PUBLIC WATER SUPPLY DISTRICT NO. 2
OF JEFFERSON COUNTY, MISSOURI

CONSTRUCTION STANDARDS AND INSPECTION

I. CONTRACTOR AND ENGINEERING

Qualified Contractors: To be approved to install any water mains, valves, fire hydrants, and other appurtenances including service taps to the District's water collection, treatment and distribution systems, a contractor must be determined to be qualified to perform such work by the District. To be a qualified contractor, each contractor must meet the following conditions:

1. Furnish and maintain performance and payment bonds conditioned for the payment of all materials, incorporated, consumed, or used in connection with the construction of such work in connection with the public work project, and all insurance premiums, both for workers' compensation, and other kinds of insurance, and for all labor performed in the public project whether by the contractor's laborers, materia-lmen, or any subcontractor, or otherwise, as well as to assure complete performance by the contractor, and all of its subcontractors. Performance and payment bonds shall be submitted by sureties or banks approved by the District. In limited instances, irrevocable letters of credit approved by the District may be approved as a performance or payment bond if submitted by a surety or bank approved by the District in an amount approved by the District. The period of a bond shall be as determined by the District in approved plans for the work project, and not less than 12 months.

2. Furnish proof and a certificate of insurance including XCU coverage. The minimum limits of liability insurance required are single limit coverage in an amount approved by the Board of Directors of the District, and not less than $2 million. Public Water Supply District No. 2 shall be listed as an additional insured, and the liability insurance coverage may not be canceled less than thirty (3o) days after notice to the District, for any reason. A contractor shall also furnish proof and provide a certificate of workers' compensation insurance.

3. A contractor shall furnish to the District a statement of its qualifications and, after review thereof, be determined by the Board of Directors of the District to be a Qualified Contractor. In all cases, the decision of the Board of Directors regarding whether a contractor is a "Qualified Contractor", shall be final and conclusive. The term "Qualified Contractor" shall also include, but not by exclusion, subcontractors employed by a contractor on any public work project for the District.

Engineering Plans: It is not the Water District's responsibility to assure that plans are submitted. Construction started without a plan submittal or approval of plans may result in a delay in water service. The Developer shall furnish **four (4) copies** of engineering plans and specifications designed by and bearing the original signature and seal of a

professional engineer registered in the State of Missouri. The engineer's plans and specifications shall accurately depict the design including location, size, and material of all proposed water mains, services, valves, hydrants, fittings, and connections per the requirements of the District and the Missouri Department of Natural Resources (MoDNR). The plans shall be to a scale approved by the District with a north arrow, location map, and relative locations of existing and proposed adjacent utilities, easements, right of ways, lots and property lines. Existing and proposed elevation contour information to U.S.G.S datum shall be provided at a minimum five (5) foot contour interval. The plans and specifications will be reviewed by the District and two (2) copies will be returned to the developer with either comments to be incorporated into the plans, marked "Approved as noted," or stamped "Disapproved Revise and Resubmit". If plans and specifications are disapproved, they must be revised, resubmitted, and approved before the start of construction. **Water Meter Service and Fire Flow Meter Service:** For projects that request/require a water meter service and fire flow meter service, these two services will be separate and individual. Therefore, each service will have a water main tap, meter tile/box, and service line. Combined water main taps, combined meter tiles/boxes, and/or combine water meter and fire flow meter services will not be allowed.

II. STANDARDS

Materials Furnished: Excepting those materials specifically excluded by this Standard, the Developer shall furnish all supplies and materials including, but not limited to, pipe, fire hydrants, fittings, valves, jointing materials, appurtenances and accessories, concrete, rock, asphalted concrete, and macadam for road and driveway resurfacing where necessary. **Pipe:** The pipe shall be **CERTA-LOC, 4''- 12'' PVC** Pipe ANSI/AWWA C900, or C909 dimension ratio 14, or Ductile Iron Pipe ANSI/AWWA C151/A21.51, thickness class 52. PVC Pipe shall have joints conforming to ASTM D3139 with elastomeric seals conforming to ASTM F477. Ductile Iron Pipe shall conform to AWWA C150 for wall thickness, AWWA C104 for cement-mortar lining, AWWA C105 for polyethylene encasement, and AWWA C111 for mechanical or push-on joints. The pipe shall be installed per AWWA C600 or AWWA C605 as applicable. Restrained joints at each pipe joint are required for the pipe to be installed at a slope greater than ten (10) percent to a maximum slope of twenty-five (25) percent. Where deemed necessary by the District to provide proper domestic and fire water service, a new water main pipe shall be extended by the Developer to a second connection to another District water main for a looped supply, including all necessary appurtenances, easements, and pressure controls. Where deemed necessary by the District to avoid landlocking the Public Water Supply, the water main pipe shall be extended to the development property lines.

Pipe Crossing Roadways: The pipe shall be a Ductile Iron Pipe, as described above, with restrained joints for directional drilling and boring installations. Restrained joints shall be ASTM D3139, boltless, push-on type, joint restrained independent of the joint seal with elastomeric sealing gaskets conforming to ASTM F477. The pipe shall be cased with steel casing pipe. Steel casing pipe shall be ASTM A139/A139M, Grade B, 35,000 psi minimum yield

strength, a minimum wall thickness of 0.25 (1/4) inches, and full circumference welded joints per AWS D1.1 to withstand excavation forces. The final casing pipe wall thickness shall be per MoDOT engineering specifications based on the final casing pipe diameter. The casing pipe diameter shall be appropriately sized to handle the carrier pipe with casing spacers to support the barrel of the carrier pipe. The ends of the casing pipe shall be sealed with rubber end seals that are secured with stainless steel bands.

Pipe Installation Parallel to Other Utilities: The water pipe shall be installed per Section 8.8 (Separation Distances From Contamination Sources) of the 10 State Standards, 2012 Edition, and Section 8.6 (Separation of Water Main, Sanitary Sewers and Combined Sewers of MoDNR's Minimum Design Standards for Missouri Community Water Systems, Effective Dec. 10, 2013. The water main shall not be installed in the same ditch area as parallel electric, telephone, cable, pipeline, or gas facilities.

Pipe Size: Minimum size of pipe shall be twelve (12) inch nominal inside diameter or larger for a main fee line. Where a larger or smaller size is required to serve the Developer's project, the District will designate to the Developer the size required from the District's standard practice or the size required by the proper fire protection authority, minimum pipe size for fire hydrants shall be 6" where multiple hydrants are required the minimum pipe size shall be 8".

Pipe Bedding: Granular cradle shall be constructed on all water mains from a plane 6" below the pipe to a plane 6" above the pipe. The granular cradle shall consist of Class II embedment material as per ASTM D2321 and shall conform to MoDOT Section 1007 Type 5.

Fire Hydrants: Fire hydrants shall be American Darling B84B, joint bell or spigot, freeze proof, dry barrel, standard compression, two-piece standpipe, break-away design, 5-1/4-inch valve opening, one 4-1/2-inch steamer nozzle, and two 2-1/2 inch hose nozzles with threads and exterior paint per the proper fire authority. The fire hydrant inlet connection shall be a 6" ALPHA stab-fit restrained joint shoe using only one top-mounted stainless-steel type 304 fastener with said fastener being torqued per the manufacturer's recommendations. Interior coating shall be per AWWA C550.

Fire Hydrant Installation: Hydrants shall be set with the bottom flange of the top section 2" above the ultimate final grade of the ground with a maximum deviation of 2" in elevation being allowed. When a dry barrel hydrant is set in pervious soil, drainage shall be provided at the base of the hydrant by placing Grade B coarse gravel or 1" straight crushed stone from the bottom of the trench to at least 6" above the waste opening in the hydrant and to a distance of 1' around the elbow. Adequate support must be provided to prevent the fire hydrant from settling. When a dry barrel hydrant with an open drain is set in clay or other impervious soil, a drainage pit 2 ft. x 2 ft. x 2 ft. shall be excavated below each hydrant and filled with Grade B coarse gravel or 1" straight crushed stone under and around the elbow of the hydrant and to a level of 6" above the drain port. Adequate support must be provided to prevent the fire hydrant from settling. Hydrants shall be located as shown on the plans and approved by the District and the proper fire protection authority. Fire hydrants shall be installed with two gate valves with valve boxes (one on each side of the

main water line connection tee) and an auxiliary gate valve with a valve box per AWWA C502. All joints between the tee (if sat off to the side of the main), gate valve, and fire hydrant shall be restrained with ALPHA stab-fit restrained joints using only one top-mounted stainless-steel type 304 fastener with said fastener being torqued per manufacturer's recommendations. Fire hydrant piping shall be of sufficient length to allow for the closure of the gate valve without the tee wrench hitting the fire hydrant. The bowl of each hydrant shall be well-braced against a sufficient area of unexcavated earth with stone slabs or concrete backing. In cases where a sufficient area of unexcavated earth is not available for thrust restraint, the hydrant shall be tied to the pipe with ALPHA stab-fit restrained joints using only one top-mounted stainless-steel type 304 fastener with said fastener being torqued per the manufacturer's recommendations.

Fittings: The fittings shall be minimum Class 350 psi compact ductile iron fittings per AWWA C153, cement-mortar lining inside per AWWA C104, and bituminous coal tar coating outside per AWWA C153. All buried fittings shall be standard thickness, rubber gasket mechanical joint type. Rubber gaskets shall be per AWWA C111. All fittings shall be restrained with ALPHA stab-fit restrained joints using only one top-mounted stainless-steel type 304 fastener with said fastener being torqued per the manufacturer's recommendations. For Ductile Iron Pipe, the fittings may be restrained gasket fittings AWWA C153 in place of using ALPHA stab-fit restrained joints. Tapped and solid plugs shall have set screws for security plugs in the bell of pipe or fittings. Solid sleeves with Mechanical Joint ends are required when deemed necessary by the District.

Thrust Restraint: Reaction blocking shall be designed for a minimum internal pressure of 300 pounds per square inch. The blocking shall be kept clear of the entire bell configuration of any adjacent joint and shall be at least as large as necessary to restrain the fittings from movement.

Minimum Bearing Area in Square Feet

Fittings						
Pipe Size	**11-1/4**	**22-1/2**	**45**	**90**	**Tee**	**Dead End**
6”	**1**	**2**	**3**	**6-1/2**	**4-1/2**	**4-1/2**
8”	**1-1/2**	**3**	**6-1/2**	**12**	**8-1/2**	**8-1/2**
12”	**3-1/2**	**7**	**14**	**26**	**18**	**18**

The above bearing areas are based on soil having an allowable safe lateral bearing capacity of 2,000 pounds per square foot. The soil of lesser bearing capacity will require a proportionally greater minimum bearing area. The alternate restrained joint design may be allowed when submitted to and approved by the District.

Valves: The valves shall be ductile iron resilient-seated gate valves manufactured per AWWA C509 or AWWA C515, and shall have the standard 2” operating nut, O-ring seal, vertical non-rising stem, low-zinc bronze, interior ferrous surfaces epoxy coating (min. 4 mil. thickness), and exterior coating per AWWA C550 or subsequent revision thereof. Valves shall open by turning to the left (counter-clockwise) and be installed in a horizontal/ plumb

position. The valves shall be designed for 250-psi water working pressure and 500-psi test pressure. All valve ends shall be restrained with ALPHA stab-fit restrained joints using only one stainless steel type 304 fastener with said fastener being torqued per the manufacturer's recommendations. For three-way tee connections, three gate valves shall be provided, one on each leg of the tee connection. The maximum spacing between valves shall be 1,000 feet. Where valves are set at a depth that leaves the operating nut more than 4 feet below grade, an extension stem shall be furnished to bring the operating nut to within 2 feet of grade.

Valve Boxes: The valve boxes shall be adjustable, screw-type, and made of cast iron. Valve boxes shall consist of a base; a bottom section, a top section, and a lid marked "water". 6", 8" and 12" valves shall have 5-1/4" diameter shaft boxes. The box shall be centered over the operating nut, and the cast iron lid shall be set flush with the finished grade or pavement surface.

Tapping Sleeves: Tapping sleeves shall be stainless steel type 304 (18-8) with a full 360° gasket. The body, lug, and gasket armor plate shall comply with ASTM A240. The MJ outlet shall be one-piece casting made of ductile iron, meeting or exceeding ASTM A536, Grade 65-45-12. MJ style per AWWA C111. The test plug shall be 3/4" NPT in compliance with ANSI B2.1 and shall be lubricated or coated to prevent galling. All metal surfaces shall be passivated after fabrication in compliance with ASTM A380. Install the tapping sleeve per

AWWA C223, MSS SP-60, and the manufacturer's instructions. Bolts and nuts shall be stainless steel type 304 (18-8) and Teflon coated. MJ bolts and nuts shall be UNC T-Bolts, heavy hex nuts, and high strength low alloy steel per AWWA C111. All bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in ANSI B18.2.

Concrete for Reaction Blocking: Concrete shall consist of an aggregate not to exceed 1" with the slump of the concrete when placed not to exceed 3" and have a crushing strength of not less than 3,000 psi in 28 days. Admixtures shall not be used except under strict methods of control and approval of the District.

Reinforcing: Reinforcement bars shall be of a deformed type and shall be billet or rail steel complying with ASTM Specification either A15 or A16 and the deformations to A305. All bars shall be bent cold. Before being installed in the final position, all metal reinforcements shall be free from mud, clay, ice, grease, oil, loose rust and scale, and other coatings, which would reduce or destroy the bond. Metal reinforcement shall be accurately positioned as to location and size, as called for on drawings.

Blow-off Valve Assembly and Air Release Valve: Blow-off valve assemblies and Air Release Valves shall have materials as specified on the District's standard details or design detail of the Developer's engineer, approved by the District. Blow-off valve assemblies shall be installed at the dead ends of all mains, except where provided with a flush hydrant or fire hydrant. Air Release Valves shall be installed at high points of the water main profiles where air may collect.

Bituminous Coatings: All bolts, tie rods, clamps or other components of dissimilar metal shall be protected against corrosion by hand application of bituminous coating.

Depth of Cover: All pipes shall be laid to a depth of at least 42" but no more than 72" below the proposed finished street pavement grade or proposed finished grade of the ground over the pipe ditch, whichever is lower. The measurement will be to the top of the barrel of the pipe. Depth of cover shall also conform to requirements of the roadway authority where applicable, and the Missouri Department of Natural Resources.

Trace Wires: All water mains and service line road crossing shall have a single continuous copper tracer wire installed in the trench, located 6" directly above the top of the pipe, during backfilling to allow line location and tracing. Tracer wire shall be #12 AWG high-strength copper clad steel conductor (HS-CCS) wire (ASTM B910) insulated with a 30 mil, high-density, high molecular weights polyethylene (HDPE) insulation/covering (ASTM D1248) and rated for direct burial use at 30 volts. HDPE insulation shall be RoHS compliant, utilize virgin grade material, and meet the APWA color code standard for identification of buried utilities. All splices shall be made using 3M splice kits approved for watertight, underground installation. The wire shall be extended up the outside of the valve boxes with a small loop inserted into the top of the valve boxes.

Water Meters: Water meters for service connections shall be provided and installed by the District. The District will allow Contractors to install the meter tile, meter yoke, and service line. **The District will provide 1" diameter taps, with the minimum size tap being 1" Any larger taps will be performed by a licensed, insured, and bonded contractor at the customers' expense and witnessed by a district employee. A water meter will not be set until a curb stop shutoff valve with a valve box is installed at the end of the 2' piece of copper, stubbed out of the meter tile and the Contractors have received satisfactory approval from District for meter tile, meter yoke, curb stop shut off and service line installation.** Water meters shall conform to AWWA C700 and C710 and be per the District standards. **Water Meter Settings and Service Lines:** Water meter settings and service lines shall conform to the 2014 Lead Copper Rule, as well as piping, compression fittings, ball curb stop, corporation stop, service clamp, and meter yoke.

A meter tile with a **composite** lid, "**without a hole**" and **composite** frame, will be set in a gravel base.

Water Service Line and Companion Fittings: Service lines shall be copper tubing, Type K, ASTM B88 with compression joints. Copper tubing shall be provided from the water main to the meter yoke in one continuous run and then out of the meter yoke, 2' beyond the meter tile on the customer side. SDR9 is an acceptable alternative to copper, with the appropriate inserts, adhering to the same configuration as the copper service. The ball **Curb** stop shall have a brass or red brass alloy body conforming to ASTM B62, a ball-type valve, self-draining, and positive pressure sealing.

Corporation stop shall have brass or red brass alloy body conforming to ASTM B62, inlet end threaded for tapping according to AWWA C800, and outlet end suitable for service pipe specified or required. Service clamp shall be brass, double strap type, and designed to hold pressures above pipe working pressure. The meter yoke shall be ASTM B-75, Copper Alloy #122, copper meter setter with angle ball valve and built-in angle cartridge dual check valve. The meter tile shall be 20" diameter x 30" tall heavy plastic meter tile with a cast iron lid with water inscription. The center of the meter tile shall be installed 10' off of the water main or 10' off of the edge of the road right-of-way if on the opposite

side of the road than the water main. The meter tile shall be installed in grassy areas, not in pavement areas. Water meter setting components shall meet the requirements and be installed per AWWA C800.

Service Lines Crossing Roadways: Water service lines crossing under paved areas shall be cased with polyethylene casing pipe. Polyethylene casing pipe shall be AWWA C901, SDR-9 or ASTM D2737, PE 4710, DR-9. The pipe shall be manufactured from resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a cell classification of PE: 445574C/E. The polyethylene casing pipe diameter shall be appropriately sized to handle the water service line, and the ends of the casing pipe shall be sealed with rubber end seals that are secured with stainless steel bands.

Permits: All work shall comply with the terms and conditions of the appropriate permits required and obtained for the project, including, but not limited to, the Missouri Department of Natural Resources Construction Permit and local fire protection authority construction permit. It is unlawful for any person other than Public Water Supply District No. 2 personnel to obtain water from the new water main unless a tap and meter set have been paid for and installed, or there must be a permit obtained from Public Water Supply District No. 2 to have a meter installed on a fire hydrant for street cleaning, watering sod, etc. Any violation will result in a tampering fee.

Field Changes: Any substantial change from the approved plans and specifications shall require prior written approval from Public Water Supply District No. 2.

As-Built Plans: The Developer shall maintain and post daily on a set of plans all as-built measurements of the pipeline, valves, fittings, and fire hydrants. All valves, fire hydrants, fittings, and significant deviations in horizontal alignment shall require three measurements: 1) perpendicular to the center line of the principal street, 2) from the center line of the nearest intersecting street measured along the center line of the principal street, and 3) measurement along the pipeline between fittings, valves, and fire hydrants. Deviation of more than one foot in horizontal alignment shall be considered significant. All valves shall have noted the number and direction of 360 degrees turn required to completely open the valve from a closed position. The make of the valve and its size should be included on the as-built plans next to the location dimensions. Fire hydrant must have the type (bell or spigot) and

the cover length the distance in feet measured to the nearest 6" from the top of the connecting pipe to the ground line at the hydrant. A copy of the finished plan with all as-built measurements, and also a reduced scale copy of the as-built plan at a scale of 1 inch = 200 feet, also an electronic form of the as-built plans shall be provided to Public Water Supply District No. 2 before opening individual user water services.

Connection to System: Actual connections to Public Water Supply District No. 2 existing system will be scheduled only after all pipe and appurtenances have been installed and the connection excavation inspected by the District. Final closure by Developer to follow installation(s) of connection(s).

Disinfection: Flushing, disinfection, and test sampling of the new pipe system will be done by the Developer in the presence of the District's inspector, per Chapter 8 - Distribution Systems of the MoDNR's Minimum Design Standards for Missouri Community Water Systems, Effective Dec. 10, 2013, and AWWA C651 before being placed in service.

Disinfection chemicals shall be hypochlorite per AWWA B300 or liquid chlorine per AWWA B301. The new pipe shall be isolated from the existing system until satisfactory laboratory results can be obtained. Pipe during installation must be kept free of dirt, debris, and contamination per AWWA C651. Should the pipeline require excessive flushing, disinfection, or other cleaning procedures necessary before drinking water use, such will be at the expense of the Developer. **The cost of the water used for flushing and filling the new mains will be at the current District rate schedule at the time of the new development.**

Pressure and Leakage Tests: Pressure and leakage tests shall be performed in the presence of the District's inspector and conform to the current standards of the District, MoDNR, and AWWA C600. Pipe, fittings, joints, and appurtenances shall be repaired or replaced by the Developer as may be needed to meet Pressure and Leakage Test requirements. **It will be the Developer's responsibility to pay for water used to do pressure and leakage tests, the current District rate schedule will apply at the time of development. You may request a rate schedule from the District office located at 195 Old Sugar Creek Road, High Ridge, MO 63049.**

III. INSPECTION

Public Water Supply District No. 2 and its authorized representatives shall be given free access to the work, storage sites, and all material-producing facilities. Every reasonable aid shall be provided for ascertaining that the materials and workmanship are per the plans and specifications. The inspection of all work, unless otherwise specified, will be under the jurisdiction of the representative of Public Water Supply District No. 2. Any work not constructed per plans and specifications, whether or not in the presence of Public Water Supply District No. 2 inspector, shall be subject to rejection at any time before formal acceptance by Public Water Supply District No. 2. All work found unsatisfactory will require the completion of a rejection slip stating a cause of rejection and, whenever practicable, a copy will be given to the Contractor's field supervisor and the Developer's field supervisor the same work day as a cause of rejection is discovered by Public Water Supply District No. 2 inspector.

At the beginning of the work or on resumption thereof after temporary suspension for any reason, the Contractor shall make notification to the Public Water Supply District No. 2 for an inspector before noon of the working day before inspection service is required on the work. The inspection by Public Water Supply District No. 2 is not to guide the Contractor in the installation of the system, but only to advise the Developer of deficiencies that will require correction before acceptance of new installation in the Public Water Supply District No. 2 system for operational purposes.