

ADDENDUM NO. 1
to the
CONTRACT DOCUMENTS & TECHNICAL SPECIFICATIONS
for construction of
DOWNTOWN WATERLINE REPLACEMENT
for
CITY OF MONTGOMERY
in
MONTGOMERY COUNTY, TEXAS

JUNE 23, 2020

Addendum No. One (1) covers the following changes to the technical specifications and construction drawings:

CONTRACT DOCUMENTS

1. Specification 01571 – Traffic Channelizing Devices

Replace Section 1.4 Measurement and Payment with the following:

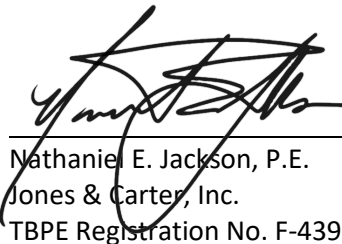
Separate measurement and payment of temporary traffic channelizing will not be made. Include cost of these items in the lump sum amount bid for Bid Item No. 29.

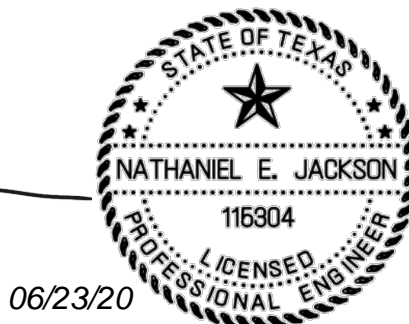
2. Specification 02555 – Water Distribution Mains

Replace the specification with the attached, and revised, specification in its entirety. The changes to the specification include addition of details regarding approved products and installation methods for restrained joint pipe.

3. Sheet 2 – General Notes

Replace the sheet with the attached, and revised, sheet in its entirety. The changes to the general notes include addition of Note No. 7 under the General Notes section.


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TBPE Registration No. F-439



END OF ADDENDUM NO. 1

June 23, 2020

TRAFFIC CHANNELIZING DEVICES

1.0 GENERAL

1.1 DESCRIPTION

- a. This section specifies the requirements for furnishing, installing, relocating, maintaining, and subsequently removing the temporary traffic channelizing devices. The following devices are specified herein:

- (1) Barricades, Types I, II, and III
- (2) Cones, tubular and conical
- (3) Drums
- (4) Vertical panels
- (5) High level warning devices

1.2 QUALITY ASSURANCE

- a. All temporary traffic channelizing devices shall comply with the requirements of the Texas Department of Transportation (TxDOT) Manual on Uniform Traffic Control Devices for Streets and Highways and the applicable regulations and standards for Montgomery County, Texas, and the City of Montgomery, Texas.

- b. Reference Standards Applicable to this Section:

- (1) Texas Department of Transportation (TxDOT).
 - (a) Texas Manual on Uniform Traffic Control Devices for Streets and Highways.
- (2) The above referenced standards may be obtained from:

Texas Department of Transportation
Highway Building
11th and Brazos Streets
Austin, Texas 78701
(512)475-2081

1.3 SUBMITTALS

Certificates shall be submitted for each traffic channelizing device, indicating that the device complies with the requirements of the TxDOT Manual on Uniform Traffic Control Devices for Streets and Highways.

1.4 MEASUREMENT AND PAYMENT

Separate measurement and payment of temporary traffic channelizing will not be made. Include cost of these items in the lump sum amount bid for Bid Item No. 29.

2.0 PRODUCTS

2.1 MATERIALS

Temporary traffic channelizing barricades, cones, drums, vertical panels, and high level warning devices shall comply with the requirements of Part VI, Section C - Channelizing Devices in the TxDOT Manual on Uniform Traffic Control Devices for Streets and Highways.

3.0 EXECUTION

3.1 INSTALLATION

- a. Temporary traffic channelizing devices shall be installed in accordance with the requirements of Part VI of the TxDOT Manual on Uniform Traffic Control Devices for Streets and Highways and the details shown on the drawings.
- b. Devices shall be maintained as necessary during the course of the work, and shall be removed from the Work Site when no longer needed.

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1.0 GENERAL

1.1 SCOPE

This section specifies furnishing and installing new water lines including valves, valve boxes, flushing valves, blocking, fittings and other appurtenances.

1.2 RELATED WORK

- a. Division 2, Site Work.
 - (1) Excavation, Trenching, and Backfilling for Utilities.
 - (2) Concrete construction for structures.
- b. Division 3, Concrete. Cast-in-place concrete.

1.3 REFERENCE STANDARD

- a. Except as otherwise specified or shown, the workmanship, methods of installation, construction procedures and materials furnished will be in strict accordance with the following publications of the, City of Montgomery, Texas. Use the latest editions and any applicable amendments.
 - (1) City of Montgomery Design Manual
 - (2) City of Montgomery Standard Construction Details

1.4 MEASUREMENT

- a. Flushing Valves and Service Leads. Measure these items by the number of each size and type installed complete and in place.
- b. Gate Valves. Measure these items by the number of each size and type installed complete and in place.
- c. Water Lines. Measure water lines by the linear foot of each type and size installed complete and in place. Measurement will be along the centerline of the pipe and will include all fittings incorporated in the work.

1.5 PAYMENT

- a. Payment for flushing valves and gate valves will be at the contract unit price.
- b. Payment for water lines and valves will be at contract unit price for the type and size specified.
- c. No direct payment will be made for fittings, blocking, excavation, backfill, compaction and other miscellaneous work and materials necessary for proper construction of a water distribution system. These are included in the contract prices of the various component parts.

2.0 PRODUCTS

2.1 DUCTILE IRON PIPE

- a. Provide ductile iron pipe centrifugally cast in accordance with the latest revision of AWWA C-151 or AWWA C-115.
 - (1) Ductile iron pipe used with threaded or flanged connections shall be thickness Class 53 (minimum).
 - (2) Ductile iron pipe used with compression-type push-on connections shall be thickness Class 51 for four-inch (4") pipe and thickness Class 50 (minimum) for six-inch (6") and larger pipe.
 - (3) Ductile iron pipe conforming to AWWA C-151, electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.
- b. Provide all pipe with joints of the type and size shown on construction drawings.
 - (1) Provide and install flanged connections in accordance with the latest revision of AWWA C-115.
 - (2) Provide and install push-on type connections in accordance with the latest revision of AWWA C-111.
- c. The interior surfaces of all ductile iron pipes shall be cement mortar lined to standard thickness and sealed in accordance with the latest revision of AWWA C-104. The exterior surface of all buried ductile iron pipe shall be coated with coal tar or asphaltic base bituminous materials to a minimum dry thickness of 1 mil and wrapped with polyethylene encasement in accordance with the latest revision of AWWA C-105. Exterior surfaces of ductile iron pipe above ground shall be coated as outlined in the Section on Protective Coatings.

2.2 ASBESTOS-CEMENT PIPE

Asbestos-cement pipe is not allowed.

2.3 STEEL PIPE

- a. Provide all steel pipe intended for use as carrier pipe in a distribution system, sizes six-inches (6") through 24-inches (24"), conforming to the latest revision of AWWA C-200. Four-inch (4") pipe shall meet the criteria in this section.
- b. Minimum wall thickness for carrier pipe must meet the following criteria:

<u>Nominal Pipe Size (Inches)</u>	<u>Outside Diameter (Inches)</u>	<u>Minimum Wall Thickness (Inches)</u>	<u>Pounds per Linear Foot, Uncoated</u>
4	4.500	0.237	10.79
6	6.625	0.280	18.97
8	8.625	0.322	28.55
10	10.750	0.365	40.48
12	12.750	0.375	49.56
16	16.000	0.375	62.58
20	20.000	0.375	78.60
24	24.000	0.375	94.62

- c. Furnish pipe with beveled ends for field butt-welding.
- d. The interior surfaces of all steel pipes shall be cement mortar lined to standard thickness and sealed in accordance with the latest revision of AWWA C-205 for shop coating, or in accordance with the latest revision of AWWA C 602 for field coating. The interior coating system must meet National Sanitation Foundation (NSF) Standard 61.
- e. Coat exterior surfaces of the pipe with coal tar epoxy protective coating. Exterior coating system shall conform to the latest revision of AWWA C-210. Coat the exterior of field welds with cold-applied tape in accordance with the latest revision of AWWA C-209.
- f. Furnish new and unused pipe manufactured in compliance with Underwriters' Laboratories, Inc., Specifications, Steel Pipelines for Underground Water Service. Pipe must be acceptable, without penalty, to the Texas Fire Insurance Commission for use in water works distribution systems.

2.4 POLYVINYL-CHLORIDE (PVC) PIPE

- a. Provide PVC pipe as manufactured by Certainteed, Johns-Manville, Clow, Gifford-Hill, Robintech, Napco Certa-Lok or approved equal as listed on the City of Houston Approved Product Approval List. The pipe material shall conform to ASTM D-1784 and National Sanitation Foundation Standard No. 14 for a design stress of 2,000 psi. The pipe must also conform to quality control tests as described in ASTM 1599, ASTM 1598, ASTM 2152 and ASTM 2241.
- b. For two-inch (2") water lines, the PVC shall conform to ASTM D-2241, SDR 21, Class 200 for a working pressure up to 200 psi.
- c. For four-inch (4") through twelve-inch (12") water lines, the PVC pipe shall conform to AWWA C-900, DR 18 Class 235 for a working pressure up to 150 psi.
- d. For larger than twelve-inch (12") water lines:
 - (1) Polyvinylchloride (PVC) pipe conforming to AWWA C-905, DR-18.
- e. PVC Restrained Pipe material shall conform to AWWA C-900, DR-18 for restrained joints where shown on the construction plans.

2.5 COPPER TUBING

- a. Provide copper tubing for underground service in ¾-inch (¾"), one-inch (1"), 1½-inch (1½") and two-inch (2") sizes. Fabricate the tubing from Type K soft-annealed tubing with proper bending temper.
- b. Tubing must meet requirements of ASTM B-88 and Federal Specification WWT-799, with the following exceptions:
 - (1) In the section of ASTM B-88 dealing with number of test samples, modify to provide one (1) sample of each size of tubing for each 7,500 feet or less of tubing.
 - (2) Furnish ¾-inch (¾") tubing in coils, preferably flat, of 60 feet. Furnish 1½-inch (1½") and two-inch (2") tubing in straight 20-foot (20') lengths.

2.6 FITTINGS

- a. For cast or ductile iron pipefittings, furnish mechanical joint, Type III, or a boltless, gasketed joint such as Bell-Tite, Tyton or approved equal. Cast iron fittings shall conform to latest revision of AWWA C-110 and C-111. Compact ductile iron pipefittings shall conform to the latest revision of AWWA C-153 and shall be rated 350 psi.
- b. Provide factory-forged, steel pipefittings four-inches (4") through 24-inches (24") conforming to AWWA C-208. Furnish long radius fittings for all bends. Bevel ends for field butt-welding. Provide fitting with wall thickness equal to or greater than the wall thickness of the pipe to which the fittings is to be welded. Insulation joints shall be installed where steel pipe is connected to any other type waterline.
- c. For PVC pipefittings and joints, provide Fluid-Tite by Certainteed, Ring-Tite by Johns-Manville, or approved equal. The fittings shall conform to ASTM D-2467 and the joints shall conform to ASTM D-3139. The pipe material shall conform to ASTM D-1784 and National Sanitation Foundation Standard No. 14 for a design stress of 2,000 psi. The gasket material shall conform to ASTM F-477.

2.7 GATE VALVES

Furnish four-inch (4") through 12-inch (12") gate valves with gray or ductile cast iron body, double disk or resilient seated, nonrising stem, O-ring seal with two-inch (2") square nut. Gate valves must conform to AWWA C-500, C-509 or C-515 Standards for Gate Valves for Ordinary Water Works Services. Provide a mechanical joint or a hub-end, gasketed valve to match the pipe selected. Furnish a valve stem which turns counter-clockwise to open.

2.8 VALVE BOXES

Provide buried valves with cast iron valve boxes of the extension sleeve type suitable for depth of cover over pipe as shown. Furnish valve boxes at least five inches (5) in diameter, $\frac{3}{16}$ -inch ($\frac{3}{16}$ ") thick, with suitable cast iron bases and covers. Coat all parts of valve boxes, bases and covers by dipping in hot bituminous varnish. Provide Mueller H-10360, two-piece, screw type with base, top section and cover as required, or an approved equal. Identify covers with the castings. WATER.

2.9 FLUSHING VALVES

- a. Provide flushing valves conforming to AWWA Standard C-502-85 and City of Montgomery Design Manual as follows:
 - (1) Mueller Centurion 250, Model A423, Option 110.
 - (2) East Jordan Ironworks, EJ Watermaster, Model 5CD250.
- b. Furnish flushing valves of the compression-type shut-off, closing with the pressure. Valves must have collision safety construction and be dry top designed for 150 psi working pressure. Fabricate all working parts of bronze.
- c. Equip the barrel with a six-inch (6") inlet connection of all-bronze parts and having a self-centering drain valve. Provide the connection with two (2) hose nozzles, with a nominal inside diameter of 2½-inches, and a nominal 4-inch (4") inside diameter pumper connection, conforming to National (American) Standard Fire Hose Connection Screw Threads (per NFPA No. 194 and ANSI B26-192S latest revision).
- d. Equip all nozzles with nozzle caps securely and with cap gaskets of rubber. Other hydrant gaskets may be of rubber composition, copper, asbestos, lead or impregnated fiber composition. Attach nozzle caps to the barrel with chains not less than ⅛-inch ($\frac{1}{8}$ ") diameter.

- e. Provide a hydrant with bury length (the distance from the bottom of flushing valve lead to finished grade) as specified. If the Contractor varies the depth of bury of the waterline from the depth shown on the plans, all hydrant adjustments will be at no additional cost to the Owner.
- f. Have the barrel joint connecting the upper and lower hydrant sections designed so that the hydrant shutoff valve will remain closed and reasonably tight against leakage in the event of an impact resulting in damage or breaking of the hydrant above or near ground level. Provide the joint with a breakable bolt flange or breakable coupling that will include a minimum of eight (8) bolts. Provide the valve stem with a breakable stem coupling opposite the breakaway barrel.
- g. Provide the valve stem with a bronze sleeve and suitable seals and a travel stop. Do not expose operating threads to water. Lubricate the threads fully when opening and closing the shut-off valve from the lubricating reservoir sealed top and bottom. Equip the valve stem with a thrust bearing or lubricated thrust collar to minimize operating torque.
- h. Furnish a valve stem which opens counterclockwise.
- i. Provide a valve stem operating nut that is nonrising, pentagonal shape, with one and ½-inch (1½") from point to flat and depth of 1¾-inch (1¾").
- j. All operating parts, including the valve seat, must be removable through the barrel, without digging.
- k. Paint flushing valves with one (1) coat of universal primer and two (2) finishing coats of alkyd paint of color specified.

3.0 EXECUTION

3.1 STAKING

Waterlines will be staked by Engineer only on request by Contractor. Flushing valves will be offset with elevation to top of curb.

3.2 SETTING VALVES, VALVE BOXES AND FLUSHING VALVES

- a. Prior to installing valves or flushing valves, remove foreign matter from within the valves. Inspect the valves in open and closed position to verify that all parts are in satisfactory working condition.
- b. Install valves, valve boxes and flushing valves where shown or as located by the Owner. Set valves and flushing valves plumb and as detailed on drawings. Center valve boxes on valves. Locate valves away from roads or streets. Carefully tamp earth around each valve box for a minimum radius of four-feet (4'), or to undisturbed trench face if less than four-feet (4'). Set flushing valves three (3) feet from the edge of the shoulder, at the point of curvature of the intersection curb radius and at such elevations that connecting pipe will not have less cover than distributing mains.
- c. Place a concrete thrust block opposite pipe connections, set against the vertical face of the trench to prevent the valve from blowing off the line. If the character of the soil is such that the flushing valve cannot be securely wedged in this manner, provide bridle rods and rod collars of not less than ¾-inch (¾") stock protected by a coat of acid-resisting paint.
- d. Place at least five (5) cubic feet of broken stone around the base of the flushing valve to insure drainage. Compact backfill thoroughly around the valve to grade line.

3.3 PIPE INSTALLATION

a. Preparation.

- (1) Use piping and materials for water mains of types specified, unless otherwise shown.
- (2) Do not lay pipe in water, or when trench or weather are unsuitable for work, except with permission of the Engineer. Keep water out of trench until joining is complete. When work is not in progress, close ends of pipe and fittings securely so that no trench water, earth or other substance will enter pipes or fittings.
- (3) Keep the inside of the pipe free from foreign matter during operations by plugging or other approved method.
- (4) Place pipe so that the full length of each section rests solidly upon the pipe bed, with recesses excavated to accommodate bells and joints. Take up and relay pipe when the grade or joint is disturbed after laying.
- (5) Locate no joints closer than nine-feet (9') from sanitary sewer crossovers.
- (6) Where pipe ends are left for future connections install valves, plugs or caps, as shown.
- (7) Handle pipe and accessories so that all pipe placed in the trench is sound and undamaged. Take particular care not to injure pipe coating. Do not place other pipe or anything else inside the pipe or fitting after coating has been applied.
- (8) Cut neatly, using approved type mechanical cutter without damaging pipe. Use wheel cutters when practicable.
- (9) Before installation, inspect pipe for defects and tap with a light hammer to detect cracks. Replace sections of pipe found to be defective, damaged or unsound, before or after laying.

b. Pipe Bedding and Backfill.

- (1) Regardless of the type of pipe being laid, provide six-inches (6") of sand bedding in the bottom of the trench, the trench having previously been cut six-inches (6") below grade. Provide sand bedding prior to laying the pipe and making up the joints. After making up and inspecting joints, place sand backfill around the pipe, extending the full width of the trench and to a minimum compacted depth of twelve-inches (12") over the top of the pipe to provide a compacted encasement surrounding the pipe. Take care that no dirt, clods or trench sides are allowed to fall on or to rest against the pipe prior to completion of the sand encasement.
- (2) Backfill remainder of the trench as described under Excavation, Trenching, and Backfilling for Utilities, except under pavement sections. Under existing or proposed paving sections, backfill trench with sand, compacted in 12-inch (12") layers, to within one-foot (1') of finished pavement surface.

c. Placing and Laying.

- (1) Bury waterlines 12-inches and smaller and flushing valve leads to a minimum depth of four-feet (4'). Bury waterlines 16 inches and larger to a minimum depth of five-feet (5').
- (2) Do not exceed pipe manufacturer's recommendations for deflections from straight line or grade as required by vertical curves, horizontal curves, or offsets. If alignment requires deflections in excess

of these limitations, furnish special bends or sufficient number of shorter lengths of pipe to provide angular deflections within the limits set or approved.

- (3) After a length of pipe is placed in the trench, hold packing material for the joint around the bottom of the spigot so that packing will enter the bell as the pipe is pushed into position, or a rubber gasket may be inserted in the bell before pushing the pipe into place. Center the spigot on the bell and push the spigot into required alignment and position. Except where necessary in making connections with other lines, lay pipe with bells facing the direction at least two (2) lengths of pipe ahead of each joint, with packing of pipe laying. Lay installed and earth fill tamped alongside pipe, before joint is poured.

d. Joints.

- (1) Install mechanical joints according to the recommendations of the manufacturer.
- (2) Make slip-on joints according to the recommendations of the manufacturer.
- (3) If lubricant is required, it shall be non-toxic, it shall not support the growth of bacteria, and it shall not contribute taste and odor to water systems flushed with a chlorine solution for disinfection.

e. Anchorage of Fittings.

- (1) Thrust Block. Anchor tees, elbows and plugs of water mains with concrete thrust blocks as shown. Place blocks so that the joints will be accessible for inspection and repair. Use concrete with 3,000 psi compressive strength.
- (2) Substitution. In lieu of thrust blocking on cast iron pipe, substitute push-on, locking-type joints. Provide joints such as Lok-Tyton as manufactured by the United States Pipe and Foundry Company. Equip these joints with Lok-Tyton gaskets and pipe groove according to manufacturer's recommendations.

f. PVC Restrained Mechanism

- (1) For low-profile coupling with spline-type joints:
 - a. Do not apply lubricant to spline or pipe or coupling spline grooves.
 - b. Do not use excessive force while inserting the spline through coupling.
 - c. Insert spline until it is fully seated around circumference of pipe.
- (2) Field Cutting Pipe Ends:
 - a. Perform by workers certified by manufacturer.
 - b. Use a PVC pipe cutter and provide square ends.
 - c. Follow manufacturer's recommendation to disassemble restrained joint after it has been locked in place.
 - d. For low-profile coupling with spline-type joints, use manufacturer approved power routing and grooving tool to field fabricate required pipe groove.

3.4 DISINFECTION

Water mains shall be thoroughly disinfected in accordance with AWWA Standard C-651-05 before use or acceptance for domestic operation.

Tablet Method

- a. Placing of Calcium Hypochlorite Granules. During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500 feet intervals. The quantity of granules shall be as follows:

<u>Pipe Diameter (Inches)</u>	<u>Calcium Hypochlorite Granules (oz)</u>
4	1.7
6	3.8
8	6.7
10	10.5
12	15.1
16 & larger	$D^2 \times 15.1$

Where D is the inside diameter in feet.

- b. Placing of Calcium Hypochlorite Tablets. During construction, 5-g calcium hypochlorite tablets shall be placed in each section of pipe and also one (1) such tablet shall be placed in each hydrant, hydrant branch, and other appurtenances. The number of 5-g tablets required for each pipe section shall be $0.0012d^2L$, where d is the inside diameter in inches, and L is the length of section in feet. (See following table). Attach all tablets inside and at top of the main.

<u>Pipe Diameter (Inches)</u>	<u>Length of Section (Feet)</u>				
	<u>13</u>	<u>18</u>	<u>20</u>	<u>30</u>	<u>40</u>
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

- c. Filling and Contact. When installation is completed, the main shall be filled. Precautions shall be taken to eliminate air pockets. Water shall remain in the pipe for at least 24 hours. Valves shall be positioned so that the strong chlorine solution in the treated main will not flow into water mains in active service.

3.5 TESTING

- a. Hydrostatic Tests: Test all new waterlines hydrostatically in substantial compliance with AWWA E-600-05, C-602-05 & C-605-05. Hydrostatic testing shall be conducted in a manner approved by and in the presence of the Engineer.
- (1) Contractor shall provide measurement gauges and recording devices for the test including pump, pipe connections, calibrated meter and other necessary apparatus necessary to conduct the test. Provide calibration information to Engineer prior to testing.
 - (2) Tests shall be performed only after the pipelines have been properly filled, flushed, and purged of air.

- (3) For small diameter water lines (12" and smaller), apply a test pressure of 125 psi. For larger diameter waterlines (16" and larger), apply a test pressure of 150 psi. Allow pressure to stabilize for a minimum of 15 minutes.
- (4) Maintain test pressure for a minimum of two (2) hours when joints are exposed and a minimum of eight (8) hours when pipe has been backfilled.
- (5) During the tests, the system and exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. Visible leaks shall be repaired. Defective elements shall be repaired or replaced and the test repeated until the test requirements have been met.
- (6) The testing allowance shall be defined as the water required to maintain the pressure within 5 psi of the specified hydrostatic test pressure. No system will be accepted if the quantity of water required exceeds the amount as determined by the following:

$$Q = \frac{LDVP}{487,000}$$

Where:

Q = quantity of makeup water, gallons per hour
 L = length of pipe section being tested, linear feet
 D = nominal diameter of pipe, inches
 P = average test pressure during the hydrostatic test, psi

This formula is based on a testing allowance of 3.19 gpd/mi/in. of nominal pipe diameter at a test pressure of 150 psi.

<u>Duration of Test</u>	<u>Acceptable Loss as % of Maximum Allowable</u>
2 hr. (Min.)	25%
4 hr.	50%
6 hr.	75%

For steel water pipe, the testing allowance shall be 10 gal/mi/in. of nominal pipe diameter at a test pressure of 150 psi.

MAXIMUM ALLOWABLE LEAKAGE

Gallons Per Hour Per 1,000 Ft. of Main

Table 2 Hydrostatic test makeup water allowances per 1,000 ft (305m) of PVC/DIP pipe*-gph**

Avg. Test Pressure psi	Nominal Pipe Diameter, in. (mm)													
	4	6	8	10	12	14	16	18	20	24	30	36	42	48
300	0.14	0.21	0.28	0.36	0.43	0.50	0.57	0.64	0.71	0.85	1.07	1.28	1.49	1.71
275	0.14	0.20	0.27	0.34	0.41	0.48	0.54	0.61	0.68	0.82	1.02	1.23	1.43	1.63
250	0.13	0.19	0.26	0.32	0.39	0.45	0.52	0.58	0.65	0.78	0.97	1.17	1.36	1.56
225	0.12	0.18	0.25	0.31	0.37	0.43	0.49	0.55	0.62	0.74	0.92	1.11	1.29	1.48
200	0.12	0.17	0.23	0.29	0.35	0.41	0.46	0.52	0.58	0.70	0.87	1.05	1.22	1.39
175	0.11	0.16	0.22	0.27	0.33	0.38	0.43	0.49	0.54	0.65	0.81	0.98	1.14	1.30
150	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.75	0.91	1.06	1.21
125	0.09	0.14	0.18	0.23	0.28	0.32	0.37	0.41	0.46	0.55	0.69	0.83	0.96	1.10
100	0.08	0.12	0.16	0.21	0.25	0.29	0.33	0.37	0.41	0.49	0.62	0.74	0.86	0.99
75	0.07	0.11	0.14	0.18	0.21	0.25	0.28	0.32	0.36	0.43	0.53	0.64	0.75	0.85
50	0.06	0.09	0.12	0.15	0.17	0.20	0.23	0.26	0.29	0.35	0.44	0.52	0.61	0.70

* If the pipeline under test contains sections of various diameters, makeup water allowance will be the sum of the test allowance for each size.

** To obtain makeup water allowance in liters per hour, multiply the values in the table by 3.79.

Where practicable, pipelines shall be tested in lengths between line-valves or plugs of 4,000 feet or less.

Regardless of the rate of line loss, repair observed leaks. Replace faulty or defective materials at no charge in the contract sum. Provide all pumps, gages, meters, and other equipment necessary for performance of the tests.

- b. Bacteriological Tests. After disinfecting and flushing mains, obtain the service of an approved laboratory to gather representative samples and conduct bacteriological tests in accordance with AWWA C651-92 or latest revision. Take two (2) consecutive sets of samples, taken at least 24 hours apart, at each dead end line (blow-off) and for each 1,200 linear feet of distribution main. Test results must meet Texas Department of Health requirements. Make all necessary corrections, repeat disinfection and flushing procedures, and retest affected lines, if test results are not acceptable. Repeat this procedure until satisfactory results are obtained.

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GENERAL NOTES

1. CONSTRUCT WASTEWATER COLLECTION SYSTEMS, WATERLINES AND STORM DRAINAGE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF MONTGOMERY CODE OF ORDINANCES AND DESIGN CRITERIA MANUAL UNLESS SHOWN/STATED OTHERWISE WITHIN THESE DRAWINGS.
2. UTILITIES PRESENTED ON THESE DRAWINGS ARE SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS IN THE FIELD PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL NOTIFY TEXAS ONE CALL AT 713-223-4567/800-245-4545 AND LONE STAR ONE CALL AT 800-669-8344 AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO EXISTING WATER, WASTEWATER AND STORM DRAINAGE LINES. DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH THE CITY OF MONTGOMERY CODE OF ORDINANCES AND DESIGN CRITERIA MANUAL UNLESS SHOWN/STATED OTHERWISE WITHIN THESE DRAWINGS.
4. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER.
5. CONTRACTOR SHALL COMPLY WITH LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION
6. THE APPROXIMATE LOCATION OF EXISTING UTILITIES ARE GIVEN FOR REFERENCE ONLY. BEFORE COMMENCING THE WORK ON THIS CONTRACT, THE CONTRACTOR SHALL VERIFY BY FIELD INVESTIGATION THE ACTUAL LOCATIONS OF ALL UTILITY FACILITIES WITHIN AND ADJACENT TO THE LIMITS OF THE WORK THAT MAY BE AFFECTED BY THE WORK. CONFLICTS WHICH RESULT DUE TO NEGLIGENCE BY THE CONTRACTOR TO LOCATE, HORIZONTALLY AND VERTICALLY, EXISTING UTILITIES WHICH ARE SHOWN ON THE CONSTRUCTION DRAWINGS, OR WHICH THE CONTRACTOR HAS BEEN GIVEN NOTICE OR HAS KNOWLEDGE, SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE COST OF REMEDIAL WORK, REMOVAL OF PORTIONS OF THE WORK OR EXTENSIVE DESIGN CHANGES OCCASIONED BY THE FAILURE OF THE CONTRACTOR TO VERIFY THE LOCATION OF EXISTING UTILITIES AS DESCRIBED ABOVE SHALL BE BORNE BY THE CONTRACTOR.

7. THIS PROJECT IS SUBJECT TO THE PROVISIONS OF THE AMERICAN IRON AND STEEL AS INCLUDED IN THE SPECIFICATIONS SECTION TWDB - 1106.

WATERLINE CONSTRUCTION NOTES

1. WATERLINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST CITY OF MONTGOMERY RULES AND REGULATIONS, STANDARD SPECIFICATION, AND CONSTRUCTION DETAILS.
2. 4" THRU 12" WATERLINES SHALL BE P.V.C. CLASS 225, DR-18, AWWA C-900 AND 1" THRU 3" WATERLINES SHALL BE PVC SCHEDULE 40. 4" THRU 54" D.I.P. waterlines SHALL BE AWWA C151 (ANSI A21.51) AND DOUBLE WRAPPED IN 8-MIL POLYETHYLENE. PIPE SHALL BE LINED IN ACCORDANCE WITH AWWA C104 (ANSI A21.4).
3. CONCRETE THRUST BLOCKS SHALL BE PROVIDED AS NECESSARY TO PREVENT PIPE MOVEMENT. WHERE PREVENTING MOVEMENT OF 16" OF GREATER PIPE NECESSARY DUE TO THRUST, USE RESTRAINED JOINTS.
4. ALL WATERLINES UNDER PROPOSED OR FUTURE PAVING AND TO A POINT ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE ENCASED IN BANK SAND TO 12" OVER PIPE AND BACKFILLED WITH CEMENT STABILIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE.
5. ALL WATERLINES AND SEWER LINE CROSSINGS SHALL BE CONSTRUCTED PER CITY OF MONTGOMERY AND TCEQ REGULATIONS.
6. ALL WATER VALVES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF AWWA C-500 AND SHALL BE OF THE RESILIENT SEAT TYPE. ALL VALVES TO BE OPENED. ALL VALVES TO OPEN COUNTER CLOCK WISE.
7. ALL WATERLINES TO BE DISINFECTED IN CONFORMANCE WITH AWWA C-651 AND THE TEXAS STATE DEPARTMENT OF HEALTH. AT LEAST ONE BACTERIOLOGICAL SAMPLE SHALL BE COLLECTED FOR EACH 1,000 LINEAR FEET OF WATERLINE AND SHALL BE REPEATED IF CONTAMINATION PERSISTS.
8. ALL BELOW GRADE VALVES SHALL BE GASKETED, HUB-END GATE VALVES WITH A CAST IRON BOX, EXCEPT WHERE FLANGES ARE CALLED OUT ON THE PLANS.
9. 4" THRU 12" FITTINGS SHALL BE CEMENT MORTAR LINED COMPACT DUCTILE IRON PRESSURE FITTINGS PER ANSI A21.53, OR PUSH ON FITTINGS PER ANSI A21.10 PRESSURE RATED AT 250 PSIG.
10. HYDROSTATIC TESTING: ALL WATER PIPE SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE LATEST CITY OF HOUSTON STANDARD CONSTRUCTION SPECIFICATIONS. TESTS ARE TO BE PERFORMED ON THE TOTAL FOOTAGE OF WATER PIPE LINE INCLUDED IN THE PROJECT.
11. ALL WATERLINES TO HAVE 4' MINIMUM COVER TO FINISHED GRADE AND MINIMUM 12" CLEAR TO OTHER UTILITIES AT CROSSING UNLESS OTHERWISE NOTED ON PLANS. ALL WATERLINES INSTALLED OVER 8' DEEP SHALL UTILIZE RESTRAINED JOINT FITTINGS.
12. CONTRACTOR SHALL KEEP WATER PIPE CLEAN AND CAP (OR OTHERWISE EFFECTIVELY COVER) OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS OR OTHER SOURCES OF CONTAMINATION FROM UNFINISHED PIPE LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.
13. PRIOR TO BACKFILLING ALL UNDERGROUND WATERLINES, CONTRACTOR TO INSTALL A CONTINUOUS #14 COPPER TRACER WIRE, LOCATED DIRECTLY OVER THE BURIED LINES AND ACCESSIBLE AT EACH VALVE STACK.

PROTECTION REQUIREMENTS AT
WATER LINE - SANITARY SEWER CROSSINGS

	PROPOSED WATER LINE				PROPOSED SANITARY SEWER			
	OVER		UNDER		OVER		UNDER	
	EXISTING SS	PROP SS	EXISTING SS	PROP SS	EXISTING WL	PROP WL	EXISTING WL	PROP WL
Minimum 2 feet vertical clearance	✓ ¹	✓ ¹	✓	✓	NOT ALLOWED	✓	✓ ¹	✓ ¹
Place 1 full section (min 18 ft) of WL centered at SS crossing. Provide restrained joints on WL, spaced at least 9 ft. horizontally from centerline of SS	✓	✓	✓	✓		✓		✓
Place 1 full section (min 18 ft) of SS centered at WL crossing. Provide restrained joints on SS, spaced at least 9 ft. horizontally from centerline of WL		✓					✓	✓
Replace 1 full section of existing SS with pressure-rated DIP or pressure rated PVC pipe with adapters and restrained joints centered at WL crossing	✓ ^{2,3}		✓ ³					
Provide DIP for small diameter WL (less than 24 inches), PVC pipe is only allowed if encased per TAC § 290.44 and use restrained joints for both DIP and PVC pipe			✓	✓		✓		
Embed SS with CSS for the total length of 1 pipe segment plus 1 foot beyond the joints on each end	✓ ^{2,3}	✓ ⁴	✓ ³	✓ ⁴		✓ ⁴	✓ ⁴	✓ ⁴
Place 1 full section (min 18 ft) of min 150 psi SS centered at WL crossing. Provide restrained joints on SS, spaced at least 9 ft horizontally from centerline of WL or encase in a joint of 150 psi pressure pipe (min 18 ft) two nominal sizes larger with spacers at 5 ft interval.				✓		✓		

1. Minimum clearance is 2 feet for non-pressure rated SS and 1 foot for pressure rated SS.
2. Required if existing SS is disturbed and/or there is evidence of leakage.
3. Not required for augered WL, unless there is evidence of leakage; completely fill augered hole with bentonite/clay mixture.
4. Not required for augered SS, completely fill augered hole with bentonite/clay mixture.

Note:

- a. Both water lines and wastewater main or lateral must pass a pressure and leakage test as specified in AWWA C600 standards.
b. Sanitary sewers (SS) is applicable to both gravity sanitary sewers and force mains.

CONSTRUCTION SEQUENCE

- THE CONTRACTOR SHALL COMPLETE THE WORK IN THE FOLLOWING ORDER:
1. REMOVE 12" PLUG WEST OF SHEPPARD STREET ALONG SH-105. CONSTRUCT 12" WATERLINE ALONG SH-105 TO HOUSTON STREET INCLUDING INSTALLATION OF TAPPING SLEEVE AND VALVE, DISINFECTION, AND TESTING.
2. PLUG EXISTING 6" WATERLINE ON HOUSTON STREET NEAR CAROLINE STREET AND CLOSE GATE VALVE AT SH-105. CONTINUE CONSTRUCTION OF 12" WATERLINE ON SH-105 THROUGH MCCOWAN STREET INCLUDING INSTALLATION OF TAPPING SLEEVE AND VALVE, DISINFECTION, AND TESTING.
3. CONSTRUCT 12" WATERLINE ON POND STREET & FM 149 INCLUDING INSTALLATION OF TAPPING SLEEVE AND VALVE, DISINFECTION, AND TESTING.
4. CONSTRUCT 12" WATERLINE ON HOUSTON STREET INCLUDING INSTALLATION OF TAPPING SLEEVE AND VALVE, DISINFECTION, AND TESTING.

GENERAL CONSTRUCTION NOTES

1. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY CITY ENGINEER CHRIS ROZNOVSKY AT (281) 363-4039 OR CROZNOVSKY@JONESCARTER.COM A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY PUBLIC WORKS FOREMAN MIKE MUCKLEROF AT (936) 597-6434 A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION TO SET UP AN INSPECTION TO VERIFY CITY'S FACILITIES.
3. CONTRACTOR SHALL CONTACT CITY OF MONTGOMERY UTILITY OPERATOR, MICHAEL WILLIAMS OF GULF UTILITY SERVICE AT (713) 494-1793 A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION TO SET UP AN INSPECTION TO VERIFY CITY'S FACILITIES.
4. THE CITY'S UTILITY OPERATOR AND PUBLIC WORKS FOREMAN SHALL BE NOTIFIED 24 HOURS IN ADVANCE TO WITNESS AND INSPECT ANY SANITARY SEWER LINE CONNECTION. NO SANITARY SEWER LINES SHALL BE BACKFILLED BEFORE THE CITY'S UTILITY OPERATOR OR PUBLIC WORKS FOREMAN HAS INSPECTED THE CONNECTION.
5. CONTRACTOR SHALL CONTACT THE CITY'S UTILITY OPERATOR OR PUBLIC WORKS FOREMAN TO OPERATE ALL VALVES. AT NO TIME IS THE CONTRACTOR OR CONTRACTOR'S REPRESENTATIVE TO OPERATE ANY PART OF THE CITY OF MONTGOMERY WATER SYSTEM.
6. THE OWNER OR CONTRACTOR SHALL INSTALL AND TEST APPROPRIATE BACKFLOW PREVENTION, PER CITY OF MONTGOMERY RULES & REGULATIONS.

UTILITY NOTES

CAUTION: OVERHEAD POWER LINES

OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES. PARTIES RESPONSIBLE FOR THE WORK INCLUDING CONTRACTORS, ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT 713-207-2222.

CAUTION: UNDERGROUND ELECTRICAL FACILITIES

UNDERGROUND ELECTRICAL FACILITIES EXIST IN THE AREA OF THIS PROJECT. DO NOT BEGIN CONSTRUCTION UNTIL THESE FACILITIES HAVE BEEN LOCATED AND STAKED. TO HAVE THESE UNDERGROUND FACILITIES STAKED, CALL THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567, OR TOLL FREE AT 1-800-669-8344, AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION.

CAUTION: UNDERGROUND GAS LINES

UNDERGROUND GAS LINES EXIST IN THE AREA OF THIS PROJECT. DO NOT BEGIN CONSTRUCTION UNTIL THESE LINES HAVE BEEN LOCATED AND STAKED. TO HAVE THESE UNDERGROUND LINES STAKED, CALL THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567, OR TOLL FREE AT 1-800-669-8344, AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION.

GENERAL SURVEY NOTES

1. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT COMMITMENT FOR TITLE INSURANCE OR ABSTRACTOR'S CERTIFICATE AND THEREFORE EASEMENTS OR ENCUMBRANCES MAY EXIST WHICH ARE NOT SHOWN HEREON. NO RESEARCH OF THE PUBLIC RECORDS OF MONTGOMERY COUNTY, TEXAS REGARDING THESE EASEMENTS OR ENCUMBRANCES WAS PERFORMED BY JONES|CARTER.
2. BEARINGS SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE, AS PER THE CITY OF MONTGOMERY CONTROL NETWORK.
3. RESEARCH FOR ADJOINER TRACTS WAS PERFORMED BY JONES|CARTER ON MAY 15, 2017.
4. REFERENCE IS HEREBY MADE TO A SEPARATE SURVEYOR'S REPORT PREPARED OF EVEN DATE HERewith DESCRIBING THE LOCATION OF APPROXIMATE RIGHT-OF-WAY LINES AND PRIVATE PROPERTY LINES SHOWN HEREON.
5. ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY CONTROL MONUMENT 7₃₂MONT 7₃₂ LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 105 (AKA EVA STREET), APPROXIMATELY 260- FEET NORTHEAST OF THE FARM-TO-MARKET ROAD 149 (AKA LIBERTY STREET), AS SHOWN HEREON, WITH A PUBLISHED 7₃₂LOCAL ELEVATION7₃₂ OF 7₃₂291.77' GEOD '097₃₂.
6. TEMPORARY BENCHMARK A BEING A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF STATE HIGHWAY 105 AND FARM TO MARKET ROAD 149. ELEVATION = 296.35', 7₃₂LOCAL ELEVATION7₃₂.
7. TEMPORARY BENCHMARK B BEING A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHWEST CORNER OF SKINNER'S CARPET AND FLOORING (21240 STATE HIGHWAY 105). ELEVATION = 308.66', 7₃₂LOCAL ELEVATION7₃₂.
8. TEMPORARY BENCHMARK C BEING A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE NORTHWEST CORNER OF STATE HIGHWAY 105 AND SHEPPARD STREET (SOUTHWEST CORNER OF 7₃₂CEDAR PARK7₃₂). ELEVATION = 298.64, 7₃₂LOCAL ELEVATION7₃₂.
9. TEMPORARY BENCHMARK D BEING A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHEAST CORNER OF STATE HIGHWAY 105 AND HOUSTON STREET. ELEVATION = 312.37, 7₃₂LOCAL ELEVATION7₃₂.
10. VISIBLE IMPROVEMENTS/UTILITIES WERE LOCATED WITH THIS SURVEY; NO SUBSURFACE PROBING, EXCAVATION OR EXPLORATION WAS PERFORMED FOR THIS SURVEY.
11. DIG TESS, A ONE-CALL NOTIFICATION CENTER, WAS CONTACTED ON MAY 1, 2017 TO PROVIDE NOTIFICATION TO UTILITY FACILITY OWNERS/OPERATORS TO LOCATE THEIR UNDERGROUND UTILITIES, AS INDICATED BY TICKET NUMBER(S) 1762261666, 571072046, 1762261559, 571071927, 1762262333, 571072651, 1762261797, 1763703016, 571072180, 571209102, 1962261975 AND 571072355.

EXISTING LEGEND

- 1-3 = Concrete Paving
PP ● = Power Pole
SP ● = Service Pole
SAN MH ● = San Sew MH
STM MH ● = Storm MH
● = Street Light
PF = Picket Fence
CLF = Chain Link Fence
P = Electricity Power Line
RCP = Reinforced Concrete Pipe
PVC = Poly Vinyl Chloride Pipe
WV = Water Valve
Guy Wire = Guy Anchor Wire
* = Fire Hydrant
= Ditch
W.M. = Water Meter
G = Gas Line
W = Gas Line
C/O = Clean out
TSB = Traffic Signal Box
CP = Control Panel
Vol. = Volume
Pg. = Page Number
M.C.P.R. = Montgomery County Plat Records
M.C.D.R. = Montgomery County Deed Records
M.C.C.F. No. = Montgomery County Clerks File Number
R.O.W. = Right-of-Way
Fnd. IR = Found Iron Rod
Sq. Ft. = Square Feet
F/L = Flow Line
POB = Point Of Beginning

BENCH MARK

ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF MONTGOMERY BENCHMARK MONT 7,

ELEVATION = 291.77', 1988 NAVD, GEOD '09.

1% ANNUAL CHANCE FLOODPLAIN

ACCORDING TO MAP NO. 48148302008 OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE RATE MAPS FOR MONTGOMERY COUNTY, DATED AUGUST 18, 2014, THE SUBJECT TRACTS ARE SITUATED WITHIN UNSHADED ZONE "X" ; DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

TBM A

A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF STATE HIGHWAY 105 AND FARM TO MARKET ROAD 149

ELEV. = 296.35' (AS SHOWN)

TBM B

A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHWEST CORNER OF SKINNER'S CARPET AND FLOORING (21240 STATE HIGHWAY 105)

ELEV. = 308.66' (AS SHOWN)

TBM C

A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE NORTHWEST CORNER OF STATE HIGHWAY 105 AND SHEPPARD STREET (SOUTHWEST CORNER OF "CEDAR PARK")


ELEV. = 298.64' (AS SHOWN)

TBM D

A RAILROAD SPIKE IN A POWER POLE LOCATED AT THE SOUTHEAST CORNER OF STATE HIGHWAY 105 AND HOUSTON STREET.

ELEV. = 312.37' (AS SHOWN)

BID SET ONLY
NOT FOR CONSTRUCTION

CITY OF MONTGOMERY, TEXAS		
Chris Roznovsky, P.E. City of Montgomery, City Engineer Signature Valid for One (1) Year		Date
6/23/20	ADDED NOTE VIA ADDENDUM NO. 1	NEJ
NO. / DATE	REVISIONS	APP.
CITY OF MONTGOMERY MONTGOMERY COUNTY, TEXAS		
 JONES CARTER Texas Board of Professional Engineers Registration No. F-439 1575 Sawdust Road, Suite 400 • The Woodlands, Texas 77380 281.363.4039		
SH-105 WATERLINE REPLACEMENT		
GENERAL NOTES		
FILE NO:		
JOB NO:	W5841-0028	
DATE:	May 2020	
DCN. BY:	KMV	
DWG. BY:	KEB	
SCALE:		
SHEET No.	2 OF 24	05/27/20