



Louisville Water
4” -20” Pipeline
Material Specification

March 2020

Contents

03 21 00 - REINFORCEMENT BARS	1
SECTION 03 21 16 EPOXY-COATED REBAR ANCHORS	1
SECTION 04 22 00 CONCRETE UNIT MASONRY	2
22 11 00 FACILITY WATER DISTRIBUTION	3
SECTION 22 11 16.02 BRASS FITTINGS AND VALVES	3
26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL	4
SECTION 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	4
31 25 00 – EROSION & SEDIMENTATION CONTROLS	5
SECTION 31 25 14.16 ROLLED EROSION CONTROL MATS AND BLANKETS	5
33 01 00 - OPERATION & MAINTENANCE OF UTILITIES	6
SECTION 33 01 10.54 CLEANING OF WATER UTILITY PIPING (POLY PIGS).....	6
33 05 00 – COMMON WORK RESULTS FOR UTILITIES	7
SECTION 33 05 07.24 STEEL CASING PIPE.....	7
SECTION 33 05 07.24.01 CASING SPACERS	8
SECTION 33 05 09.43 TAPPING SADDLES	9
SECTION 33 05 09.44 TAPPING SLEEVE & GATE VALVE.....	10
SECTION 33 05 19 DUCTILE IRON PIPE.....	12
SECTION 33 05 19.01 POLYWRAP FOR WRAPPING DUCTILE IRON	14
SECTION 33 05 19.02 POLYTAPE FOR WRAPPING DUCTILE IRON.....	15
SECTION 33 05 31.16 PVC PIPE.....	16
SECTION 33 05 31.26 SERVICE SLEEVES	18
SECTION 33 05 73 VALVE BOXES, LIDS, & RISERS.....	19
SECTION 33 05 73.01 PLASTIC METER VAULTS & EXTENSION RINGS.....	20
SECTION 33 05 73.02 METER SETTERS	21
SECTION 33 05 73.03 PIPE REPAIR SLEEVES	23
SECTION 33 05 73.04 FRAMES, RISERS, AND MONITOR CASTINGS	24
SECTION 33 05 81 ALUMINUM HATCHES	25
40 05 00 - COMMON WORK RESULTS FOR PROCESS INTERCONNECTIONS	26
SECTION 40 05 17 COPPER TUBING	26
SECTION 40 05 61.23 SWING CHECK VALVES	27
SECTION 40 05 61.24 FLAT FACED FLANGED SPOOL PIECES	29
SECTION 40 05 61.25 MJ RESTRAINED JOINT ADAPTERS	32

SECTION 40 05 61.26 BELL JOINT CLAMPS.....	33
SECTION 40 05 61.27 DUCTILE IRON PIPE RESTRAINED JOINT GASKETS.....	34
SECTION 40 05 61.28 RESTRAINT JOINT CLAMPS.....	35
SECTION 40 05 61.29 DUCTILE IRON FITTINGS.....	36
SECTION 40 05 61.30 REPAIR COUPLING AND GASKETS.....	39
SECTION 40 05 65.23 VALVES AND APPURTENANCES.....	40
SECTION 40 05 67.36 WATER PRESSURE REGULATORS FOR PRV.....	42
SECTION 40 05 78.11 AIR RELEASE VACUUM VALVE.....	43
SECTION 40 05 81.13 FIRE HYDRANTS.....	45
SECTION 40 05 89 KEYTUBE.....	47

Appendix - List of Drawings

SECTION 03 21 00	REINFORCING STEEL FOR ANCHORING GATE VALVES	5006
SECTION 33 05 73	VALVE BOX & LID	5000
SECTION 33 05 73.02	1-1/2" METER SETTER WITH 1" BYPASS	3204
SECTION 33 05 73.02	2" METER SETTER WITH 1" BYPASS	3205
SECTION 34 05 73.04	3" ELEVATOR RISER RING (J-HOOK STYLE) FOR SMALL METER VAULT FRAMES AND LIDS	5102
SECTION 34 05 73.04	1-1/2" ELEVATOR RISER RING (J-HOOK) FOR SMALL METER VAULT FRAMES AND LIDS	5103
SECTION 34 05 73.04	3" RISER (HEX HEAD BOLT) FOR SMALL METER VAULT COVERS	5103B
SECTION 34 05 73.04	LIGHT & HEAVY VAULT FRAME	5104
SECTION 34 05 73.04	MONITOR LID RISER RING	5105
SECTION 34 05 73.04	MONITOR FLANGE & RING	5106
SECTION 40 05 61.24	WELDOLET FITTING	9004

03 21 00 - REINFORCEMENT BARS
SECTION 03 21 16
EPOXY-COATED REBAR ANCHORS

1. GENERAL

- A. Steel Reinforcing Bar Anchors shall conform to the requirements of ASTM A615 – Specification for Deformed and Plain Billet –Steel Bars for Concrete Reinforcement for Grade 60 reinforcing steel.
- B. Steel Reinforcing Bar Anchors shall be fusion bonded epoxy coated in accordance with ASTM A775 – Specification for Epoxy-Coated Reinforcing Steel Bars and the Concrete Reinforcing Steel Institute's Fusion Bonded Epoxy Coating Applicator Plant Certification Program. The fusion bonded epoxy coating shall show no evidence of separation from the bar and be free from holes, voids, contamination, cracks or other damaged areas.

2. PRODUCTS

- A. Fabrication: Reinforcing steel shall be accurately formed to the dimensions and shapes shown on Louisville Water Company Standard Drawing #5006. Standard Hooks (180° degrees) shall be bent around a pin having a diameter of 3 inches (3") for No.4 bars; 4.5 inches (4.5") for No.6 bars; 6 inches (6") for No. 8 bars; and 10.75 inches (10.75") for No. 10 bars. Bars shall be bent cold.
- B. Fabrication Tolerances:
 - 1. Sheared Length: +/- One inch (1")
 - 2. Bend Dimensions:
 - 3. +/-One Half inch (1/2") for #4 Bar Size.
 - 4. +/-One inch (1") for Larger than #4 Bar Size.
- C. Reinforcing Steel shall be rejected if the extent of the epoxy coating damage exceeds 1% of the surface area in any one-foot length.
- D. The proposed contractor(s) shall provide certification stating that the reinforcing steel and epoxy coating conform to the requirements of ASTM A615 and/or ASTM A775 Standards (latest editions) upon request by LWC.

SECTION 04 22 00
CONCRETE UNIT MASONRY

1. GENERAL

- A. Provision of concrete blocks for supporting fire hydrants and temporary support of gate valves.
- B. Related work:
 - a. Fire hydrants and gate valves
- C. Submittals:
 - a. Submit manufacture's information showing the concrete block type, dimensions and compliance with ASTM C90.

2. PRODUCTS

- A. The concrete blocks shall be new, 4" x 8" x 16" solid concrete block, with actual dimensions of 3.625" x 7.625" x 15.625".
- B. The solid concrete block shall comply with ASTM C90 for normal weight load bearing concrete masonry units. The solid concrete block shall have a minimum weight of 31.25 lbs. and have a minimum compressive strength of 1,900 psi.

3. MANUFACTURERS

- A. The concrete block shall be as supplied by Lowes Home Improvement or approved equal.

22 11 00 FACILITY WATER DISTRIBUTION
SECTION 22 11 16.02
BRASS FITTINGS AND VALVES

1. GENERAL

- A. All items shall comply with applicable provisions of the AWWA C800 section 4 "material shall comply with the requirements of the Safe Drinking Water Act standards currently in effect for no lead brass". Louisville Water Company reserves the right to require the contractor to supply an affidavit from the manufacturer stating that the products provided comply.

2. PRODUCTS

- A. Contractor shall provide installation instructions with all couplings and valves and will be required to provide to the Inspectors.
- B. All items that the Louisville Water Company rejects as not conforming to standards shall be returned to the Contractor at the expense of the Contractor. If the items are found to be defective, they shall be replaced with like items at the Contractor's expense.
- C. Valves and fittings shall be complete and ready to install when shipped. The Contractor shall use care in preparing them for shipment to avoid damage during handling or transit. Damaged items will be returned at contractor's expense.
- D. Corporation stops shall be suitable for both dry and wet tapped connections on PVC and ductile iron water mains.
- E. All fittings in the Bidders Proposal Sheet described as "compression" style, shall be manufactured with a stainless steel gripper ring. The gripper ring shall be molded into the gasket and is drawn down when the nut is tightened, providing a mechanical restraint and hydraulic seal. In addition, the interior portion of the nut must have a transparent fluorocarbon coating that provides smooth torque transfer.
- F. Items 2050006 & 2050007 height must not exceed 7 W' from bottom of inlet to the top of the stop.

3. MANUFACTURERS

- A. Prequalified manufacturers of brass fittings and valves are (or approved equal):

Mueller	Trenton Pipe
Ford Meter Box	Merit Brass
A Y McDonald	Lee Brass
Cambridge Brass	Milwaukee
Watts	Kitz

**26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

1. GENERAL

- A. Provision of tracing wire for locating buried PVC pipe.
- B. Related work:
 - a. PVC pipe, Asbestos Cement (AC) pipe, gate valves and key tubes
- C. Submittals:
 - a. Submit manufacture's information showing the tracer wire type, AWG size, insulation color and materials composition and wire materials of construction.

2. PRODUCTS

- A. Tracer wire shall be new, 12 AWG solid THHN copper conductor.
- B. The wire shall be covered with PVC insulation over which a nylon (polyamide) jacket is applied and rated for 600 volts. The insulation and jacket shall be RoHS compliant and utilize virgin grade material.
- C. The insulation color shall be blue for water service to match the APWA color code standard for identification of buried utilities.

3. MANUFACTURERS

- A. The tracer wire shall be Pro-Line Safety Products or approved equal.

31 25 00 – EROSION & SEDIMENTATION CONTROLS
SECTION 31 25 14.16
ROLLED EROSION CONTROL MATS AND BLANKETS

1. GENERAL

- A. Provision of geotextile filter fabric for lining of fire hydrant drainage pits.
- B. Related work:
 - 1. Fire Hydrants
- C. Submittals
 - 2. Submit manufacture's information showing the geotextile fabric type, weight, color and materials of construction.

2. PRODUCTS

- A. The geotextile fabric shall be #200 spun bond polypropylene (i.e., 2 ounces per square yard or 67.7 grams per square meter) with the following characteristics:

Test		ASTM Method	Unit	Average	Minimum
Material weight			$\frac{g}{m^2}$	68	65.5
Tensile Grab	MD	D5034-09	lbs.	38.5	34.6
Grab Elongation	MD	D5034-09	%	118	106
Tensile Grab	CD	D5034-09	lbs.	34.4	31
Grab Elongation	CD	D5034-09	%	128	115.5

- B. The geotextile fabric shall be supplied in 48-inch x 48-inch sheets.

3. MANUFACTURERS

- A. Geotextile filter fabric shall be #200 polypropylene as manufactured by Ovasco Industries or approved equal.

33 01 00 - OPERATION & MAINTENANCE OF UTILITIES
SECTION 33 01 10.54
CLEANING OF WATER UTILITY PIPING (POLY PIGS)

1. GENERAL

- A. Provision of polyurethane foam pipeline cleaners for pigging of the water main prior to placing the main in-service.
- B. Related Work:
 - a. Ductile Iron Pipe and PVC Pipe, Ductile Iron Fittings, Gate Valves
- C. Submittals:
 - a. Submit manufacture's information showing the pipeline cleaner type, diameter, density, length of nose and length of body, color and materials of construction.

2. PRODUCTS:

- A. Pipeline cleaners shall be new, of medium density (5-8 lbs./c.f.), flexible, and composed of an open cell urethane foam body with high resilience.
- B. The outer coating shall be composed of a tough urethane elastomer coating applied in crisscross bands to enhance cleaning and yield strong resistance to wear yet remain flexible to allow the cleaner to pass through fittings, bends, gate valves and other diameter reductions of up to 65% of the cross-section area of the nominal main.
- C. Pipeline cleaner shall be bullet shaped and have a nose on one end and be blunt on the other end and have crisscross bands and sized for the type of water main being cleaned.
- D. Pipeline cleaners shall be color coded for the type of service intended and for easy identification, e.g., blue for PVC pipeline cleaners and red for ductile iron pipeline cleaners.
- E. The materials that compose the pipeline cleaner shall be food grade compatible.
- F. Pipeline cleaners must have an outside diameter based on the type and size of main to be pigged, in accordance with Table 1 for DR 18 PVC pipe and Table 2 for Pressure Class 350 Ductile Iron pipe.

Table 1- Poly Pig Sizes for DR 18 PVC Pipe

Nominal Pipe Size, in.	AWWA C900 DR 18 PVC I.D, in.	Poly Pig Size, in.
4	4.27	4.55
6	6.13	6.35
8	8.04	8.3
12	11.73	12.05

Table 2- Poly Pig Sizes for PC 350 Ductile Iron Pipe

Nominal Pipe Size, in.	Pressure Class 350 Ductile Iron Pipe I.D, in.	Poly Pig Size, in.
4	4.3	4.55
6	6.4	6.65
8	8.55	8.85
12	12.64	13.05
16	16.72	17.10
20	20.84	21.35

3. MANUFACTURERS

- A. Pipeline cleaners shall be Municipal Series Model B4 for DR 18 PVC pipe and Model RX-4 for Ductile Iron pipe as manufactured by Pipeline Pigging Products, Incorporated or approved equal.

33 05 00 – COMMON WORK RESULTS FOR UTILITIES
SECTION 33 05 07.24
STEEL CASING PIPE

1. GENERAL

- A. The Casing Pipe shall be shipped on flatbed trucks with end bulkheads on the truck and shall be banded together in a maximum of one layer. Each bundle shall not exceed six lengths of pipe. A non-construction grade 4 x 4 timber shall be placed between each layer and/or bundle. Each 4 x 4 timber shall contain a wood chock at the end of the 4 x 4 placed firmly against the pipe. The wood chock shall be 3 ½ x 3 ½ x 3 ½ triangular in shape.

2. PRODUCTS

- A. The material shall conform to the chemical and mechanical requirements of the latest revision of ASTM A 139 “Electric-Fusion (ARC) Welded Steel Pipe” (NPS 4 and over), unless otherwise stated herein.
- B. The pipe furnished shall be grade B. The steel shall be new and previously unused.
- C. Hydrostatic testing shall not be necessary.
- D. All pipe lengths shall be 20 feet, + or – ½ inch, and shall be beveled at one end (for field welding of circumferential joints) and shall be plain right angle cut at the other end. All burrs at the end of the pipe shall be removed.
- E. The wall thickness at any point shall be within 12.5% of the thickness specified in the “Louisville Water Company Technical Specifications and Standard Drawings for Pipeline Construction 2008”.
- F. Circumference- The outside circumference of the pipe shall not vary more than + or – 1% but not exceeding + or – 3/4” from the nominal outside circumference.
- G. Ovality (Out-of-Roundness) - The pipe diameter within 4.0 in. of ends, shall not vary more than 1% from the specified diameter.
- H. Straightness- All pipe lengths shall be 20-foot in length unless approved by the Project Manager.
- I. All ID obstructions (bead welds, slags, etc.) shall not extend more than 3.32” from the ID face.

SECTION 33 05 07.24.01
CASING SPACERS

1. GENERAL

- A. Casing Spacers shall be utilized to protect pipe from damage caused by being pulled through metal casing pipe and to prevent the bells from sliding and resting on the casing pipe. Refer to "Louisville Water Company Technical Specifications and Standard Drawings for Pipeline Construction 2008" Drawing 1500, Steel Casing Pipe and Casing Runners.

2. PRODUCTS

- A. Casing spacers shall provide projections around the entire circumference of the carrier pipe.
- B. Casing spacers shall be in segments for field assembly, without the need for special tools.
- C. Spacer segments shall be secured around the carrier pipe by means other than adhesives.
- D. If Casing spacers contain polymers, the polymer shall contain ultraviolet inhibitors.
- E. Casing spacers shall have a minimum compressive strength of 3000 psi.
- F. Casing spacers shall have impact strength of 1.5 ft-lbs./inch.
- G. Casing spacers shall have a dielectric strength of 800 volts/mil.
- H. Each casing spacer shall have full length, integral skids with a minimum bandwidth of 5" and a runner height of 1.95" – 2.2" for a carrier pipe diameter of 4" through 14".
- I. Each casing spacer shall have full length, integral skids, with a minimum bandwidth of 8" and a runner height of 1.95" – 2.2" for a carrier pipe diameter of 16" through 30".
- J. Casing spacers may utilize varying numbers of same size segments to comprise a wrap, around the entire circumference of the carrier pipe.

3. MANUFACTURERS

- A. Prequalified manufacturer are APS, GPT Ranger II, or approved equal.

**SECTION 33 05 09.43
TAPPING SADDLES**

1. GENERAL

- A. The Louisville Water Company has both PVC and Ductile Iron Pipe installed in the system. The Louisville Water Company has DR14 and DR18 PVC pipe that meets AWWA C900, “Standard for Polyvinyl Chloride (PVC) Pressure Pipe – 4” through 12” for Water.” Louisville Water Company infrastructure contains thickness class 54 and Pressure Class 350 Ductile Iron Pipe that meets AWWA C151. Water temperature inside the pipe will vary from 34° Fahrenheit to 90° Fahrenheit. Water pressure rating for pipe shall be: 305 PSI for DR14 PVC Pipe; 350 PSI for Ductile Iron Pipe and 235 PSI for DR18 PVC Pipe. Saddles must withstand the aforementioned service conditions.

2. PRODUCTS

- A. Materials received damaged will be returned at contractor’s expense.
- B. The straps for PVC Pipe shall be constructed of type #304 stainless steel or better and flattened to provide a wide bearing surface against the pipe. All saddles shall provide a minimum of two inches total width along the pipe’s axis for taps up to one inch in size. Taps 1 ¼” through 2” shall have a minimum of three inches total band width with full circumferential support.
- C. Service Saddles for Ductile Iron Pipe must be constructed with dual bronze straps and having 4 bolts attached with brass unitized nuts and washers in accordance with AWWA C800 & M23. Nuts shall be brass alloy per ASTM B62 and AWWA C800.
- D. The body shall be cast from certified 85-5-5-5 water works brass conforming to the latest edition of ASTM B-62 and AWWA C800.
- E. The rubber gasket shall be EPDM rubber or better and shall conform to the pipe surface and bonded in place for easy installation.

3. MANUFACTURERS

- A. Provided below is a list of prequalified manufacturers for PVC Pipe and Ductile Iron Pipe (or approved equal):

Pre-qualified Manufacturers	PVC Pipe	Ductile Iron Pipe
A.Y. McDonald	3845	3825
Ford Style	202BS	202B
Mueller	BR2S	BR2B
SmithBlair	325’S	325’S

SECTION 33 05 09.44
TAPPING SLEEVE & GATE VALVE

1. PRODUCTS

A. TAPPING SLEEVE

1. Tapping Sleeve shall meet the requirements of AWWA C223 and AWWA C500/C509 as applicable to the type of valve specified.
2. Tapping sleeve shall be a high-pressure full circumference band with a flanged (FLG) outlet. Sleeves shall have a rated minimum working pressure of 200 PSI up to and including 10-inch outlets.
3. Sleeve bodies and branches shall be 18-8 stainless steel type 304 per ASTM A240 and fully passivated for maximum corrosion protection. FLG outlets shall be the same stainless steel or ductile iron and joined to the body as one unit.
4. The branch shall contain a 3/4-inch NPT bronze or stainless steel test plug located at the 12 o'clock position, based on length of sleeve (top of sleeve) for release of air during installation and to allow for hydrostatic testing.
5. Gaskets shall provide a full circumferential seal around the body and a hydro-mechanical seal at the outlet seal and be compounded for use with potable water and shall meet or exceed the most recent edition of ASTM D2000.
6. Bolts, heavy hex nuts and washers shall be 18-8 stainless steel type 304 and treated to prevent galling.
7. Sleeves shall be delivered complete with gaskets & accessories. Sleeves must be tagged and marked indicating the size & O.D. ranges.

B. GATE VALVE

1. General Requirements:
 - i. Unless otherwise specified below, these requirements shall apply to all gate valves.
 - ii. Gate valves shall meet the requirements of AWWA C500 and AWWA C509 as applicable to the type of valve specified.
 - iii. Buried and submerged valves shall be furnished with mechanical joints and stainless steel hardware, non-rising stem design.
 - iv. Exposed valves shall be furnished with Class 250 flanged ends; provide valves outside screw and yoke. Exposed valves 16-inch and larger shall be furnished with a valve bypass.
 - v. The valve body, bonnet, and gate castings shall be constructed of ductile iron, and shall have full shell thickness according to AWWA C509, Table 2, Section 4.4.
 - vi. Rising stem valves shall be sealed with adjustable and replaceable packing; valve design must permit packing replacement under operating system pressures with only moderate leakage.
 - vii. Non-rising stem valves shall use double O-ring stem seal, except that packing shall be used where gear operators are required.

- viii. Except as otherwise specified, valves shall be rated for the following working water pressures:

Valve Size	Pressure (psig)
3-inch to 20-inch	250

- ix. All valve bodies shall be hydrostatically tested to at least twice the rated working water pressure. In addition, valves shall be seat-tested, bi-directional at the rated working pressure, with a bubble tight seal. Provide certification of testing.
- x. Flanged valves to have face-to-face dimensions per ANSI C115.
- xi. All bonnet and packing gland bolts shall be zinc or cadmium electroplated steel; packing gland bolts shall have bronze nuts.
- xii. All valves shall be marked per AWWA Standards, including name of manufacturer, valve size and working pressure, and year of manufacture.
- xiii. Valve operation shall be open right (turning clockwise). Provide permanent label showing “OPEN” and arrows.
- xiv. Valves shall be suitable for potable water service.
- xv. Gate Valves shall be Type V134 resilient seated ductile iron gate valves manufactured by Mueller, American Flow Control, or equal.
- xvi. Internal and external epoxy of valve body, including bonnet, per AWWA C550.
- xvii. Gate shall be encapsulated with synthetic rubber. It shall be bonded and vulcanized in accordance with ASTM D429 Method B.
- xviii. No recesses in valve body.
- xix. Valves shall be installed as shown on the PROJECT DRAWINGS.

2. Buried Valve Requirements

- i. Buried valves shall conform to the requirements above, except mechanical joint bell ends per AWWA C111. All exposed valve hardware (nuts, bolts, washers, etc.) including bonnet, bonnet cover, stuffing box, gear adapter, and joints shall be Type 304 stainless steel.
- ii. Stem shall be non-rising design, double O-ring seals for non-gear valves and shall incorporate packing for geared valves.
- iii. Valve shall be provided with valve box, 2-inch operating nut and extension stem and stem cover, and tee handled valve wrenches.
- iv. All valves that have mechanical joint ends shall have MJ coupled restraint joints.

**SECTION 33 05 19
DUCTILE IRON PIPE**

1. GENERAL

- A. Pipe shall be ductile iron and shall be manufactured in accordance with the latest edition of AWWA C150 and C151 and AWWA/ANSI C104/A21.4-Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for the water distribution system of the Louisville Water Company. Water temperature inside the pipe will vary from approximately 34° F to 84° F. All pipe shall be furnished with push-on joints as per the latest edition of AWWA/ANSI C151/A21.51, Sec. 51.2.6.

2. PRODUCTS

A. METAL THICKNESS REQUIRED FOR DUCTILE IRON PIPE

Size	Rated Working Pressure (Meet or Exceed)	Nominal Metal Thickness
4"	350	0.25"
6"	350	0.25"
8"	350	0.25"
10"	350	0.26"
12"	350	0.28"
14"	350	0.31"
16"	350	0.34"
20"	250	0.38"
24"	250	0.43"
30"	250	0.49"
36"	250	0.56"
48"	250	0.70"

B. SPECIFIC REQUIREMENTS

1. Certificate of Compliance: A certificate stating compliance with the latest edition of AWWA/ANSI C104/A21.4 shall be submitted with this bid. Records supporting compliance with the testing procedures and acceptance values established in the standard shall be made available upon request.
2. Louisville Water Company reserves the right to have either independent testing or its own employee evaluation present during production to verify compliance to applicable AWWA standards.
3. Coating: Pipe shall have an outside asphaltic coating approximately 1 mil thick. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and strongly adherent of the pipe. The inside shall be lined with cement mortar lining and seal coated in accordance with the latest edition of AWWA/ANSI C104/A21.4 – Standard for Cement-Mortar Linings for Ductile Iron Pipe and fittings for Water. Thickness of the cement lining shall not be less than 1/6 inch for 3 to 12 inch pipe, 3/32 inch for 14 to 24 inch pipe and 1/8 inch for 30 to 48 inch pipe. Special attention is directed to strict observance of the requirements in AWWA Standard C104, 4.11, relating to characteristic of asphaltic seal as to

deleterious effects upon quality, color, taste or odor imparted to potable water, leaching resistance and limit of toxic substances.

4. Joints:

- A. Mechanical and Push-On: Mechanical and push-on joints including accessories shall conform to ANSI/AWWA C111/A21.11.
- B. Restrained: When restrained joints are required, they shall be boltless push-on type. Boltless restrained joints shall be either U.S. Pipe and Foundry “TR Flex”, American Ductile Iron Pipe “Flex-Ring”, or equal. Restrained joint pipe shall be furnished with a factory welded retaining ring. The use of field installed retaining rings such as “Gripper Rings” and “Field Lock Gaskets” will be permitted for 12” and smaller ductile iron water main only.

5. Marking Pipe: Each length of pipe shall be clearly marked by the manufacturer identifying the name of the manufacturer, year of manufacture, identified as being ductile iron, new weight without lining, pressure rating, metal thickness or nominal thickness, casting period and nominal length of pipe.

6. Type and Class: Pipe shall be of nominal 18 ft. or 20 ft. laying lengths as per the latest edition of AWWA/ANSI C151/A21.51, free of surface defects, especially pitting, with push-on type joints and shall be furnished complete with standard rubber o-ring gaskets meeting the latest edition of AWWA/ANSI C111/A21.11- Standard for Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

3. MANUFACTURERS

A. Past accepted or used Manufacturers (or Approved Equal):

US Pipe	McWane
Griffin Pipe	Clow
American Ductile Iron	

7. All others shall submit technical specifications and affidavit of compliance that the pipe meets AWWA specifications as listed and all other Louisville Water Company specifications listed herein.

SECTION 33 05 19.01
POLYWRAP FOR WRAPPING DUCTILE IRON

1. GENERAL

A. POLYETHYLENE WRAP

1. All material supplied shall be free from defects in material and workmanship and shall meet standards as stated in this specification.
2. All polyethylene wrap shall be linear low density, 8 mil thick, Tube-Type.
3. Wrap shall be furnished in rolls appropriate to the project (no scrap pieces), non-perforated.
4. Wrap shall be tinted PMS color 299-C or LWC approved tinted blue color.
5. Product shall be in conformance with the latest edition of AWWA Standard C105/A21.5.
6. Film shall be manufactured of virgin polyethylene materials.
7. A certificate of compliance to all AWWA C105/A21.5 requirements shall be provided by the manufacturer.
8. Approved manufacturers are Hamilton Plastics, Christy's, Champion Plastics, and AA Thread.

SECTION 33 05 19.02
POLYTAPE FOR WRAPPING DUCTILE IRON

1. GENERAL

A. POLYETHYLENE TAPE

1. All material supplied shall be free from defects in material and workmanship and shall meet standards as stated in this specification.
2. The material shall have a polyethylene film backing with the following performance characteristics.
 - (1) Minimum thickness shall be 7 mils.
 - (2) Minimum tensile strength shall be 20 lbs/inch per ASTM D-1000.
 - (3) Adhesion to steel shall be a minimum of 25 oz/inch per PSTC-101.
 - (4) Adhesion to backing shall be a minimum of 25 oz/inch per PSTC-101.
 - (5) Minimum operating temperature shall be no greater than 40 degrees Fahrenheit.
 - (6) Maximum operating temperature shall be no less than 180 degrees Fahrenheit.
3. Tape shall be minimum 1.89 inches in width and yellow in color.
4. Tape shall be Polyken 809 as manufactured by Berry Global Inc. or equal.

SECTION 33 05 31.16
PVC PIPE

1. GENERAL

- A. The pipe supplied shall be Polyvinyl Chloride Pipe, cast iron O.D. base design, blue in color and manufactured in accordance with the latest edition of ANSI/AWWA C900, "AWWA standard for underground installation of Polyvinyl Chloride (PVC) Pressure Pipe and fabricated fittings, 4" through 12" for water distribution." This pipe is intended for use as municipal water pipe in the potable water distribution system of Louisville Water Company.

2. PRODUCTS

A. Certifications:

1. The manufacturer of the pipe furnished under these specifications must be listed by the Underwriters Laboratory, be approved by the Factory Mutual System and in compliance with the National Sanitation Foundation (NSF) standard number 61.
2. Certification of compliance with the latest edition of AWWA C900 with the testing procedures and acceptance values established in the standard shall be made available upon request. Each length of pipe, including the integral bell, shall be pressure tested to two times the AWWA rated pressure for a minimum of five (5) seconds.
3. Louisville Water Company reserves the right to have independent testing or an its own representative evaluation present during production to verify compliance to referenced AWWA standards.

B. Type and Class:

1. Pipe shall be of nominal 20' laying lengths. Exclusions are taken to the AWWA allowance of random lengths, length variance shall be ± 1 inch. Pipe shall have gasket bell end type joints and shall be furnished complete with gaskets in place, meeting the latest revision to ASTM F477, "Elastomeric Seals for Joining Plastic Pipe".

C. Markings:

1. Pipe shall bear identification markings that will remain legible during normal handling, storage, and installation. The markings shall be prescribed by AWWA Standards applied in a manner that will not reduce the strength of the pipe or otherwise damage it. The tapered end of the pipe shall have a fully-seated line encircling its circumference. Additional markings on the pipe shall include the following and shall be applied at intervals of not more than five feet:
 - a. Nominal size (for example, 4 in.)
 - b. PVC
 - c. Dimension Ratio (DR)
 - d. AWWA pressure class
 - e. AWWA designation number for this standard
 - f. Manufacture's name or trademark and production record code, including year of manufacture
 - g. Seal (mark) of the testing agency that verified the suitability of the pipe material for potable water service.

D. Bevel Requirements:

1. Factory-finished spigot ends must have a minimum level of 15 degrees to a maximum bevel of 22.5 degrees. The vertical face of the spigot end may not exceed 75% of pipe wall thickness and the horizontal length of the bevel shall not exceed 1.25".

3. MANUFACTURERS

A. PVC water main shall be manufactured by (or approved equal):

North American

Certainteed

Sanderson

Diamond Plastics Royal

Vulcan

National Pipe

Vinylplex

SECTION 33 05 31.26
SERVICE SLEEVES

1. GENERAL

- A. Provision of SERVICE SLEEVE for installing water service line 2-inch and smaller.
Service sleeve shall be used as a casing pipe installed prior to the installation of paved roads for the future service line (carrier pipe).

2. PRODUCTS

- A. Service sleeve shall be new Schedule 40 PVC pipe with a minimum 2-inch inside diameter.
- B. Schedule 40 PVC pipe shall be made in accordance to ASTM 1785 and ASTM 2466.
- C. Schedule 40 PVC pipe shall be gray in color.
- D. Schedule 40 PVC pipe shall be IPS.
- E. Schedule 40 PVC pipe shall be supplied in 20-ft length

SECTION 33 05 73
VALVE BOXES, LIDS, & RISERS

1. PRODUCTS

A. LWC Valve Boxes

- i. LWC Valve boxes are a unit and shall be delivered as a valve box set.
- ii. The units must conform to the enclosed drawings.
- iii. Contractor will be required to create molds for the valve boxes.
- iv. The casting shall be cast iron conforming to the latest editions of ANSI/AWWA A21.10/C110; ASTM 126, Class B; or ASTM A48, Class 30.
- v. The casting shall be uniform, smooth and free of burrs, spurs and cracks.
- vi. The thickness and dimensions shall conform to the attached drawings.
- vii. The coating for general use under normal conditions shall be a petroleum-asphaltic coating approximately 1 mil thick. The coating shall be applied to the entire external portions of the unit.
- viii. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and strongly adherent to the casting.
- ix. The weight of each complete unit shall be a minimum of seventy (70) pounds.
- x. Drawings are included in the bid package for clarification and measurement purposes. All units must conform to the enclosed drawings.

B. County 5 1/4-inch Valve Box Lids & Risers

- i. The Lids and Risers furnished under this bid must be interchangeable with the Tyler Union
- ii. Two Piece 5 1/4" shaft valve boxes marked "Water".
- iii. The casting shall be cast iron conforming to the latest editions of ANSI/AWWA A21.10/C110; ASTM 126, Class B; or ASTM A48, Class 30.
- iv. The casting shall be uniform, smooth and free of burrs, spurs and cracks.
- v. The coating for general use under normal conditions shall be a petroleum-asphaltic coating approximately 1 mil thick. The coating shall be applied to the entire external portions of the unit.
- vi. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and strongly adherent to the casting.

2. MANUFACTURERS

- A. Preapproved manufacturers for LWC Valve Boxes are Sigma Corporation, Russell Pipe or General Foundries.
- B. Preapproved manufacturers for County 5 1/4" Valve Box Lids & Risers are Sigma Corporation, Russell Pipe, Star Pipe, Tyler Union or General Foundries.

SECTION 33 05 73.01
PLASTIC METER VAULTS & EXTENSION RINGS

1. PRODUCTS

- A. Meter vaults and elevator rings shall be designed to support a vertical 20,000 pound axial load equally distributed around the rim while freestanding (without horizontal support) on a flat surface with a maximum deflection of less than or equal to 0.5 inches.
- B. The vaults shall be designed to a minimum pipe stiffness of four (4) PSI. The pipe stiffness shall be tested in accordance with ASTM D2412.
- C. Meter vaults shall not develop environmental stress cracking or be subject to deformation, sagging, or degradation in any manner while in storage or in underground applications.
- D. Meter vaults shall be resistant to moisture and both acid and alkaline conditions.
- E. Meter vaults shall be suitable to be stored outside and withstand ultra violet (U.V.) radiation and all weather conditions with temperatures ranging from -30° (degrees) to 140° (degrees) Fahrenheit.
- F. The small meter vault weight shall not exceed 50 lbs. and the large meter vault weight shall not exceed 80 lbs. Meter vaults shall not be corrugated.
- G. The small meter vault shall have an inside diameter range of 19.50” to 20.30” at the top of the vault and shall be 19.0” on the bottom of the vault.
- H. The large meter vault shall have an inside diameter range of 35.50” to 36.25”.
- I. Manufacturer’s data showing inside diameter, outside diameter, length, pipe stiffness (testing according to ASTM D2412), section modules, vertical load carried at 0.25 inch deflection of pipe shall be provided upon request. Certified test data showing compliance with the strength requirements of this specification shall be provided upon request.
- J. The interior surface area shall be of white color for reflective purposes.
- K. There shall be 2 mouse holes measuring 3” wide X 4” tall 180 degrees opposite each other at bottom of vault.
- L. Elevator rings must be compatible with the manufacturer’s own vault and with pre-qualified manufacturer’s vaults listed.
- M. Sizes of elevator rings for the 20 x 36 vault shall be 4”, 6”, 8”. A 22-degree sloped model shall also be provided. The size provided for the 36 x 36 vault shall be 3”.
- N. Average Thermal Resistance “R” per specimen thickness shall be no less than 0.150 (Hr.ft².degF)/BTU.

2. MANUFACTURERS

- A. The following are Pre-qualified:
 - i. Oldcastle Precast: Item #00202032, body HW0020-36 Blk/Wht, 2MH, SW, LVILLE
 - ii. Oldcastle Precast: Item #00362003 0036-36 B Body B-W 2 MsHI
 - iii. Bingham & Taylor: Item # MMP2036 – Diameter 20-inch, Depth 36-inch
 - iv. Bingham & Taylor: Item # PMP3636 – Diameter 36-inch, Depth 36-inch

SECTION 33 05 73.02
METER SETTERS

1. GENERAL

- A. The 1 1/2-inch and 2-inch Meter Setters with 1-inch bypass to be furnished shall be manufactured in accordance with these specifications and the standards of the water service industry for potable water service installation.
- B. The setter assemblies shall have dimensions in compliance with the attached drawings.
- C. These setters shall be utilized in the potable water distribution system of Louisville Water Company; water temperature will vary from 34- F to 90- F, with a maximum working water pressure of 125 psi.

2. PRODUCTS

A. General Assembly and Shipment

- 1. Copper Tubing: The copper tubing shall be soft copper, Type K in all sizes and shall conform to the latest edition of AWWA C800 A.2, ASTM B88 and B88M.
- 2. Fittings: The fittings shall be in accordance with the latest edition of AWWA C800 and ASTM B88 with joints as described in the attached drawing (see pages DR-1 and DR-2).
- 3. Solder connections shall be lead-free and suitable for standard copper tubing.
- 4. Threaded connections shall be standard iron pipe threads.
- 5. Meter flanges shall be standard 1 1/2 and 2-inch with support brackets and contain either EPDM or better rubber gaskets with 5/8-inch holes in wings for meter bolts.
- 6. Meter assembly bottom support spreaders shall be copper.
- 7. Each setter shall be packaged complete with all components and gaskets and shall be partially assembled into the following components:

(1) 1 1/2-INCH METER SETTER

- (a) Two (2) 90° ell with yoke bar and eye (1 1/2 -inch solder x 1 1/2-inch male thread with female compression coupling)
- (b) Four (4) adapters (1 1/2 -inch solder x 1 1/2 -inch male thread or compression)
- (c) Two (2) tees (1 1/2—inch x 1 1/2-inch x 1-inch thread)
- (d) One (1) 1 1/2 -inch angle meter valve with padlock wings on inverted key and support brackets on meter flange (1 1/2 female thread on 1 1/2 meter flange).
- (e) One (1) 1 1/2 -inch angle check valve with support brackets on meter flange (1 1/2 -inch female thread on 1 1/2-inch meter flange).
- (f) Two (2) 1-inch angle meter valves on bypass with padlock wings on inverted key and a 1-inch meter coupling nut (1 -inch female thread x 1-inch female thread).
- (g) Four (4) adapters on bypass (1-inch male thread x 1-inch solder).

(2) 2-INCH METER SETTER

- (a) Two (2) 90° ell with yoke bar and eye (2-inch solder x 2-inch male thread with female compression coupling).
- (b) Four (4) adapters (2-inch solder x 2-inch male thread or compression).
- (c) Two (2) tees (2-inch x 2-inch x 1-inch thread)
- (d) One (1) 2-inch angle meter valve with padlock wings on inverted key and support brackets on meter flange (female thread on meter flange).
- (e) One (1) 2-inch angle check valve with support brackets on meter flange (female thread on meter flange).

- (f) Two (2) 1-inch angle meter valves on bypass with padlock wings on inverted key and a 1-inch meter coupling nut (1-inch female thread x 1-inch female thread).
- (g) Four (4) adapters on bypass (1-inch male thread x 1-inch solder).

3. MANUFACTURERS

A. The following are pre-qualified models. All other models must be pre-approved by the Project Manager.

- 1. 1-1/2-inch Meter Setter
 - (1) Ford VFH 66
 - (2) A.Y. McDonald 20R621WDFE 664
 - (3) Mueller

- 2. 2-inch Meter Setter
 - (1) Ford VFH 77
 - (2) A.Y. McDonald 20R721WDFE 774
 - (3) Mueller

SECTION 33 05 73.03
PIPE REPAIR SLEEVES

1. GENERAL

- A. Stainless Steel Bands - Shall be of flexible stainless steel. Consist of one or more sections. Made of #304 stainless steel per ASTM A240, minimum 20 gauge. Bands shall have applicable outside diameter (O.D.) ranges adhered to the band in the form of a stamp or label, for easy identification.

2. PRODUCTS

- A. Lugs - Shall be made of high-strength ductile iron. Designed so there is no interference between lug fingers and wrench room used to tighten the nuts.
- B. Bolts and Nuts - Shall be #304 stainless steel with rolled NC threads and treated to prevent galling. Nuts shall be #304 stainless steel, heavy hexagon head.
- C. Bolt Length - On the 4, 6 and 8 inch sleeves, the center bolt shall be 1 ½ inch longer than the standard 6 7/8 inches (shall be minimum of 8 3/8 inch). On the larger sleeves, the center bolt shall be 2 inches longer than the standard 7 inches (shall be a minimum of 9 inches).
- D. Gaskets - Shall be engineered of a rubber compound suitable for potable water. Must be gridded and overlapping to ensure adequate seal. Must meet or exceed ASTM D2000. Must be free of excessive adhesive, which could interfere with the seal.
- E. Band Lengths - Sleeves 12 inch and smaller shall be single band not less than 12 inches in length, with a five (5) bolt lug pattern. Sleeves 16 inch shall be double band and not be less than fifteen (15) inches in length with a six (6) bolt lug pattern. Sleeves 20 inch and larger shall be double band not less than 24 inches in length, with a ten (10) bolt lug pattern.

SECTION 33 05 73.04
FRAMES, RISERS, AND MONITOR CASTINGS

1. GENERAL

- A. All castings for water meter vaults shall be iron-cast gray iron per ASTM A48, Class 25 or ductile iron with a minimum tensile strength of 25,000 pounds.
- B. All castings shall be painted with one coat of black asphaltic material, or electrostatically applied epoxy paint. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the casting.
- C. Monitor castings shall consist of a flange and ring.
- D. Hooks, bolts, and nuts for elevator/ riser rings for J-hook style shall be brass or bronze and installed in the frames prior to delivery. Hooks must be capable of bending to a minimum deflection of 90 degrees in any direction without breaking or cracking.
- E. Hex-head bolts and nuts for risers shall be carbon steel and meet ASTM 325 Type 1.

2. PRODUCTS

A. Workmanship

- 1. Inside lip of the frame must be void free with a clean, uniform, smooth, machined like finish.
- 2. The surface of the casting shall be free of adhering sand, scale, cracks, and hot tears as determined by visual inspections.
- 3. No repairing by plugging and welding will be accepted.
- 4. All frames shall be smooth and free of burrs and sharp edges.

B. Dimensions

- 1. Dimensions shall be in accordance with the attached drawings 5102, 5103, 5103B, 5104, 5105, and 5106. A tolerance of 1/16" will be allowable on all physical dimensions except brass hook anchor hole with a 1/32" + only (not less) on risers.

C. Performance Standards

- 1. Small frames (light) must be interchangeable with Ford Meter Box Co., model C3.
- 2. Small frames (heavy) must be interchangeable with Ford Meter Box model C3H.
- 3. Risers furnished under this bid shall work with Ford Meter Box Co. small frames model C3, C3H, Meter Box Covers MC-36, and Bingham and Taylor's BTC-3 and BTC-3H.
- 4. Risers for monitor castings shall work with Ford Meter Box model RR-11.
- 5. Monitor rings must be interchangeable with Ford Meter Box model RR-11.
- 6. A minimum weight load capacity certification shall be provided from an independent engineering testing company (written in English). Materials shall be capable of withstanding a minimum weight load capacity in accordance with AASHTO M306 testing standards. The proof loads shall be 20,000 pounds for heavy frames, monitor castings, and elevator/riser rings and 7,500 pounds for light frames.
- 7. Failure to meet minimum proof loads listed will be cause for immediate rejection.

3. MANUFACTURES

A. The castings shall be from the following manufacturers or approved equal:

- Ford Meter Box
- General Foundries
- Bingham and Taylor
- Vestal Industries

**SECTION 33 05 81
ALUMINUM HATCHES**

1. PRODUCTS

- A. Hatch shall have an H-20 load capacity to handle vehicular traffic.
- B. Hatch channel frame and door panel must be made of ¼" aluminum diamond plate.
- C. Hatch channel frame must be 6" in depth to mount flush, top and bottom, when installing a 6" concrete slab top.
- D. Hatch must be equipped with a #304 stainless steel hold open arm and release mechanism to secure the door once it is opened.
- E. Top of hatch door must close flush with the top of the frame.
- F. Hatch door must open at 90° (degrees).
- G. All hinges and fastening hardware shall be #304 stainless steel.
- H. Unit shall lock using a #304 stainless steel slam lock with removable key wrench that will be provided with each hatch.
- I. Hatch shall have a 1 ½" drain hole located inside the channel frame. Any re-enforcement shall not protrude outside of the exterior rectangular frame.
- J. Hatch shall come equipped with a #304 stainless steel compression spring to counter balance the door weight and resist downward pressure while being closed.
- K. Hatch shall come equipped with a recessed #304 stainless steel or better handle to assist in opening and closing the door. The top of the handle shall be recessed a minimum of ½" below the top surface of the hatch.
- L. Louisville Water Company standard frame opening size will be 30" x 36".
- M. Hatch Lid shall have four (4) spaces with 4" diameter clearance from any re-enforcement to allow four (4) holes to be drilled by others, of 4" in diameter at locations determined by the manufacturer. Locations shall not interfere with the loading design capacity.

2. MANUFACTURES

- A. The hatches shall be from the following manufacturers or approved equal:
 - USF Fabrication
 - EJ USA
 - Cierra/Babcock-Davis
 - Halliday

40 05 00 - COMMON WORK RESULTS FOR PROCESS INTERCONNECTIONS
SECTION 40 05 17
COPPER TUBING

1. PRODUCTS

- A. A Purchase Order number must appear on all bills of lading and invoices.
- B. Copper shall be Type K soft, free from defects, pinholes, kinks, and shall be rounded.
- C. The material supplied shall be in conformance with the latest edition of the AWWA C800 Standard, ASTM B88 and B88M.

2. MANUFACTURERS

- A. The prequalified manufactures are as follows or approved equal:
 - 1. Cerro
 - 2. Mueller
 - 3. Weiland
 - 4. Howell
 - 5. Great Lakes

SECTION 40 05 61.23
SWING CHECK VALVES

1. GENERAL

- A. The swing check valves shall have a cast iron or ductile iron body and cover. The cast iron shall equal or exceed the requirements of ASTM A-126, Class B with a tensile strength greater than 31,000 PSI. Ductile iron shall conform to ASTM A-395 or ASTM A-536.

2. PRODUCTS

- A. Swing check valves must be certified for use in drinking water in accordance with NSF/ANSI 61 and are Certified Lead-Free per NSF/ANSI 372. Every valve is to be tested in accordance with and is certified to AWWA C508.
- B. The valve shall have a ductile iron or stainless steel clapper disc certified for use in drinking water in accordance with NSF/ANSI 61 and are Certified Lead-Free per NSF/ANSI 372. The clapper shall open fully to provide a net flow not less than the nominal pipe area. The disc shall bear against a stop in the full open position located to withstand impact or flow pressure which might damage the disc and related parts.
- C. The clapper disc shall have a composition disc seating surface of EPDM rubber or better, conforming to the requirements of AWWA C508.
- D. The hinge pin shall be of stainless steel and provide free rotation of the clapper disc.
- E. The machined seat ring shall screw into the valve body and provide a uniform seating surface for the clapper.
- F. All internal parts shall be readily accessible through the valve cover.
- G. Cover and flange nuts and bolts shall be type #304 stainless steel.
- H. Cover and flange gaskets shall be EPDM or BUNA-N rubber, 1/8 inch thick and of uniform dimensions, conforming to the requirements of AWWA C508.
- I. The ends shall be flanged and shall conform in dimensions and drilling to ANSI B16.1, Class 125.
- J. The valves shall conform to all applicable requirements of AWWA C508, "Standard for Swing Check Valves for Waterworks Service, 2 inch through 24 inch NPS and NSF/ANSI 61 and are Certified Lead-Free per NSF/ANSI 372."
- K. The coating furnished shall be suitable for potable water service and shall conform to AWWA C550, "Protective Internal Coatings for Valves and Hydrants."
- L. All internal and external surfaces except finished or bearing surfaces shall be shop cleaned and coated in accordance with this specification and applicable Steel Structures Painting Council specifications (SSPC).
- M. The surface shall be free of irregularities, burrs and sharp or rough edges prior to the application of the coating.
- N. Surface preparations for fusion bonded epoxy coating system shall conform with SSPC SP10, "White Metal Blast Cleaning." The fusion bonded epoxy coating shall be suitable for ferrous and non-ferrous metals subject to chemical corrosion and/or physical abrasion. Preheat and cure requirements of the manufacturer shall be observed. Dry powder shall be spray applied uniformly to achieve a minimum final dry film thickness of 8 mils.
- O. The selected coating system specifications shall be submitted for approval. A light clear color shall be used to enhance inspection.
- P. All swing check valves shall be guaranteed against defects in materials and workmanship for a period of one (1) year from date of shipment. Parts to replace those in which a defect has developed within such period will be supplied without charge, piece for piece, upon proper proof of defect.
- Q. Swing check valves shall be guaranteed to operate under a working pressure of 150 PSI, without leakage or damage to any parts. Valves shall be factory tested at 350 PSI.

- R. The valve body and cover shall be hydrostatically tested to withstand 350 PSI. No leakage through the body joints shall occur for one (1) minute.
- S. Seat and disc closure shall be hydrostatically tested to withstand 175 PSI differential pressure against the outlet end. Maximum permissible leakage shall be one (1) fluid ounce per hour per inch of nominal valve size.
- T. The valve casting shall have cast markings or a permanently affixed nameplate identifying the manufacturer, valve size, working pressure, flow directions (arrow) and year of manufacture.

**SECTION 40 05 61.24
FLAT FACED FLANGED SPOOL PIECES**

1. GENERAL

- A. All steel pipe and fittings listed in Section 2 Paragraph A1 and Section 3 Paragraph A, below shall conform to the requirements of the latest editions of the following AWWA specifications:

C-800- C200	Steel water pipe 6” and larger
C-207	Steel pipe flanges
C-210	Liquid epoxy coating systems for interior and exterior of steel water pipelines.

2. PRODUCTS

- A. All Spool pieces must have flat faced flanges.
 B. Description – Large Meter By-Pass and Test Spools
 Steel flanged spool with one (1) 2” female Standard Iron Pipe (FIP)) threaded steel outlet. (Weldolets) Outlets will be installed between flanged eyelets to allow suitable clearance so that nuts and bolts may be inserted through the flanges.

Nominal Lengths

Nominal Size	Length
3 Inch	7 Inch
4 Inch	7 Inch
6 Inch	7 ½ Inch
8 Inch	8 Inch

- C. Description- Large Meter By-Pass Spools
 Steel flanged spool with two (2) 2” female Standard Iron Pipe (FIP) threaded Steel outlet. (Weldolets) Outlets will be installed between flanged eyelets to allow suitable clearance so that nuts and bolts may be inserted through the flanges. Outlets shall be spaced 180⁰ apart.

Nominal Lengths

D. Nominal E. Size	Length
F. 3 Inch	7 Inch
G. 4 Inch	7 Inch
H. 6 Inch	7 ½ Inch
I. 8 Inch	8 Inch

D. Pipe

Pipe shall be Schedule 40 black and shall meet or exceed the latest edition of AWWA standards as follows:

AWWA	C-200	Steel Pipe
ASTM	A120	Welded Steel
AWWA	C-800	Service Lines

E. Preparations of the Ends

The ends shall be plain end and fitted with flat faced flanges and shall conform to and tested with the latest edition of AWWA Standard C-200 “Steel Water Pipe”.

Steel Weldolet With Female Standard Iron Pipe Thread (FIP)

Schedule	40
End Preparations	Threaded Female Outlets
Strength Requirements	Conform to latest editions of ANSI B16.9, B16.11, ASTM A-105

F. Flanges

1. Flanges shall be flat faced AWWA Standard steel hub slip-on conforming with the latest edition of AWWA Standard C-207 – “Steel Pipe Flanges For Water Works Service – Sizes 4 inch through 144 inch”.
2. Materials shall conform to the latest edition of AWWA Standard C-207, Section 4.
3. The dimensions and drilling shall conform with the latest edition of AWWA Standard C-207, Table 3, Class D.

G. Coating

1. The coating shall be high solid epoxy coating/Porter coating #7536 or equal and must conform to the latest edition of AWWA C-210 “Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines” and must be EPA approved for potable water linings.
2. The application instructions shall be in strict adherence with manufacturer’s instructions and the latest edition of AWWA Standard C-210.
3. Surface preparations shall be performed and all mill scale shall be removed prior to the application of the coating.
4. Two (2) coats shall be applied and the finished coating shall be free of holidays and pinholes and have a minimal dry film thickness of 10 to 12 mils.
5. Threaded flanges shall be cleaned and with no obstruction to the threads.

H. Attachment of Weldolet

1. The pipe of depth and tap drill size shall be in compliance with the attached sheet Standard Drawing #9004 Weldolet Fitting.
2. The weld fillet shall conform to the latest edition of AWWA Standard C-200, "Steel Water Pipe".

I. Welded Joints

1. The manufacturer shall be responsible for the quality of all work performed by his organization and meet the latest edition of the standard qualification procedure of the American Welding Society and the latest edition of AWWA C-207.

J. Handling

1. Handling and shipping shall be in compliance with the latest edition of AWWA C-200, "Steel Water Pipe".
2. Finished spools shall be stacked on pallets with sufficient spacers or pads to prevent damage to the spool pieces and/or the coatings.
3. Spool pieces showing chips or abrasions will be rejected. The contractor at his expense shall replace or recondition each rejected section.

SECTION 40 05 61.25
MJ RESTRAINED JOINT ADAPTERS

1. GENERAL

- A. A compact, bolt through, Mechanical Joint (MJ) Restrained Adapter designed to connect MJ valves to MJ fittings, or MJ fittings to other MJ fittings at a linear distance not to exceed one and one-half inches shall be provided. The design of the restraint shall be such that it can replace the piece of pipe commonly needed to join an MJ fitting to another MJ fitting or valve. The restraint shall be designed to eliminate the need for MJ glands and rubbers.

2. PRODUCTS

- A. Restrained Adapter shall be an integral casting, i.e. no welds and made of ductile iron conforming to ASTM A80-55-06 and rated at 350 psi
- B. Restrained Adapter shall be supplied with NSF 61, 5-mil fusion bonded epoxy coating conforming to AWWA C116/A21.16-09 as well as the coating, surface preparation and application requirements of ANSI/ AWWA C550.
- C. The same design of Restrained Adapter shall be available in sizes 4" to 20". Restrained Adapter and accessories (MJ gaskets, nuts and bolts) shall be packaged in one (1) box.
- D. Mechanical Joint gasket shall be Styrene Butadine Rubber (SBR) or approved equal.
- E. Bolts shall be weathering steel (Corten). Nuts shall be SAE Grade 2 steel with black oxide coating. For restraint sizes 4" to 8", bolt length shall be 5". For restraint size 12" to 20", bolt length shall be 6".

3. MANUFACTURERS

- A. Restrained Joint Adapters shall be Star Pipe Series 100 MJ, Foster Adapter by In Fact, or approved equal.

**SECTION 40 05 61.26
BELL JOINT CLAMPS**

1. PRODUCTS

- A. The joint clamp must be designed to fit pipe and fittings with a spigot end OD range of 50.3 to 51.98 inches and with a bell face height up to 5.00 inches.
- B. The joint clamp design must fit and function properly on all classes of both the Dennis Long Company and AWWA standard PIT cast iron pipe, as well as American Standard specifications (ASA) for lead joint cast iron pipe and fittings.
- C. Joint clamps shall have a working pressure rating of 150 psi minimum.
- D. Clamps must be ductile iron and shall have asphaltic coating of approximately 1 mil thick. All bolts must be low alloy Cor-ten and all thread.
- E. Rubber gaskets must not require additional fasteners or restraints to remain securely attached to clamps during assembly. Gaskets shall be made from NBR or EPDM.
- F. Each Bell Joint Clamp provided by the manufacturer shall be packaged and contain all the necessary parts and materials required to install the bell joint clamp on the pipe.
- G. Hex head bolts shall be 1 3/4" - 2" wrench size and be able to accommodate standard air/impact tools and sockets for these sizes. Hex head nuts shall be 1 3/4" wrench size and be able to accommodate standard air/impact tools and sockets for this size. In no case shall the head thickness of a bolt or nut compromise LWC's ability to fasten and tighten bolts for the clamps using impact sockets tools.
- H. The joint clamp shall allow reasonable room for impact socket thickness to ensure standard air impact tools can easily access bolts and nuts on clamps, in a manner that allows standard air/impact tools to assemble, disassemble, tighten or loosen bell joints clamps.
- I. The joint clamp shall be NSF 61 certified.
- J. Clamp shall include the following standard items:
 - a. Standard Hook Assembly
 - b. Body Segment
 - c. Shoe
 - d. Gasket

2. MANUFACTURERS

- A. Clamp shall be proportionally designed for 48" pipe and supplied as Romac bell joint leak clamp 416 BJLC or approved equal.

SECTION 40 05 61.27
DUCTILE IRON PIPE RESTRAINED JOINT GASKETS

1. GENERAL

- A. The restrained joint gaskets shall be designed for use on Louisville Water Company ductile iron pipe meeting the specifications herein "33 05 19 Ductile Iron Pipe".

2. PRODUCTS

- A. The gaskets shall be used in pressurized ductile iron to prevent the joints from separating due to thrust forces.
- B. The gaskets shall be pressure rated to the pressure class of the pipe and fittings. Restrained joint gaskets for pipe 4" to 24" shall have a minimum pressure rating of 250 PSI.
- C. The gaskets shall conform to the latest edition of the AWWA/ANSI C111/A21.11.
- D. The rubber shall be made of EPDM or SBR.

SECTION 40 05 61.28
RESTRAINT JOINT CLAMPS

1. GENERAL

- A. Mechanical joint restraint shall include a restraining mechanism which, when actuated, imparts wedging against the entire circumference of the pipe, increasing its resistance as the pressure increases. Mechanical joint restraints utilizing set screws are not approved for sizes 4" to 12".

2. PRODUCTS

- A. Glands shall be manufactured of ductile iron conforming to the latest edition of ASTM A536.
- B. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. They shall have a working pressure of at least 250 PSI with a minimum safety factor of 2:1.
- C. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts, conforming to the latest editions of ANSI/AWWA A21.11 and C153/A21.53.
- D. Restraint joint clamps from 4" to 12" shall fit both PVC and Ductile Iron Pipe.
- E. Restraint joint clamps from 16" or larger shall fit only Ductile Iron pipe.
- F. Mechanical joint restraint shall include a restraining mechanism which, when actuated, imparts wedging against the pipe, increasing its resistance as the pressure increases.

3. MANUFACTURERS

- A. Prequalified manufactures for Restraint Joint Clamps (or approved equal) are:
 - (1) Romac
 - (2) Star
 - (3) Ford grip rings (for Ductile Iron Pipe 4"-24")
 - (4) Ebba Iron
 - (5) Sigma

SECTION 40 05 61.29
DUCTILE IRON FITTINGS

1. GENERAL

A. Submit shop drawings

1. Include all fittings, bends, outlets, restrained joints, tees, special deflection bells, adapters, solid sleeves and specials.
2. Include manufacturer's drawings and specifications providing complete details of all items.
3. All other pertinent information for all items to be furnished; product data to show compliance of all couplings, supports, fittings, coatings and related items.

B. Submit the name of the fitting suppliers.

C. Submit Catalog cuts and installation instructions for boltless restrained joint pipe, and mechanically restrained and flanged connections to valves and fittings.

D. If mechanical coupling system is used, submit piping, fittings, and appurtenant items which will be utilized to meet system requirements.

E. Submit Certification that all bolts to be furnished conform to referenced standards.

F. Submit information on all warranties.

2. PRODUCTS

A. Fittings

1. General

(1) Pipe fittings shall be ductile iron and meet the requirements of ANSI/AWWA C110/A21.10 or AWWA C153/A21.53.

(2) Fittings shall have the same pressure rating, as a minimum, of the connecting pipe. Minimum pressure rating is 350psi for 20-inch diameter and smaller.

(3) Fittings shall be provided with the same joints and couplings that match the pipe restraining method.

(a) Push On Joints

(i) Mechanical Joint Fittings (and Valves)

(ii) 4"-12" Utilize Romac Gripper Glands or Bolt-Through Restraint (e.g. Foster Adapters)

(iii) 16"-20" Utilize EBAA Iron MegaLug

(b) Boltless Restrained Joints

(i) 20" and Smaller: Mechanical Joint Fittings, or Boltless Restrained Fittings (same manufacturer as pipe), or Friction type restrained glands such as Megalug, or Mechanical Joint Coupled End Joint

(ii) For >20": Boltless Restrained Fittings (same manufacturer as pipe). The use of friction type restrained joints such as Megalugs shall not be allowed for piping greater than 20-inch diameter. Valves may be either Boltless Restrained or Mechanical Joint Coupled End Joint with 316 stainless steel bolts.

(c) Flanged Joints = AWWA Flanged Joint Fittings

(4) Closures shall be made with restrained mechanical joint ductile iron solid sleeves.

B. Couplings

1. General

(1) Couplings shall meet and be similar to pipeline restraining system.

(2) Couplings shall be manufactured for potable water use using standard materials meeting NSF 61 and 372 and AWWA standards.

(3) Provide restraining tabs, eyelets or the like where necessary.

(4) Couplings shall be from reputable potable water manufactures such as EBAA Iron, Romac, Smith-Blair, Krausz, Dresser, and Ford Meter Box.

2. Restrained Flange Adapters

(1) Ductile Iron – ASTM A536, Grade 65-45-12

(2) Flanged – ASME/ANSI B16.1, Class 125; match pipe system

- (3) Allowable joint deflection of 5-degrees
 - (4) Fully restrained with tie-rods/gussets to limit movement after installation
 - (5) Minimum of six (6) restraining T-bolts and nuts made of high strength low alloy steel, coarse thread meeting AWWA C111.
 - (6) Wedges acceptable; No set-screws allowed
 - (7) Fusion-bonded NSF 61 epoxy coating, interior and exterior
 - (8) Romac Restrained Flanged Coupling Adapter (RFCA), Smith Blair Style 911/912 Flange-Lock Restrained FCA, Dresser Style 127 (restrained), or approved equal
3. Restrained Dismantling Joint
- (1) Compatible with flanged fittings
 - (2) Adjustable length of at least 2.5 inches
 - (3) Allowable deflection of a minimum of 1.5 degrees
 - (4) Ductile Iron – ASTM A536, Grade 65-45-12
 - (5) Flanged – ASME/ANSI B16.1, Class 125; match pipe system
 - (6) Restrained with tie-rods to limit movement after installation
 - (7) Minimum of four (4) restraining T-bolts and nuts made of high strength low alloy steel, coarse thread meeting AWWA C111.
 - (8) Fusion-bonded NSF 61 epoxy coating, interior and exterior
 - (9) Romac DJ400 or approved equal
4. Dresser Style Couplings
- (1) Shall consist of two steel follower rings, two resilient gaskets, one steel middle ring, EPDM rubber wedge, and a set of steel follower trackhead bolts.
 - (2) Steel to Steel – prepare ends per manufacturer’s recommendations
 - (3) Externally restrained / rodded (stainless steel)
 - (4) Romac 501 or approved equivalent
5. MegaLug
- (1) MegaLug by EBAA Iron or approved equal
 - (2) Fusion bonded epoxy
 - (3) Domestic Iron
6. Restrained Transition Couplings – (steel vault to ductile iron water main)
- (1) Restrained couplings Typically used to join steel pipe (e.g. from vault) to ductile iron pipe water main.
 - (2) Insulating Coupling with separate insulated restraining rods system including rod sleeves, isolation washer/hardware kit.
 - (3) Style shall be from steel pipe size to ductile iron pipe size.
 - (4) Coupling shall have factory fusion-bonded epoxy coating or approved equal.
 - (5) The restraints or double end rods and nuts shall be manufactured of stainless steel nuts and bolts or have a factory-applied corrosion-resistant coating.
 - (6) Coupling shall incorporate dissimilar metals insulating boot and gasket kit including isolation sleeves for tie-rods.
 - (7) The couplings shall be insulating couplings with insulated restraining rods from vault to pipe.

C. CORROSION PROTECTION

1. Interior Coatings

- (1) Ductile iron fittings shall have a cement mortar lining and seal coat in accordance with AWWA C104/A21.4.
- (2) Fittings
 - (a) Buried fittings may be either factory fusion-bonded epoxy coated per AWWA C550, or cement mortar lined seal coat in accordance with AWWA C104/A21.4. Lining shall be NSF 61 certified.

D. GASKETS

1. General Materials

- (1) All gasket materials shall comply with Table 5-1 of AWWA M-41 and per AWWA C110, C111, and C115
- (2) Rubber-gasket joints shall conform to AWWA C111
- (3) Gaskets shall have proven performance in the potable water industry for resistance to chlorinated and chloraminated water systems.
- (4) Generally EPDM material shall be used for all pipes, fittings and valves.
- (5) Gaskets shall be supplied by the pipe or fitting manufacturer.
- (6) Comply with applicable joint type and pressure rating of the pipe system.

2. Push-On Joints:

- (1) EPDM material
- (2) Nitrile (NBR) shall be used within 200 feet of any buried underground petroleum storage tank
- (3) "Joint Restraint"
 - (a) Shall be used minimum within 200 feet of any facility such as a tank, pump station or control valve vault (e.g. PRV) or as shown on plans for pipe sizes <16-inches.
 - (b) US Pipe Field-Lok, or American Fast-Grip, or approved equal.

3. Flanged Joints

- (1) Gaskets shall be full face
- (2) Pre-punched holes
- (3) Minimum 1/8" thick
- (4) EPDM or Viton material
- (5) Special pressure rated for 350psi such as US Pipe "Flange-Tyte" or American "Toruseal" or approved equal.

4. Flange Isolation Kits

- (1) Isolating and Sealing Gasket
 - (a) One full faced isolating and sealing gasket, LineBacker Type "E", 1/8" thick, G-10 retainer containing a precision tapered groove to accommodate the controlled compression of a Teflon (or Viton) quad-ring sealing element. Sealing element placement shall accommodate either flat, raised face or RTJ flanges. The quad-ring seal shall be pressure energized. The G-10 retainer shall have a 550 volts/mil dielectric strength and a minimum 50,000 psi compressive strength. The full faced flange isolating gasket shall be 1/8" less in I.D. than the I.D. of the flange in which it is installed.
- (2) Full Length Bolt Isolating Sleeves
 - (a) One full length G-10 sleeve (extending half way into both steel washers) for each flange bolt. The G-10 shall be a 1/32 inch thick tube with a 400 volts/mil dielectric strength and water absorption of 0.10% or less.
- (3) Washers
 - (a) Two, 1/8 inch thick, G-10 isolating washers for each bolt. Their compressive strength shall be 50,000 psi, dielectric strength 550 volts/mil and water absorption of 0.10% or less. Two, 1/8 inch thick zinc plated, hot rolled steel washers for each bolt. The I.D. of all washers shall fit over the isolating sleeve and both the steel and isolating washers shall have a same I.D. and O.D.

**SECTION 40 05 61.30
REPAIR COUPLING AND GASKETS**

1. GENERAL

A. Center Ring, End Ring and Gaskets

1. Standard couplings shall have the ability to be used as a straight coupling as well as a transition coupling.

2. PRODUCT

- A. Couplings shall be ductile iron per ASTM A536 or greater and shall be shop coated for protection during shipment and storage. Ends must have a smooth inside taper for uniform gasket seal. The 4, 6 and 8 inch couplings shall have a center ring length of a minimum of five (5) inches. The 10-12 inch couplings shall have a center ring length of minimum of six (6) inches. The 14-16 inch and larger couplings shall have a center ring length of a minimum of seven (7) inches.
- B. Center rings shall have applicable outside diameter (O.D.) ranges posted on the barrel for easy identification. This may be in the form of stamp or adhered label.
- C. Gaskets shall be sized to fit standard cast and ductile iron pipe and shall be engineered of rubber compound suitable for potable water lines per ASTM D2000. Gaskets must have the size embossed for easy identification.
- D. Transition Rings and Gaskets
 - (a) Transition rings and gaskets must be sized to be used with repair couplings to provide transition in outside diameter (O.D.) ranges from standard pipe to oversized pipe as indicated by outside diameter (O.D.) ranges.
- E. Bolts and Nuts
 - (a) Bolts and Nuts shall be trackhead with a heavy hexagon nut. Bolts and nuts shall be #304 stainless steel with rolled threads and treated to prevent galling.

3. MANUFACTURERS

A. Acceptable Manufacturers (or approved equal):

Ford Meter Box	Powerseal
JCM	Romac
Mueller	SmithBlair

SECTION 40 05 65.23
VALVES AND APPURTENANCES

1. GENERAL

- A. All valves furnished under this specification shall conform to the latest edition of AWWA C509 “Standard for Resilient Seat Gate Valves for Water Systems” or AWWA C515 Standard, “Reduced- Wall, Resilient-Seated Gate Valves for Water Supply”. Protective interior shall be provided meeting all requirements of the latest edition AWWA C550 Standard, “Protective Interior Coating for Valves and Fire Hydrants” (latest edition). Only ductile iron bodies will be accepted.
- B. Catalog data, net weight and certified drawings as per the latest edition of Section 4.1, 4.2, and 4.3 of AWWA C509 and/or AWWA C515 Standards (latest editions) shall be furnished with submittal.

2. PRODUCTS

- A. Resilient-seated gate valves shall conform in all respects to ANSI/AWWA C515-09 with non-rising stems, fully bronze mounted with O-ring seals. Stems shall be made of one piece as per the requirements of AWWA C509 and/or AWWA C515 Standards (Section 4, latest editions). Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship and shall conform to the latest revisions of AWWA Specification C-500. Valves shall have a rated working pressure of 250 psi, and test pressure of 500 psi and shall be opened by turning clockwise only.
- B. All internal components shall be able to withstand without damage or distortion an input torque of 50 ft-lbs. above that listed in the torque test in Section 5 of the AWWA C509 and/or AWWA C515 Standards (latest edition). All test results pertaining to Section 5 of AWWA C509 and/or AWWA C515 Standards (latest edition) shall be furnished upon request.
- C. All bonnet and packing gland nuts and bolts, and operator retainer nuts or pins shall not be less than #304 stainless steel. All bolts and fasteners shall be non-metric. Bonnets for 4” diameter gate valves shall have four (4) bolts. Bonnets for 6” – 12” diameter shall have at least six (6) bolts. Bonnets for 16” diameter and larger shall have bolts per manufacturer recommendation.
- D. All bonnet and packing gland bolts shall be zinc or cadmium electroplated steel; packing gland bolts shall have bronze nuts.
- E. Gate Valves shall be designed for buried service where groundwater may completely submerge the valve and actuator. Gate valves shall be furnished with mechanical joint end connections with stainless steel hardware T-316. The end connections shall be suitable to receive ductile iron pipe. All gate valves 24-inch and larger shall be equipped with mechanical restraint mechanisms to pipe utilizing a positive mechanical restraint such as American’s Coupling Gland Ends, or approved equal, employing stainless steel 316 bolts and nuts. No friction type restraint such as Mega lugs will be acceptable for 24-inch and larger gate valves.
- F. Wheel valves shall have flanged ends rated at 125 lbs. in accordance with AWWA C509 and/or AWWA C515 Standards (latest editions). It shall also conform to the dimensions and drillings of ANSI B16.1, class 125 or ANSI/AWWA C110/A21.10 Standards (latest editions). Wheel valves shall be handwheel operated, left hand open with an arrow symbol (← *LHO*)(left hand open) indicating direction of open. Handwheels shall be ductile iron.
- G. All gate valves supplied shall be MJ x MJ, or Flange x MJ type. The operating nut shall be ductile iron. Gate and tapping valves shall have operating nuts that are right hand open (clockwise) type and labeled for the direction of open with an arrow symbol (→

RHO)(right hand open). The operating nut locking mechanism shall be visibly centered on the stem.

- H. All valves and appurtenances shall have the name of the manufacturer, year manufactured, valve size, flow-directional arrows, and the working pressure for which they are designed cast in raised letters on some appropriate part of the body.
- I. The epoxy coating shall be fusion-bonded and shall comply with ANSI/AWWA C550 Standards (latest editions) on all internal and external surfaces of the valve body and bonnet to a minimum thickness of 10 mils.
- J. The disk shall seat in wedging fashion utilizing two guides, either integral with the body or the wedge. The disk shall be fully encapsulated with EPDM or equivalent rubber.
- K. Gate valves and tapping valves shall be supplied with a means to lift and handle each valve (i.e. cast-in-place lifting lugs or locking steel collars that attach to the stem directly under the operating nut).
- L. All valves shall packages shall include MJ Gate accessory packs, bolts and gaskets for tapping and flanged gates as required for installation. The valves shall be protected with end caps, cardboard or plastic, over each outlet to protect the coating on the interior of the valve.
- M. Contractor shall provide a certificate stating that the valve and all materials used in its construction conform to the requirements of AWWA C509 and/or AWWA C515 Standards (latest editions)..
- N. Format and location: The gate valves shall be Iron body, Resilient Seat Gate Valve as manufactured by Mueller Co., American Flow Control Series 2500, or an approved equal.
- O. The valve manufacturer shall supply and integrally mount all valve operators at the factory. The valve and operators shall be shipped as a unit.

SECTION 40 05 67.36
WATER PRESSURE REGULATORS FOR PRV

1. PRODUCT

- A. Regulators must meet requirements of ASSE Standard 1003 – “performance requirements for water pressure reducing valves”.
- B. Regulators must have an integral by-pass check valve.
- C. Regulators must have a built in strainer on regulators 1” and smaller.
- D. Regulators must have bronze bodies with sealed spring cage. Sealed spring cage shall be bronze or corrosion resistant 304 stainless steel or epoxy coated, cast iron with adjusting screw.
- E. Regulators must cover the range of 75-150 PSI and be factory set at 85 - 90 PSI. Bidders must include instructions for adjusting pressure with each regulator.
- F. ¾” Regulators shall be furnished with ¾” male meter thread ends and must meet or exceed a minimum flow capacity of 22 GPM at a 50 PSI drop below set pressure.
- G. 1” Regulators shall be furnished with 1” male meter thread ends and must meet or exceed a minimum flow capacity of 32 GPM at a 50 PSI drop below set pressure.
- H. 1 1/2” Regulators shall be furnished with 1 1/2” NPT threaded female union inlet x NPT female outlet and must meet or exceed a minimum flow capacity of 70 GPM at a 50 PSI drop below set pressure.
- I. 2” Regulators shall be furnished with 2” NPT threaded female union inlet x NPT female outlet and must meet or exceed a minimum flow capacity of 100 GPM at a 50 PSI drop below set pressure.
- J. All nuts and bolts shall be #304 stainless steel.
- K. Elastomers must be EPDM Rubber.

2. MANUFACTURERS

- G. Prequalified models are the following:
 - 1. Watts L25AUB-Z3-HR-Z6
 - 2. Wilkins 600 XL HR-SC-DM

SECTION 40 05 78.11
AIR RELEASE VACUUM VALVE

1. GENERAL

- A. Air release and vacuum valves shall be designed to control the flow of large air volumes both into and out of the pipelines to which they are connected. Valves shall be tight against leakage under a working pressure of 250 psi and shop tested at a pressure of 300 psi.

2. PRODUCTS

- A. The air release vacuum valve shall be comprised of a small orifice assembly and large orifice assembly housed in a single body. The large orifice assembly shall exhaust air from a pipeline during the initial filling of the pipeline. The large orifice assembly shall not blow shut while exhausting air, even while venting air at sonic velocity. When all air has been exhausted from the pipeline, the large orifice float ball shall be buoyed up to seat tightly against a resilient seat ring. The large orifice float ball shall remain tightly closed while the pipeline is under positive pressure. Should the pipeline pressure fall below atmospheric pressure, the large orifice float ball shall fall away from the seat ring and permit air to enter the pipeline.
- B. The small orifice assembly shall automatically release air accumulations from the pipeline while under positive pressure. When the valve body fills with air, the small orifice float ball falls to open the small orifice and exhaust the air to atmosphere. When the air has been exhausted, the small orifice float shall be buoyed up and tightly close the small orifice. There shall be no baffles, deflectors, or stems.
- C. Each valve shall be furnished with a flanged gate valve for isolation purposes.
- D. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME): B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. American Water Works Association (AWWA): C512, Standard for Air-Release, Air Vacuum, and Combination Air Valves for Waterworks Service. C550, Standard for Protective Interior Coatings for Valves and Hydrants.
- E. Air release vacuum valve shall conform to AWWA C512. The exterior of air valves shall be coated in accordance with AWWA C550. The interior of air valves shall be coated in accordance with AWWA C550. Air release vacuum valves shall be factory tested in accordance with AWWA C512. They shall be suitable for operating pressures between 3 and 250 psi for water service. They shall combine operating features of air and vacuum valve, and air release valve. The air and vacuum portion shall automatically exhaust air during filling of system and allow air to re-enter during draining or when vacuum occurs. The air release portion shall automatically exhaust entrained air that accumulates in system. The valve shall be single body or dual body with air/water inlet: NPT and Air Outlet: NPT.

3. MANUFACTURERS

- A. Acceptable manufacturers (or Approved Equal):
 - 1. A.R.I. Flow Control Accessories Ltd.; Model D-040-C, D-040-STST.
 - 2. A.R.I. Flow Control Accessories Ltd.; Models S-050-C, S-050-C-V, S-052
- B. Materials:
 - 1. Body and cover: Reinforced nylon body and stainless steel base or stainless steel body and stainless steel base.
 - 2. Base Reinforced nylon or stainless steel.
 - 3. Clamping stem, plug – Reinforced nylon
 - 4. Float – Foamed polypropylene
 - 5. Flange made of reinforced nylon/cast ductile/ ST 37

6. 2-Inch threaded male connection NPT
 7. Discharge outlet – polypropylene
- C. Design requirements:
1. Size: 2 IN.
 2. Working Pressure: 250 psi
 3. Release 10 cfm at 10 psi differential at 150 psi line pressure.
- D. Contractor shall furnish any accessories required to provide a completely operable valve.
- E. Air release vacuum valve shall be complete shop assemble unit including any interconnecting piping, speed control valves, control isolation valves and electrical components.
- F. Air release vacuum valve shall have internal epoxy coating suitable for potable water for all iron body valves in accordance with AWWA C550.
- G. Air release vacuum valve shall be shop hydrostatically tested to piping system test pressure.
- H. Contractor shall provide one (1) set of any special tools or wrenches required for operation or maintenance for each type valve.

**SECTION 40 05 81.13
FIRE HYDRANTS**

1. PRODUCTS

- A. Fire Hydrants furnished under this bid shall meet or exceed the American Water Works Association (AWWA) latest edition of Standard C502 – “Standard for Dry Barrel Fire Hydrants,” except as otherwise noted in these specifications.
- B. Hydrant inlet shall be 6” DIPS mechanical joint with accessory packs unattached to joint.
- C. Hydrants shall be supplied with black caps and gaskets having 1 ½” pentagon nut and supplied without chains.
- D. All below ground external bolts, studs and nuts (excluding MJ Bolts) shall be 304 stainless steel or approved equal.
- E. Gaskets and other materials shall not contain asbestos.
- F. Manufacturer will provide full detail or chemical composition of all lubrication oil and or grease.
- G. Hydrants shall be furnished in varying depths of bury. Bury depth shall be stenciled on the lower part of the hydrant barrel in a minimum of 3” lettering.

CASTING AND APPEARANCE

- A. Hydrants shall be furnished with (2) two – 4” I.D. outlets at 120°. The hydrants operating nut shall be 1 ½” pentagon and 1” minimum in height.
- B. Hydrants furnished shall have all bronze on bronze moving parts. Hydrants shall be coated with a primer and a second coat of the color “traffic orange” or “chrome yellow” as specified by the Project Manager.
- C. Hydrant stem threads shall be Acme Profile. Hydrant nozzle threads shall be copper alloy National Standard Threads.
- D. Distance from the bury line to center of the breakaway flange shall be between 2 & 4 inches. Distance from the bury line to the center of the nozzle shall be between 18 & 24 inches.
- E. Approved bury depths: 3’6”, 4’, 4’6”, 5’, 5’6”, 6’ and 6’6”

HYDRANTS – OPERATION

- A. Hydrants shall be designed for a minimum working pressure of 200 psi.
- B. Hydrants shall have a minimum main valve openings of 5 ¼”.
- C. All hydrants shall have breakaway stem and barrel. Breakaway stem coupling shall be attached to stem with a coupling pin that protrudes a minimum of 1/2” to facilitate removal. Stem coupling pin must protrude one (1) side only and be secured with a cotter pin. Stem coupling pin material to be 304 stainless steel or approved equal.
- D. The frangible parts (stem coupling and flange) shall break in a manner that prevents damage to other parts of the hydrant.

- E. All hydrants shall have removable valve stem and seat.
- F. Hydrants shall be self-draining.
- G. Hydrant internal drain holes shall comply with the following requirements:
 - i. Minimum of two (2) drain holes per hydrant in the seat ring
 - ii. Minimum drain hole diameter shall be 0.25"
- H. Hydrant external drain ports shall comply with the following requirements:
 - i. Minimum of two (2) drain ports per hydrant
 - ii. Drain ports shall be tapped with NPT
 - iii. Minimum tap size shall be 0.125" NPT
 - iv. Hydrants shall be shipped with drain ports unplugged.
- I. Hydrant valve seat threads shall be copper alloy to copper alloy.
- J. Hydrants shall not exceed a maximum allowable head loss of 13.0 PSI at 1,500gpm.
- K. Hydrant main valve shall close with pressure.
- L. Hydrant lubrication shall be by oil or grease.

2. MANUFACTURERS

- A. Approved manufacturers for fire hydrants are as follows (or approved equal):

American Flow Control	6" B84B
The Mueller Centurion	A 425 5/14
US Pipe Metropolitan	250 M94

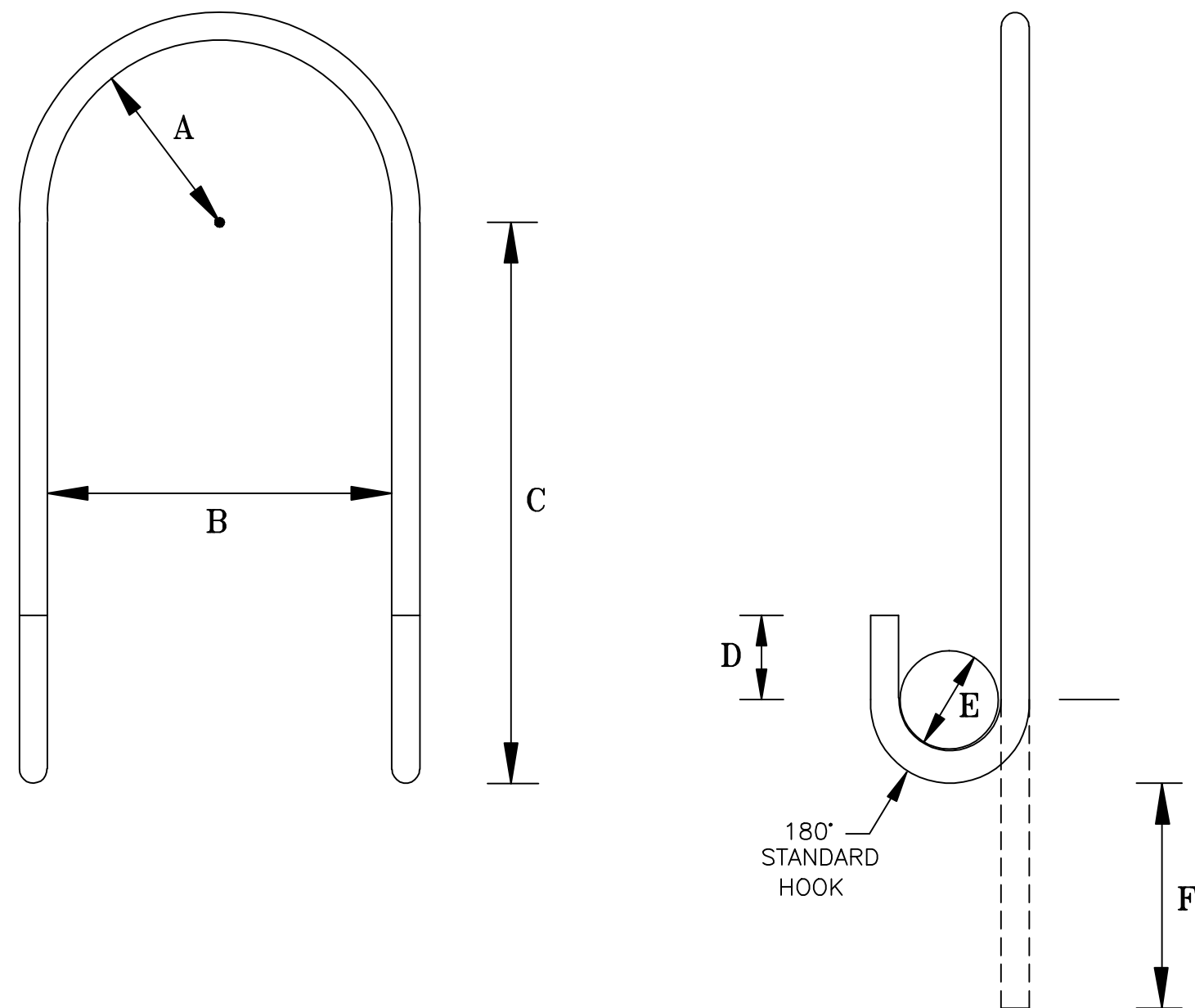
SECTION 40 05 89
KEYTUBE

1. PRODUCTS

- A. Keytube shall be new corrugated polyethylene pipe with appropriate inside diameter, non-perforated and flexible.
- B. Corrugated polyethylene pipe shall be double wall.
- C. Corrugated polyethylene pipe inner wall thickness shall be a minimum 0.5 mm.
- D. Corrugated polyethylene pipe shall be made in accordance to ASTM 2648, ASTM 477, ASTM 3212 and AASHTO M 252
- E. Corrugated polyethylene pipe shall be black in color.
- F. Corrugated polyethylene pipe shall be suited for heavy construction.

2. MANUFACTURERS

- A. Corrugated polyethylene shall be Maxflo AE Pipe as manufactured by Timewell Drainage Products, Incorporated or approved equal.



NOTES:

1. REINFORCING STEEL SHALL BE DEFORMED GRADE 60 AND EPOXY COATED.
2. REINFORCING STEEL SHALL BE INSTALLED WITH A MINIMUM DISTANCE OF 3" TO SURROUNDING TRENCH WALLS AND BOTTOM.

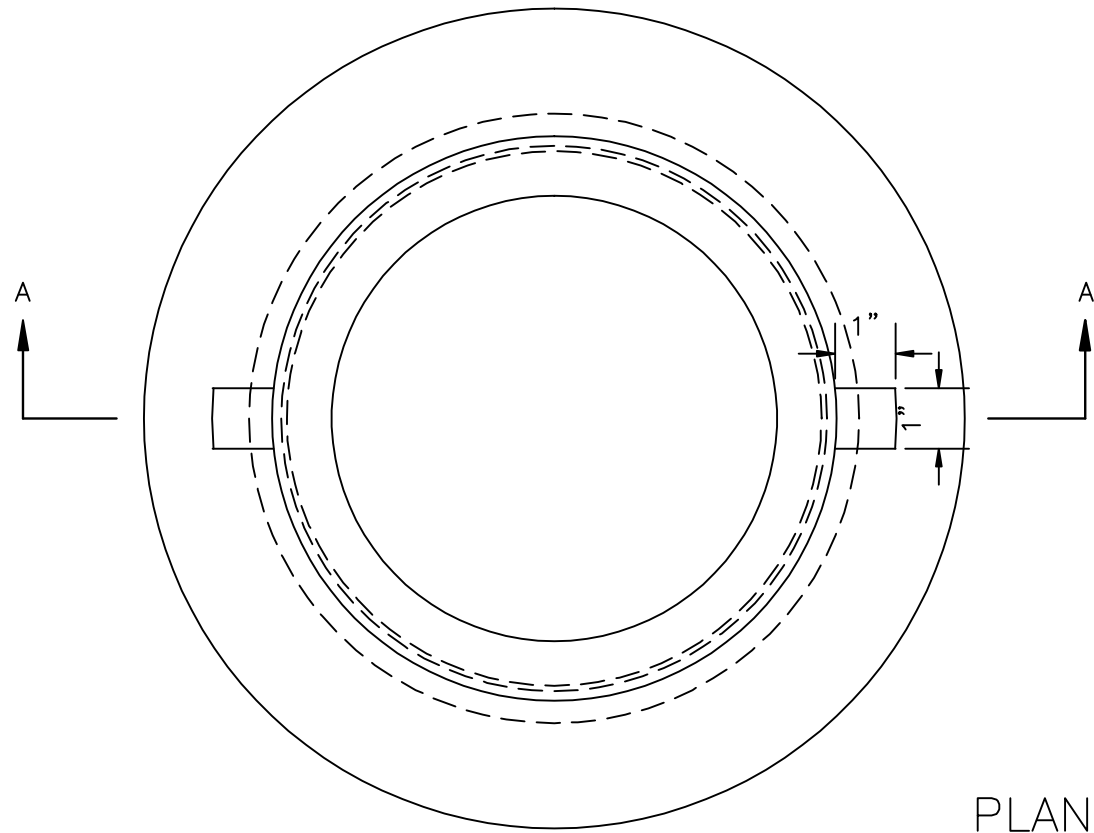
REINFORCING SCHEDULE

GATE VALVE SIZE	BAR SIZE	TOTAL LENGTH (+/-)	A	B	C	D	E	F
4" DIA.	#4	62"	5"	10"	17"	2.5"	3"	6"
6" DIA.	#4	68"	6"	12"	18"	2.5"	3"	6"
8" DIA.	#4	76"	7.5"	15"	20"	2.5"	3"	6"
12" DIA.	#6	103"	9.5"	19"	28"	3"	4.5"	8"
16" DIA.	#8	155"	12"	24"	47"	4"	6"	11"
20" DIA.	#10	218"	13.5"	27"	70"	5"	10.75"	17"

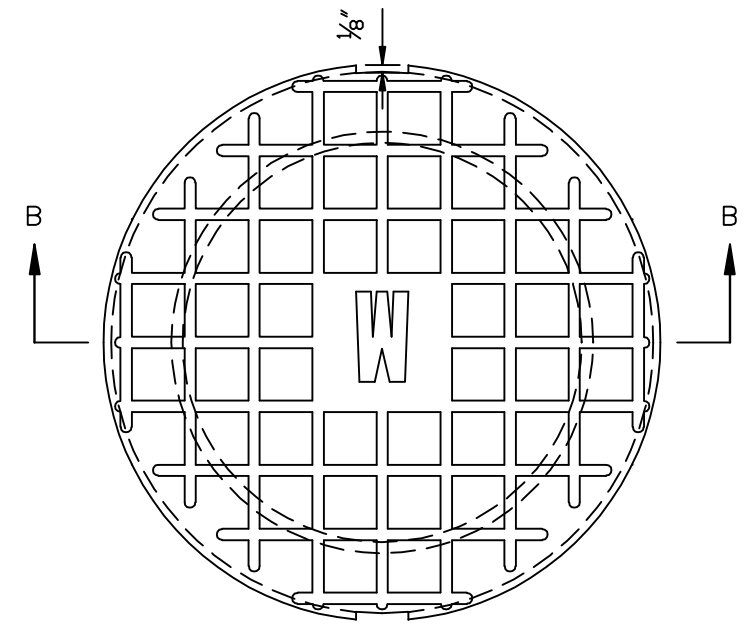
LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
 GREGORY C. HEITZMAN - PRESIDENT
 JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
 REINFORCING STEEL FOR
 ANCHORING GATE VALVES

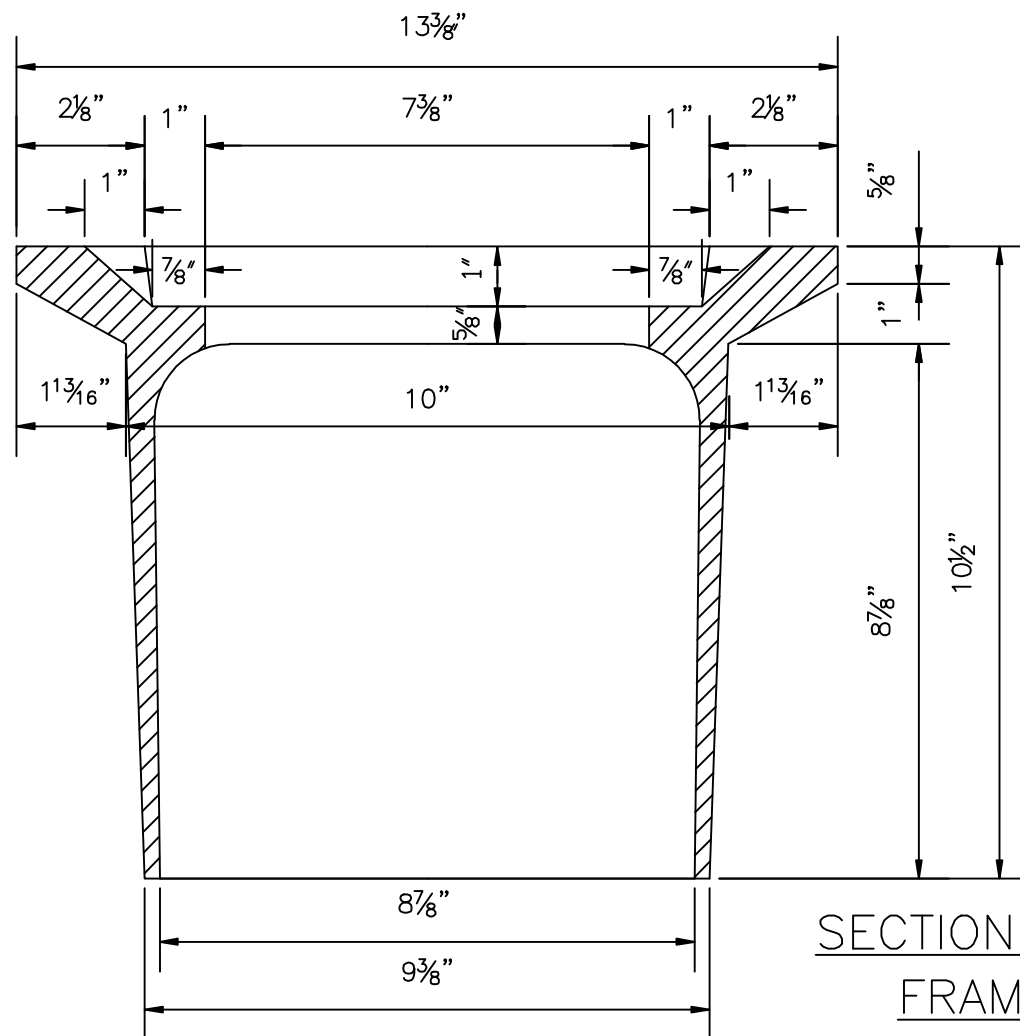
DATE	JUNE 2009	SCALE	NONE
DRAWING NO.	5006	SHEET	1 OF 1



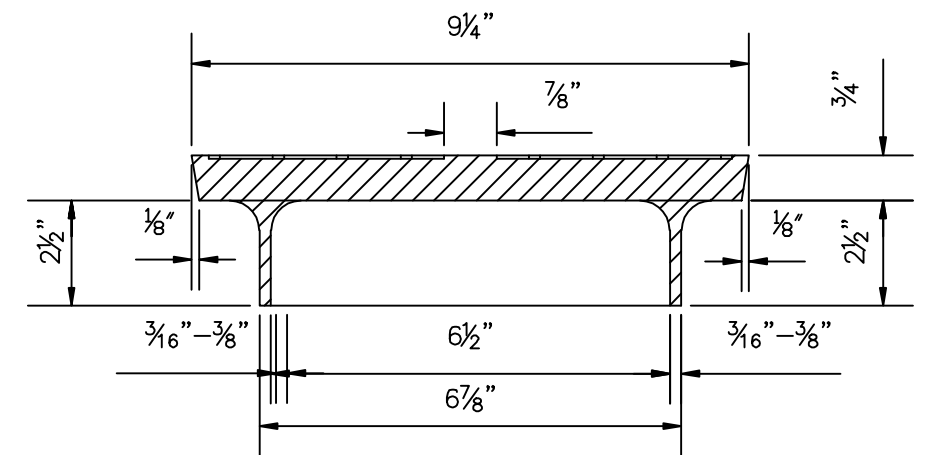
PLAN



PLAN



SECTION A-A
FRAME



SECTION B-B
LID

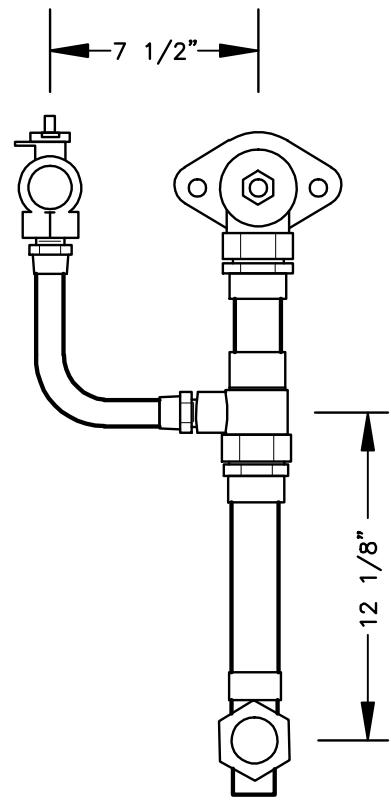
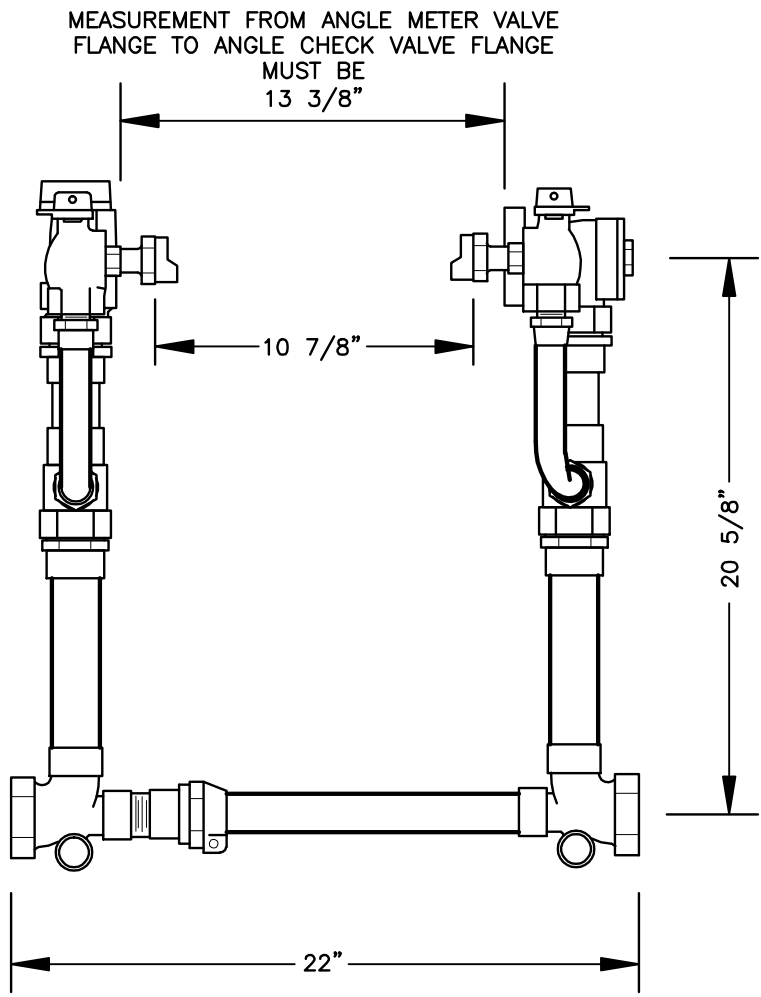
NOTE

LID HAS WAFFLE DESIGN OF $\frac{7}{8}$ " SQUARES WITH $\frac{1}{16}$ " DEEP x $\frac{3}{16}$ " WIDE VALLEYS BETWEEN SQUARES WITH A BLOCK TYPE LETTER "W" IN CENTER $1\frac{1}{2}$ " TALL x $1\frac{1}{2}$ " WIDE WITH $\frac{1}{4}$ " WIDE BARS AROUND WHICH A SQUARE BACKGROUND $2\frac{3}{8}$ " x $2\frac{3}{8}$ " x $\frac{1}{16}$ " DEEP HAS BEEN CAST THE WAFFLE DESIGN IS OPTIONAL CASTING DIMENSIONS SHOWN ARE MINIMAL THICKNESSES CASTING TOLERANCES ARE + $\frac{1}{16}$ " FOR VALVE BOX FRAME AND - $\frac{1}{16}$ " FOR LID SHOP DRAWINGS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

LOUISVILLE WATER COMPANY
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
GREGORY C. HEITZMAN - PRESIDENT
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
VALVE BOX & LID

DATE	MARCH 2008	SCALE	NONE
DRAWING NO.	5000	SHEET	1 OF 1

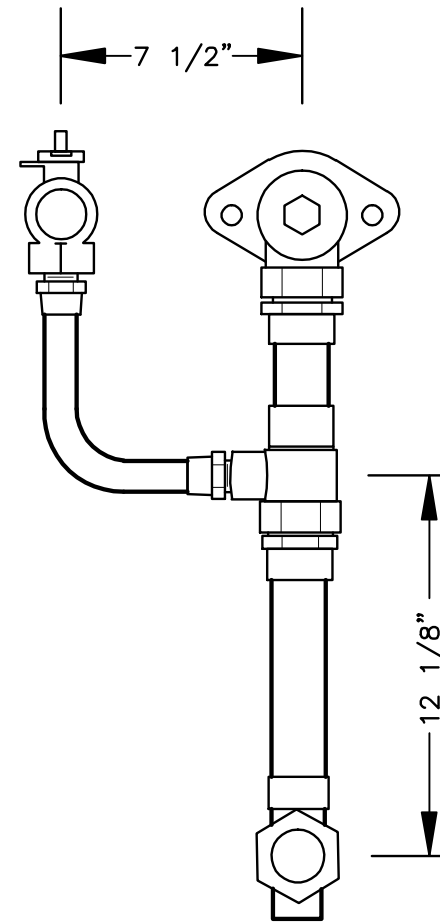
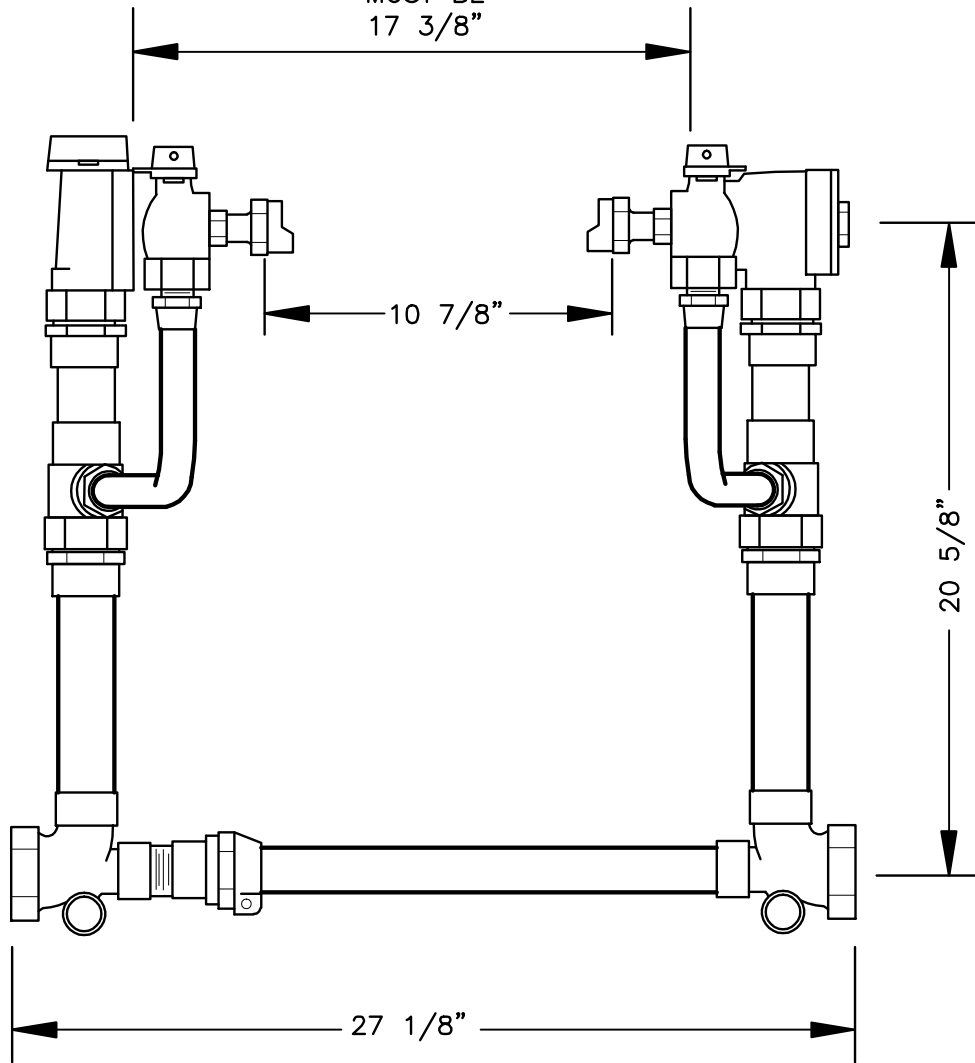


LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
 GREGORY C. HEITZMAN - PRESIDENT
 JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
 1 1/2" METER SETTER
 WITH 1" BY-PASS

DATE	JUNE 2008	SCALE	NONE
DRAWING NO.	3204	SHEET	1 OF 1

MEASUREMENT FROM ANGLE METER VALVE
FLANGE TO ANGLE CHECK VALVE FLANGE
MUST BE
17 3/8"



LOUISVILLE WATER COMPANY
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
GREGORY C. HEITZMAN - PRESIDENT
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

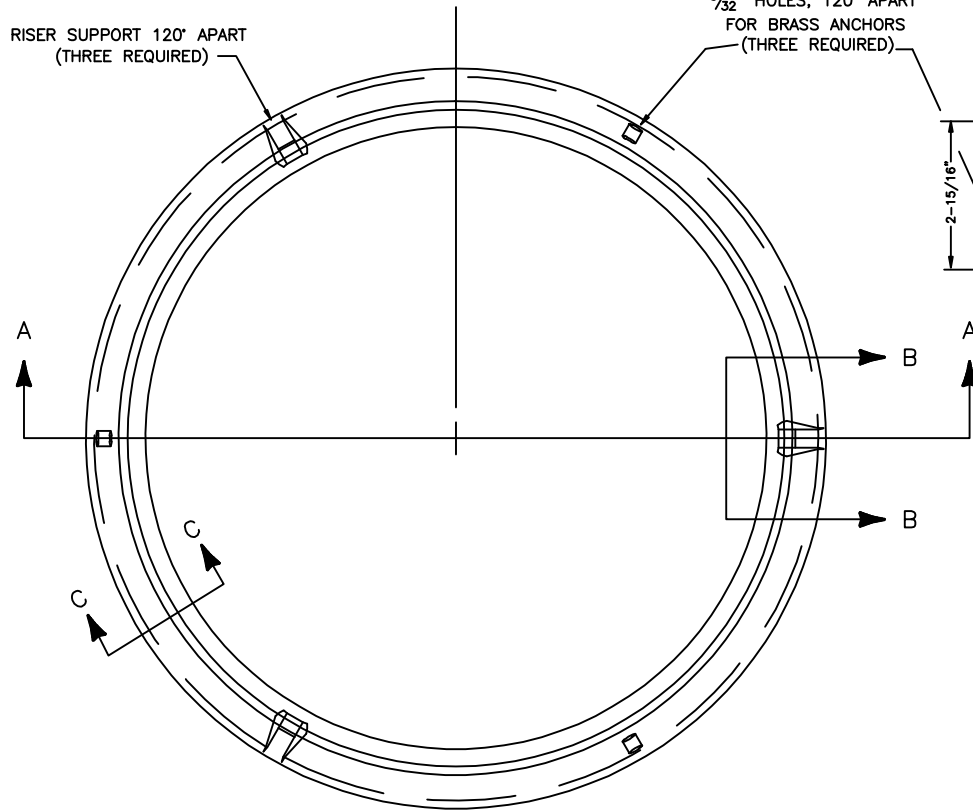
STANDARD DRAWING

2" METER SETTER
WITH 1" BY-PASS

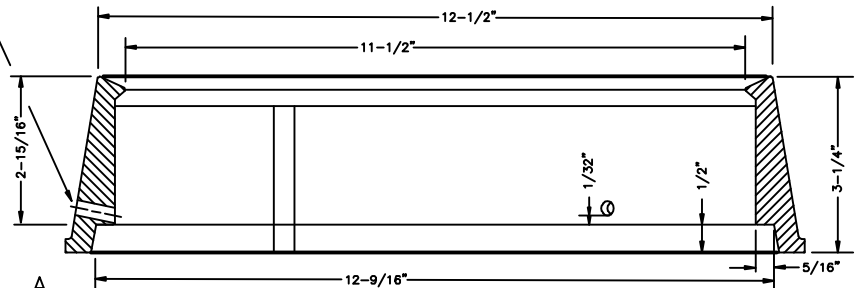
DATE	JUNE 2008	SCALE	NONE
DRAWING NO.	3205	SHEET	1 OF 1

RISER SUPPORT 120° APART
(THREE REQUIRED)

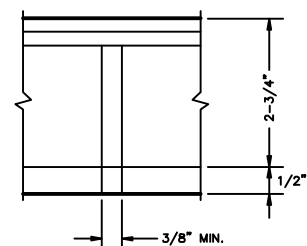
9/32" HOLES, 120° APART
FOR BRASS ANCHORS
(THREE REQUIRED)



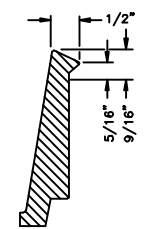
TOP VIEW



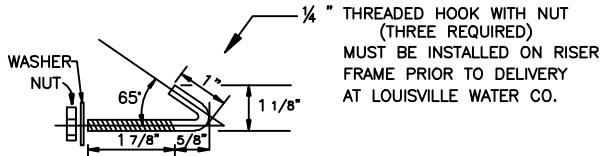
SECTION "A-A"



SECTION "B-B"
DETAIL OF RISER SUPPORT



SECTION "C-C"



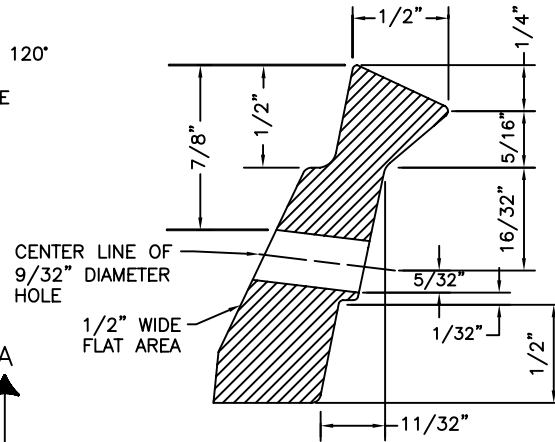
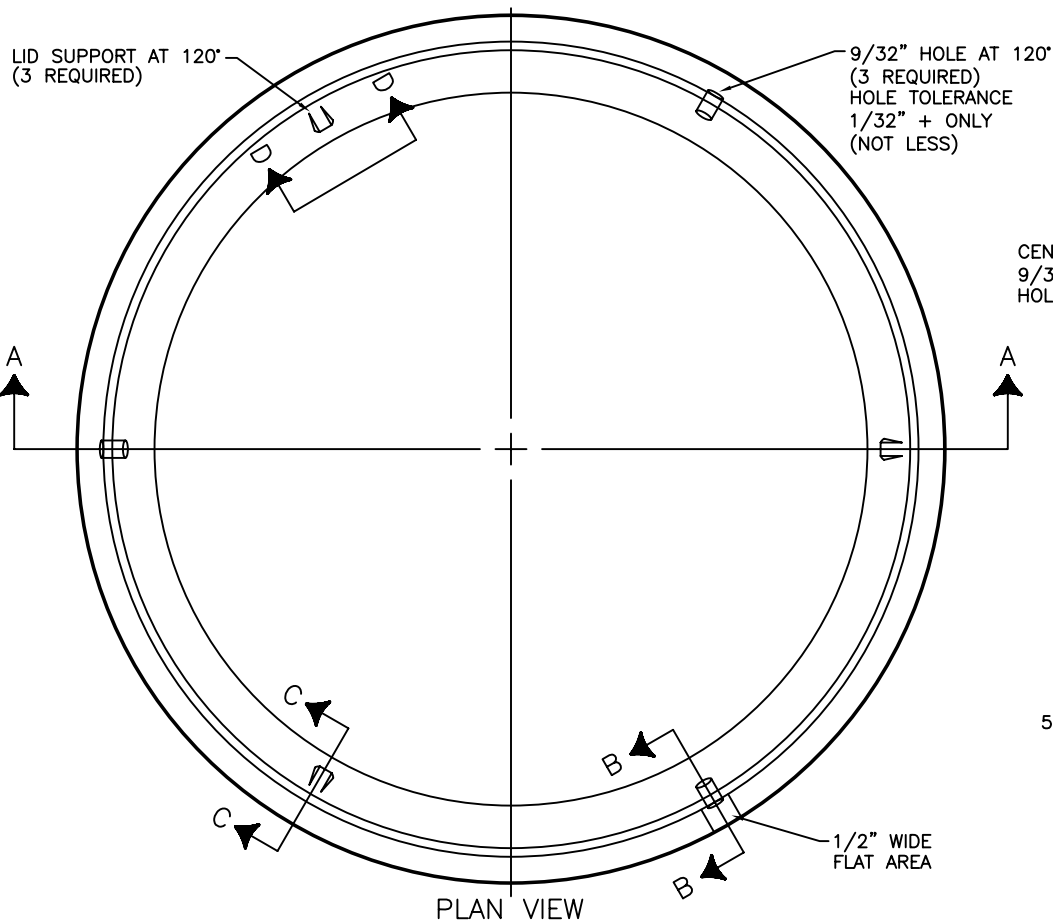
BRASS OR BRONZE
HOOK ANCHOR
NO SCALE

1/4" THREADED HOOK WITH NUT
(THREE REQUIRED)
MUST BE INSTALLED ON RISER
FRAME PRIOR TO DELIVERY
AT LOUISVILLE WATER CO.

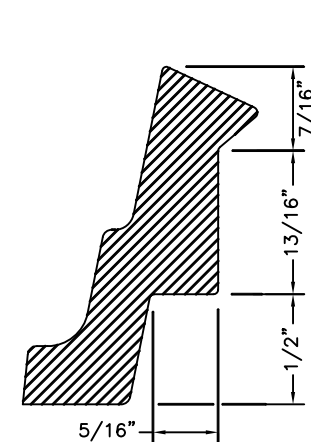
LOUISVILLE WATER COMPANY
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
GREGORY C. HEITZMAN - PRESIDENT
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
3" ELEVATOR RISER RING
(J-HOOK STYLE) FOR SMALL
METER VAULT FRAMES AND LIDS

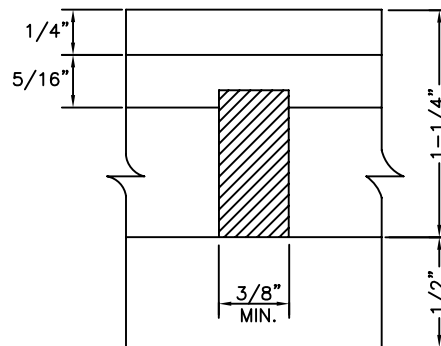
DATE	JULY 2009	SCALE	NONE
DRAWING NO.	5102	SHEET	1 OF 1



SECTION "B-B"

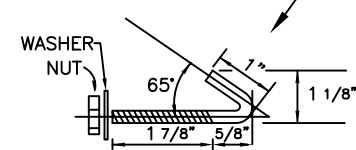


SECTION "C-C"

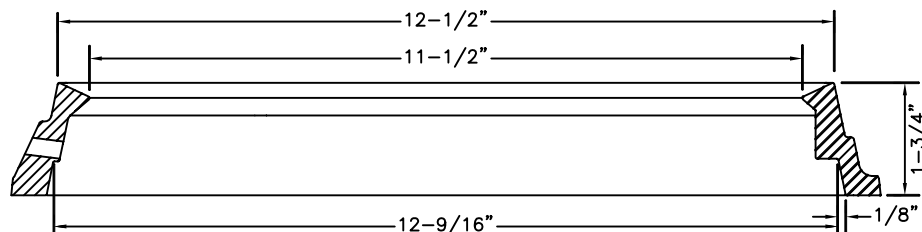


SECTION "D-D"
DETAIL OF RISER SUPPORT

1/4" THREADED HOOK WITH NUT
(THREE REQUIRED)
MUST BE INSTALLED ON RISER
FRAME PRIOR TO DELIVERY
AT LOUISVILLE WATER CO.



BRASS OR BRONZE
HOOK ANCHOR
NO SCALE

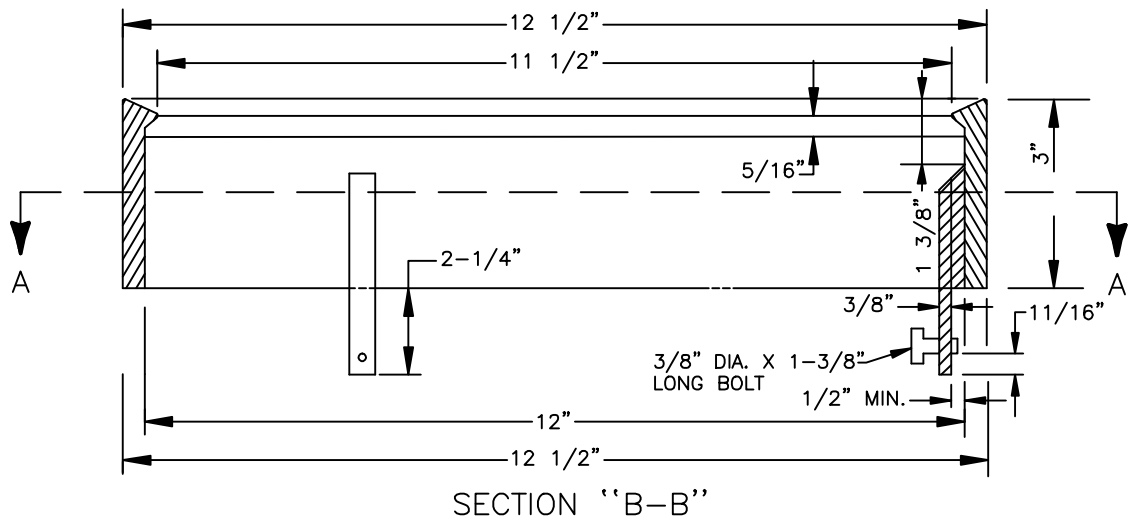
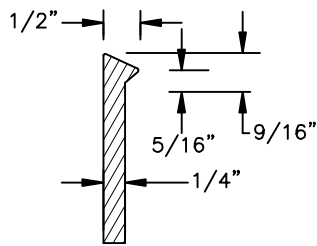
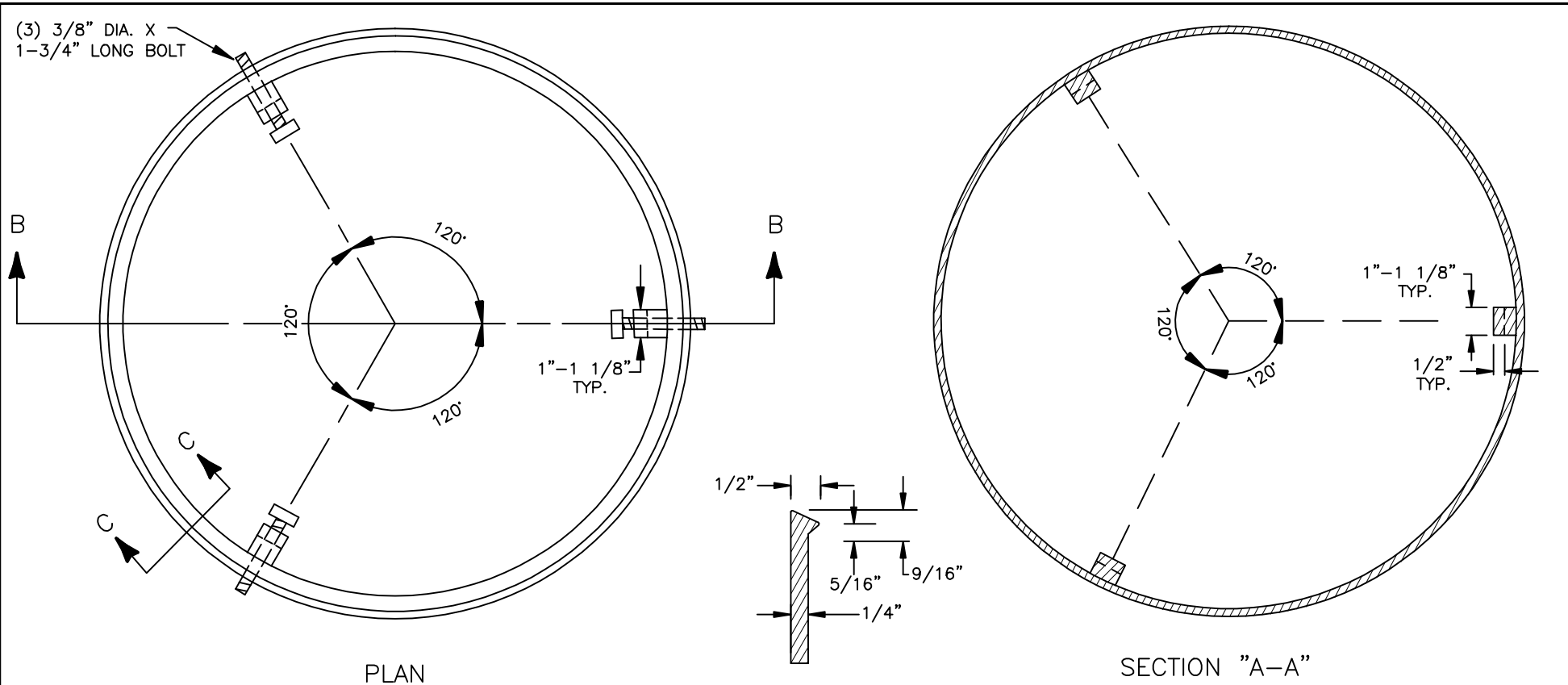


SECTION "A-A"

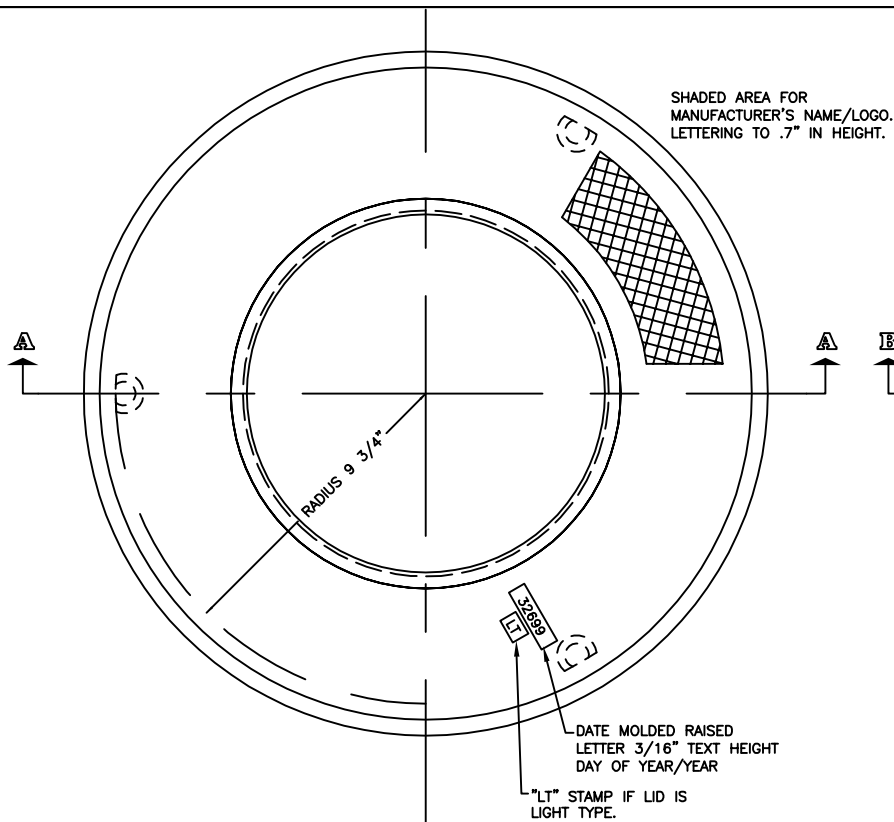
LOUISVILLE WATER COMPANY
550 S. 3RD STREET - LOUISVILLE, KENTUCKY 40202 - (502) 589-3600
GREGORY C. HEITZMAN - PRESIDENT
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
1-1/2" ELEVATOR RISER RING
(J-HOOK) FOR SMALL METER
VAULT FRAMES AND LIDS

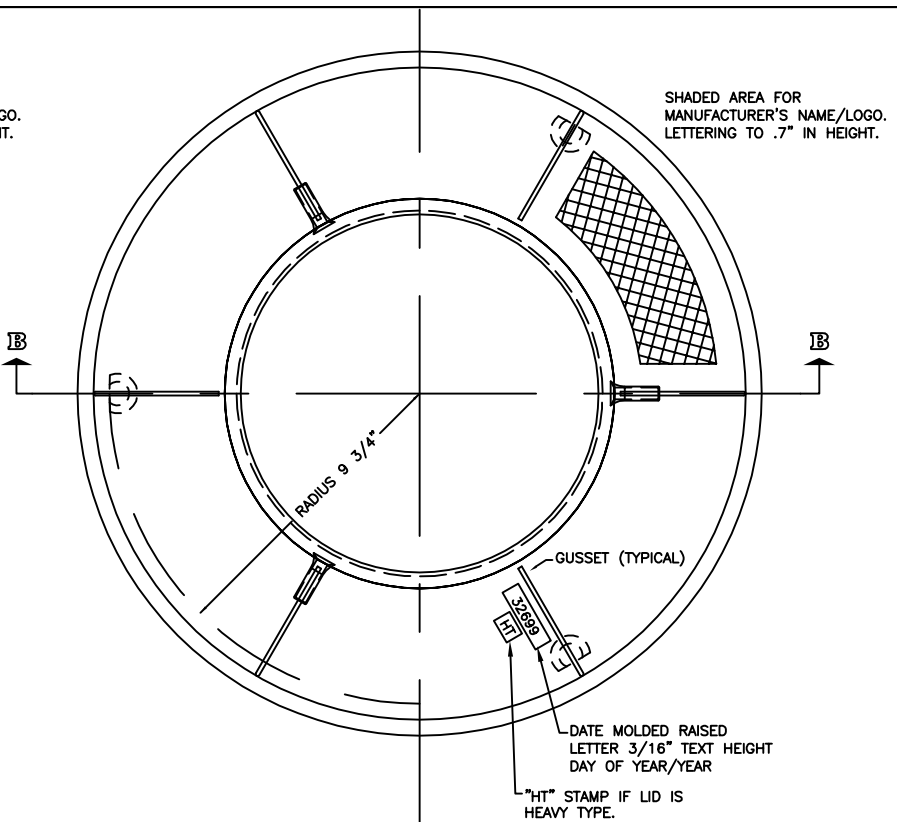
DATE	MAY 2010	SCALE	NONE
DRAWING NO.	5103	SHEET	1 OF 1



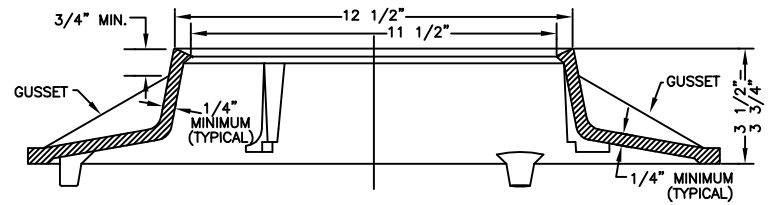
LOUISVILLE WATER COMPANY			
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 589-3600			
GREGORY C. HEITZMAN - PRESIDENT			
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER			
STANDARD DRAWING			
3" RISER (HEX HEAD BOLT)			
FOR SMALL METER VAULT COVERS			
DATE	DEC 2010	SCALE	NONE
DRAWING NO.	5103B	SHEET	1 OF 1



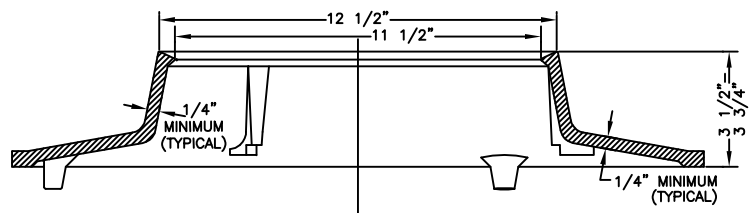
LIGHT METER VAULT FRAME



HEAVY METER VAULT FRAME

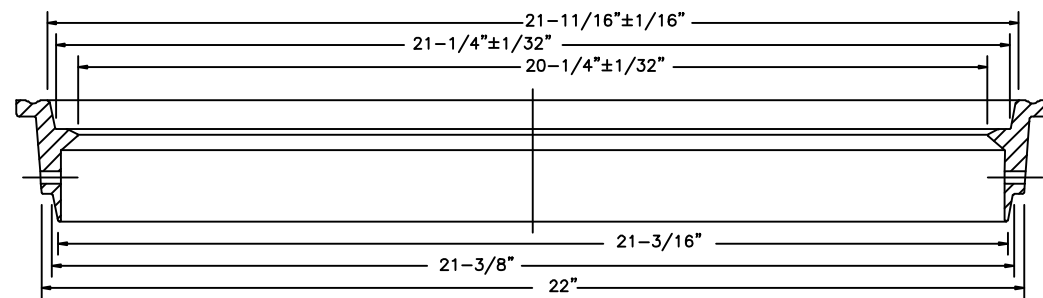
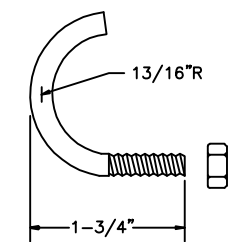
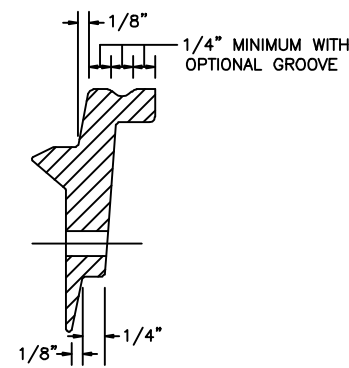
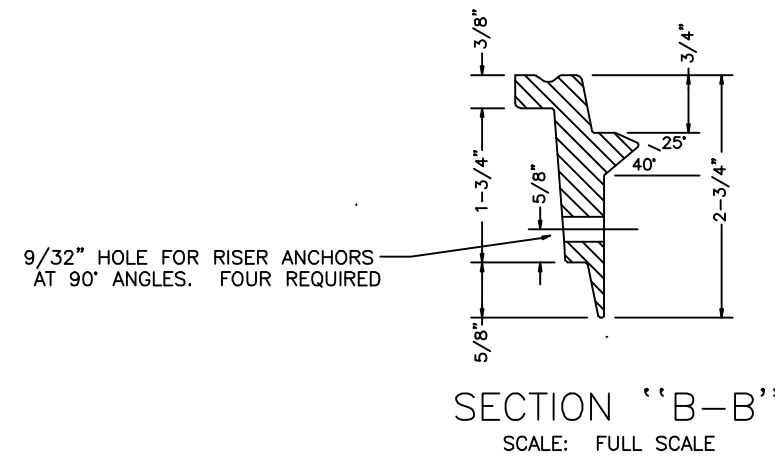
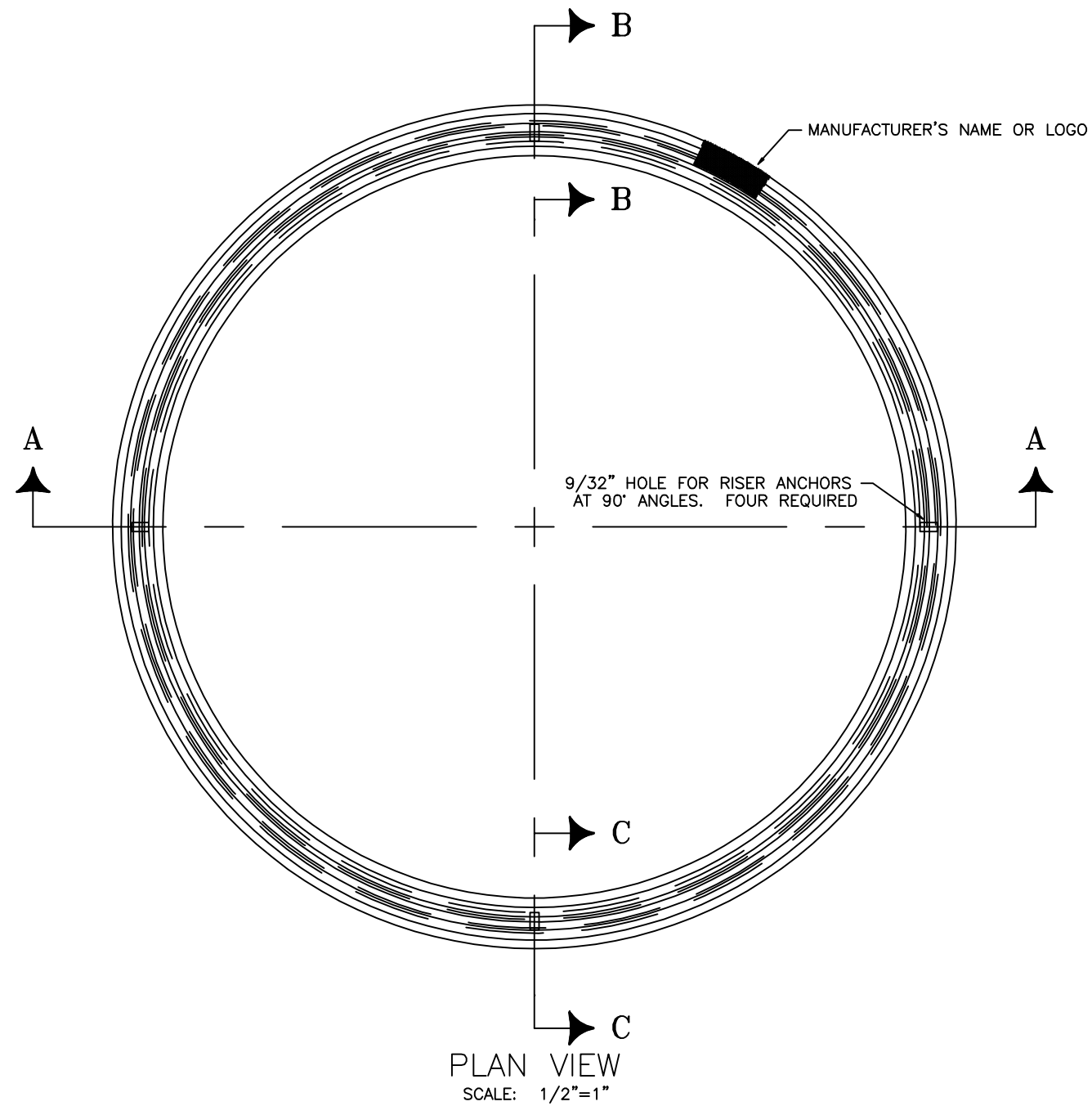


**SECTION B-B
HEAVY METER VAULT FRAME**



**SECTION A-A
LIGHT METER VAULT FRAME**

LOUISVILLE WATER COMPANY			
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600			
SPENCER W. BRUCE, P.E. - PRESIDENT			
TIMOTHY KRAUS, P.E. - VICE PRESIDENT / CHIEF ENGINEER			
STANDARD DRAWING			
LIGHT AND HEAVY VAULT FRAME			
DATE	SEPTEMBER 2019	SCALE	NONE
DRAWING NO.	5104	SHEET	1 OF 1

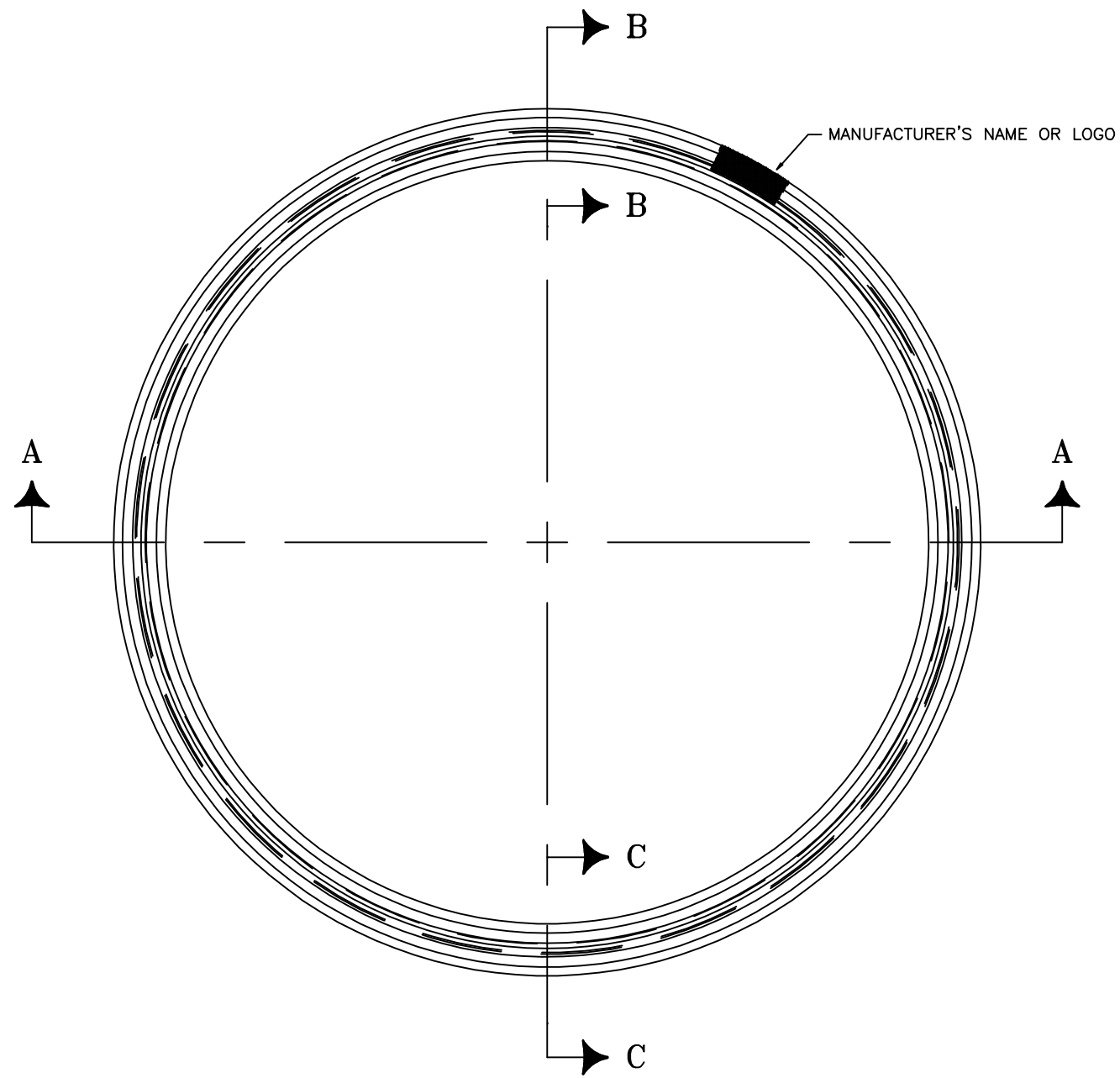


REVISED: 3-31/08 RC

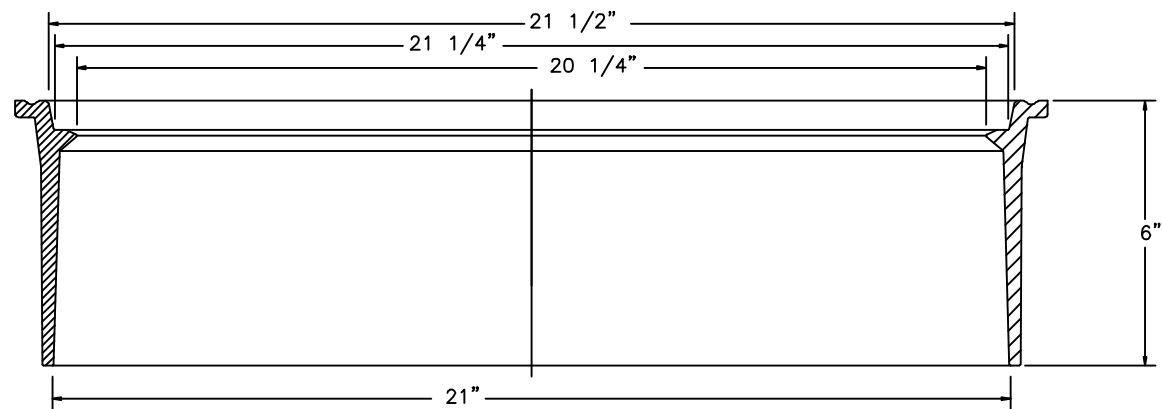
LOUISVILLE WATER COMPANY
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
GREGORY C. HEITZMAN - PRESIDENT
JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
MONITOR LID RISER RING

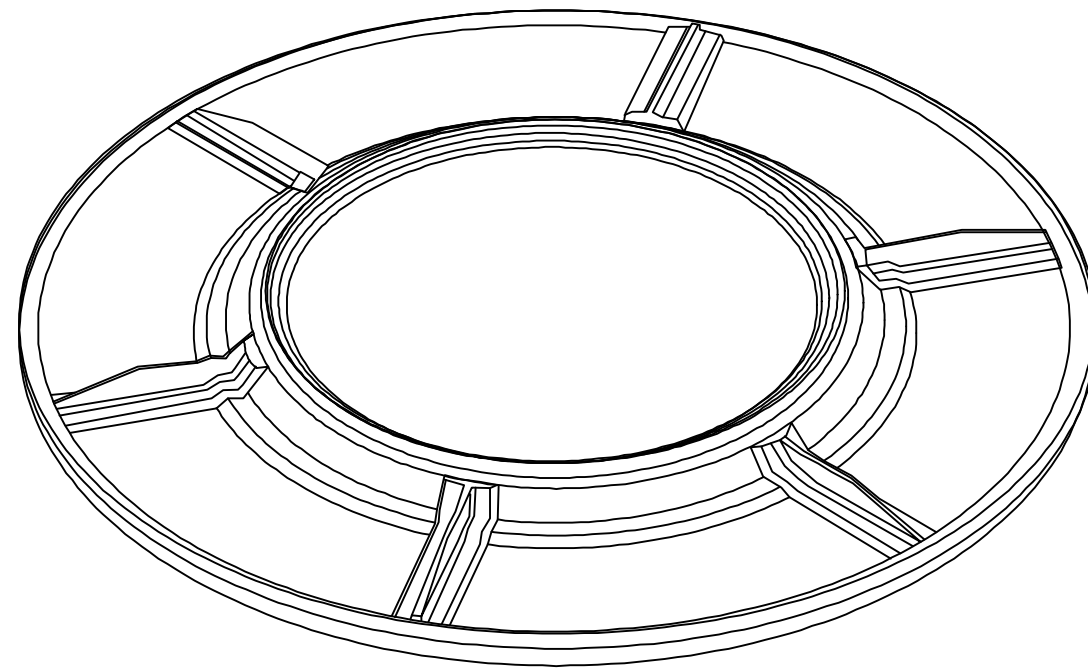
DATE	MARCH 2008	SCALE	NONE
DRAWING NO.	5105	SHEET	1 OF 1



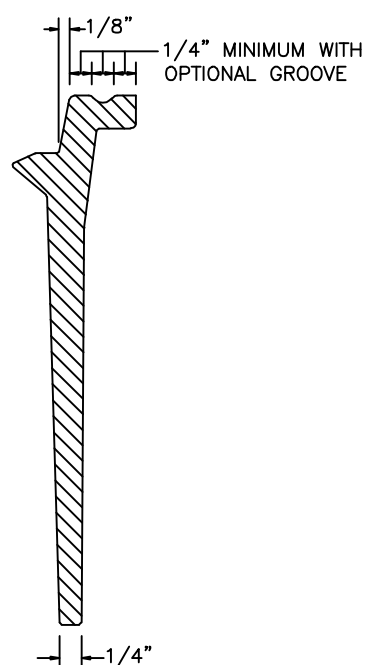
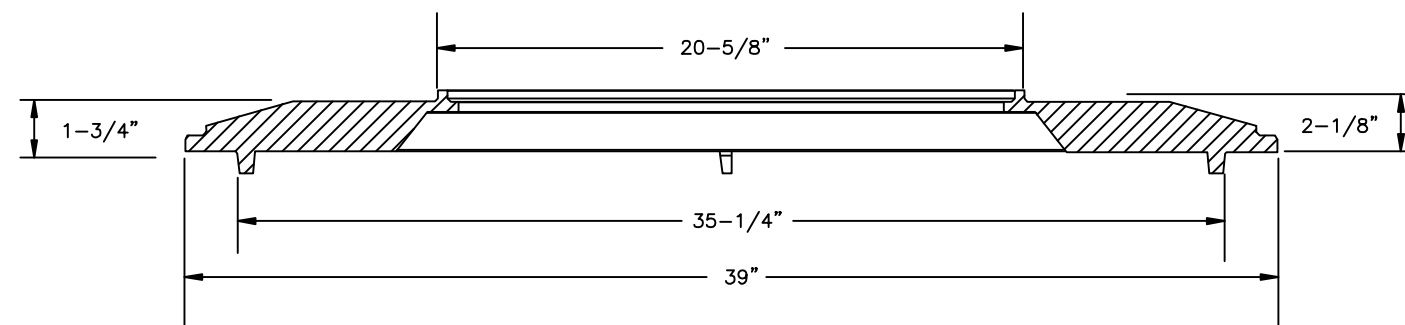
PLAN VIEW
MONITOR COVER RING



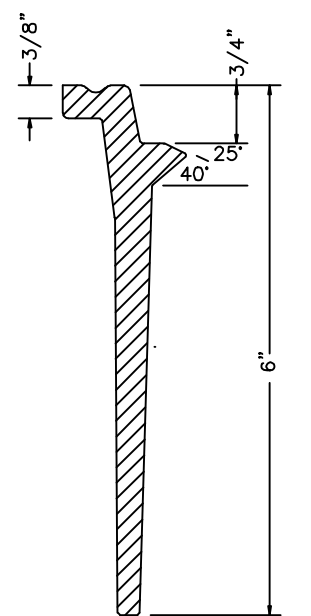
SECTION "A-A"



MONITOR COVER FLANGE



SECTION "C-C"



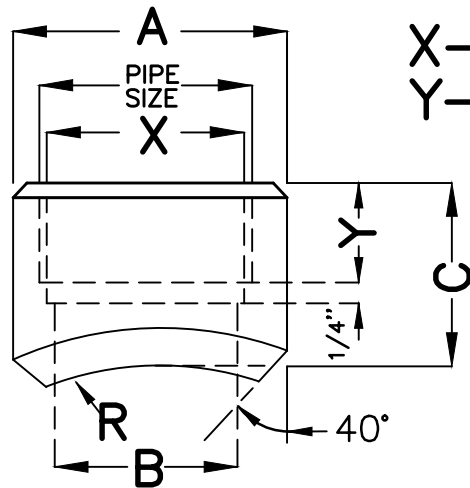
SECTION "B-B"

LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
 GREGORY C. HEITZMAN - PRESIDENT
 JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING

MONITOR FLANGE AND RING

DATE	MARCH 2008	SCALE	NONE
DRAWING NO.	5106	SHEET	1 OF 1



X—NPT TAP DRILL SIZE
 Y—PIPE DEPTH MIN.

PIPE SIZE	A	B	C	Y	R
1/2	1.125	.687	1.000	.781	0.420
3/4	1.375	.875	1.125	.793	0.525
1	1.625	1.125	1.375	.984	0.657
1 1/4	2.062	1.437	1.500	1.008	0.830
1 1/2	2.250	1.687	1.500	1.025	0.950
2	2.875	2.218	1.750	1.058	1.187
2 1/2	3.375	2.500	2.000	1.571	1.437
3	4.000	3.125	2.500	1.633	1.750

NOTE:
 FOR TAKE OFF DIM'S
 ADD "C" DIM, PLUS
 HALF THE HEADER SIZE.

ALL DIMENSIONS ARE INCHES.
 (ENGLISH UNITS)

LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
 GREGORY C. HEITZMAN - PRESIDENT
 JAMES H. BRAMMELL - VICE PRESIDENT/CHIEF ENGINEER

STANDARD DRAWING
 WELDOLET
 FITTING

DATE	FEBRUARY 2012	SCALE	NONE
DRAWING NO.	9004	SHEET	1 OF 1