

# Portland Fire & Rescue



## **Fire & Life Safety Requirements for Fire Department Access and Water Supplies**

*This guide is intended to provide assistance in the application of the Fire Code in all areas served by  
Portland Fire & Rescue*

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# NOTE TO USER

## **Authority and Scope**

Portland Fire & Rescue has elected to administer and enforce the Oregon Fire Code under the authority granted to us by ORS 476.030. The Oregon Fire Code is the International Fire Code, 2012 Edition, as published and copyrighted by the International Code Council, which has been amended and adopted by the Oregon State Fire Marshal's Office. Portland Fire & Rescue enforces the Oregon Fire Code with local amendments.

Portland Fire & Rescue has prepared this guide to provide good faith guidance to building officials, contractors, architects, business owners, and the general public 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. The requirements of this guide shall not be construed as altering any existing code, law or regulation which may require fire protection features not covered or alluded to in these requirements, nor shall they waive any requirements of any code, law or regulation. The reader is cautioned that the guidance detailed in this guide may or may not apply to their specific situation, and that Portland Fire & Rescue retains final authority to determine compliance.

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## **FIRE APPARATUS ACCESS**

Fire apparatus access roads shall be in accordance with all applicable requirements of the International Fire Code and this Guide. Access shall consist of roadways, public and private streets, fire lanes, parking lot lanes or a combination thereof.

### **FIRE APPARATUS ACCESS ROAD EXCEPTION FOR AUTOMATIC SPRINKLER PROTECTION:**

When buildings are completely protected with an approved automatic fire sprinkler system installed in accordance with OFC Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, the requirements for fire apparatus access may be modified as approved by the fire code official.

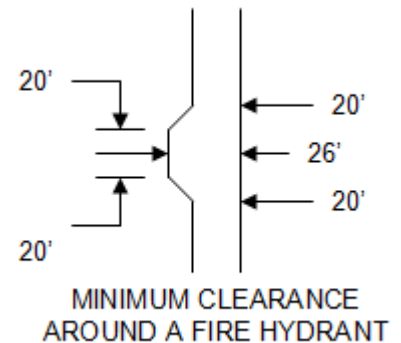
**ADDITIONAL ACCESS:** The fire code official is authorized to require more than one fire apparatus access road based on the potential for impairment of a single road by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access. (OFC 503.1.2)

**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, exclusive of shoulders, and an unobstructed vertical clearance of not less than 13 feet 6 inches. (OFC 503.1.1 & OFC 503.2.1)

***Note:*** When serving two or less dwelling units or Group U accessory buildings, the driving surface may be reduced to 12 feet, although the unobstructed width shall be 20 feet. Turning radius for curves and turnarounds on 12 feet wide roads shall comply with the inside turning radius and outside turning radius of 25 feet and 45 feet respectively. (OFC 503.2.4 & D103.3)

### **FIRE APPARATUS ACCESS ROADS WITH FIRE HYDRANTS:**

Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be 26 feet within 20 feet of the hydrant, exclusive of shoulders, to provide a staging area for apparatus on the access road. See Appendix D for exceptions. (OFC D103.1)

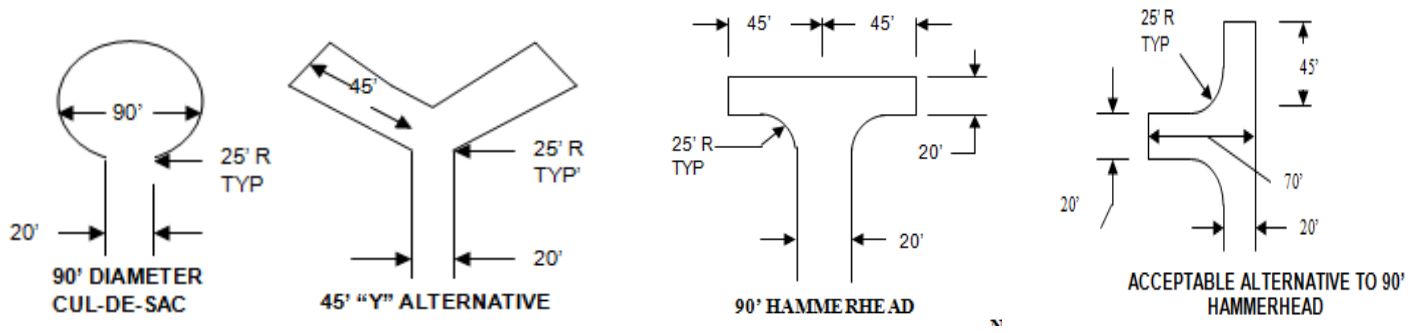


**SURFACE AND LOAD CAPACITIES:** Fire apparatus access roads shall be of an all-weather surface that is easily distinguishable from the surrounding area and is capable of supporting not less than 12,500 pounds point load (wheel load or gross wheel position weight) and 75,000 pounds live load (gross vehicle weight). Documentation from a registered engineer that the final construction is in accordance with the requirements of the Fire Code and this Guide may be requested. (OFC 503.2.3 & D102.1)

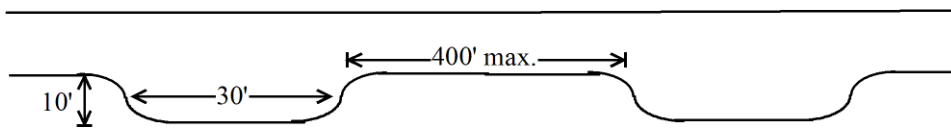
**TURNING RADIUS:** The required turning radius of a fire apparatus access road shall have an inside turning radius and outside turning radius of not less than 25 feet and 45 feet respectively, measured from the same center point. (OFC 503.2.4 & D103.3)

**FIRE APPARATUS ACCESS ROAD DISTANCE FROM BUILDINGS AND TURNAROUNDS:** Access roads shall be within 150 feet of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility. When the building is equipped throughout with an approved automatic sprinkler system, access roads shall be within 250 feet of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility. 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 300 feet. (OFC 503.1.1 & 503.2.5)

**DEAD END ROADS AND TURNAROUNDS:** Dead end fire apparatus access roads in excess of 300 feet in length shall be provided with an approved turnaround. Diagrams of approved turnarounds are shown below: (OFC 503.2.5 & D103.1)



**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 503.2.2)



**BRIDGES AND ELEVATED SURFACES:** Private bridges shall be designed and constructed in accordance with the State of Oregon Department of Transportation and the American Association of State Highway and Transportation Officials HS 25 (AASHTO). 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 Portland Fire & Rescue after construction is completed. Maintenance of the bridge shall be the responsibility of the party or parties that use the bridge for access to their property. Portland Fire & Rescue 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. Vehicle load limits shall be posted at both entrances to bridges when required by the *fire code official*. (OFC 503.2.6)

**GRADE:** The grade of a fire apparatus access road shall not exceed 15% for unsprinklered properties. When fire sprinklers are installed and topographical conditions will not allow a lesser grade, a maximum grade of 18% will be allowed. (OFC 503.2.7 & D103.2)

**ANGLES OF APPROACH AND DEPARTURE:** Intersections and turnarounds shall be as level as possible with the exception of crowning for water run-off which can include slopes up to 5% maximum. Grades on stop controlled approaches to intersections shall not exceed 5% for an approach distance of not less than 50 feet. (OFC 503.2.8 & D103.3.1)

**OBSTRUCTION OF FIRE APPARATUS ACCESS:** Fire apparatus access roads shall not be obstructed in any manner, including the parking of vehicles. The minimum widths and clearances established in OFC Section 503.2.1 shall be maintained at all times. Traffic calming devices shall be prohibited unless approved by the fire code official. (OFC 503.4 & OFC 503.4.1)

**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. 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 posted every 100 feet and 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 503.3 & OFC D103.6)



***Note:*** Standards adopted by PBOT may supercede requirements of the Fire Code and this Guide.

**PAINTED CURBS:** Where required or provided, fire apparatus access roadway curbs shall be painted red and marked “NO PARKING FIRE LANE” at a minimum of 20 foot intervals. Lettering shall have a stroke of not less than 1 inch wide by 6 inches high. Lettering shall be of contrasting colors. (OFC 503.3)

**GATES:** Gates securing fire apparatus roads shall comply with all of the following: (OFC D103.5)

- Minimum unobstructed width shall be not less than 20 feet in width.
- Where no turning movement is required within 30 feet of either side of the gate, the minimum width may be reduced to 14 feet in width.
- Gates serving one- or two- family dwellings shall be a minimum of 12 feet in width.
- Gates shall be set back at least 30 feet from the intersecting roadway.
- Gates shall be of the swinging or sliding type.
- Manual opening gates shall not be locked with a padlock or chain and padlock unless they are capable of being opened by means of forcible entry tools or when a key box containing the key to the lock is installed at the gate location.
- Electric gates shall be equipped with a means for operation by fire department personnel.
- Electric gate operators shall be listed in accordance with UL 325.
- Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.
- Bollards are an approved alternate if they can be readily removed by one person, and they shall not be locked with a padlock or chain unless they are capable of being removed by means of a forcible entry tool or approved locking device.

**PREMISES IDENTIFICATION:** New and existing buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property, including monument signs. 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 ½ inch. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure(s). (OFC 505.1)

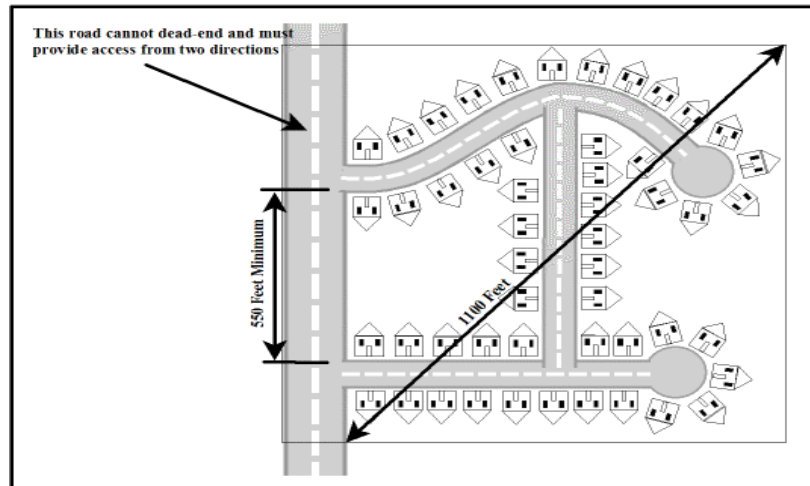
**ADDITIONAL ACCESS ROADS – COMMERCIAL & INDUSTRIAL DEVELOPMENTS:** Buildings exceeding 30 feet in height or three stories in height or buildings having a gross area of more than 62,000 square feet shall have at least two separate means of fire apparatus access. Buildings having a gross building area of up to 124,000 square feet may have a single fire apparatus access road provided all buildings served by the single access road are equipped throughout with an approved automatic sprinkler system. (OFC D104)

**ADDITIONAL ACCESS ROADS – MULTIPLE-FAMILY RESIDENTIAL DEVELOPMENTS:** Multiple- family residential projects having more than 100 dwelling units shall be equipped throughout with two separate means of fire apparatus access. Projects having up to 200 dwelling units may have a single fire apparatus access road provided all buildings, including nonresidential occupancies, are equipped throughout with an approved automatic sprinkler system. (OFC D106)

Multiple- family residential projects having more than 200 dwelling units shall be provided with two separate and approved fire apparatus access roads regardless of whether they are equipped with an approved automatic sprinkler system.

**ADDITIONAL ACCESS ROADS – ONE- OR TWO-FAMILY RESIDENTIAL:** Development of one- or two-family dwellings where the number of dwelling units exceeds 30 shall be provided with two separate and approved fire apparatus access roads. Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system, a single access will be allowed. (OFC 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, D106 & D107)



**AERIAL FIRE APPARATUS ROADS:** When the vertical distance between the grade plane and the highest roof surface exceeds 30 feet, approved aerial fire apparatus access roads shall be provided. For purposes of this section, the highest roof surface shall be determined by measurement to the eave of a pitched roof, the intersection of the roof to the exterior wall, or the top of parapet walls, whichever is greater. (OFC D105.1)

- Aerial fire apparatus access roads shall have a minimum unobstructed width of 26 feet exclusive of shoulders or parking, in the immediate vicinity of the building or portion thereof that will accommodate aerial operations.
- The side of the building on which the aerial apparatus access road is positioned shall be approved by the fire code official.

- At least one of the required access routes meeting this condition shall be located within a minimum of 15 feet and a maximum of 30 feet from the building, and shall be positioned parallel to one entire side of the building.
- The portions of aerial fire apparatus roads used for aerial operations shall be as flat as possible and shall not exceed 6% slopes in any direction for lengths up to 60 feet.
- Overhead utility and power lines shall not be located within the aerial fire apparatus access roadway or be located within 10 feet of an aerial ladder extended from the fire apparatus access roads to the roof of the building or portion thereof.

**Note:** For one- and two-family dwellings, an aerial fire apparatus access road will not be required when the vertical distance between the point a ground ladder would be placed during emergency operations and the highest roof surface is less than 30 feet or if provided with an approved fire sprinkler system.

**ALTERNATE TO AERIAL FIRE APPARATUS ROADS:** Buildings complying with the following conditions will be exempt from the requirements of aerial fire apparatus access roads:

1. Building is equipped with an approved automatic sprinkler system,
2. There are no combustibles concealed attic spaces,
3. All stairway exit enclosures shall have a fire-resistance rating of not less than 2 hours,
4. The roof is essentially flat (33-percent slope or less) and,
5. Approved access is provided to the roof from all stairways. In buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an alternating tread device, a ship stair or ladder that provides a clear width of not less than 30 inches between handrails through a roof hatch or trap door not less than 30 inches (762 mm) wide and 8 feet (2438 mm) long (OSSC 1009).
6. Building requiring standpipes are equipped with at least one standpipe that terminates on the roof.

## **FIREFIGHTING WATER SUPPLIES**

**COMMERCIAL BUILDINGS – REQUIRED FIRE FLOW:** The minimum available fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in OFC Appendix B, Table B105.1. A reduction in required fire-flow up to 75% is allowed, but in no case shall the resulting fire-flow be less than 1500 gpm at 20 psi residual. (OFC Appendix B)

**ONE- AND TWO- FAMILY RESIDENTIAL - REQUIRED FIRE FLOW:** The minimum available fire flow for one and two-family dwellings not exceeding 3,600 square feet shall be 1,000 gpm at 20 psi residual for duration of 1-hour. For one and two-family dwellings exceeding 3,600 square feet, the required fire flow shall be as specified in OFC Appendix B, Table B105.1. For areas designated as “*Wildland Urban Interface Zones*” the minimum available fire flow shall be 1,750 gpm at 20 psi residual. See Zone map at [www.portlandmaps.com](http://www.portlandmaps.com) to determine if a property is within the “*Wildland Urban Interface Zone*”.

**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, 2012 Edition. (OFC B107.1)

**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 FIREFIGHTING WATER SUPPLY DURING CONSTRUCTION:** Approved fire apparatus access roadways and an approved water supply for fire protection, either temporary or permanent, shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. (OFC 3312)



# FIRE HYDRANTS

**FIRE HYDRANTS – COMMERCIAL BUILDINGS:** Where a portion of a facility or 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. For buildings equipped throughout with an approved automatic sprinkler system the distance requirement may be increased to 600 feet. (OFC 507.5.1)

**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 by an approved route around the exterior of the structure(s), on-site fire hydrants and mains shall be provided. (OFC 507.5.1)

**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.

**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

**Note:** A deficiency of up to 10 percent may be allowed where existing fire hydrants provide all or a portion of the required fire hydrant service. Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table C105.1.

## **CONSIDERATIONS FOR PLACING FIRE HYDRANTS SHALL BE AS FOLLOWS:**

- 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 507.5.1)
- 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 may be considered when 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. (OFC C104)

**FIRE HYDRANT DISTANCE FROM A FIRE APPARATUS ACCESS ROAD:** Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets. (OFC C102)

**CLEAR SPACE AROUND FIRE HYDRANTS:** A 3 foot clear space shall be provided around the circumference of fire hydrants. (OFC 507.5.5)

**PHYSICAL PROTECTION:** Where fire hydrants are subject to impact by a motor vehicle, guard posts, bollards or other approved means of protection shall be provided. (OFC 507.5.6 & OFC 312)

**FIRE DEPARTMENT CONNECTIONS:** A fire hydrant shall be located within 150 feet of a fire department connection (FDC) or as approved. Fire hydrants and FDC's shall be located on the same side of the fire apparatus access roadway or drive aisle. (OFC 912 & NFPA 13)

