence Building Department: 503-838-1212

City of Monmouth Building Department: 503-751-0139

**This guide is intended to provide assistance in the application of the fire code in all areas served by Polk County Fire District No. 1.**

## Notes to Users

### Local Development Codes

Check the City of Independence, Monmouth or Polk County development code to determine the applicability of roadway standards as it relates to conflicts with this guide and/or the adopted fire code.

### ORS 368.039 Road standards adopted by local government supersede standards in fire codes; consultation with fire agencies.

(1) When the governing body of a county or city adopts specifications and standards, including standards for width, for roads and streets under the jurisdiction of the governing body, such specifications and standards shall supersede and prevail over any specifications and standards for roads and streets that are set forth in a uniform fire code adopted by the State Fire Marshal, a municipal fire department or a county firefighting agency.

(2) This section applies to specifications and standards for roads and streets adopted by the governing body of a county or city in a charter, acknowledged comprehensive plan or ordinance adopted pursuant to ORS chapter 92, 203, 221 or 368.

(3) Before adopting or amending any comprehensive plan, land use regulation or ordinance that establishes specifications and standards for roads and streets, a governing body of a county or city shall consult with the municipal fire department or other local firefighting agency concerning the proposed specifications and standards. The county or city governing body shall consider the needs of the fire department or firefighting agency when adopting the final specifications and standards.

### Dispute Resolution Process

The Office of State Fire Marshal's (OSFM), Dispute Resolution Process allows an aggrieved party to dispute inspection findings of the local fire marshal. This process allows the aggrieved party to ask for a "second opinion" but does not supersede the local or State Fire Marshal's appeal process. The local fire marshal, through the OSFM, arranges a conference call with the aggrieved party and on-call code experts from other jurisdictions and industry. The on-call group discusses the case and the local fire marshal takes the group's second opinion into consideration when rendering a decision in writing to the aggrieved party. The goal of the OSFM is to conduct the conference call within 48 hours (two business days) for new construction and no more than seven business days for maintenance issues of the notice of dispute. Aggrieved parties who are not satisfied with the findings can appeal the decision to a local appeals board, if available, otherwise to the OSFM.

### Preamble/Authority and Scope

Polk County Fire District No. 1 has elected to administer and enforce the Oregon Fire Code under the authority granted to us by ORS 476.030 or ORS 476.060. The Oregon Fire Code is the International Fire Code, 2014 Edition, as published and copyrighted by the International Code Council, which has been amended and adopted by the Oregon State Fire Marshal's Office. In order to further the Oregon State Fire Marshal's goal of promoting fire code consistency throughout the state, Polk County Fire District No. 1 enforces the Oregon Fire Code with no local amendments.

Nevertheless, Polk County Fire District No. 1 has prepared this Applications Guide to provide good faith guidance to building officials, contractors, business owners, the public, and fire marshals on local interpretations and practices that are considered to be in compliance with the Oregon Fire Code. The intent is to clarify aspects of the code that are vague or non-specific by addressing selected issues under normal conditions. This Applications Guide does not create or replace code provisions, and is not an adopted policy. The reader is cautioned that the guidance detailed in this Applications Guide may or may not apply to their specific situation, and that Polk County Fire District No. 1 retains final authority to determine compliance.

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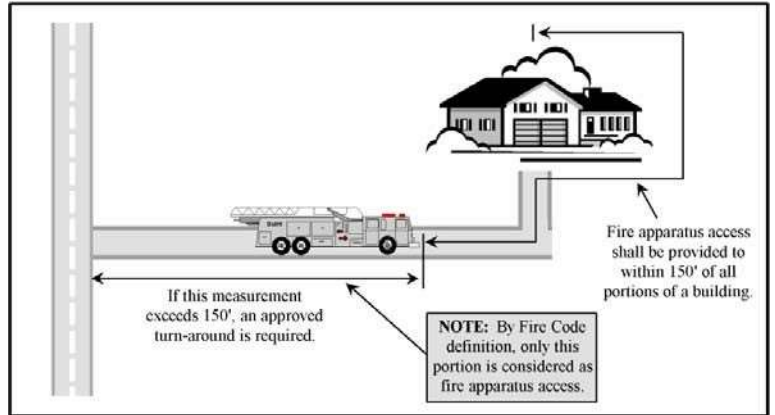
# FIRE APPARATUS ACCESS

**Fire Apparatus Access Road Exceptions:** The requirements for fire apparatus access may be modified as Approved by the fire code official where any of the following apply: (OFC 503.1.1 Exception)

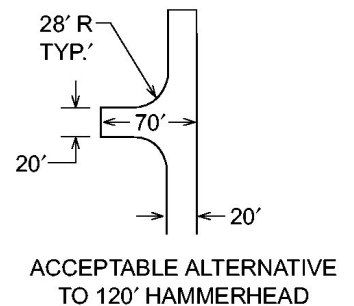
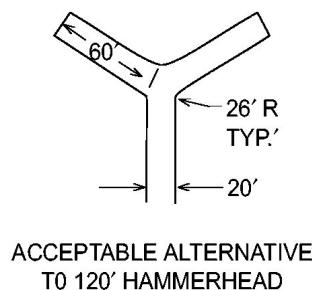
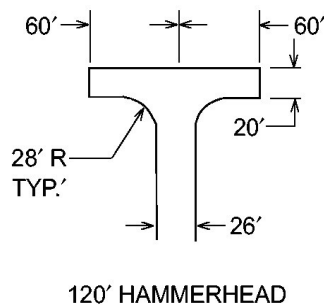
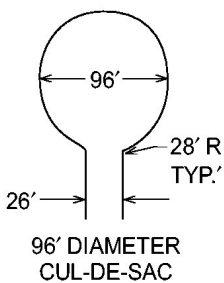
- 1) Buildings are equipped throughout with an approved automatic fire sprinkler system (the approval of this alternate method of construction shall be accomplished in accordance with the provisions of ORS 455.610(5)).
- 2) Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.
- 3) There are not more than two Group R-3 or Group U occupancies.

## **Fire Apparatus Access Road Distance from Building and Turnarounds:**

Access roads shall be within 150 feet of all portions of the exterior wall of the first story of the building as measured by an approved route around the exterior of the building. An approved turnaround is required if the remaining distance to an approved intersecting roadway, as measured along the fire apparatus access road, is greater than 150 feet. (OFC 503.1.1)

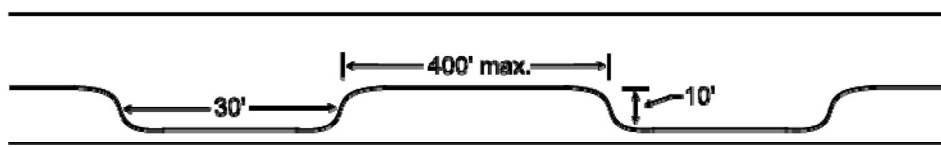


**Dead End Roads:** Dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround. Diagrams of approved turnarounds are shown below: (OFC 503.2.5)



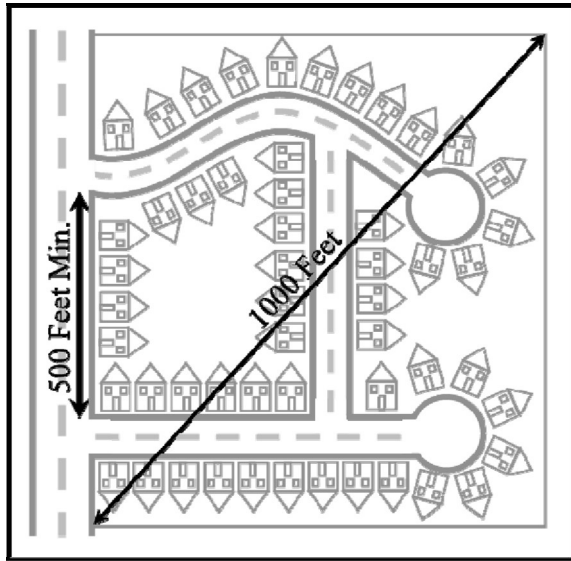
**Turning Radius:** The inside turning radius and outside turning radius shall be not less than 28 feet and 48 feet respectively, measured from the same center point. (OFC 503.2.4 & Appendix D)

**Turnouts:** When a fire apparatus access road exceeds 400 feet in length, turnouts 10 feet wide and 30 feet long shall be provided in addition to the required road width and shall be placed no more than 400 feet apart, unless otherwise approved by the fire code official. These distances may be adjusted based on visibility and sight distances. (OFC Chapter 5)



**Multiple Access Roads:** Developments of one- and two-family dwellings where the number of dwelling units exceeds 30, multiple-family residential projects having more than 100 dwelling units and where vehicle congestion, adverse terrain conditions or other factors that could limit access, as determined by the fire code official, shall be provided with not less than two approved means of access. Exceptions may be allowed for approved automatic sprinkler system. The approval of fire sprinklers as an alternate shall be accomplished in accordance with the provisions of ORS 455.610(5). (OFC D106 & D107)

**Multiple Access Roads Separation:** Where two access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses. (OFC D104.3 & D107.1)



**Grade:** Fire apparatus access roadway grades shall not exceed 10 percent. Intersections and turnarounds shall be level (maximum 5%) with the exception of crowning for water run-off. When fire sprinklers are installed, a maximum grade of 15% may be allowed. The approval of fire sprinklers as an alternate shall be accomplished in accordance with the provisions of ORS 455.610(5) and OAR 918-480-0100. (OFC D103.2)

**Fire Apparatus Access Road Width and Vertical Clearance:** Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet (26 feet adjacent to fire hydrants (OFC D103.1)) and an unobstructed vertical clearance of not less than 13 feet 6 inches. (OFC 503.2.1 & D103.1)

**Note:** When serving two or less dwelling units and accessory buildings, the driving surface may be reduced to 12 feet, although the unobstructed width shall be 20 feet. Turning radii for curves and turnarounds on reduced width roads shall be not less than 25 feet and 45 feet respectively, measured from the same center point.

**Aerial Fire Apparatus Road Width:** Buildings more than 30 feet in height shall have fire apparatus access roads constructed for use by aerial apparatus with an unobstructed driving surface width of not less than 26 feet. (OFC D105.2)

**Surface and Load Capacities:** Fire apparatus access roads shall be of an all-weather surface that is easily distinguishable from the surrounding area and is capable of supporting not less than 12,500 pounds point load (wheel load) and 60,000 pounds live load (gross vehicle weight). Documentation from a registered engineer that the final construction is in accordance with approved plans or the requirements of the Fire Code may be requested. (OFC D102.1)

**Bridges:** Private bridges shall be designed and constructed in accordance with the State of Oregon Department of Transportation and American Association of State Highway and Transportation Officials Standards *Standard Specification for Highway Bridges*. A building permit shall be obtained for the construction of the bridge if required by the building official of the jurisdiction where the bridge is to be built. The design engineer shall prepare a special inspection and structural observation program for approval by the building official. The design engineer shall give in writing final approval of the bridge to the fire district after construction is completed. Maintenance of the bridge shall be the responsibility of the party (ies) that use (s) the bridge for access to their property (ies). The fire district may at any time, for due cause, ask that a registered engineer inspect the bridge for structural stability and soundness at the expense of the property owner(s) the bridge serves. (OFC 503.2.6)

**Gates:** Gates securing fire apparatus roads shall comply with all of the following: (OFC D103.4)

- Minimum unobstructed width shall be not less than the required roadway surface width, or two 10 foot sections with a center post or island.
- Gates serving three or less single-family dwellings shall be a minimum of 12 feet in width.
- Gates shall be set back at minimum of 30 feet from the intersecting roadway.
- Gates shall be of the swinging or sliding type
- Manual operation shall be capable by one person
- Electric gates shall be equipped with a means for operation by fire department personnel □ locking devices shall be approved.

**No Parking Signs:** Where fire apparatus roadways are not of sufficient width to accommodate parked vehicles and 20 feet of unobstructed driving surface, “No Parking” signs shall be installed on one or both sides of the roadway and in turnarounds as needed. Roads 26 feet wide or less shall be posted on both sides as a fire lane. Roads more than 26 feet wide to 32 feet wide shall be posted on one side as a fire lane. Signs shall read “NO PARKING - FIRE LANE” and shall be installed with a clear space above grade level of 7 feet. Signs shall be 12 inches wide by 18 inches high and shall have red letters on a white reflective background. (OFC D103.6)



**Painted Curbs:** Where required, fire apparatus access roadway curbs shall be painted red and marked “NO PARKING FIRE LANE” at approved intervals. Lettering shall have a stroke of not less than one inch wide by six inches high. Lettering shall be white on red background. (OFC 503.3)

**Premise Identification:** Buildings shall have address numbers or approved identification placed in a position that is plainly legible and visible from the access road fronting the property. Numbers shall contrast with their background and shall be a minimum of 4 inches high with a minimum stroke width of ½ inch. (OFC 505.1). Check the local city or county development code for additional or alternative requirements.

## **FIREFIGHTING WATER SUPPLIES**

**Firefighting Water Supply Exceptions:** The requirements for firefighting water supplies may be modified as approved by the fire code official where any of the following apply: (OFC 503.1.1 Exception)

- 1) Buildings are equipped throughout with an approved automatic fire sprinkler system (the approval of this alternate method of construction shall be accomplished in accordance with the provisions of ORS 455.610(5)).
- 2) There are not more than two Group R-3 or Group U occupancies.

**Commercial Buildings - Fire Flow:** The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be determined according to OFC Appendix B. The required fire flow for a building shall not exceed the available GPM in the water delivery system at 20 psi.

**Note:** Appendix B, Section B106, Limiting Fire-Flow is also enforced, save and except for the following:

- In areas where the water system is already developed, the maximum needed fire flow shall be either 3,000 GPM or the available flow in the system at 20 psi, whichever is greater.
- In new developed areas, the maximum needed fire flow shall be 3,000 GPM at 20 psi.

**Single Family Dwellings - Required Fire Flow:** The minimum available fire flow for one and two-family dwellings served by a municipal water supply shall be 1,000 gallons per minute. If the structure(s) is (are) 3,600 square feet or larger, the required fire flow shall be determined according to OFC Appendix B. (OFC B105.1)

**Rural Buildings - Required Fire Flow:** Required fire flow for rural and suburban areas in which adequate and reliable water supply systems do not exist shall be calculated in accordance with National Fire Protection Association Standard 1142, 2001 Edition. (OFC B103.3)

- Residential and accessory structures less than 3,600 sqft, including all floors, garage and basement shall not require a water supply.

**Note:** Structures protected by an automatic fire sprinkler system are not required to have a water supply other than that required to supply the fire sprinkler system.

**Access and Fire Fighting Water Supply during Construction:** Approved fire apparatus access roadways and firefighting water supplies shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. (OFC 501.4)

**Premise Identification:** New and existing buildings shall have approved address numbers, building numbers or approve building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numerals or alphabet letters. Numbers shall be a minimum of 4 inches high with a minimum stroke width of 0.5 inch. (OFC 505.1)

## **FIRE HYDRANTS**

**Fire Hydrants – Commercial Buildings:** Where a portion of the building is more than 400 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the building, on-site fire hydrants and mains shall be provided. (OFC 508.5.1)

**Note:** This distance may be increased to 600 feet for buildings equipped throughout with an approved automatic sprinkler system.

**Fire Hydrants – One- and Two-Family Dwellings and Accessory Structures:** Where a portion of a structure is more than 600 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the structure(s), on-site fire hydrants and mains shall be provided. (OFC 508.5.1)

**Fire Hydrant Number and Distribution:** The minimum number and distribution of fire hydrants available to a building shall not be less than that listed in Table C 105.1. See page 9 for hydrant proximity to FDC. (OFC Appendix C)



**TABLE C105.1  
NUMBER AND DISTRIBUTION OF FIRE HYDRANTS**

FIRE-FLOW REQUIREMENT (GPM)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS <sup>a, b, c</sup> (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT <sup>d</sup>
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more <sup>e</sup>	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m. a.

Reduce by 100 feet for dead-end streets or roads.

- b. Where streets are provided with median dividers which can be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis up to a fire-flow requirement of 7,000 gallons per minute and 400 feet for higher fire-flow requirements.
- c. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.
- d. Reduce by 50 feet for dead-end streets or roads.
- e. One hydrant for each 1,000 gallons per minute or fraction thereof

**Considerations for Placing Fire Hydrants May Be As Follows:** (OFC C104)

- Existing hydrants in the area may be used to meet the required number of hydrants as approved. Hydrants that are up to 600 feet away from the nearest point of a subject building that is protected with fire sprinklers may contribute to the required number of hydrants. (OFC 508.5.1)
- Hydrants that are separated from the subject building by railroad tracks shall not contribute to the required number of hydrants unless approved by the fire code official.
- Hydrants that are separated from the subject building by divided highways or freeways shall not contribute to the required number of hydrants. Heavily traveled collector streets only as approved by the fire code official.
- Hydrants that are accessible only by a bridge shall be acceptable to contribute to the required number of hydrants only if approved by the fire code official.
- When evaluating the placement of hydrants at apartment or industrial complexes the first hydrant(s) to be placed shall be at the primary access and any secondary access to the site. After these hydrants have been placed other hydrants shall be sited to meet the above requirements for spacing and minimum number of hydrants.

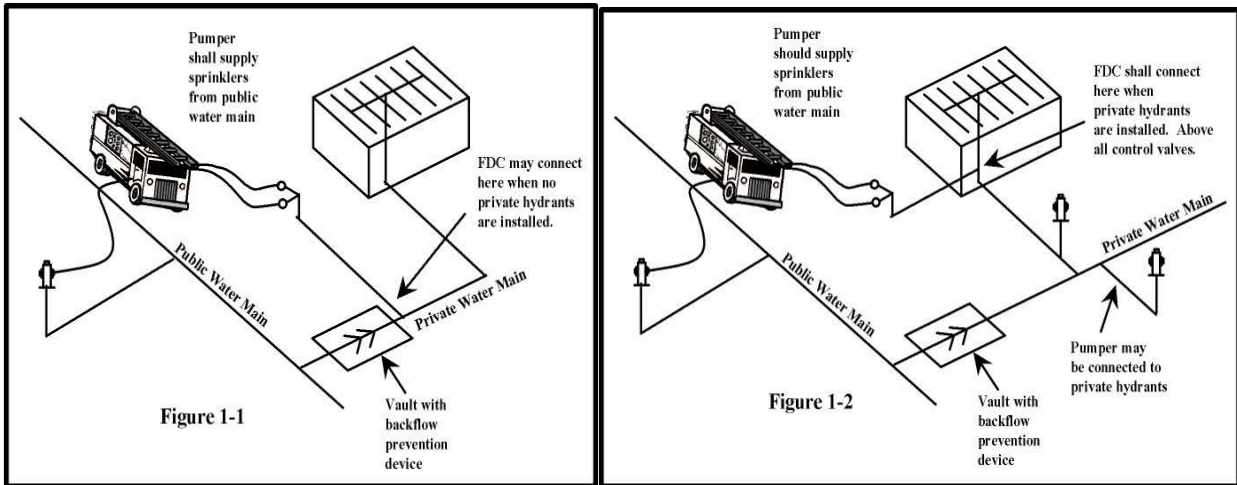
**Fire Hydrant Distance from An Access Road:** Fire hydrants shall be provided along required fire apparatus access roadway and adjacent to public streets unless approved by the Fire Chief. (OFC C102.1)

**Fire Department Water Supply Construction:** Hydrant outlet threads shall have NHS external threads for the side outlet supplied as specified in NFPA 1963, Standard for Fire Hose Connections. Installation of hydrants, fire department connections, underground fire line, water supply tanks, ponds and piping shall be compliant with Oregon Fire Code, NFPA 1142, NFPA 22, NFPA 24 and NFPA 14 with other applicable codes and standards.

**Note:** Contact serving fire jurisdiction for water supply and FDC location. Contact serving fire jurisdiction for draft ports location, size and connection type when installing draft hydrants for rural and suburban water supply.

**Fire Department Connection:** With respect to hydrants, driveways, buildings and Landscaping, fire department connections shall be so located on the street side of buildings, fully visible and recognizable from the street or nearest point of fire department vehicle access or as otherwise approved by the Fire Chief. (OFC 912.2) A fire hydrant shall be located within 100 feet of a fire department connection (FDC). Fire hydrants and FDC's shall be located on the same side of the fire apparatus access roadway. (OFC Appendix C102.1 and NFPA 14) Fire department connections shall be located not less than 1 inches nor more than 4 inches above the level of the adjoining ground, sidewalk or grade surface and installed/supported in accordance with NFPA 13 and 14.

A working space of not less than 36 inches in width, depth and 78 inches in height shall be provided and maintained in front and to the sides of wall mounted fire department connections and around the circumference of free-standing fire department connections. (OFC 912.3.2)



**STORZ Adapters – Fire Hydrants:** All fire hydrants with steamer ports shall be fitted with 5" ¼ turn STORZ hydrant adapters. A cap with cable shall be provided.

**STORZ Adapters – Fire Department Connections:** All FDCs served by 4" or larger pipe shall be fitted 5" ¼ turn STORZ adapters. A cap with cable shall be provided.

## **KEY BOXES**

**Approved Key Boxes:** for new install shall be KNOX box Rapid Entry System.

**Required Installation:** Key boxes shall be installed on buildings and structures when:

- ✓ An elevator is installed.
- ✓ Equipped with a fire alarm system.
- ✓ Equipped with an automatic fire extinguishing system.
- ✓ Access is restricted due to security arrangements.

**Exception:** Buildings and structures open and supervised twenty-four hours a day, seven days a week or constantly attended.

**Installation Details:** Key boxes shall be installed within ten feet (10') of the main entrance (address entrance), preferably located to the right side of the entrance door(s). The bottom of the key box shall be mounted at a height of seven feet (7') above the walking surface unless an alternate height is approved.

**Exceptions:** In multi-tenant buildings (each with their own outside entrance) the key box shall be located at the door that will best and most easily gain access to automatic sprinkler system controls, alarm system controls, etc.

**Required Contents:** Key boxes shall contain the following:

- ✓ Building or structure keys
- ✓ Alarm systems keys and instructions
- ✓ Elevator recall key
- ✓ Gate key
- ✓ Elevator door key
- ✓ Automatic fire extinguishing system control valve keys

And may contain the following:

- ✓ Emergency personnel contact numbers
- ✓ Hazardous materials safety data sheets
- ✓ Multiple sets of keys when required

**Required Labeling:** All keys shall be labeled as to their use, i.e., main entrance, alarm control panel, sprinkler room door, etc.

**Key Box Size:** The size of the key box shall be sufficient to contain all necessary keys and/or equipment.

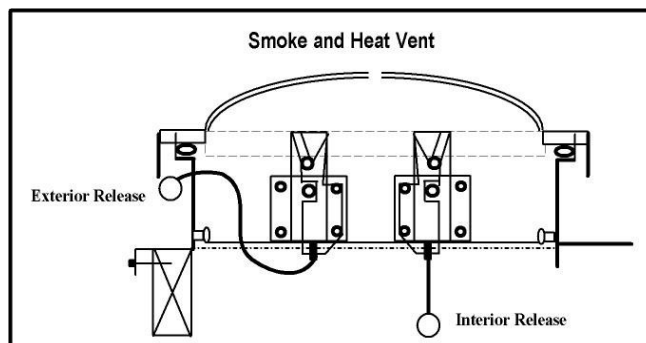
## **MANUAL FIRE ALARM BOX LOCATION**

**Group E Occupancies** - When manual fire alarm boxes are eliminated from a Group E Occupancy due to the presence of automatic fire sprinklers, a single manual pull station shall be installed in the immediate vicinity of the school office. (OFC 907.2.3(3))

**Group R-1 Occupancies** - When manual fire alarm boxes are eliminated from a Group R-1 Occupancy due to the presence of automatic fire sprinklers, a single manual fire alarm box shall be installed in the hotel or motel lobby. When a building configuration does not include a lobby, the single manual fire alarm box shall be located near the fire sprinkler riser. (OFC 907.2.8.1(2.3))

## **SMOKE AND HEAT VENTS**

**Manual Release:** Manual releases shall be provided for use during fire suppression operations. Individual exterior release mechanisms shall be provided for each vent.



## **FIRE WATCH**

**Fire Watch:** Whenever a *required* fire alarm, detection or suppression system is out-of-service and a life hazard and or distinct fire hazard is present, the fire code official and/or the property owner or manager shall initiate a fire watch. A fire watch is defined as a temporary measure intended to ensure continuous and systematic surveillance of a building or portion thereof by one or more qualified individuals for the purposes of identifying and controlling fire hazards, detecting early signs of unwanted fire, raising an alarm of fire and notifying the fire department. Each affected area or building must be patrolled hourly and documented on a written log. Individuals assigned to fire watch duty must be provided with a means of communication such as a cell phone or two-way radio and their only duties shall be to perform constant patrols. The watch shall remain in effect until repairs are made and the system(s) are back in-service. *When in doubt if a system is required or if a fire watch is needed, contact the local Fire Marshal's Office for consultation and or response.* (OFC, Section 901.7, Appendix N & Section 202)

Fire watch is not acceptable as an alternative for new construction occupancy until the building is complete.

## **Examples:**

The automatic smoke detection system in the Family Birth Center at the local Hospital is taken off-line due to unwanted false alarms and an alarm technician has been dispatched to evaluate the system. This is a required detection system and the patients occupy the floor. A fire watch is required and could be conducted by nursing and or security personnel.

The manual fire alarm system at a local Elementary School is initiating false alarms and is taken off line by school district personnel; the automatic smoke detection and fire sprinkler system are operational. It's Saturday afternoon and the building is not occupied. Although this is a required system, a fire watch is not required as the building is vacant.

The water main that serves a local apartment complex is damaged in a construction accident rendering the fire hydrants and residential fire sprinkler systems out-of-service. It's Sunday night and nearly all of the apartments are occupied. Both systems are required and a continuous fire watch is needed.

## **FIRE EXTINGUISHERS**

Size and distribution of fire extinguishers shall be compliant with Oregon Fire Code section 906 and NFPA 10 Standard for Portable Fire Extinguishers. Depending on occupancy type and hazard, size and location distance of fire extinguishers may vary.

Examples: For general light hazard occupancies a 2A 10 BC minimum rated fire extinguisher to be located in an accessible location not less than 4" nor greater than 60" in height. One for each 75 feet travel distance or each 3,000 square feet throughout the building. A 2A 20 BC minimum rated fire extinguisher accessible within 50 feet for places such as a repair garage with flammable/combustible liquids or a gas station and mounted no less than 4" nor greater than 60" in height. A Class k fire extinguisher when cooking with grease laden product shall be provided within 30 feet access and in compliance with Oregon Fire Code section 904.11.5

## **FIRE LIFE AND SAFETY SYSTEMS** (for information purposes only construction)

Provide building official approved plans and permit for fire alarm, fire alarm/sprinkler monitoring, fire sprinkler system, kitchen hood suppression system and other fire suppression system if required by the building official.

- Fire sprinkler system plans and/or underground plans shall have the valve locations, underground fire line type and size to and including the in-building risers.
- In-Building risers shall be of approved type and size and installed per manufacture specifications (double wrap protection of stainless steel with 2" annular space through foundation).
- Valves shall not be on the underground fire line to the building unless protected with a P.I.V or other approved alternative.
- Do not connect building overhead sprinkler system to the underground fire line until the underground fire line has been hydrostatically tested and flushed witnessed by the AHJ.
- OREGON FIRE CODE – 903.4.2 ALARMS – an approved audible device, located on the exterior of the building in an approved location, shall be connected to each automatic sprinkler system.
- Fire monitoring system - ensure the monitoring company is UL listed and appropriate signals such as, but not limited to, Water flow, Fire Alarm, Supervisory, Trouble report as per NFPA 72 and NFPA 13.

## **GENERAL BUILDING INFORMATION FOR FIRE MAINTENANCE**

Construction and plans approval for building and building life safety system(s) must be approved and tested by Oregon Building Official per the current code adopted at time of construction.

Ensure the additions/repairs/alterations/maintenance are within compliance of the Oregon Fire Code, NFPA Standards, including but not limited to:

NFPA 13 – Automatic Sprinkler Systems,

NFPA 13R- Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including four stories in height,

NFPA 13D Standard for the Installation of Sprinkler Systems in 1 and 2 Family Dwellings

NFPA 14 Standard for the Installation of Standpipe and Hose systems  
NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection  
NFPA 72 – National Fire Alarm and Signaling Code,  
NFPA 1142 Standard on Water supplies for suburban and rural firefighting,  
NFPA 22 standard for water tanks for private fire protection and  
NFPA 24 – Standard for the installation of private fire service mains and their appurtenances.  
NFPA 25 Water-Based Fire Protection Systems (Maintenance standard for fire sprinkler, standpipe, fire pumps and water supply)  
Any additions/remodeling or changes to the kitchen hood system to be compliant with the Oregon Fire Code, Oregon Mechanical Code, NFPA 17A Standard for Wet Chemical Extinguishing Systems and NFPA 96 Standard for Ventilation Control and Fire Protection of commercial Cooking Operations