

Orange City Fire Department

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Underground Piping for Private Hydrants and Sprinkler Supply Line



UG Piping for Private Hydrants and Sprinkler Supply Line

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PURPOSE

The design and installation of private hydrant and/or sprinkler supply underground piping must be in accordance with the provisions of the 2022 California Fire Code (CFC), the 2022 California Building Code (CBC), and the 2019 editions of NFPA 24, and 2022 NFPA 13, NFPA 13R, and locally adopted amendments to these codes.

SCOPE

This guideline is applicable to all private underground piping for hydrants and/or sprinkler supply lines for NFPA 13 and 13 R systems. This guideline is not applicable to underground piping serving fire sprinkler systems designed in accordance with 2022 NFPA 13D.

SUBMITTAL REQUIREMENTS

1. Plan Submittal Requirements

Plans shall be provided to demonstrate compliance with all codes and other regulations governing water availability for firefighting within the City of Orange. In addition, changes to existing structures or sites shall be reviewed by the OFD (Orange Fire Department) to ensure that the modifications do not affect water availability.

- A. Plans for all private underground piping for private hydrants and/or sprinkler supply line(s) shall be submitted to Orange City Fire Department (OFD) for review and approval prior to installation.
- B. All new plan submittals and revisions will consist of 3 hard copies.
- C. Plans shall be legible, scaled to nationally recognized standards, and printed as a blue or blackline drawing.
- D. Provide overhead fire sprinkler system hydraulic calculations or a letter from the overhead fire sprinkler system designer verifying that the proposed underground fire line size and design is sufficient to supply the anticipated fire sprinkler system demand.

2. Information to be provided on the title page

- A. Applicable codes and standards used for the system design (e.g., 2022 CFC, 2022 CBC, 2019 NFPA 24, etc.).
- B. Project location, including the full legal address of the facility, and building number(s) if applicable; tract or parcel number.

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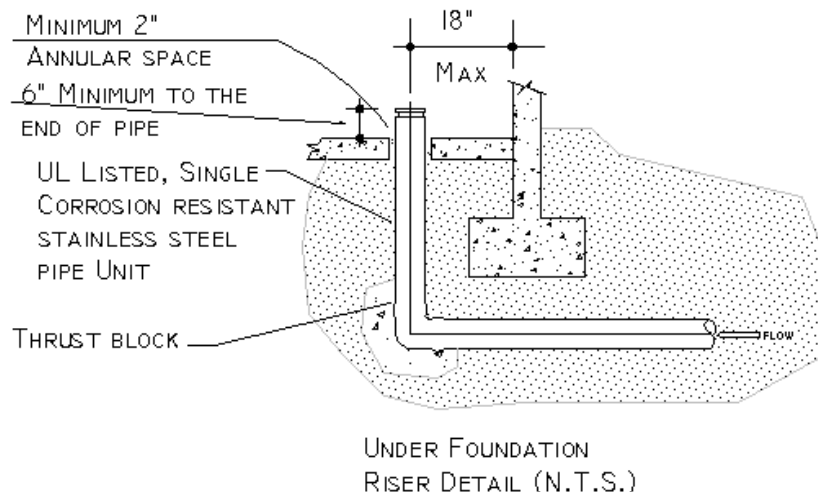
- C. The contractor's name, telephone number, address, and California State contractor's license number and classification. Contractors must possess a valid A, C16, or C34 license or be registered as a Professional Engineer (PE). Note: If the piping plan is designed by a PE, the plan shall contain the name, license number, and classification of the installing contractor, along with the PE wet stamp. If this information is not available at the time the plans are submitted, proof of compliance with this requirement must be provided to the OFD at time of inspection.

3. Additional Required Information

- A. Location of public mains and all public hydrants within 400 feet of the site.
- B. Location of all valves. Specify the type for each (e.g., post indicator valve (PIV), key gate valve, system control valve, double detector check (DDC) assembly, outside stem and yoke (OS&Y), etc.). (Note: buried gate valves without a post indicator are prohibited by OFD Exception: hydrant gate valves).
- C. PIVs, and other approved indicating valves, shall be located a minimum of 40 feet from the building served. Where it is impractical to locate control valve(s) 40 feet from the building served, they may be located closer by one of the following methods:
 - 1. Approved wall-mount indicating valves: Located on exterior walls with no openings to the building within 15 feet of the valves.
 - 2. Valve room: When the valve is placed in a room separated from the building by a one-hour fire barrier and the room is accessible from outside.
 - 3. Exterior risers: The valve may be placed in locations adjacent to exterior walls with no openings to the building within 15 feet of the valve.
 - 4. An approved manner acceptable by OFD.
- D. Pipe size, class, and type; specify lined or unlined if applicable.
- E. Indicate that ferrous pipe and fittings (excluding stainless steel 316) will be encased in loose-fitting polyethylene tubing and that ferrous joints, pipe, and fittings shall be coated with asphaltic sealant or equivalent to inhibit corrosion. (See Orange City Fire Department Notes, section 3) Exposed edges, cuts, and tears shall be tightly taped to inhibit water infiltration. Where joints are present in tubing, a minimum one-foot overlap shall be provided. Tubing shall extend three feet beyond transition between areas where ferrous pipe or fittings are used and where non-ferrous pipe begins.
- F. Thrust block locations or specify the means of restraint as approved by 2019 NFPA 24.

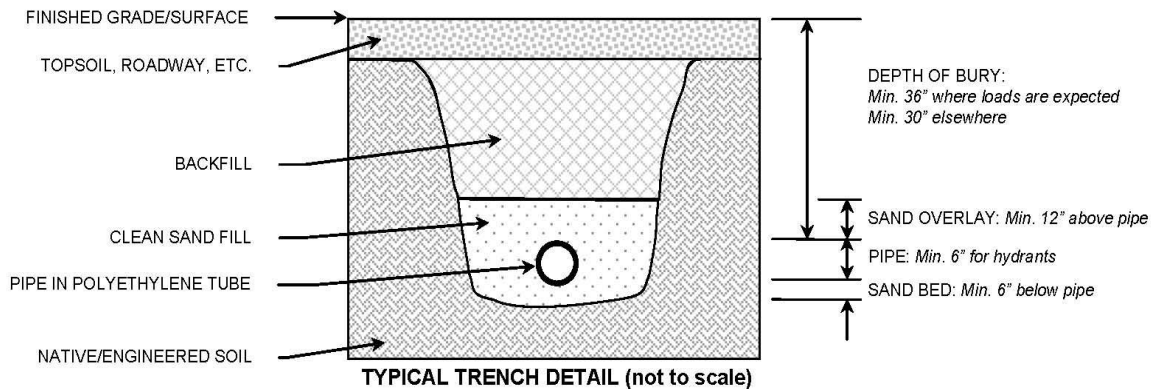
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- G. Location of the fire department connection (FDC). FDCs shall be on the address side of the building and located immediately adjacent to the approved fire department access road. The FDC shall be in a position allowing hose lines to be readily and conveniently attached. The FDC shall be located 3-5ft above adjacent grade. The FDC shall contain a minimum of two 2½” inlets. When the sprinkler demand is 500 gpm or greater (including the interior hose stream demand) or a standpipe system is included, four 2½” inlets shall be provided. The FDC shall be a listed assembly.
- H. FDCs shall be no more than 40 feet from a public hydrant located on the same side of the street or drive aisle as the hydrant.
- I. FDCs, PIVs, and backflow assemblies shall be readily visible and accessible from the fire lane. FDCs may not charge on-site hydrants. Check valves may be used to prevent charging on-site hydrants.
- J. FDCs and PIVs, shall be painted OSHA safety red. The closest upstream indicating valve to the riser shall be painted OSHA safety red.
- K. FDCs, PIVs, and DDCs, shall have durable, legible signs clearly indicating the address of the facility they serve or, where appropriate, their function (e.g., “Sectional Valve 1 of 2”). Signs shall be securely attached to the device.
- L. Large private fire service mains shall have post indicating type sectional control valves at appropriate points to permit isolation of the system in the event of a break or during repair or extension. Note: A large system is considered one with more than four connections including fire hydrants.
- M. When a pipe runs under footings or foundations of the building, a single corrosion resistant stainless steel pipe unit assembly is required. The pipe shall terminate a maximum of 18 inches from the exterior wall and six inches above the finished floor. A minimum of 2 inches clearance (annular space) shall be provided where the pipe passes through the floor or wall.



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- N. Provide a typical trench detail/section showing the depth of bury and thickness of sand bedding above and below the pipe.



- O. The attached "NOTES FOR UNDERGROUND PIPING FOR PRIVATE HYDRANTS AND SPRINKLERS" shall be placed on underground plans. The attached "NOTES FOR THRUST BLOCK RESTRAINTS" shall be placed on underground plans that use thrust blocks as the restraining method.

NOTES FOR UG PIPING FOR PRIVATE HYDRANTS & SPRINKLERS

All of the notes listed below shall be placed on the plan under the heading
"ORANGE CITY FIRE DEPARTMENT NOTES"

1. INSPECTION REQUIREMENTS

- a. A minimum of three inspections are required for underground piping serving sprinkler systems and/or private hydrants: 1) Pre-pour inspection; 2) Hydrostatic testing; 3) Flush inspection. Please schedule all inspections at least 48 hours in advance. Call OFD at (714)288-2541.
- b. **Pre-pour inspection:** Thrust block excavation shall be completed, but thrust blocks shall not be poured. All pipe shall be in place and exposed for visual inspection. Pipe shall be laid on a minimum six-inch bed of clean sand. Trenches shall be of a sufficient depth to allow the required cover above pipe. Ferrous pipe and fittings shall be encased in polyethylene tubing (not wrapped) and tightly taped to inhibit water infiltration. Ferrous joints (except for stainless steel 316) shall be coated with asphaltic sealant or other corrosion retarding material. See items **3 a-f** below for detailed requirements.
- c. **Hydrostatic testing:** Thrust blocks shall be in place. Pipe shall be center-loaded with clean sand to prevent uplift, but all joints shall remain exposed. The system shall be hydrostatically tested at 200 psi (or 50 psi over maximum static pressure, whichever is greater) for a duration of at least two hours prior to the arrival of the OFD inspector. See item **3 g** below for detailed requirements.

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- d. **Flush inspection:** All portions of the underground system shall be flushed to remove debris prior to connection to overhead piping. Flow shall be through a minimum of a four-inch hose or pipe. Hose or pipe shall be restrained to prevent injury and damage. Discharged water shall be collected or diverted in accordance with applicable SWPPP/NPDES provisions. The OFD flush and hydro inspections may be scheduled concurrently.
- e. Upon flush inspection or prior to final sprinkler or site inspection, all detector check assemblies, control valves, and fire department connections (FDC) shall be clearly labeled with the address served by the device. Address signs shall be securely attached to the device and be of a durable, fade-resistant material which is visible and legible from the fire lane. FDC and four-inch hydrant outlets shall be unobstructed and oriented toward the fire lane. Valves shall be locked in the open position with breakaway locks. All PIV valves and private hydrants shall be painted OSHA safety red. The closest upstream indicating valve to the riser shall be painted OSHA safety red. Hydrant and FDC caps shall be in place.

2. GENERAL REQUIREMENTS

- a. Installation, inspection, and testing shall conform to 2022 editions of NFPA 13 and 2019 NFPA 24. OFD jurisdiction begins after the last buried fitting of the detector check assembly. Verify design and installation requirements for the portion of the system preceding this point with the City of Orange Water Division.
- b. Vegetation shall be selected and maintained in such a manner as to allow immediate location of, and unobstructed access to; all hydrants, control valves, fire department connections, and other devices or areas used for firefighting purposes.
- c. Minimum three-foot clearance shall be provided around all hydrants and post indicating valves. In addition, minimum three-foot clearance shall be provided around the detector check assembly to allow proper operation of the device. The front of FDC and the adjacent fire access roadway shall be free of any obstructions.
- d. Any future modification to the approved private underground piping system is subject to review, inspection, and approval by the Orange City Fire Department.

3. PIPE AND TRENCH REQUIREMENTS

- a. 6-inch bed of clean fill sand shall be provided below the pipe and 12-inches above the pipe. All valves and fittings shall be encased with 6 inches of neutral sand.
- b. Pipe shall be buried at least 36 inches where subject to loading (e.g., driveways, parking lots) and at least 30 inches elsewhere.
- c. All pipe shall be approved for use in fire service systems. Class 150 will be used at a minimum, and class 200 pipe shall be used where the water pressure exceeds 150 psi. The use of galvanized pipe is prohibited when a portion of the system is buried.

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- d. Ductile iron pipe, fittings and valves shall be encased with two layers of 8-mil polyethylene tube. Wrapping the pipe in polyethylene sheeting is not acceptable. The ends of the tube and any splices made for tees or other piping components shall be tightly sealed with two-inch tape that is approved for underground use. Copper lines shall be encased in one layer 6 mil Polywrap-C.
- e. Fittings, flanges, valve flanges and valve bonnet nut and bolt surfaces shall be prime coated with Trenton Wax-Tape Primer or equal. Cover flange, all irregular surfaces and metallic pipe to 6 inches from back side of flange with Trenton #1 Wax- Tape or equivalent. After applying primer and wax-tape, cover the flange with Trenton Poly-Ply or equal.
- f. All nuts, bolts screws and washers for buried service shall be 316 stainless steel. Non-oxide grease must be applied to the threads of the plated nuts and bolts and anti-seize must be applied to the threads of the stainless steel nuts and bolts prior to installation.
- g. Thrust blocks, or another approved method of thrust restraint, shall be provided wherever pipe changes direction.
- h. A minimum two-inch clearance shall be provided where the pipe passes through slabs or walls. Underground system shall terminate at the riser flange and placed a maximum of 18 inches from an exterior wall and 6 inches above the slab.
- i. The FDC shall contain a minimum of two 2 ½” inlets. When the system design demand, including the interior hose stream demand or a standpipe, is a minimum 500 gpm, four 2 ½” inlets shall be provided. FDCs shall be painted OSHA safety red. FDC shall be 3-5 feet above finished grade.
- j. Pipe running under a building or building foundation shall be stainless steel and shall not contain mechanical joints. See Submittal Requirements for foundation riser detail item 3M.

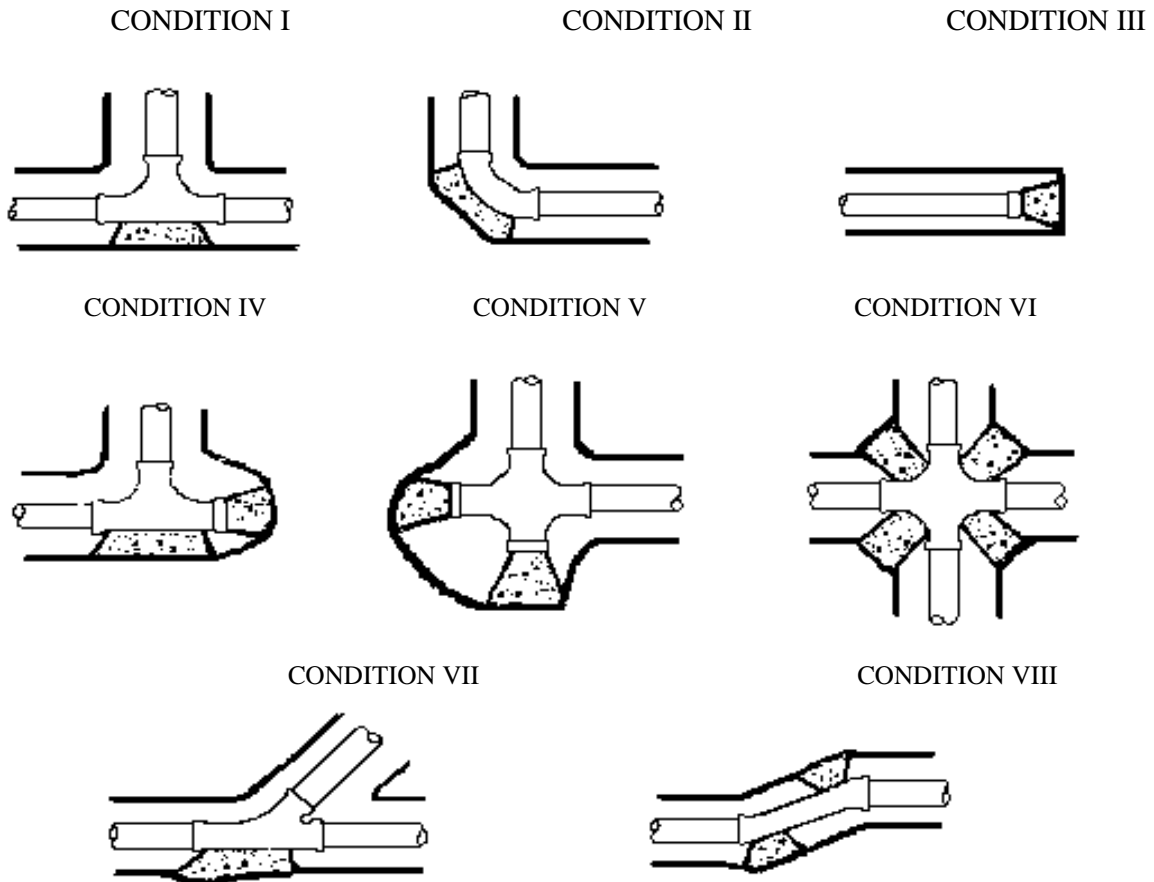
4. HYDRANT REQUIREMENTS

- a. Private fire hydrants shall be listed with a minimum of one 2 ½” and one 4” outlet. The 4” outlet shall face the fire department access road. All outlets shall be provided with National Standard Threads (NST). Private hydrants shall be painted OSHA safety yellow or safety red when pressurized by an onsite fire pump. Hydrants shall be James J-3765 or Clow 2060. Hydraulic calculations must be submitted proving minimum 1500 gpm at 20 psi from the most remote fire hydrant. Calculation method must be per NFPA 13.
- b. Fire hydrant supply piping shall be a minimum of six inches in diameter. The lowest valve operating nut shall be a minimum of eighteen inches above grade and the hydrant flange shall be a minimum of two inches above grade.
- c. A keyed gate valve shall be provided for each hydrant in an accessible location. Keyed gate valves shall be located within six to ten feet of the hydrant in an area that is unobstructed and clearly visible. Valves shall not be located in parking stalls.

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- d. All fire hydrants shall have a “Blue Reflective Pavement Marker” indicating their location. Private hydrants and markers are to be maintained in good condition by the property owner.

DETAILS FOR THRUST BLOCK RESTRAINTS



THRUST BLOCK BEARING AREA IN SQUARE FEET

Pipe Size	CONDITION							
	I	II	III	IV	V	VI	VII	VIII
<6"	2.0	2.9	2.0	2@ 2.0	2@ 2.0	4@ 1.6	2.0	2@ 1.6
6"	4.3	4.0	4.3	2@ 4.3	2@ 4.3	4@ 3.3	4.3	2@ 3.3
8"	7.4	10.6	7.4	2@ 7.4	2@ 7.4	4@ 5.7	7.4	2@ 5.7
10"	12.1	17.1	12.1	2@ 12.1	2@ 12.1	4@ 9.3	12.1	2@ 9.3
12"	17.2	24.1	17.2	2@ 17.2	2@ 17.2	4@ 13.2	17.2	2@ 13.2

NOTES

1. Thrust block areas based on 225 PSI and 2,000 PSF soil pressure with 2 ½ feet of cover minimum.
2. Thrust block bearing faces shall be placed against undisturbed soil, approved compacted backfill, or Class 100-E-100 slurry.
3. Thrust blocks shall be Class 560-C-3250 concrete, unless specified otherwise.
4. To facilitate future removal of thrust blocks and line extension use cardboard separators between blocks, if needed.