# DETAIL SPECIFICATIONS FOR WATER SYSTEM

The Public Works Department reserves the right to review, change or modify these specifications at any time. It shall be the responsibility of any person doing work under these specifications to obtain the most current issue and addendums.

# 30.0 GENERAL

# Materials:

- 1. Any material or item installed in the water system will be of American origin. Materials and other products manufactured (from ore to finish) outside of the legal boundaries of the United States are not acceptable and will not be installed in the City's water system. A certificate of origin and/or specification compliance may be required.
- 2. Protective Coating:
  - a. Cast Iron/Ductile Iron Fitting. Interior shall be cement lined and thermo epoxy lined to and including full flange face and/or push on joints.
  - b. Exterior ferrous surfaces and manufacture supplied bolts shall be bituminous coated and PE wrapped.
- 3. <u>Copper</u>. All below grade copper pipe and fittings will be Polyethylene tube encased, completely sealed at joints and ends.
- 4. <u>Silver solder</u>. All below grade copper fittings and joints will be silver soldered. Silver Solder Grade 85-15 (15% Silver).
- 5. <u>Flange Bolts</u>. All below grade flange bolts and nuts will be stainless steel Grade 304.
- 6. Irrigation Service. All irrigation services will be copper per Plate 304.
- 7. Backflow Devices. All backflow piping 3/4" to 2" will be Type K Hard. All fittings shall be Silver Soldered. Control gate valve shall be Resilient Seat type, 3/4" to 2". Control valve shall be ball type. All devices shall be tested and approved by USC Foundation.

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- 8. <u>Valves</u>. All main line valves 6" to 12" shall be approved Resilient Seat Gate Style. Valves larger than 12" shall be Butterfly.
- 9. <u>Fire Hydrants</u>. All fire hydrants shall be of bronze construction and fluted body style with removable stem inserts.
- 10. Copper Wire. In continuous runs of PVC pipeline and polyethylene services, a 12 gauge insulated copper wire shall be laid above the pipeline. The wire shall be attached to all gate valves and extended up into valve box, refer to Plate 303. Copper wire shall be continuous. Breaks or joints shall be soldered and insulated.
- 11. <u>Steel Pipe</u>. Steel pipe used to cross sewer or storm drains shall have minimum thickness of .250 inches as required by Health Department.
- 12. Water Services. All services shall be the same size from corp stop to discharge point of tail piece. Example: 1" corp stop, 1" service line, 1" meter, 1" tail piece; if required, 1" backflow device.

Services shall be installed at the locations shown on the plans, at right angles to the centerline of the main in public right-of-way within 18" of side property line, and shall be spaced a minimum of 10 feet from any sewer lateral. Services will be permitted in driveway areas only with special written approval.

13. <u>Asbestos-Cement Pipe</u>. The installation of ACP in the water system is not approved by City Council.

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Bronze:

Whenever a part of the fitting is specified to be bronze, it shall be composed of what is known as Red Brass; for example, copper 85%, zinc 5%, and tin 5% with a tensil strength of 30,000 psi, yield strength of 14,000 psi and allowable elongation of 20% unless otherwise specified. In no case shall bronze parts or fittings contain more than 2% aluminum or more than 5% zinc. Certificate of compliance is required from the manufacturer.



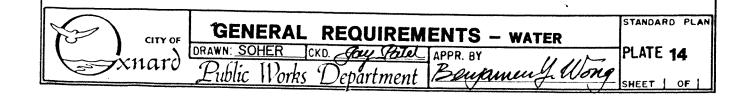
### Ductile Iron Pipe:

- <u>General</u> Ductile iron pipe, Class C-52, 6" through 24" shall be furnished with tyton joint pipe or mechanical joint with a normal laying length of 18' in accordance with AWWA Cl51-76.
- 2. Joints Mechanical joint and tyton joint accessories and dimensions shall conform to the applicable requirements of AWWA Cl10.77 unless otherwise specified. Mechanical joint glands shall be gray cast iron. Retaining gland/flange adapters with a set screw as a retaining device are not approved for use.
- 3. Coating and Lining Ductile iron pipe shall be lined with cement mortar in conformance with AWWA C-104-74, minimum thickness as follows: 6" to 12" = 1/16" 14" to 24" = 3/32"

The exterior coating for use under normal conditions shall be bituminous coating approximately one (1) mil thick. The finish coat shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe in accordance with AWWA C-106-75 and polyethylene encased AWWA C-105-72.

- 4. <u>Marking Pipe</u> The weight, class or nominal thickness and sampling method shall be shown on each pipe. The manufacturer's mark, production year and the "DI" or DUCTILE shall be cast or stamped on the pipe. All required markings shall be clear and legible and all cast marks shall be on or near the bell, in accordance with AWWA C-106-75.
- 5. <u>Fittings</u> Fittings for ductile iron pipe shall conform to AWWA C-110-77. All fittings shall be cement mortar lined and thermo epoxy coated, refer 33.1-1.

Fittings for ductile iron pipe shall conform to AWWA specifications for Class "D" fittings.



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# PVC PIPE

Pipe: PVC pipe shall conform to the quality and strength requirements of AWWA C-900 which cover PVC (Polyvinyl Chloride) pipe in sizes 4 - 12 inches. Each standard or random length of pipe shall be clearly marked with the following:

- a. Nominal size and OD base, i.e., 6" cast iron size.
- b. Material Code PVC1120.
- c. Dimentional rates, i.e., DR 25 where DR is equal to Diameter divided by Thickness.
- d. AWWA Pressure Class CL. 150/DR-18. CL200-DR-14.
- e. AWWA Designation "AWWA C-900."
- f. Manufacturer's Trade Name and Production Code.
- g. Seal (mark) of testing agency.
- 2. The standard laying length shall be 20' + 1" in all classes and sizes. A maximum of 15% may be furnished in random lengths of not less than 10 feet each.
- AWWA C-900 pipe has the same outside diameter (OD) as that of cast iron pipe (C.I.P.) in the sizes furnished.
- 4. One gasket shall be furnished with each length of elastomeric-gasket bell-end and two gaskets shall be furnished with each coupling where couplings are authorized. Prior approval is required for the use of coupling.
- 5. Pipe surfaces shall be free from nicks, scratches and other blemishes. The joining surfaces of pipe spigots and of integral bell and sleeve reinforced bell sockets shall be free from gouges or other imperfections that might cause leakage.
- 6. Trade names which are approved are Certainteed "Vinyl Iron Pipe," J.M. Mfg. "Blue Brute Pipe," and Pacific Western.
- 7. Joint Mechanisms: The joints shall be either of the following:

а. Integral Wall Thickness Bell End. (Bell and spigot with Elastomeric gasket.)

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b. Integral sleeve reinforced bell end with elastomeric gasket.

PVC solvent joints, although allowed in the AWWA C-900 Standard, are not approved.

8. PHYSICAL TEST REQUIREMENTS:

Hydrostatic, Burst and Sustained Pressure and Crushing:

Test shall be conducted by a testing laboratory with such testing available for inspection by Water Division. If required, the manufacturer shall supply a Letter of Certification attesting to their pipe meeting these specifications.

 The Hydrostatic Proof Test for every piece of pipe shall be as follows:

		(	CLAS	5 <u>S</u>		SUSTAINED PSI
D R	=	18	or	Class	150	600
D R	=	24	or	Class	250	800

# 30.4 STEEL PIPE

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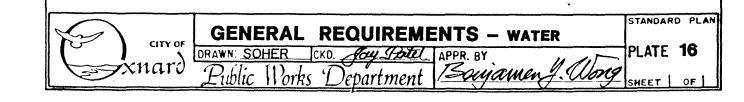
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 Steel pipe shall conform to the quality and strength requirements of AWWA C-200 or as specified below - that standard pertains to electrically buttwelded straight-seam or spiral seam pipe and to seamless pipe 6" (150mm) in diameter or larger.

The steel shall conform to one of the following:

Specification	Grade	Minimum	Yield Point (psi)
ASTM A 283	Grade Grade	+	30,000 33,000
ASTM S 570	Grade Grade Grade Grade	36 40	30,000 36,000 40,000 45,000



The stress in the steel pipe shall not exceed the higher of 15,000 psi or one-half the designated working pressure that the following minimum thickness shall be used:

Normal Inside Diameter	Minimum Thickness	Maximum Pressure For Thickness Specified
Inches (mm)	Inches	PSI
8" (200 mm) 10" (250 mm) 12" (300 mm) 14" (350 mm) 16" (400 mm) 18" (450 mm)	0.135 (10 gage) 0.135 (10 gage) 0.135 (10 gage) 0.135 (10 gage) 0.135 (10 gage) 0.135 (10 gage) 0.179 (8 gage)	394 psi 405 psi 338 psi 289 psi 253 psi 298 psi

Minimum thickness to conform to Health Department requirement is .250 inches.

Assuming 15,000 psi stress and the following below:

- P = 2ST where
  - D

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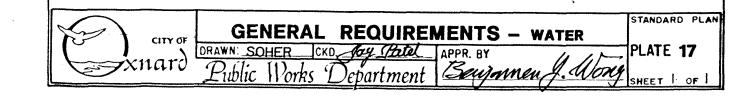
- P = Pressure (maximum working)
- S = Allowable stress (15,000 psi or one-half yield)
- T = Pipe wall thickness (inches)
- D = Outside diameter (inches)

The gage specified above considers the thickness required for external loads and a corrosion allowance.

The pipe shall be essentially round. The outside circumference shall not vary more than +/- 1.0 percent from the nominal outside circumference based upon the diameter specified (except for the ends which are discussed below).

The pipe shall not deviate by more than 1/8" from a 10' long straight edge held against the pipe.

The pipe lengths, generally 40' long, shall be furnished with a tolerance of +/-2 inches. Random lengths shall be furnished in lengths averaging 29' or more, with a minimum length of 20 feet.



2. <u>PIPE ENDS</u> - various end treatments can be supplied as discussed in AWWA C-400 and briefly listed below:

Ends for mechanical coupled field joints - these are either plain, grooved, or banded.

Ends for lap joints for field welding - these shall have a bell end pressed or rolled without hammering. The surfaces shall be ground smooth. Joints shall permit a lap, when the joint is assembled, of at least 1-1/2 inches.

Plain end pipe - these shall have a plain end right angle cut.

Beveled ends for field butt welding - these, where specified, shall have a bevel which is 30 degrees (+5 degrees -0 degrees) when measured from the pipe axis.

Ends fitted with butt straps for field welding - the butt straps may be made in halves or as complete cylinders.

Bell-and-spigot ends with rubber gaskets - these shall have bell ends which are made without hammering. Spigot ends shall be formed or fabricated to the required shape to retain the gasket. The gasket shall be designed and fitted as the sole element dependent upon to make the joint watertight. The gasket shall meet the requirements of AWWA C-400.

Plain ends fitted with flanges.

The allowable tolerance at pipe ends is discussed in AWWA C-400 and summarized below:

For bell and spigot - clearance between 0.D. of spigot and I.D. of bell shall be between 0.2 - 0.06 inches.

For lap joint - I.D. of bell shall be 1/32 - 3/16 inches greater than O.D. of spigot.

For plain ends (incl. beveled or butt straps or flanges) 0.D. within 4" of end shall be +1/16" or +1/8" from specified 0.D.

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- 3. <u>HYDROSTATIC TESTS</u> each pipe shall be tested by the manufacturer to a pressure not less than that determined by: P = 2ST
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where S = 0.75 times the minimum yield strength of the steel and the other items are as discussed earlier.

# 30.5 CEMENT MORTAR LINING

Cement mortar lining shall be uniform in thickness except at joints or other discontinuities. Ends of lining shall be left square and uniform and the lining holdback shall be as specified for the particular type or joint.

 Mortar lining and coating (ML & C) - unless otherwise approved or as revised below, all steel pipe shall be mortar lined and coated in accordance with AWWA C-205 which covers shop applied lining and coating. Cement shall be Type II, ASTM C150.

### Cement Mortar Lining Thickness

Normal Pipe	Siz.e	Lining Thickness	Tolerance
<u>Inches</u>		<u>Inches</u>	Inches
6"-10"	largor	1/4	-1/32 + 1/32
12"-16"		3/8 5/16	-1/32 + 1/32
18" and		3/8	-1/16 + 1/8

It should be noted that no wire fabric reinforcement is required for any lining of special fittings less than 24" in diameter.

# 30.6 CEMENT MORTAR COATING

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Cement mortar coating shall be reinforced over all outside surfaces of the pipe and special fittings. The coating shall be a uniform thickness except at joints or other discontinuities in the pipe. Ends of coating shall be left square and uniform and the coating holdback shall be as specified for the particular type of joint.

# Cement Mortar Coating Thickness

l. Nominal Pipe Size	Coating	Thickness Tolerance
Inches	Inches	Inches
6"-10"	$\frac{1}{2}$	-0 + 1/8
12"-16"	5/8	-0 + 1/8
18" and larger	3/4	-0 + 1/8



2. Reinforcement for the coating of pipe section shall be one of the following as specified by the supplier:

Spiral wire - 15 gage @ max. 1-1/4" spacing with wire meeting ASTM A82.

Wire fabric - 2x4 steel wire mesh, 13 gage each way meeting ASTM A185.

Ribbon mesh - 1x1 mesh of 18 gage wire or 1-1/2 x 1-1/4 mesh of 17 gage wire all meeting ASTM A82.

### 30.7 FIELD JOINTS

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- 1. ELECTRICALLY BONDED CONNECTIONS. Two metal jumper rods are required to form an electrically bonded connection between all steel pipe joints that are not welded, except at insulating couplings called for on the plans. The jumper rods shall be either 3/8" diameter rods or 1/4" x 1/2" bars. They shall be at least 7" long with an offset of 1/4" in the middle 3-inches. No welding shall take place in the middle 3" section.
- FACTORY TESTS AND INSPECTION. All materials shall 2. be inspected and tested in a normal air-dry condition by the manufacturer prior to shipment for conformance to the stated requirements. The Water Division shall at all times have the right to inspect the work and materials in the course of manufacture and to make or witness such tests as required in these specifications, or as deemed advisable. In lieu of the preceding, the manufacturer shall upon request submit a certificate stating that the materials meet the requirements of this specification. All testing shall be done in recognized testing laboratories within the State of California, approved by the Public Works Director.
- 3. WELDED JOINTS. One of each section shall be swaged out to form a female or bell end which permit the male or spigot end to enter approximately one-inch with a clearance of approximately 1/32-inch. The spigot end shall be "sized" to permit it to enter the bell end of the adjacent section and the weld bead shall be ground flush for the distance it is to enter the bell end.



BUTT STRAP CLOSURES. The butt straps shall be the 4. same thickness as the pipe wall but not less than 10 gage, at least 10" wide and rolled to fit the the outside cylinder diameter and shall be centered over the ends of the pipe sections they are to join. A standard 5" pipe half coupling shall be shop welded to the top section of the butt strap to permit access for mortar lining the inside of the The coupling shall be sealed with a standard joint. 5" plug field welded to the coupling. 30.8 Gate Valves (4" - 12"): General - Gate valves, including tapping valves 1. 4" or larger shall conform to AWWA Standard Specification C-509-80 or latest revision for resilient seat gate valves for ordinary water works service. Mueller RS or approved equal. Gate valves shall be used on all main line installation and shall be FLxMJ unless otherwise specified. 2. Resilient wedge - Cast iron wedge or disc shall have sealing surface of wedge permanently bonded or with self-locking stainless steel screws with resilient materials. Disc shall have an integrally cast ASTM B-62 bronze stem nut to prevent twisting or angling of the stem or loose stem nut on wedge or disc with non-coated disc guides. The disc coating shall be open on one side or open bottom disc so as to form no cavities or receptacles for accumulation of solids and possible stem binding. 3. Direction of operation - All valves shall open by turning the wrench to the left (counter clockwise). Stuffing Box - Stuffing boxes shall be O-ring seal 4. type. 5. Stem - Non-rising stems shall have Acme thread only. Stem thrust collars are made an integral part of stem. 6. Unobstructed waterway - Each valve shall have a smooth unobstructed waterway free from any sediment pockets. B 7. Painting and coating - Exterior shall be asphalt varnish per Federal Specification TT-V-51-E or fusion bonded Epoxy. Interior ferrous surfaces shall be coated with epoxy type coating equal to Kordell 600. STANDARD PLAN GENERAL REQUIREMENTS WATER CITY OF DRAWN: SOHER. CKD. ay Patel APPR. BY PLATE 21 narc enartment

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 <u>Valve stem extension</u> – A valve stem extension shall be provided for each valve having an operating nut more than 40" below finished grade. Extension stem either of standard manufacture or shop fabricated shall bring the operating nut within 12" of the surface.

The extension stem shall be made of solid round steel bar of a diameter equal to the valve stem diameter with a minimum of 1" diameter or extra heavy steel pipe of diameter equal to one and one-fourth (1-1/4) times the valve stem diameter with a minimum of one and one-fourth (i-1/4) inch diameter.

Solid steel plate having a diameter approximately one—half (1/2) inch less than the valve cover inside diameter which will allow smooth stem operation. Standard Plate 303.

- 30.9 <u>Butterfly valve</u> installation is permitted only when specifically called for in the plans and approved by the Water Manager.
  - 30.10 <u>Valve Boxes</u>:

Valve boxes shall be Jensen Precast HTV10-3

31.10 <u>Fire Hydrants</u>:

Fire Hydrants shall conform to AWWA C-503-75 Sec. 2.6 unless otherwise specified. Hydrant bodies will be all <u>ductile iron</u> A construction. Fluted design.

- 1. <u>Bury</u> shall have a minimum inlet size of 6" with mechanical joint. Hydrant mounting flange shall be six-hole pattern on 9.44 centers.
- <u>Hydrant bodies</u> shall have mounting flange with six-hole pattern on 9.44 centers. Required nozzles shall be individually controlled with rubber disc, compression type valve and shall be fitted with threaded protecting caps. Nozzle threads shall conform to ANSI (ASA) B 26 National Standard fire hose coupling screw threads.



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3. <u>Spools</u> - Break-Away. A spool shall be installed between bury and hydrant body. Spool to be cement mortar and Thermo Epoxy lined, refer 30.02. Six-bolt pattern to be same as hydrant body. Break-away bolts to be installed per Plate 300. 4. Coating. Interior ferrous surfaces of the bury and spool shall be cement mortar and Thermo Epoxy lined, refer 33.1. Exterior painting - all fire hydrants shall be surface prepared to receive paint by scraping and wire brushing, and shall be painted with one coat of surface primer and two coats of finish paint. Refer to section 33.1-4. 🕂 5. Fire hydrants shall have a 6" barrel unless otherwise noted. The sizing and type of City of Oxnard approved hydrants are as follows: 4" x 2-1/2" Type Residential R-1 Jones Triton J-4040 or equal Type II R-2 or greater4" x 4" x 2-1/2"Industrial and ManufacturingJones Triton J-4060 or equal 4" x 4" x 2-1/2" Written approval before installation of other types, makes, and models will depend on but not limited to availability and interchangeability of repair parts as determined by the Water Division. 6. Minimum Hydrant and Water Flow Requirements Α. General – A sufficient number of hydrants shall be installed to concentrate the required fire flow within 400' of any structure. Hydrants shall be placed at least 50' from the structure protected. Where this is not possible, they shall be placed where the possibility of injury from buildina collapse is limited. \* The flows indicated below are minimum. Additional fire flow may be required based on the types of building construction, distance to exposures, number of stories, type of hazard presented by the proposed use and the ground floor area of the building. STANDARD PLAN GENERAL REQUIREMENTS - WATER 2002 OXNARD PLATE 23 CKD.: A. WITHANAGE DRAWN: C. GIRON

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### B. Residential

- \* Fire flow 2500 GPM @ 20 PSI Hydrant spacing 500' for single-family residential with no structure more than 300' from a hydrant. 300' multiple-family residential with no structure more than 200' from a hydrant.
- C. Industrial and Commercial Areas
  - \* Fire flow 4500 GPM @ 20 PSI
    Hydrant spacing
    300' and so located that no structure is more
    than 150' from multiple hydrants. (On-site
    included.)

# D. On-site Hydrants

Location - as designated by the Fire Department. Refer: EASEMENT 2.11 A.

No portion of a structure shall be more than 150' from a hydrant.

Fire flow - multiple occupancy residential -1250 GPM @ 20 PSI minimum individual hydrant flow.

Industrial - 1500 GPM @ 20 PSI minimum individual hydrant flow.

Heavy industrial - 1750 GPM @ 20 PSI minimum individual hydrant flow.

#### Fire Sprinkler System

Fire Department to determine location of Fire Department connection.

31.1 COUPLINGS AND FITTINGS:

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- Valves shall be Mueller Resilient Gate Valve FL X MJ or approved equal.
- Couplings shall be FLEXIBLE or FULL CIRCLE. PVC coupling shall meet the requirements of AWWA C-900 and will require prior approval for use.



- 3. Cast Iron/Ductile Iron Fittings shall meet AWWA C-110-79 Joint Style Mechanical Joint - Short short body style not approved.
- 4. All external ferrous surfaces and bolts shall be Bitumimous coated and PE wrapped. All internal ferrous surfaces shall be cement mortar lined and Thermo Epoxy Coated with Kordell 600 or approved equal, refer 30.0-2.
- 5. Flange bolts shall be stainless steel.
- 6. Main line and aperture specifications are listed throughout Water System Detail Specs, as applicable.
- 32.0 SERVICE MATERIAL

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# 32.1 Copper Water Service Tubing

Materials - all 3/4" and 1" copper tubing shall be seamless copper water tubing Type K, soft temper or approved equal.

All 1-1/2" or 2" copper tubing shall be seamless copper water tubing Type K, soft temper or approved equal and shall be delivered in approximately 20 feet straight lengths. No coiled copper shall be used in sizes 1-1/2" or larger. All sweat joints are to be silver soldered, 15% silver. (85-15)

# 32.2 Polyethylene Water Service Pipe

1. <u>General</u> - All polyethylene pipe shall conform to all applicable requirements in the latest revisions of the following standards unless otherwise specified:

ASTM D-148 standard specifications for polyethylene molding and extrusion materials.

ASTM D-2239 standard specification for polyethylene (PE) plastic pipe (SDR-PR).

 <u>Material</u> - Polyethylene extrusion compound from which the polyethylene is extruded shall comply with the applicable requirements for PE-3408.

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3. <u>Rating Dimensions and Tolerance</u> - The PE pipe shall be rated for use with water 200 PSI at 73 degrees F.

The dimensions and tolerances shall comply with iron pipe size (SDR-7) - ASTM for 3/4" and 1" service lines. For 1-1/2" and 2" service lines, the dimensions and tolerances shall comply with copper tubing, size SDR-9 ASTM D2737.

- 4. <u>Minimum Burst Pressure</u> The minimum burst pressure at 73 degrees F as determined in accordance with ASTM D-1599 shall be 630 PSI.
- 5. <u>Marking</u> PE pipe or tubing shall be permanently indent branded indicating size, manufacturer's name, pressure rating, NSF logo, material designation code, applicable ASTM Specification, date code and any other appropriate code designation.
- Protection PE pipe or tubing shall be protected for outdoor storage with suitable wrapping material.
- 7. Workmanship The PE pipe or tubing shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other defects. It shall be uniform in color, capacity, density and other physical properties.
- 32.3

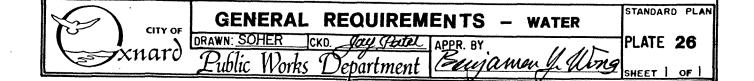
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<u>Angle Meter Stops</u> - All 3/4" and 1" angle meter stops should be Ford pack joint with insert and wing lock, part number KV-63 or approved equal.

All 1-1/2" and 2" angle meter stops shall be Ford pack joint wing lock with meter flange part number KV-43 with insert for PE services. 1-1/2" and 2" angle meter stops shall be Ford FIP X meter flange wing lock part number FV13 or approved equal for copper service. Bolts and nuts shall be red brass.

32.4 <u>Corporation Stop</u> - All corporation stops shall be Ford valve number FB1001 for PE and FB 800 for copper service or approved equal.



32.5	Branch Connection (Manifold) - All two branch connec- tions shall be Ford UV-63-42-W. Two branch or manifolds are not allowed automatically for use. Locations and use are to be performed by Water Division upon approval.
32.6	Service Saddles - As listed or approved equal. C-900 PVC shall be single unit iron pipe tap. Ford Cat. No. S71 IP TAP.
	AC Pipe. Flat double strap bronze. Ford Cat. No. 202B IP TAP.
	Cast Iron/Ductile Iron. Flat double strap ductile or malleable iron. Ford Cat. No. 202B IP TAP.
	All service connections 4" or larger connection shall consist of a tee or tapping tee with a flanged outlet and a flange RS gate valve, as specified on plans.
33.0	Miscellaneous Materials:
	<ol> <li>Curb Stops for Blowoffs, etc All curb stops for blowoffs, air valves, etc., shall be bronze, as specified in Section 1.01, flatway with tee head. Both inlet and outlet shall be female IPT.</li> </ol>
	2. <u>Bolts and Nuts</u> - Bolts and nuts for all below ground flanged connections shall be stainless steel, grade 304 - except when attaching hydrants to buries in which case they shall be Cadmium Plated breakaway type.
	3. <u>Gaskets</u> - Gaskets for all flanges shall be full face, cloth inserted rubber, with a minimum thick- ness of one-eighth-inch.
	Special Purpose Valves:
	4. <u>Air Release Valves</u> - Air release valves shall be APCO #65 or #200A, or approved equal. Valve shall be designed to exhaust air which accumulates in the line while operating under pressure. See Plate W-8 for installation.
	5. <u>Size of Valves</u> - Size of valves shall be shown on Water Plan. Tap and service pipe will be same size as valve.
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### 33.1 Protective Coating

- 1. Cast iron/ductile iron fittings.
  - a. Interior shall be cement lined per AWWA C-104-74 and thermo epoxy coated to and including full flange force and/or push-on joints.
  - b. Exterior ferrous surfaces and M.J. retaining bolts shall be bituminous coating per AWWA C-106-75 and polyethylene wrapped.
- 2. Copper tubing and below grade fitting shall be polyethylene encased per Uniform PLumbing Code.
- 3. Valves, gate and butterfly.
  - a. Interior ferrous surfaces shall be coated with thermo epoxy equal to Kordell 600.
  - b. Exterior shall be asphalt varnish per Federal Specification TT-V-51-E or fusion bonded epoxy.
- 4. Fire hydrants.
  - a. Exterior painting. One coat of primer, Dunn-Edwards 42-44 and two coats of Dunn-Edwards Hi-Visibility Yellow, Syn-Lustro #10-14.
  - Bury and spool. Refer to Section 33.1-1.
     Delete polyethylene wrap at bury flange.
- 5. Air-Vac valve cans.

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- a. Exterior galvanized surfaces shall be etched with one coat of GE 123 and one coat of Dunn-Edwards 43-7 Galv-Alum primer and two coats of Water Valve Blue, Dunn-Edwards Syn-Lustro #10-50. Formula 1 gal. 10-50; B2Y24 E-Y24.
- b. Services with backflow assemblies. Exterior surface shall be painted with one coat of Dunn-Edwards 43-4 Bloc-Rust primer and two coats of Dunn-Edwards Machinery Green #10-6 Syn-Lustro.

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#### 36.0 CONSTRUCTION DETAILS

Α. General

- A Plot Plan or Water Plan with proposed service 1. locations will be submitted to the Water Division for approval of service locations.
- 2. All services will be installed at location as shown on approved plans. Location will be in public-right-of-way within 18 inches of side property line.
- Earthwork The contractor is referred to Plate 3. 4D or 5D of Public Works Standards. Earthwork of the detailed technical specifications of these specifications.
- Water service connections shall be installed in 4. conformance with standard drawing number 304 and 305 and other applicable standard drawings.
- All copper services will be Polyethylene 5. encased.
- All pipes, valves and fittings shall have a 6. minimum working pressure rating of 160 PSI. Pipe ends, where joining special fittings, shall be sweat fittings for adaption to copper tube.
- 7. Irrigation services will be copper.
- Service size will be same from water main 8. through meter, tailpiece and backflow device (if device required).
- Copper service pipes and fittings of two-inches 9. or less in diameter shall be Type K Soft or Type K Hard. All joints will be silver solder 85-15 and polyethylene encased.
- 10. Polyethylene pipe 3/4" and 1" PE OD will be iron pipe size. 1-1/2" and 2" PE OD will be copper tube size. Fitting will be pack joint style with seamless steel insert.
- 11. Services or laterals larger than two-inches shall be C900 PVC CL 200 (DR-14). Three-inch meters will be connected to four-inch service per standard plate.

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	36.1	Pipe Depth to Bottom o	f Trench from Finished (	Grade
		Size of Pipe	Depth of All	Pipe
		6 " 8 "	49" 50"	
		10 "	51"	
		12"	52"	
	36.2	Handling and Laying Pi	<u>pe</u> :	
		removed from t is lowered int it shall be ke and after layi shall be close sewer plugs or of each day's openings are 1	foreign matter or dirt he inside of the pipe be o its position in the t pt clean by approved me ng. All openings in the d with watertight expan- PVC C-900 test plugs a operation or whenever t eft unattended. The us- ther similar temporary ed.	efore it reuch, and ans during e pipeline dable type t the end he pipe e of bur-
		the open ends approved means	pipe laying is not in p of pipe shall be closed , and no trench water s nter the pipe.	by
		the pipe, adeq on the pipe to has floated sh	is excluded from the i uate backfill shall be prevent floating. Any all be removed from the directed by engineer.	deposited pipe which
		flected vertic	ductile iron pipe shal ally or horizonally in tion by the manufacture	excess of
			s - (See Department of Section Three.)	Health
<u>REV. APPR BY DATE</u>		dedicated on t Casings shall enamel coated ness as shown the water main with the appli mendations. W pipe through t tain a uniform	ngs shall be installed he plans by jacking or be of smooth steel, coa with diameter and cylin on the plans. Installa within the casing shal cable pipe manufacturer ooden skids used to con he casing shall be size space between the pipe shall be filled with a	boring. t tar der thick- tions of l comply 's recom- vey the d to main- and
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designated by the Engineer. If deemed necessary to fill voids outside the casing well, holes shall be provided at four feet intervals, staggered longitudinally for injection of cement mortar grout. The ends of the casings shall be sealed with Portland cement concrete or approved flexible material. If a rigid connection is made between the casing and PVC pipe, a flexible joint shall be made at a point not more than two feet from each end of the casing.

Pipe installed in casing and offset shall be ductile iron. Joints shall be U.S. pipe TR Flex restrain joint or approved equal.

- 4. Relocation or offsetting of water main, fire hydrant laterals and large services.
  - a. Offset section shall be welded steel cement mortar lined, mortar coated. Refer to Section 30.4.
  - b. Offset section will include blow-off valve and air-vac breaker.
  - c. Thrust blocks are required at each elbow.

# 36.3 Installing Valves and Boxes:

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- <u>Gate Valves</u> All resilient gate valves shall be anchored in concrete in the manner shown on standard Plate 302. Care shall be taken to prevent concrete from running over the valve bells against the pipe or into the bells, and to keep the bonnet bolts accessible. Any concrete on the operating nut, stem packing glands or bonnets shall be removed.
- 2. <u>Butterfly Valves</u> All butterfly valves shall be anchored in concrete in the manner shown on standard Plate 302. Care shall be taken to prevent the concrete from running over the valve bells against the pipe or into the bells, and to keep the valve operator bolts accessible. Any concrete on operating nut, stem spading glands or bonnets shall be removed.

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3. Valves Boxes - Valve boxes shall be installed by the contractor at each valve location, with or connected to the work. The boxes shall be so placed that they will just cover the packing glands of the valves, and so that settlement of one and one-half inches will not bring the bottom of the boxes into contact with the valves. Boxes shall be set plumb and centered over operating nut of valve. See standard Plate 303.

# 36.4 Installing Fire Hydrants:

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1. <u>Standard Fire Hydrant</u> - The location of hydrants shall be approximately as shown on the plans. Where hydrants are to be placed at corners, they shall be located five feet before the beginning of the curb curve. At locations other than corners, they shall be placed as close to property lines between lots as field conditions permit, except that they shall not be within five feet of the driveway. Fire hydrant lateral shall be perpendicular to main.

The complete hydrant installation will include a main line MJ tee with a six-inch flanged outlet, and a six-inch flange by MJ valve. Α six inch MJ bury and 6x6 breakaway spool. 1 n parkways, the bury and spool shall be set so that its flanged outlet is approximately threeinches above the top of the curb. Where no parkway exists, the centerline of the bury shall be approximately 18-inches behind the face of the curb. The hydrant body shall be set on the bury so that the outlets are aligned to the curb as shown on standard Plate 300. Acceptable breakaway bolts shall be used with nuts on the underside of the flange. Upon completion of the installation, the hydrant shall be cleaned of all concrete, dirt, and debris, and all exposed iron or steel parts, including bolts, painted in accordance to Section 33.1 of these specifications.

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36.5 Thrust Devices:

All fittings, hydrants, reducers, caps and line valves subject to thrust action from line or test pressure shall be chocked against thrust by "poured in place" concrete blocks of sufficient size as determined by the engineer. Thrust blocks shall consist of concrete developing a compressive set strength of 2,000 psi in 28 days, poured against undisturbed earth, in such a manner that all joints are exposed. Socket clamps shall be protected with a coating of mortar or bituminous material.

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#### Air and Vacuum Valves:

Air release and vacuum valves shall be installed where indicated on the plans and where directed by the engineer. Installation shall consist of a corporation stop, service saddle, copper tubing, curb stop, air-vac valve with return bend, and housing. Valve assembly shall be installed above ground and in accordance with standard Plate 308.

- 36.7 Services:
  - 1. All services unless otherwise indicated on the plans or specified in the special conditions, of new water services from three-quarters inch to two inches in size shall be as shown on standard Plate 304 and 305 or applicable plates and shall include excavation and backfill furnishing, installing, testing, and disinfecting of service tubing, tube fittings, corporation stops, and curb or angle stops with an appropriate fitting for meter connection. Services 4" and larger shall include a tee, valve, thrust block, cast iron pipe, and cap or plug. All service runs shall be perpendicular to the main for their entire length.
  - 2. Services General:
    - Meter type shall be approved by Water Division.
    - b. All polyethylene services shall be perpendicular to the main, with 12 gauge locating wire installed.
    - c. Services shall not be installed on private property without public utilities easement.

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- d. Contractor shall install double meter stop, meter box and copper tailpiece to property line.
- e. Meter boxes subject to traffic shall have cast iron or steel lids.
- f. Close keyways in meter box with steel shingle.
- g. Jumper will be provded by City. To be picked up at Meter Shop by contractor. Service tapping card must be on file for each service.
- h. Construction water bibs must be connected at at the coupling on customer side of service.
- If straight copper tubing is installed, then sweat 90 degree elbow with silver solder 85-15.
- j. 1-1/2" and 2" services will have flanged angle meter stops. Ford FV-13 or FV-43, as applicable.
- k. Service pipe and tailpiece will be same size as meter.
- Service clamp and corporation stops asbestos-cement pipe and PVC pipe. Service saddle will be used for all service connections. Corp Stop Type F 101, 1P inlet threads outlet connection 1P pack joint with stainless steel insert. For 1-1/2" and 2" corporation stop. Ford Type F100 for copper service.

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m. Ductile iron pipe - 3/4" and 1" corporation stops shall be installed directly into mains of all sizes except four-inch. 1-1/2" and 2" services shall be installed with service saddles on all size mains. Corporation stops shall not be located within 12" (measured longitudinally along pipe) of each other.

Service pipes - All copper service pipes and fittings of 2" or less in diameter shall be copper Type K soft or copper Type K hard with silver solder sweat joint.

Polyethylene pipe fittings of pack joint style with stainless steel inserts. 3/4" and 1" PE to be iron pipe size, 1-1/2" and 2" PE to be copper tube size. Services or laterals larger than 2" shall be PVC AWWA C900 CL200. Three-inch meters will be connected to four inch service laterals. (All services shall be tested prior to backfilling. A minimum separation of 5' shall be maintained between water services and sewer laterals to 207A.)

# 36.8 New Services:

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- Location: All services 3/4" to 4" or larger shall be located at side property line. Services include domestic, irrigation and fire sprinkler or any other type of water service from City water system to private property.
- 2. Service types:
  - a. Single domestic. Refer to standard Plate 304/305.
  - b. Single irrigation. Refer to Plate 304.
  - c. Two (2) service manifold. Refer to standard Plate 321.
  - d. Industrial manifold. Refer to standard Plate 322.
  - e. Four (4) service manifold. Refer to standard Plate 319.
  - f. Cross-Connection (backflow) services. Refer Section 39.0.

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# 3. Irrigation service:

All irrigation services shall be copper/polyethylene encased. Per Plate 304.

4. Two (2) service manifold:

Two (2) service manifold shall be copper. The installation of manifold service requires approval. Water demand calculation shall be included on water plan as submitted by registered engineer.

#### 5. Industrial manifold:

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- a. Industrial manifold will be installed at property line between two properties.
- b. Fire sprinkler connection requires double check detector check valve assembly and Fire Department connection.
- c. Domestic and irrigation take-off shall be 2" copper 5 feet long to serve each property. If meter size and water demand cannot be served with 2" pipe, a 4" service lateral 5 feet long shall be installed.
- d. A reduced pressure principal backflow assembly shall be installed on irrigation and domestic services.
- e. Street service lateral size shall be determined by estimated total demand. Material shall be C900 CL200 PVC.
- f. Exact location of backflow assemblies shall be determined by Water Division.

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### 36.9 Existing Water Services:

- 1. Transferring Services If an existing service meets the requirements of these specifications and is deemed acceptable by the Water Manager, it need not be renewed or replaced. It may be disconnected from the existing main and reconnected to the main, all additional material and labor required being furnished by the contractor, unless otherwise specifically provided in the special condition.
- 2. Replacing Services - Galvanized black iron or PVC services not meeting the requirements of these specifications or services acceptable to the Water Manager shall be replaced by new material conforming to the requirements of these specifications. Where an existing service is on flat rate and does not include a meter, the replacement shall consist of connection to the main (with service clamp, if required), service line, meter stop, an idler of approved size and construction, meter box and connection to the customer's service at property line. Unless specifically provided in the special conditions, the contractor shall furnish all necessary labor and materials for the replacement with the approval of the Water Manager.

# 36.10 Sterilization

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After the pipe, services, hydrants and appurtenances have been completely installed, the contractor shall sterilize the installation with a solution of 20 to 50 ppm chlorine to the satisfaction of the County Health Department. He shall furnish all materials required and shall provide any necessary tape for introduction of the chlorine into the line and for flushing out after chlorination. The contractor may use chlorine tablets in place of liquid or gas chlorine. Application of liquid or gas chlorine shall be done through calibrated device which indicates rate of injection and mixing with the water.

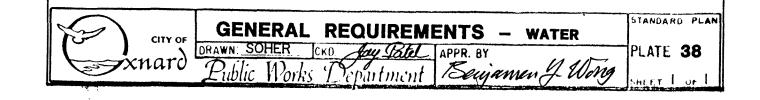
city of City of Canard Brawn: SOHER John Joy Gratel. APPR. BY DRAWN: SOHER John Joy Gratel. APPR. BY Diblic Works Department Beijamen J. Wong When tablets are used, they shall be affixed to the pipe on the day the pipe is installed in the ground. The contractor shall furnish the City Inspector with an approved chlorine testing device. The minimum number of chlorine tablets to be used per each 13' of pipe will be two for 6" or less diameter pipe, three for 8" pipe, four for 10" pipe, and four for 12" pipe. The chlorine tablets will be attached with #1 Permatex or approved equal to the crown of each section of pipe in order to distribute the chlorine solution evenly. Chlorine and testing of the new installation shall be done prior to making a final connection. This should be done according to State Health Standards.

#### 37.0 Testing and Installation:

When the pipe has been satisfactorily sterilized, flushed, and bled of air, the entire installation, including water main, services, and fire hydrants, shall be subjected to 200 psi pressure for a minimum period of 15 minutes and two hours at 150 pounds, visible leaks in joints repaired. A 1 1 asbestos-cement pipe shall be filled with water for at least 24 hours prior to testing, and pipe with cement joints shall not be tested until the final joints have cured for 36 hours. The maximum allowable leakage per one inch inside diameter for each 100' of pipe over a 2 hour test at 150 psi shall be as follows:

a.	Welded Steel Pipe	.0118	gal.
b.	Concrete Cylinder Pipe	.0118	gal.
c.	Polyvinyl Chloride	refer	to Mfg. test
d.	Ductile Iron Pipe		
	1) Caulked Joints	.0424	gal.
	2) Rubber Ring Joints	.0212	gal.

All joints which show leakage in excess of the above mentioned table shall be remade or recaulked according to the direction of the engineer. The amount of actual leakage shall be metered with an acceptable calibrated tank. New values which prove to be leaking will be replaced by the contractor. The installation shall be tested in sections. Each section being defined as the length of pipe between valves.



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38.0 Easements:

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1. Where a fire line or a water main crosses private property, a licensed surveyor or registered civil engineer shall stake such line and submit 8-1/2" x ll" copies of the alignment staking notes and grade sheets to the Water Manager for approval prior to the start of any Each sheet is to bear the seal construction. and signature or responsible person. Alignment staking notes shall show and reference all existing monuments used in the survey and all distances set off or measured and all augles set off or measured. The information shown shall be done in a legible professional manner and shall be sufficient for retracement of the survey without any further research. Grades shall be staked a minimum of every 25' with the offset and the cut indicated for each station.

An inclusive water easement will be required for such lines unless it is determined by the City that it is beneficial to both parties involved to allow the water line to be private (see Section 2.118). The easement will be a minimum of 15' wide, with the water line located 5' from one side to allow a 10' work area. The easement will be recorded in the tract or parcel map and will be indicated on the water plans prior to approval by the City. If no map is recorded, the easement shall be recorded on a Grant Deed and registered. All lines from the main up to and including the meter box will be within the easement.

Private property with exclusive easement shall be classified as special application allowed only for supplying on site fire hydrants. Fire line on private property with an exclusive water easement will not be classified as a point of service connection.

2. If the City allows a water line to be private, the line will have a backflow prevention device located so as to prevent possible contamination of the public water from the private line. The location and type of backflow device will be subject to the City's approval prior to installation. Refer standard Plate 311.

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## 39.0 Cross-Connection Backflow

The water supplier shall protect the public water supply from contamination by implementation of a Cross-Connection Control program.

The purpose of this section is to protect the public water supply against actual or potential cross-connections by isolating within the premise. Contamination or pollution may occur because of some undiscovered or unauthorized cross-connection on the premises.

Minimum requirements for cross-connection/backflow protection are contained in Title 17 of California Administration Code, USC Foundation for Cross-Connection Control and Hydraulic Research. Manual of Cross-Connection latest edition and Chapter 33 Article 4 of City Code.

# 39.1 Approval of Backflow Preventers:

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Backflow preventers shall be approved by a recognized testing organization. Refer to Title 17, Section 7601.

Backflow preventers required by this Chapter shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demoustrated their competency to perform such tests to the Department.

#### Location of Backflow Preventers:

- Air-gap Separation. An air-gap separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved in writing by the water supplier and the health agency.
- 2. Double Check Valve Assembly. A double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance.

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- 3. Reduced Pressure Principle Backflow Presention Device. A reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance.
- 4. Location, size, and type of backflow prevention shall be approved by water supplier. Protection shall be as close to the service connection as practical with a maximum of five feet from street right-of-way and within three feet of side property line. An exclusive easement from City right of way to a maximum of five feet beyond device and two and a half feet on each side of device.
- 5. All backflow preventers shall be visible from City right of way to allow visual inspection and access at all times. If at any time visual inspection or access is obstructed by fences or any other obstruction, water service will be discontinued per City Code, Chapter 33.

# 39.2 Basic Service Type Requiring Backflow Preventer:

- 1. Commercial and industrial manifold services.
- 2. Non-residential irrigation services.
- 3. Restaurant services.
- 4. Fire sprinkler system with Fire Department connection.

Service not listed above may require backflow devices and shall be determined on a case by case basis per Title 17 and Manual of Cross-Connection Control.

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# 39.3 Service piping:

Service pipe from City main to meter backflow preventer and to point shall be:

- 3/4 inch to 2 inch shall be copper tubing Type K hard.
- 4 inch and large shall be C900 PVC CL200 to first 90 degree ell per standard Plate 310.

# 39.4 Inspection and Testing:

- All installations of backflow preventers shall be inspected by Cross-Connection Control personnel.
- Water service to unapproved devices or installations will be discontinued until device or installation is approved.
- 3. Testing shall be per Title 17.

### 39.5 Non-Approved Backflow Preventers:

 Pressure vacuum breaker (PVB) and atmospheric vacuum breakers (AVB) are not approved for use at user's connections.

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# Fire Sprinkler Systems:

- All fire sprinkler systems are required to have a double check detector check valve assembly and a Fire Department connection.
- Bypass meter type and manufacture shall be approved by Water Division. Refer approved water system materials.
- Installation shall be at location shown on plans. Other details refer to standard Plate 311.

