NORTHSTAR
FIRE DEPARTMENT

Underground Piping/Supply Lines for Fire Sprinklers (NFPA 13) & Hydrants – Guidelines & Specifications

Fire Prevention Guideline P-20

PURPOSE

The purpose of this guideline is to provide the basic information necessary to meet minimum requirements for the design and installation of underground piping and supply lines in accordance with the provisions of the most recently adopted editions/versions of the California Fire Code. California Building Code (CBC), NFPA 24, NFPA 13, and Northstar Community Services District (NCSD) locally adopted ordinances.

SCOPE

This guideline is applicable to all underground piping/supply lines for fire sprinklers (13) & Hydrants within Northstar. This guideline must be used in conjunction with NCSD's Ordinance 21-05 Water Ordinance.

Note: For requirements regarding Fire Department Connections (FDC), see Fire Sprinkler NFPA 13 Guidelines and Specifications. For requirements regarding underground fire sprinkler supply piping for single-family residences, see Fire Sprinkler NFPA 13D Guidelines and Specifications.

REQUIREMENTS

1. GENERAL SUBMITTAL REQUIREMENTS

1.1 Plans for all private underground piping for private hydrants and/or sprinkler supply line(s) shall be submitted to NFD for review and approval prior to installation.

1.2 All fire sprinkler plans submittals to the fire department shall be sent as electronic copies in .pdf format and include:

- 1 sets of plans
- 1 set of hydraulic calculations that comply with the calculation procedure and format of the CRC or NFPA 13D
- Water flow data from NCSD Utilities, NFD or other approved water supply source.
- 1 set of manufacturers material information sheets for the fire sprinkler heads, piping, bell and horn/strobe device, flow switch and hangars.

1.3 Plans shall be legible, scaled to nationally recognized standards, and printed as a blue or blackline drawing. NFD does not accept either pen and ink plans or pen & ink changes to blueline plans.

1.4 A current (within twelve months), completed Water Availability form shall accompany plans.

1.5 Installation, inspection, and testing shall conform to NFPA 13 and NFPA 24. NFD starts at the downstream side of the last valve on the detector check assembly. Verify design and

installation requirements for the portion of the system preceding this point with the NCSD Utilities Department.

1.6 Any future modification to the approved underground piping system is subject to review, inspection and approval by NFD.

1.7 Approval of this plan shall not be interpreted as approval of any information or project conditions other than those items on this plan and applicable sections of NFPA 13 and NFPA 24. This project may be subject to additional requirements not stated herein upon examination of actual site and project conditions or disclosure of additional information.

2. INFORMATION TO PROVIDE ON TITLE PAGE

2.1 Applicable codes and standards (current versions adopted by the state of California used for the system design (e.g., CFC, CBC, NFPA 24, etc.).

2.2 Project location, including the full legal address of the facility, and building number(s) if applicable; tract or parcel number.

2.3 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 NFD at time of inspection.

3. DESIGN REQUIREMENTS

Pipe & Trench Requirements (For more detailed information/requirements, review NCSD Ordinance 21-05, Appendix A-6)

3.1 A six-inch (6") bed of 3/8" minus clean fill sand, pea gravel or quarry fines shall be provided below the pipe and twelve-inches (12") shall be provided above the pipe and from each side.

3.2 Pipe shall be buried at a minimum of 42" and no less than 48" where subject to loading (e.g., unpaved traffic areas)

3.3 All pipe shall be listed and approved for use in underground fire service systems.

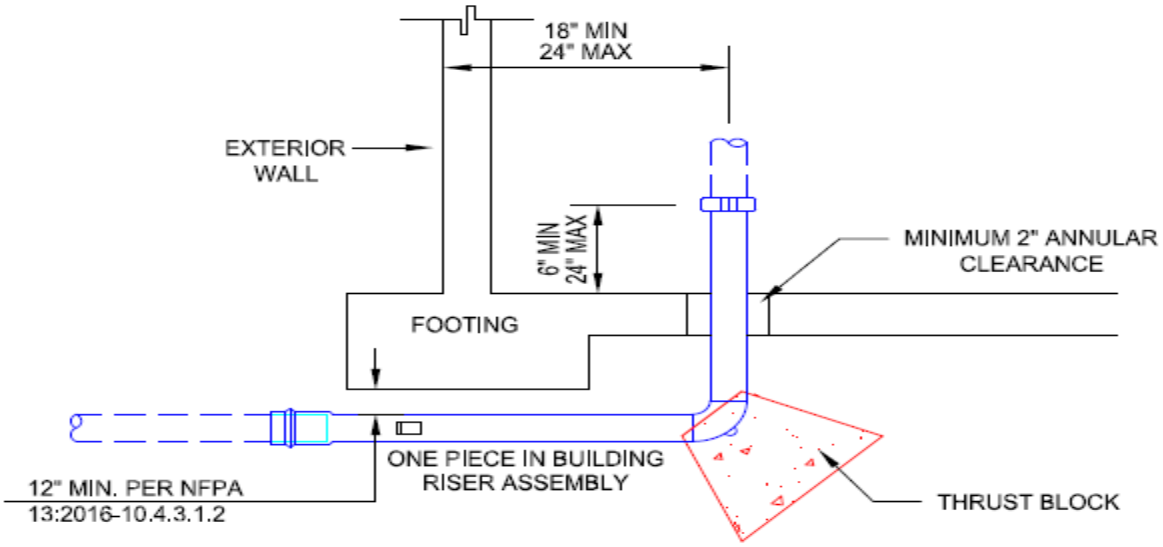
3.4 All ferrous pipe and fittings shall be protected by wrapping in polyethylene sheeting.

3.5 All bolts and ferrous fittings used for underground connections shall be cleaned and thoroughly coated with asphalt or other corrosion retarding material after assembly and prior to wrapping. Nuts and bolts shall be cadmium plated, zinc coated. Threads shall be coated with "Loctyte" anti-seize. The bolt shall extend at least 3 threads through the nut.

3.6 Thrust blocks, or another approved method of thrust restraint, shall be provided wherever pipe changes direction. Both thrust blocks and mechanical restraints (megalug style) are required at pipe fittings.

3.7 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 minimum of 18- inches and a maximum of 24-inches from an exterior wall and 6-inches above the slab.

3.8 Pipe running under a building or building foundation shall be stainless steel and shall not contain mechanical joints.



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

Hydrant Requirements

3.10 Hydraulic calculations shall be provided for all private fire hydrant systems. Calculations shall be calculated back to the point of the flow test. The fire hydrant system shall meet the fire flow requirements as required by the CFC and NCSD Ordinance(s).

3.11 Hydrants shall be Mueller “Super Centurian” model/make. Fire hydrants shall be listed with a minimum of two 2 ½ inch and one 4 ½ inch outlets. The 4 ½ inch outlet shall face the fire department access road. All outlets shall be provided with National Standard Threads (NST). Hydrants shall be painted red (Rust-Oleum Safety Red #2163 or equivalent).

3.12 2” locator wire riser. 12” riser to extend above grade.

3.13 Fire hydrant supply piping shall be a minimum of 6 inches in diameter (either ductile iron or C-900 PVC).

3.14 Top of fire hydrant to be 30” minimum to 42” max above grade.

3.15 The lowest outlet cap nut shall be a minimum height of 18-inches above finished grade.

3.16 A keyed gate valve shall be provided for each hydrant in an accessible location. Keyed gate valves shall be located within 6 to 10 feet of the hydrant in an area that is unobstructed and clearly visible. Valves shall not be located in parking stalls.

3.17 The curb adjacent to the fire hydrant shall be painted red for a total of fifteen (15) feet (7 1/2 feet on each side of the hydrant).

3.18 All fire hydrants shall have a “Blue Reflective Marker” on a post indicating their location. The post must also have a sign indicating the “number” assigned to the hydrant. Please contact NFD for information re. the sign that must be placed on the post.

NORTHSTAR FIRE DEPARTMENT NOTES
Underground Piping/Supply Line for Fire Sprinkler Systems NFPA 13

NOTES for Underground Piping/Supply Line for Fire Sprinklers (NFPA 13)
(All of the notes listed below shall be placed, verbatim, on the plan under the heading "NFD NOTES")

INSPECTION REQUIREMENTS

1. A minimum of three NFD 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 NFD to schedule an inspection at (530) 562-1212 ext.1.
2. 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 6-inch bed of clean sand. Trenches shall be of a sufficient depth to allow the required cover above the pipe. Ferrous pipe and fittings shall be encased in polyethylene tubing (not wrapped) and tightly taped to inhibit soil infiltration. Ferrous joints (with the exception of stainless steel 316) shall be coated with asphaltic sealant or other corrosion retarding material.
3. Hydro 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 2 hours prior to the arrival of the NFD inspector. At the conclusion of hydrostatic testing, pressure shall be relieved in the presence of Fire Prevention staff to verify proper movement of gauge needle.
4. Flush inspection:
    - All pipe and fittings shall remain exposed for visual inspection.
    - Flush line until water runs clear and line is free of debris in accordance with NFPA 24 (10.10.2.1).
    - Use chart below (Figure 1.0) to determine appropriate number and size of hose lines for reach desired water flow for proper flushing. Example: a 6" underground fire line requires a flow of 880 GPM for proper flushing. To achieve a proper flow, two (2) – 2 1/2" hoses would need to be attached to the manifold. Alternately a single 4" hose could be attached to the manifold to achieve the same flow.

Suggested Number of Lines to Reach Required Flow - Figure 1.0

Pipe Size	Required Flow Rate	2 1/2"	4"	6"	8"
4"	390 GPM	1	-	-	-
6"	880 GPM	2	1	-	-
8"	1,560 GPM	4	2	1	-
10"	2,440 GPM	6	3	1	-
12"	3,520 GPM	8	4	2	1

- SAFETY IS THE CONTRACTORS RESPONSIBILITY. If unsafe conditions are observed, Fire Prevention staff will require that corrective measures are taken. If corrective measures are not sufficient, Fire Prevention staff will end the inspection.

4. 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(es) 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 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.

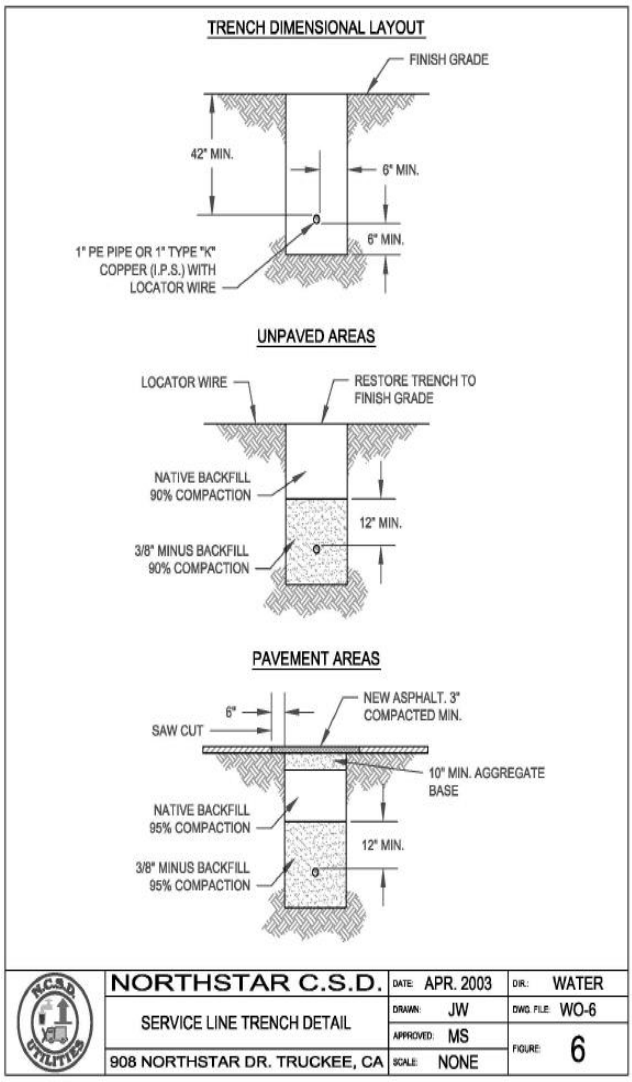
GENERAL REQUIREMENTS

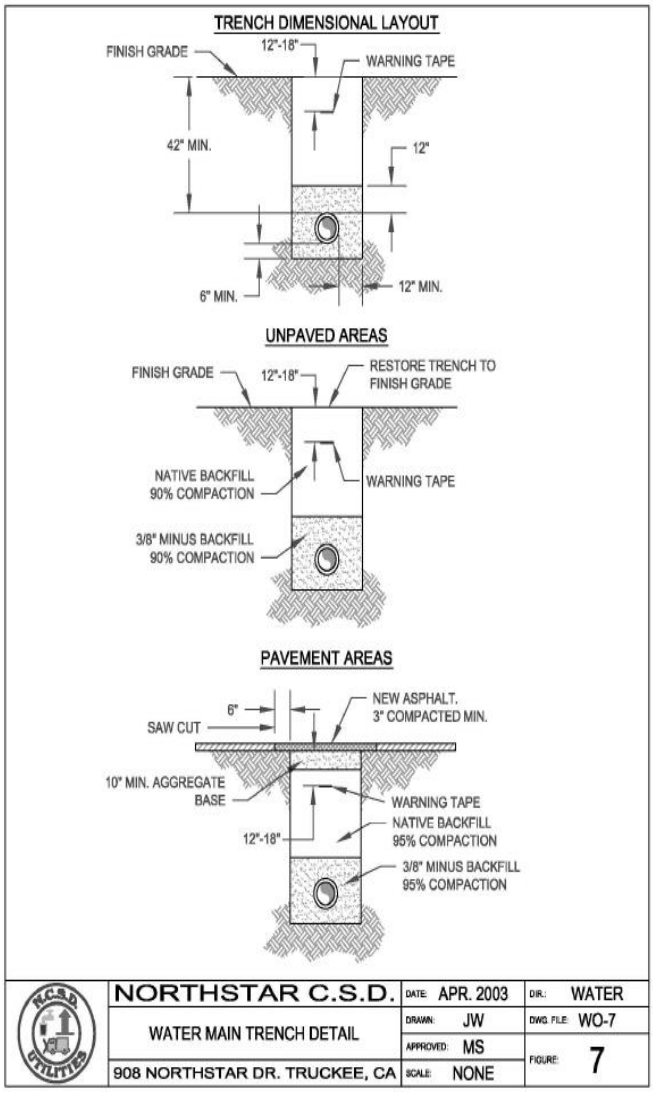
5. Installation, inspection, and testing shall conform to 2016 editions of NFPA 13 and NFPA 24. NFD begins at the downstream side of the last valve on the detector check assembly. Verify design and installation requirements for the portion of the system preceding this point with the local water district.
6. 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.
7. A minimum 3-foot clearance shall be provided around all hydrants and post indicating valves. A minimum 3-foot clearance shall be provided on at least one side of a detector check assembly to allow proper operation of the device. The front of the FDC and the adjacent fire access roadway shall be free of any obstructions.
8. Any future modification to the approved private underground piping system is subject to review, inspection, and approval by the NFD. FDC shall be visible (facing the apparatus access road), accessible and located within fifty (50) feet of a public fire hydrant. Exceptions may be made by NFD.
9. Approval of this plan shall not be interpreted as approval of any information or project conditions other than those items and requirements identified in this Guideline, and applicable sections of the CA adopted editions of NFPA 13 and NFPA 24. This project may be subject to additional requirements not stated herein upon examination of actual site and project conditions or disclosure of additional information.

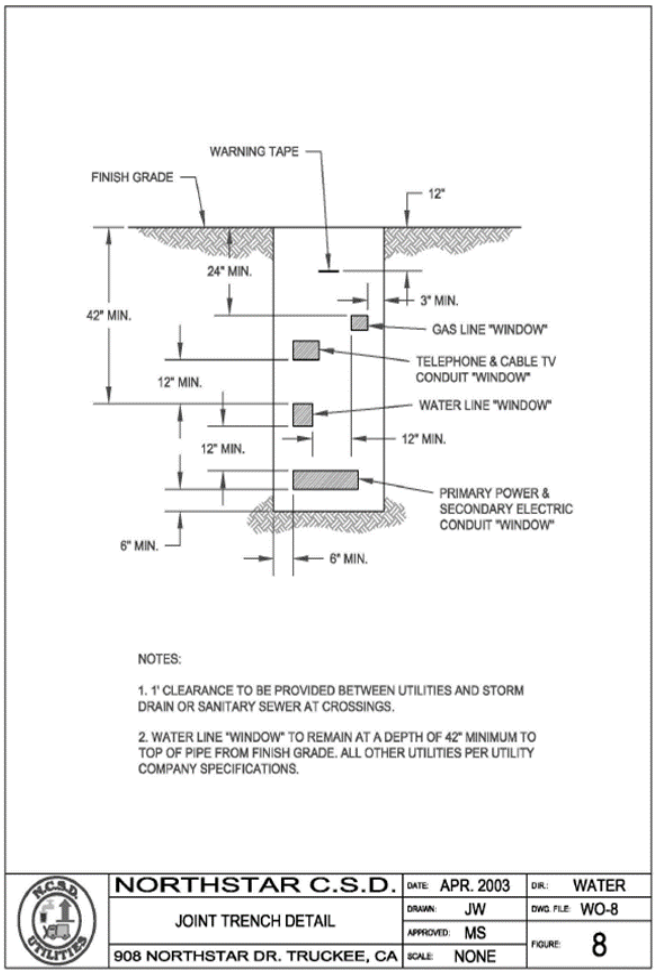
PIPE AND TRENCH REQUIREMENTS

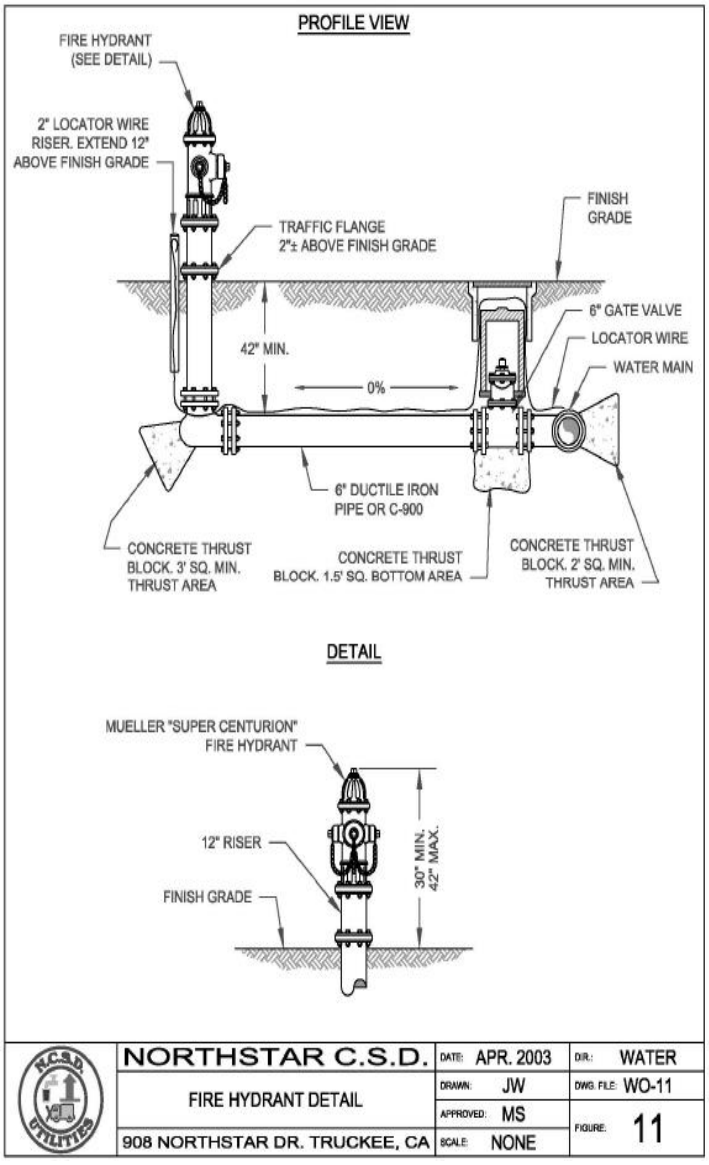
10. A six-inch (6”) bed of 3/8” minus clean fill sand, pea gravel or quarry fines shall be provided below the pipe and twelve-inches (12”) shall be provided above the pipe and from each side.
11. Pipe shall be buried at a minimum of 42” and no less than 48” where subject to loading (e.g., unpaved traffic areas).
12. All pipe shall be approved for use in fire service systems. C900 PVC pipe is preferred for mains, hydrant laterals, and service laterals grater than 2” in diameter. HDPE pipe is preferred for service laterals 2” in diameter or less. PVC pipe shall be dimension ratio (DR) 18, class 150 for internal working pressures up to 130 psi; use DR 14, class 200 for internal working pressures between 130 psi and 180 psi. For internal working pressures greater than 180 psi, pipe DR/class shall be determined by the Engineer. HDPE pipe shall conform to AWWA C-901, Standard designation PE 3408, SDR 9, class 200 and shall be Iron Pipe Size.
13. All ferrous pipe and fittings shall be protected by wrapping in polyethylene sheeting.
14. All bolts and ferrous fittings used for underground connections shall be cleaned and thoroughly coated with asphalt or other corrosion retarding material after assembly and prior to wrapping. Nuts and bolts shall be cadmium plated, zinc coated. Threads shall be coated with “Loctyte” anti-seize. The bolt shall extend at least 3 threads through the nut. Thrust blocks, or another approved method of thrust restraint, shall be provided wherever pipe changes direction. Both thrust blocks and mechanical restraints (megalug style) are required at pipe fittings.
15. 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 minimum of 18- inches and a maximum of 24-inches from an exterior wall and 6-inches above the slab.
16. Pipe running under a building or building foundation shall be stainless steel and shall not contain mechanical joints.

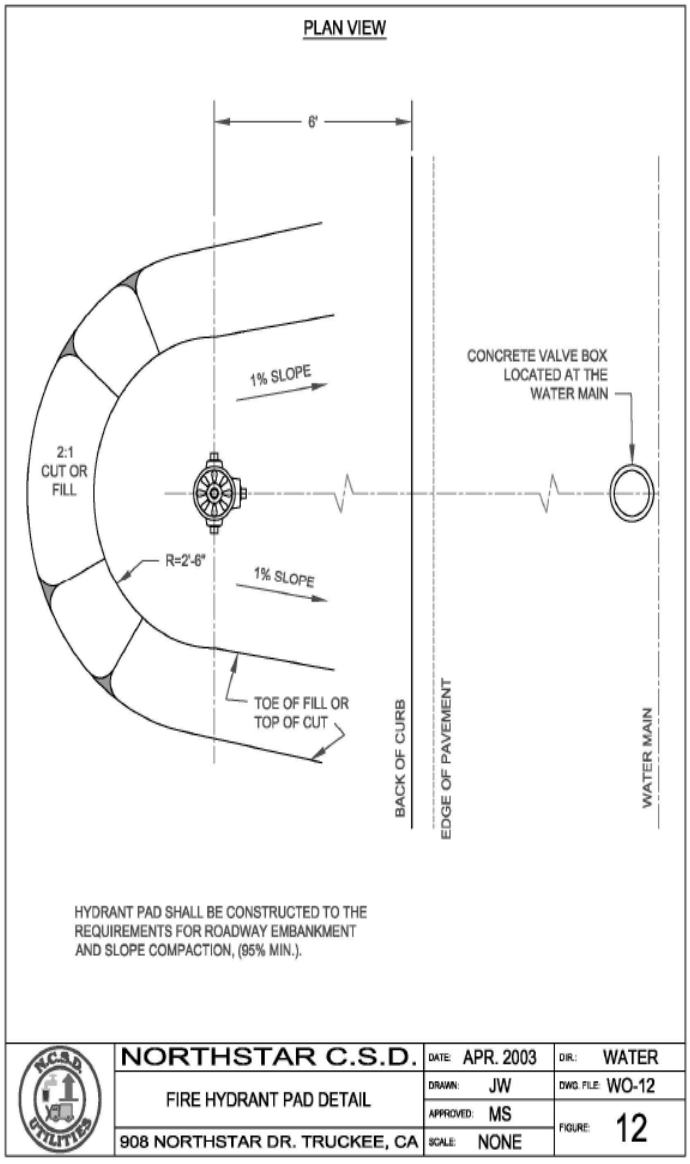
DETAILS for Underground Piping/Supply Line for Fire Sprinklers (NFPA 13) (All of the details listed below shall be placed, verbatim, on the plan under the heading "NFD NOTES")






WARNING TAPE
FINISH GRADE
12"
24" MIN.
3" MIN.
42" MIN.
GAS LINE "WINDOW"
TELEPHONE & CABLE TV CONDUIT "WINDOW"
12" MIN.
WATER LINE "WINDOW"
12" MIN.
12" MIN.
PRIMARY POWER & SECONDARY ELECTRIC CONDUIT "WINDOW"
6" MIN.
6" MIN.
NOTES:
1. 1' CLEARANCE TO BE PROVIDED BETWEEN UTILITIES AND STORM DRAIN OR SANITARY SEWER AT CROSSINGS.
2. WATER LINE "WINDOW" TO REMAIN AT A DEPTH OF 42" MINIMUM TO TOP OF PIPE FROM FINISH GRADE. ALL OTHER UTILITIES PER UTILITY COMPANY SPECIFICATIONS.
NORTHSTAR C.S.D.
JOINT TRENCH DETAIL
908 NORTHSTAR DR. TRUCKEE, CA
DATE: APR. 2003
DRAWN: JW
APPROVED: MS
SCALE: NONE
DIR.: WATER
DWG. FILE: WO-8
FIGURE: 8


PROFILE VIEW
FIRE HYDRANT (SEE DETAIL)
2" LOCATOR WIRE RISER. EXTEND 12" ABOVE FINISH GRADE
TRAFFIC FLANGE 2"± ABOVE FINISH GRADE
FINISH GRADE
6" GATE VALVE
LOCATOR WIRE
WATER MAIN
42" MIN.
0%
6" DUCTILE IRON PIPE OR C-900
CONCRETE THRUST BLOCK. 3' SQ. MIN. THRUST AREA
CONCRETE THRUST BLOCK. 1.5' SQ. BOTTOM AREA
CONCRETE THRUST BLOCK. 2' SQ. MIN. THRUST AREA
DETAIL
MUELLER "SUPER CENTURION" FIRE HYDRANT
12" RISER
FINISH GRADE
30" MIN. 42" MAX.
NORTHSTAR C.S.D.
FIRE HYDRANT DETAIL
908 NORTHSTAR DR. TRUCKEE, CA
DATE: APR. 2003
DRAWN: JW
APPROVED: MS
SCALE: NONE
DIR.: WATER
DWG. FILE: WO-11
FIGURE: 11


PLAN VIEW
6'
1% SLOPE
CONCRETE VALVE BOX LOCATED AT THE WATER MAIN
2:1 CUT OR FILL
R=2'-6"
1% SLOPE
TOE OF FILL OR TOP OF CUT
BACK OF CURB
EDGE OF PAVEMENT
WATER MAIN
HYDRANT PAD SHALL BE CONSTRUCTED TO THE REQUIREMENTS FOR ROADWAY EMBANKMENT AND SLOPE COMPACTION, (95% MIN.).
NORTHSTAR C.S.D.
FIRE HYDRANT PAD DETAIL
908 NORTHSTAR DR. TRUCKEE, CA
DATE: APR. 2003
DRAWN: JW
APPROVED: MS
SCALE: NONE
DIR.: WATER
DWG. FILE: WO-12
FIGURE: 12