SPECIFICATIONS FOR
PERUQUE CROSSING
PHILLIPS 66
00-11282M 6-12-06

9-21-06 CITY COMMENTS
10-24-06 CITY COMMENTS
10-25-06 LIGHTING
11-14-06 CITY COMMENTS

ALL WATER SYSTEM EXTENSIONS SHALL CONFORM TO THE WATER SYSTEM SPECIFICATIONS OF ST. CHARLES COUNTY PUBLIC WATER SUPPLY DISTRICT NO. 2. DNR REVIEW #61996-04

SECTION 1 - WATER DISTRIBUTION SYSTEM MATERIALS

1. GENERAL

Materials for use at any location in the water distribution system shall meet the requirements as set forth in the following Articles under this Section. Where references are made to standards such as AWWA, ANSI, ASTM, etc. it shall be understood that such references are to the latest edition of such standards. When requested by the District, Contractors shall furnish affidavits from their suppliers certifying that materials conform to stated standards before being incorporated into the work.

Where materials are specified by brand name and model, followed by the words "or approved equal", the information concerning an "approved equal" product must be submitted to the District and a written statement of approval by the District must be issued by the District before such material may be used. In all cases, approval of such alternate products shall be at the sole discretion of the District.

Failure to comply with these specifications shall result in rejection of the work by the District.

2. PIPE

All pipe for water mains shall be 6" (inch) in diameter or larger and shall be PVC or ductile iron. In general pipes 6", 8" and 12" in size shall be PVC and pipes larger than 12" shall be ductile iron. For certain projects, 12" pipe may be required to be ductile iron. No 10", 14" or 18" pipe will be allowed except as required to connect to existing facilities.

PVC pipe shall be class 200, with a standard dimension ratio (SDR) of 21 or as otherwise directed by the District. Pipe for use under this heading shall be manufactured from clean, virgin, N.S.F. approved Type I, Grade 1, 1120 P.V.C. conforming to A.S.T.M. specification D2241. The pipe shall be pressure rated for a hydrostatic working pressure of 200 PSI at 73.4 degrees F. and shall meet all applicable requirements as set forth under Commercial Standard (CS) 256-63. The pipe shall also conform to the following tests conducted at 73.4 degrees F.

a. Hydrostatic Integrity: The pipe shall withstand without failure, a pressure of 420 PSI for at least 1,000 hours, in accordance with A.S.T.M. Specifications 1598-63T. The pipe shall withstand without failure, a pressure of 630 PSI, applied in 60 to 90 seconds in accordance with Specification 2599-62T.

b. Vice Flattening Test: A 2 inch wide section of pipe shall be flattened in less than one minute, to 100% without showing evidence of shattering or splitting at 73.4 degrees F.

c. Pipe Wall Thickness: Rigid plastic pipe shall be manufactured to provide a minimum pipe wall, and bell or coupling thickness in accordance with the following schedules:

	Minimum Wall Thickness (Inches)	
I.D. Size (Inches)	Barrel	Bell
2	.113	.146
4	.214	.258
6	.316	.376
8	.410	.481
10	.511	.607
12	.606	.735

Concentricity: The outer diameter of the pipe shall be concentric within .003 of an inch.

All PVC pipe shall be joined by means of a rubber ring slip joint. Cement weld or glued joints will not be permitted. The slip joint shall be formed by a bell joint which shall be an integral and homogenous part of the pipe formed by extrusion, with a ring groove for seating the rubber ring gasket. "Ultra Blue" or other PVC with any thickness less than stated above will not be allowed.

Ductile Iron pipe shall conform to AWWA C-151 and be cement lined and seal coated in accordance with AWWA C-104. The joints shall be push on type with rubber gaskets conforming to AWWA C-111. In general, ductile iron pipe shall be pressure Class 250 with Class 50 wall thickness. For all pipe placed in casing pipe under roads or highways, where used for creek or ditch crossings or at any location requiring vertical fittings with concrete encasement or thrust blocking, the pipe shall be pressure Class 350 with Class 52 wall thicknesses.

3. FITTINGS

All fittings shall be ductile iron, Class 350, conforming to AWWA C-153. The fittings shall have mechanical joints conforming to AWWA C-111 and be cement lined and seal coated in accordance with AWWA C-104.

4. VALVES

Valves for 6", 8" and 12" pipe shall be gate valves. Valves for 16" pipe and larger shall be butterfly valves. All gate valves shall be ductile iron or cast iron, resilient wedge valves, with non rising stems, 2" operating nuts, mechanical joints and epoxy coated bodies and be manufactured in accordance with AWWA Standard C-509. The wall thickness for ductile iron valves shall meet or exceed AWWA Standard C-153. The valves shall be designed to withstand a working pressure of 250 PSI on either side of the valve. The valves shall be American Flow Control Model AFC-2500, U.S. Pipe Metroseal 250, Tyler Class 250, Mueller A-2360 or approved equal.

The valves shall open counterclockwise and have the maker's initials, pressure rating, and year in which manufactured cast on the body. Where valves are set at a depth that leaves the operating nut more than four (4) feet below the proposed grade, an extension stem shall be furnished to bring the operating nut to within two (2) feet of the proposed grade.

Butterfly valves shall conform to AWWA C-504 for Class 150B butterfly valves. All butterfly valves shall have a working pressure of 200 PSI. All valve components shall conform to Underwriters Laboratories classification in accordance with ANSI/NSF 21.11.

Butterfly valves shall have cast iron or ductile iron bodies, be designed for buried service, have mechanical joint ends and have side mounted 2" square operating nuts suitable for use in a standard valve box as stated herein for gate valves.

Discs shall be offset to provide an uninterrupted 360 seating edge and shall be ductile iron per ASTM A48, Class 40C. The disc seating edge shall be solid 316 stainless steel. Sprayed mating seating surfaces are not acceptable. The disc shall be securely attached to the valve shaft utilizing a field removable replaceable 316 stainless steel torque screw on sizes 6" – 12" or a tangential pin locked in place with a set screw on sizes above 12".

The valves shafts shall be type 304 stainless steel. Valve seals shall be self-compensating V-type packing with a minimum of four sealing rings. One piece molded shaft seals and O-ring shaft seals will not be allowed.

The seats shall be of Buna-N for water and shall be molded in and vulcanized to the valve bodies. The seats shall contain integral shafts seals protecting the valve bearings and packing from any line debris. Seats vulcanized to cartridge inserts in the valve bodies and seats on the discs are not allowed. Valve shaft bearings shall be non-metallic and permanently lubricated.

The exterior and interior of metallic surfaces of each valve shall be shop painted per AWWA C 504. the interior of the bodies shall have a full rubber lining vulcanized to the valve bodies.

Each valve operator shall be sized to operate the valve at the rated working conditions of the valve. Each valve shall be assembled, adjusted, and tested as a unit per AWWA C 504, by the valve manufacturer. The test pressure for leakage tests shall be 225 PSI.

5. VALVE BOXES

All buried valves shall be provided with a Buffalo type valve box, Tyler 562-S or 564-S, or approved equal. The tops of the valve boxes shall be designed with grooves to accommodate a valve box adjusting tool as provided in the tops of the above referenced Tyler valve boxes. The valve boxes shall be furnished complete with extension pieces where necessary and the top of the box shall be flush with the finished grade or pavement surface. All valve boxes shall have a ½" diameter hole field drilled 3" from the top to accommodate the water main locater wires.

6. CONCRETE FOR THRUST BLOCKING

Concrete for thrust blocking shall be ready mix concrete, composed of Portland cement, sand and gravel with not more than six (6) gallons of water per sack of cement. The concrete shall be a 5-1/2 sack mix with 28 day minimum compressive strength of 3,000 PSI.

7. BEDDING MATERIAL

Bedding material for all PVC pipe and where required for ductile iron pipe shall be crushed limestone and screenings, ¼" minus.

8. WATER MAIN TRACER TAPE

Water main tracer tape shall be installed with all water mains. The materials to be installed for this purpose shall consist of three (3) inch wide tape made of bonded layer plastic with a metallic foil core. Tape splices shall be knotted to prevent tensile pressure on the splice. The material to be used for this service shall be "Terra Tape D" as manufactured by the Griffolyn Company of Houston, Texas, or approved equal. The metallic tape shall be colored to contrast with the soil and shall bear an imprint identifying the line below, such as, "Caution, Water Main Buried Below".

9. WATER MAIN LOCATER WIRE

For all water mains, PVC and ductile iron pipe, a locater wire shall be provided as specified in Section II of these specifications. The locator wire shall be a single insulated No. 12 copper wire, THNN or THWN, gasoline and oil resistant. The insulated wire shall be furnished in rolls of not less that 500 feet, where splices are required, all splices shall be made with 3M splice kits. No other type of splicing will be allowed.

10. TAPPING SLEEVES AND VALVES

All tapping sleeves shall be stainless steel with stainless steel flanges. The tapping sleeves shall be Power Seal No. 3490 .SS, Smith Blair 665 or JCM 432, or approved equal, with class 125 ANSI B-16.1 flanges on the outlets. For ductile iron pipes, 12"and larger, Smith Blair 662 or other approved 4 bolt models may be used.

Tapping valves shall be designed for leak tight attachment to the tapping sleeve and tapping machine, shall have mechanical joint x flanged joint ends and shall otherwise conform to Section "I-4 Gate Valves" of these specifications. All tapping valves shall have a valve box conforming to "I-5 Valve Boxes" of these specifications.

11. CASING PIPES

Casing pipes for road and highway crossings shall be welded steel pipe with a minimum wall thickness of ¼", unpainted or coated, and shall have a minimum diameter of 10" larger than the nominal size of the water main.

12. PIPE SPACERS IN CASING PIPES

Wherever water mains are installed in casing pipes, the ductile iron pipe shall be supported with "RACI" tape spacers at 6' intervals, or 3 spacers per 20' length of pipe. The spacers shall be carefully installed on the pipe before it is installed in the casing pipe.

13. FIRE HYDRANTS

Fire hydrants shall have a 5-1/4" valve opening, one 4-1/2" steamer nozzle and two 2-1/2" hose nozzles and a 6" mechanical joint shoe. The fire hydrants shall be Mueller Figure A-423, American Darling No. B-84-B or Kennedy K81D, delivered to the site coated with a black bituminous coating for the portions to be underground and a primer and yellow finish coat for the portions to be exposed. The types of paint and coating shall be as recommended by the fire hydrant manufacturer. All hydrants shall receive a final paint coat in the field. Exposed barrels and tops shall be chrome yellow. All hydrant cap threads shall be field-lubricated with an approved, food-grade grease. The hydrants shall have a minimum "bury" of four (4) feet unless the depth of the main requires a deeper "bury". Refer to Detail B of these specifications.

14. POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE

Polyethylene encasement shall be applied to underground installations of ductile iron pipe, fittings, valves and other appurtenances.

Polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of A.S.T.M. Standard Specification D-1248-78 for Polyethylene Plastics Molding and Extrusion Materials:

Raw material used to manufacture polyethylene film :
Type: I
Class: A (natural) or B (black)
Grade: E-1
Flow rate: 0.4 maximum
Dielectric strength: Volume resistivity, minimum ohm-cm(3) 10 (15)

Polyethylene film:
Tensile strength: 1200 psi (8.3 MPa) minimum
Elongation: 300 percent minimum
Dielectric strength: 800 V/mil. (31.5 um) thickness minimum

Thickness:
Polyethylene film shall have a minimum thickness of 0.008 in. (8 mil. or 200 um). The minus tolerance on thickness shall not exceed 10 percent of the nominal thickness.

Tube size or sheet width:
Tube size or sheet width for each pipe diameter shall be as listed below.

Nominal Pipe Diameter (in)	Minimum Polyethylene Width in. (cm) Flat Tube	Sheet
4	16 (41)	32 (82)
6	20 (51)	40 (102)
8	24 (61)	48 (122)
10	27 (69)	54 (137)
12	30 (76)	60 (152)
14	34 (86)	68 (172)
16	37 (94)	74 (188)
24	41 (104)	82 (208)

15. MANUAL AIR RELEASE DEVICES

Manual air release devices shall be constructed of the materials as shown on Detail E of these specifications.

16. MAIN LINE PRESSURE REDUCING VALVES

Where a main line pressure reducing valve is required, it shall consist of an underground package pressure reducing station as manufactured by Engineered Fluid, Inc., Centralia, Illinois, or approved equal. The primary pressure reducing valve shall be sized as required by the District Engineer. The pipeline on each side of the pressure reducing station shall have a gate valve installed within 10-20 feet from the pressure reducing station such that the entire pressure reducing station can be shut down without taking any customers out of service.

The station shall be an underground steel capsule, 7'-0" minimum outside diameter with a minimum inside height of 6'-6". The station shall have a rectangular access hatch 30" X 36" with a Bilco Model MS-50 roof scuttle made of 11 gauge aluminum. The scuttle cover shall have 1" of fiberglass insulation protected by an 18 gauge aluminum liner. The entry lock on the access hatch shall be the pin tumbler, dead bolt type with a safety release, all as shown in Bilco Drawing 6184. Two keys shall be provided, and the locks shall be "keyed alike" such that they may be operated with all other locks on similar PRV stations in the District.

The top and bottom plates shall be lap welded to the capsule and the joints of all steel components shall be lap welded. The capsule shall be reinforced by channels and angles and be provided with lifting plates. The station shall be installed and bolted to an 8" thick reinforced concrete pad. The top of the access hatch shall be 11" above finished grade.

An aluminum access ladder shall be provided which meets UL and OSHA qualifications under Type I, Heavy Duty Specifications. The ladder shall be bolted into place and be removable to allow equipment maintenance. The capsule shall be provided with an 18" diameter, 8" deep sump. The capsule working area shall be covered with a rigid, neoprene floor mat. Pipe supports shall be provided inside the capsule as needed for the support of the equipment. No lighting or other electrical equipment will be required inside the capsule.

All surfaces of the entire structure shall be sandblasted (SSPC SP6) and coated with Tnemec Series 66 Hi-Build Epoxyline, applied in two applications to a total dry film thickness of 8.0 mils. Two 17 pound package magnesium anodes shall be provided, buried and attached by heavy copper wire to lugs provided for that purpose.

MAIN LINE PRESSURE REDUCING VALVES (Cont.)

The main line pipeline through the capsule shall have a normally closed isolation valve and a compression coupling or flanged coupling adapter to allow removal of the isolation valve. The primary pressure reducing valve shall be located in a by pass loop, the same size as the main line. The loop shall contain, in addition to the primary pressure reducing valve, two isolation valves and a compression coupling or flanged coupling adapter to allow removal of the equipment. All isolation valves shall be rated at 250 PSI working pressure. There shall also be provided a 3" loop with the secondary pressure reducing valve (3"), two 3" isolation valves and a coupling for the removal of equipment. All piping shall be schedule 40 steel with flanged ends except that the 3" piping and fittings shall be stainless steel. Where the pipes pass through the capsule wall, they shall be fully welded along the circumference on both sides of the capsule wall.

A pressure gauge shall be provided in the piping on each side of the pressure reducing valves. The gauges shall have 4-1/2" diameter clear faces. The gauge on the inlet side shall have a range of 0-200 PSI and the gauge on the outlet side shall have a range of 0-100 PSI.

The primary pressure reducing valve shall be a Cla-Val Model 690G-01ABC or approved equal. The secondary pressure reducing valve shall be a Cla-Val Model 90G-01ABCS or approved equal. The valves shall both have all stainless steel trim.

The supplier of the pressure reducing stations shall provide 2 bound copies of O&M Manuals to the District, and shall provide on full day at the job site for start-up and training.

In the event a pressure reducing station is proposed, other than as manufactured by Engineered Fluid, Inc., plans of the station showing all structural and piping details shall be submitted along with the water main extensions. Also included shall be details of the PRV's to be furnished. These plans must bear the seal and signature of the Missouri Registered Professional Engineer. Approval of both the plans for the water main extension and the PRV Station must be granted by the District Engineer before the project will be approved. If requested, structural calculations shall be provided in addition to the drawings of the PRV station. Deviations to the station as specified will only be allowed at the sole discretion of the District Engineer. Care must be exercised that the station is designed to allow easy access to the main PRV and piping and that the top hatch is located such that the main PRV can be easily removed. The contractor shall provide the services of one full day by a representative of the PRV valve manufacturer for start up and training.