
Special Specification 7200

Gas Utilities



1. DESCRIPTION

Furnish, install, or replace gas pipe, valves, appurtenances, and services, with associated labor and materials in conformance with CITY OF BOERNE requirements and details shown on the plans. Obtain necessary permits, provide testing as necessary, and request inspection of the completed gas lines before being placed in service.

2. GENERAL

Responsible for the construction of complete facilities, conforming in all respects with the details shown on the plans and as covered by this item.

No gas service may be cut or turned-off after 2:30 PM each day. All gas services cut or turned-off during the day must be restored before 4:00 PM that same day. All work must be coordinated with the Engineer and CITY OF BOERNE.

Locate all existing gas facilities as needed for the construction and installation of new gas facilities. Upon request, the Engineer will provide copies of the appropriate CITY OF BOERNE gas maps to facilitate locating activities for the existing facilities at the project site; however, the Engineer and CITY OF BOERNE do not guarantee the accuracy of such gas facilities map information. Use conventional pipe locating equipment and techniques in conjunction with information from the maps to determine the actual location of existing gas facilities and be liable for any damages to existing gas facilities and any other utilities that are incurred by construction activities.

While this item and the details shown on the plans are intended to be full and complete, the Contractor is considered bound by customary good construction practice whether referred to specifically or not.

3. REFERENCES

Attention should be directed to the following items:

Item 9, "Measurement and Payment;"

Item 400, "Excavation and Backfill for Structures;"

Item 401, "Flowable Backfill;"

Item 402, "Trench Excavation Protection;" and

Item 420, "Concrete Substructures."

- American National Standards Institute (ANSI)
 - ANSI B40.100, "Pressure Gauges and Gauge Attachments"
- American Society for Testing and Materials (ASTM)
 - ASTM D2513, "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings"
 - ASTM D2683, "Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing"
 - ASTM D3261, "Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing"
 - ASTM D3350, "Standard Specification for Polyethylene Plastics Pipe and Fitting Materials"
 - ASTM D2774, "Standard Practice for Underground Installation of Thermoplastic Pressure Piping"
 - ASTM F1055, "Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing"
 - ASTM F2138, "Standard Specification for Excess Flow Valves for Natural Gas Service"
 - ASTM F2620, "Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings"

4. MATERIALS

Furnish all materials in accordance with the requirements shown on the plans and in the details for each particular system in accordance with all materials requirements of the CITY OF BOERNE.

Polyethylene pipe to be Driscoplex 6500, PE 2406/2708 per ASTM D3350, with wall thickness DR 11 manufactured by Performance Pipe, A division of Chevron Phillips Chemical Company. Pipe to be yellow for gas service and in sizes 1 in., 2 in., 4 in., and 6 in. with lot numbers with length markings every foot.

Polyethylene fittings to be ASTM D2513 compliant from either Performance Pipe, A division of Chevron Phillips Chemical Company, Central Plastics Company, or an approved equal. Material to be PE 2406/2708 per ASTM D3350 with butt fusion fittings per ASTM D3261, socket type fittings per ASTM D2683, and electrofusion fittings per ASTM F1055. Service Risers are to be anode less per ASTM F2509 and comply with 49 CFR 192.283 in 1 in. or 2 in. sizes and manufactured by Central Plastics Company.

Polyethylene ball valves 1 in. and larger must be full port PE 2406/2708 per ASTM D3350 from R.W. Lyall & Company, Inc., Flowserve Nordstrom Valves, Flowserve Corporation, Elster Perfection, or approved equal. Excess flow valves must meet ASTM F2138 and be from Gas Breaker, Inc., Elster Perfection, or approved equal. Valve boxes must be screw type with 5 1/2 in. diameter shaft and bottom section molded to fit over 2 in., 4 in., or 6 in. plastic valves. Accepted manufacturers are Bingham and Taylor, Handley Industries, Inc., or an approved equal. Locks must be firomatic lockseals from Highfield Manufacturing.

Tracer wire must be ASTM D1248 compliant thermoplastic insulated wire rated for 600 volts and 12 AWG solid copper conductor with a yellow jacket, either HMW-HDPE or HMWPE, and 30 mils

minimum. The wire must be approved for direct burial and be heat, oil, and gasoline resistant. Tracer wire locate boxes can have cast iron or ductile iron rims and yellow lids with a standard pentagon head lock bolt and nickel plated brass terminals for tracer wire connection. The boxes must be 2 ½ in. diameter ABS plastic tubes with magnet embedded in tube wall.

All materials are to be unloaded (not dropped) with proper equipment to prevent damage.

Deliver the materials along the right of way in such a manner as to not cause interference to driveways, streets, other construction operations, sidewalks, etc. Prevent dirt or debris from entering into the pipe, couplings, fittings, etc.

Upon completion of the gas work, promptly return excess or salvaged materials furnished or owned by CITY OF BOERNE to the designated CITY OF BOERNE Center.

5. CONSTRUCTION METHODS

5.1. **Excavation.** Excavation (trenching) required to complete the pipeline installation will have enough width to allow installation of piping and valves at depths specified on the plans or the design standards listed in this item. Blasting to perform the excavation is not allowed. In cases where shrubbery and trees that are labeled to remain are encountered in any location where in the opinion of the Engineer the use of trenching equipment may result in unnecessary damage, the Engineer may require the trench to be excavated by hand.

5.2. **Dust Suppression.** Whenever trenching activities create significant amounts of dust or other undesirable emissions into the atmosphere, take action to reduce these emissions, as determined by the Engineer.

5.3. **Boring.** At the locations shown on the plans, the pipe installation is accomplished with a boring operation using the following methods.

The use of guided or directional boring equipment is acceptable if the Contractor demonstrates such equipment is capable of installing the pipe along a controlled and constant horizontal and vertical alignment. Insure that the pipe is not damaged as it is pulled or otherwise inserted into the bored hole. The bored hole must not exceed the diameter of the casing by 1-1/2 in.

When boring equipment is used to install plastic pipe, a fusible link will be used between the pull head and the pipe at all times to prevent damage during the pull-back operation. The fusible link should be at least 2 ft. in length and be a section of pipe that is 1 nominal pipe size smaller than the pipe being installed.

Any voids outside of the casing, including abandoned and misaligned holes must be pressure grouted.

Whenever service lines are planned for installation along a section of gas main that is being installed with guided or directional boring equipment, excavate at least 1 service tap location to provide an intermediate inspection hole before pulling the pipe into the bored hole. The

intermediate inspection hole is to be located near the middle of the directional bored section. If several service line connections are planned along the route, the Engineer must approve the location of the service tap that is excavated for the intermediate inspection hole before the pipe insertion process.

Mains and service lines that are installed by guided or directional boring equipment must not be installed at depths greater than 6 ft. unless one of the following conditions applies:

- The plans specifically require installation depths in excess of 6 ft.
- Installation depths in excess of 6 ft. are necessary to achieve acceptable clearance between the pipe and another utility or structure while maintaining the minimum burial depth requirements for the pipe.
- The Engineer's prior approval for such installation when the conditions described above exist are not applicable.
- When guided or directional boring equipment is used to install gas distribution facilities, additional compensation due to extra depth of cover will not apply.
- An electrical continuity test will be conducted by the Contractor on each installed tracer wire to verify that the wire has not been "shorted" during the installation procedure.

- 5.4. **Temporary Bridges.** When the trench is excavated where it is necessary to have a passageway across the trench, provide safe, temporary bridges or provide other safe means of crossing the trench.

No streets, alleys or driveway are to be blocked at night, except with the Engineer's prior approval. Trenches and holes left open during non-working periods (overnight, a weekend, etc.) must be protected and with barricades and warning lights.

- 5.5. **Protection of Pipe Ends.** Keep the pipeline installation clean. At the end of each day's work and at any other times that the ends of the installed pipe are left unattended, the pipe ends must be securely closed to prevent the entrance of water, animals, trash or any other obstructions, and not opened until work is resumed.

If there is an obstruction in a portion of the lines, remove all foreign matter if it is in the lines. The work necessary to assure that foreign matter is not present and to remove the foreign matter if it is present is included in the installation cost of the line.

- 5.6. **Welding.** All welding is in accordance with API Standard 1104, 18th Edition, dated September, 1994 (or the latest edition), as outlined here in, as shown on the plans, or as directed and approved by the Engineer.

Welds are to be made with the "shielded metal-arc" process. All welding equipment and materials such as the welding rods will be furnished by the Contractor. Brand of welding rods proposed must be approved by the Engineer before use.

Where determined by the Engineer to be necessary, back-welding or inside-welding of all tube turns, ells, etc., in the pipeline is to be performed as part of the required work.

All welds to be made with not less than 3 beads. The second or "Hot Pass Bead" should be run on the full circumference of the pipe as soon as practical where the Hot Pass or second bead is run before the Stringer Bead has cooled.

Before being allowed to weld, each welder must qualify in accordance with Section 3.0 of API Standard 1104 and must pass the tests listed in paragraph 3.4 of this Standard. Conduct, or make arrangements for, qualification tests for welders. The qualifying tests will be conducted in the presence of the Engineer.

Each welder will be assigned a specific number and it will be the welder's responsibility to affix his number with a crayon next to each weld for future identification. Steel die stamping is not to be used.

Welding inspection is in accordance with Section 5.1 of API Standard 1104. Test all welds with soap suds while the line is subjected to an internal air pressure of 90 PSI before field coating the joints.

Pin holes, leaks, cold laps, rivers, undercutting or any other defects occurring in any weld, are to be repaired by cutting out the entire weld and completely rewelding. Whenever it becomes necessary to remove a weld from the completed line, replacement is made by welding into the line a pup joint with a minimum length of 10 ft.

- 5.7. **Coating of Pipe.** If the pipe is coated and wrapped pipe, the Contractor will be responsible for coating all field joints and repairing damaged and defective coating on the pipe regardless of the nature, extent or cause of damage or defect. However, if the pipe had a damaged or defective coating of such magnitude as to require an extra charge to properly coat, first refer this matter to the Engineer and not proceed until authorization to do so has been obtained.

For coating field joints of pipes coated with TGF-3 coal tar enamel, the coating on the pipe must be cut back a distance of 8 to 12 in. from the joint. The edge of the enamel and felt wrapping is to be feathered at these points to assure a firm bond between the original coating and the field coating. After the joints are welded and tested, and the welds cleaned and brushed, the bare ends of the pipe are to be thoroughly cleaned, then immediately given a hand-brushed coat of primer to dry surfaces. Exercise care to prevent primer from being applied too heavily, especially at the base of the welds; any runs or sags which have dried or dead primer must be scraped off and the pipe reprimed. After the tape primer has dried to a tacky consistency, apply cold wrap tape with a 30% overlap, taking care not to create any voids between the pipe and tape coating. No primer or coating will be applied to wet or damp pipe.

All repairs to damaged coating which exceeds 2 sq. in. will be made by breaking out the old coating, scraping the pipe to bare metal, feathering the edges to assure a firm bond and repriming. After the primer has dried to a tacky consistency, apply cold wrap tape taking care not to create any voids between the pipe and the tape coating. For repairs less than 2 sq. in., the pipe does not have to be scraped to bare metal and primed; however, the good enamel around the damaged portion is to be feathered before the cold wrap is applied.

- 5.7.1. **Repairs.** Repairs to Fusion Bonded Epoxy (F.B.E.) and Powercrete coated pipe may include the following additional repair procedures.

For pinhole and small area repair, the pipe surface and small area holidays where repairs by the patching stick method are approved by the Engineer and is a recommended procedure by the coating manufacturer, the original coated surface must be thoroughly cleaned and lightly abraded with sandpaper. Patching stick material is to be compatible with the F.B.E. epoxy coating system and is to be material normally supplied by the manufacturer of the F.B.E. coating system.

It is to be applied by heating the clean pipe surface until the patching stick begins to melt when it is rubbed over the heated area. Continue heating the coated surface while applying the patching stick like a brazing rod. Build a small puddle of melted compound to obtain a minimum thickness of 0.025 in. Continue heating until the compound flows out smoothly. In all instances the manufacturer's recommendations for the use of the patching stick are to be followed.

An alternate method, for repairs to small area holidays, is liquid epoxy. The material for patching is to be 100% solids catalytically cured epoxy coating normally supplied by the manufacturer of the F.B.E. coating system. The original coated surface must be thoroughly cleaned and lightly abraded with sandpaper. All dust is to be wiped off before applying the patch coating. This type of repair coating is to be applied by spatula, brush, roller, or spray to attain a uniform minimum thickness of 0.025 in. and is to overlap the surrounding undamaged coating by at least 1 in. The patch coating is not to be applied when pipe temperatures are below 50°F unless provisions are made for complete heat curing, using methods and temperatures in accordance with procedures recommended by the patch coating manufacturer.

At the option of the Engineer, completely cured coating repairs are to be inspected with the Contractor's holiday detector. A patch-coated area is to be allowed to cure before handling as per manufacturer's specifications. Supply necessary equipment to complete repairs to manufacturer's guidelines.

For large area repair, where repairs are approved by the Engineer, the following procedures are to be followed. The pipe is to be cleaned to remove all dirt, scale, rust, damaged or disbonded coating and other foreign material. Areas repaired before surface oxidation or rusting occurs may be prepared by hand sanding, power tool grinding, or surface oxidation or other approved and suitable means. Areas repaired after surface oxidation or rusting occurs are to be cleaned using abrasive blasting before coating repairs. The edges of the original coating are to be "feathered out" around the area to be coated and all dust wiped off before applying the patch coating.

The material for patch coating must be 100% catalytically cured epoxy coating supplied by the manufacturer of the F.B.E. coating system. This type of repair coating is to be applied by spatula, brush, roller or spray to attain a uniform minimum thickness of 0.025 in. or as recommended by the manufacturer. The patch compound is to overlap the surrounding undamaged coating by at least 1 in. A patch-coated area is to be allowed to cure before handling as per manufacturer's specifications. At the option of the Engineer, completely cured coating repairs are to be inspected with the Contractor's holiday detector. Supply necessary equipment to complete repairs to manufacturer's guidelines.

For coating field joints on fusion bonded epoxy coated pipe, heat shrink sleeves may be employed when approved by the Engineer. Heat shrink sleeves are to be the heat shrinkable wraparound

sleeves with either a specially formulated mastic sealant or a solvent free, 2 component liquid epoxy primer designed to prevent corrosion of joints on buried pipelines.

Apply sleeves in compliance with manufacturer's recommendations. In addition, for field joints within bores, heat shrink sleeves may also be employed when approved by the Engineer, provided the sleeves are manufactured for this application. Sleeves for this application are to consist of a combination of the following components: a specially designed wraparound heat shrinkable sleeve, a high shear strength thermoplastic hot melt adhesive, a solvent free, 2 component epoxy, a specially designed wear cone, and optional clamping belts. Supply necessary equipment to install sleeves in accordance to manufacturer's recommendations. This may include, but not be limited to, high intensity gas torches and abrasive blast equipment for pipe surface preparation.

After the field joints have been coated and immediately before the pipe is lowered into the ditch, the entire coating will be tested to locate breaks or pinholes and other flaws in the coating with an approved holiday detector in good working condition capable of producing the testing voltage in pulsating cycles at very low amperage. The voltage used is not to exceed 14,000 volts for pipe coatings of 0.094 in. For fusion bonded epoxy coated pipe, the coating is to be checked for holidays using a dry-type holiday detector. The holiday detector is to be set at 150 volts per mil thickness of coating. All defective places will be plainly marked immediately. Furnish the holiday detector, and check the coating for holidays in the presence of the Engineer.

Compression type couplings, valves, welded fittings, etc., will receive a cold applied mastic after the pipe is in the trench and has been tested for leaks. A plastic wrap supplied by CITY OF BOERNE will be installed over the mastic to protect the coating during backfilling.

Handling coated pipe is to be accomplished only with suitable equipment to prevent damage to the coating. The coated pipe is to be placed on skids alongside the trench until it is to be welded and lowered into the trench. The skids are to be of enough width or padded with sand bags or resilient pads to prevent the skid edges from cutting the coating and wrapping. The skids are to be arranged to permit the coated pipe to bear on the full width of the skid.

Coated and wrapped pipe is to be carefully handled with wide rubber, leather, composition, or canvas slings or belts containing no protruding rivets or belts that may damage the coating. Wire rope, tongs, chains, hooks, and bare cables must not come into contact with the coating. Coated pipe is not to be handled when the temperature is low enough to cause cracking of the enamel.

- 5.8. **Plastic Gas Pipe.** Handle the pipe only with suitable equipment to prevent damage to the pipe such as fracture, kinking, deep gouges or cuts. The pipe is not to be subjected to abuse by dropping, throwing or dragging except over smooth non-scratching terrain or surface.

Install an insulated copper tracer with all pipe for the purpose of locating the pipe after backfilling. This wire is to be installed with 1 in. of separation from the pipe.

Fuse pipe joints in accordance with requirements of ASTM F2620 and manufacturer's instructions.

Before starting production fusing, each employee that will be making fusion joints must qualify according to 49 CFR Part 192, Paragraph 285. Conduct, or make arrangements for the qualification tests. The qualifying tests are to be conducted in the presence of the Engineer.

Furnish all specialty tools and equipment required to handle, install, butt fuse and squeeze-off the pipe. Insure all specialty tools and equipment are specifically designed for use on plastic piping systems and are in good working condition.

All pipe joints are to be soap bubble tested with the line between 90 and 100 PSIG internal pressure. The test is to be made in the presence of the Engineer.

- 5.9. **Cathodic Protection.** Install packaged anodes, insulating joints and insulating flange sets as provided for by this Item or as shown on the plans. Welding machines are not be used to test insulation or otherwise be grounded across insulating devices. Insulation will be checked by the Engineer and declared acceptable only after testing establishes satisfactory performance.

- 5.10. **Installation and Backfill.** All stumps and roots found in the trench are to be cut and removed where they will not come in contact with the pipe. All loose rocks, stones, blocks, heavy clods, tree limbs, etc., which may damage or prevent proper installation of the pipe are to be removed before the pipe is installed. The pipe will not be lowered into the trench until it is in full compliance to specified requirements.

The trench is to be excavated a minimum of 6 in. deeper than the proposed pipe depth so that Red Poteet sand approved by the Engineer can be placed in the trench before the pipe is installed. The sand placed in the trench to cushion the pipe is to be leveled and tamped so that the weight of the pipe is evenly distributed on the sand cushion.

Unless the plans or the Engineer requires flowable backfill, backfilling must be conducted in a manner where the trench will be neatly and uniformly backfilled and compacted. Exercise care to prevent hand shovels and tampers from damaging the pipe. Provide 12 in. of sand backfill around and over the pipe to form a protective cushion between the pipe and the materials and equipment used for backfilling. After the pipe has a 12 in. minimum cover of sand, the remaining backfill may contain rocks and gravel, except that large rocks in excess of 2-1/2 in. in diameter, width or length, will not be used.

When crossing drainage ditches and minor streams, furnish and install all materials necessary for bank reinforcement. The backfill is to be properly maintained until the work has been completed and accepted. No reimbursement will be made for repairing of backfill due to floods or other conditions occurring before final acceptance.

Control the excavation and backfilling operation to have a maximum amount of 600 LF of open trench commensurate with good construction practices. Any surplus material not used for backfilling is to be disposed of properly. Attain the minimum specified cover for the gas piping.

Backfill in public and private thoroughfares must be properly compacted to ninety-five per cent (95%) density to prevent settlement or damage to other buried utilities. CITY OF BOERNE will strictly enforce this requirement through random visual inspection and the use of standard compaction evaluation methods. The Contractor will not use soil from the right of way except from the spoil bank. The Contractor will dispose of any surplus soil. The Contractor will provide density testing reports to ensure proper compaction when the city, county or state entity with jurisdiction over the project requests such tests.

- 5.11. **Final Piping Connections, Tie-Ins and Purging.** All connections to existing mains must be made by qualified persons employed by the CITY OF BOERNE. This includes all necessary preparations for tie-ins and purging for all sections of gas lines installed. Weld short stop fittings and other necessary fittings on existing steel gas lines that will be used by CITY OF BOERNE to control the flow of gas into the new gas lines. CITY OF BOERNE will control the flow of gas on all operative gas facilities while making final piping connections and tie-ins.

Furnish all necessary equipment and instrumentation that is required to insure that the final tie-in welds and fusions between new and existing gas facilities are performed in a safe manner. Such equipment and instrumentation may include pneumatic air movers, combustible gas indicators (CGI's), oxygen monitors, self-contained breathing apparatus and fire retardant clothing for construction personnel, and fire extinguishers.

- 5.12. **Clean-Up.** As soon as backfill is completed on a section of pipeline, clean the right of way, remove and transport all surplus CITY OF BOERNE issued materials to the designated CITY OF BOERNE Center. Dispose of all refuse such as brush, broken skids, rock, etc. The earth on both sides of the trench which has been disturbed during the construction of the gas line is to be leveled, and the entire area left in a condition satisfactory to the Engineer.

- 5.13. **Gas Facility Access Cover Adjustments.** Install riser rings on gas facility access cover assembly to raise existing access cover to be flush with pavement or grade in unpaved areas. Adjustment, excavation, demolition of concrete, and replacement of existing gas facility access cover assembly may be necessary if final grade is below existing grade. General Use concrete used for gas facility access cover adjustments must have a minimum compressive strength of 4,000 psi. The contractor must be responsible for damage to other appurtenances and structures whether CITY OF BOERNE owned or not, and perform the adjustment in accordance with the paving contractor's schedule.

- 5.14. **Casing.** Install casing pipe in straight horizontal alignment and vertical alignment with the following tolerances:

1. Horizontal alignment is allowed a maximum deviation of ½ in. in 10 ft. measured with a 10 ft. straightedge (the too) and 2 in. in 100 ft. overall from straight with a maximum 3 in. deviation from line on plans.
2. Vertical alignment is allowed a maximum deviation of ½ in. in 10 ft. measured with a 10 ft. straightedge (the too) and 1 in. in 100 ft. overall from straight with a maximum 1 in. deviation from grade on plans provided carrier pipe can be kept to grade with spacers.

After casing is installed, use casing spacers at minimum 10 ft. spacing or less as required by the manufacturer. For HDPE carrier pipes use non-metallic casing spacers or stainless steel casing spacers, installing 2 within 2 ft. of each joint with one on either side of the joint.

Plug ends of casing with end seals using Modular seal, Linkseal, or equal if the carrier pipe is centered in the casing pipe or one-piece synthetic rubber molded "S" shaped seal if the carrier pipe is not centered in the casing pipe.

6. TESTS

- 6.1. **Radiographic Inspection.** Applies when radiographic inspection is specified by this Item or by the plans.
- 6.1.1. **Standards and Codes.** The latest editions of the following documents apply when required:
- Department of Transportation, 49 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards."
 - Recommended Practice No. SNT-TC-1A, Supplement A "Radiographic Testing Method."
 - ANSI B31. 8, "Gas Transmission and Distribution Piping Systems."
 - ASME Code Section V, "Nondestructive Examination."
 - United States Nuclear Regulatory Commission, Title 10, Chapter 1, CFR - Energy and other federal, state and local regulations for protection against radiation hazards.
- 6.1.2. **Radiographic Procedure.** Perform all radiographic inspections in accordance with Section 8.2 of API Standard 1104. The Contractor is to provide a copy of the written procedure to the Engineer for acceptance.
- 6.1.3. **Personnel Qualifications.** Radiographic certification will be through a qualification and certification program that incorporates the requirements of Recommended Practice No. SNT-TC-1A, Supplement A in accordance with Section 8.7 of API Standard 1104.
- 6.1.4. **Equipment and Material.** Furnish all equipment and materials necessary for the performance of the radiographic inspection. The materials and equipment include all film and supplies for the processing, film identification, recording, filing and storage. Provide all barriers, warning systems, film badges, documentation and records necessary for the protection and personnel monitoring of every person near a radiation source.
- 6.1.5. **Production Radiography Procedures.** Notify the Engineer if any welds fail to meet the radiographic inspection. All welds or welded joints that are repaired or replaced are to be radiographed again.
- 6.1.6. **Film Identification Procedure.** Film identification is in accordance with Section 8. 6 of API Standard 1104. The method of identification will be as approved by the Engineer before the start of radiographic inspection.
- 6.1.7. **Radiographic Reports and File.** Furnish the Engineer a report for each calendar day the unit is on the project. All radiographs made are to be delivered to the Engineer and become the property of CITY OF BOERNE.
- 6.2. **Pressure Testing.** Demonstrate to the satisfaction of the Engineer, by performing a pressure test, that the mains and services installed do not leak and will operate safely at the desired maximum allowable operating pressure. Pressure tests will be performed to verify satisfactory workmanship and the strength of materials. To the extent practical, the test is to be conducted to the entire pipeline to minimize the number of untested tie-in connections. All joints used to tie-in a test segment of pipeline after the test are to be soap bubble tested at not less than its operating pressure. Repair any leaks or failures which are revealed by the test.

Furnish all supervision, labor, materials and equipment to perform the pressure test, including but not limited to, pumps, compressors, pigs, test instrumentation and water. Pressure test requirements will be as indicated on the plans. The requirements indicate the minimum and maximum test pressure, test fluid and test duration, as appropriate.

Conduct the test in accordance with the applicable requirements of 49 CFR Part 192 and take all necessary safety precautions to protect construction personnel and the general public during the test. Obtain all permits necessary to conduct the test except for the Railroad Commission of Texas test water discharge permit that is required for a hydrostatic pressure test.

6.2.1. **Standard Air Test.** Gas mains and services to be operated at pressures of 60 PSIG or less. The test pressure is to be a minimum of 90 PSIG and a maximum of 100 PSIG. The test duration is to be enough to ensure discovery of all leaks. At the minimum, each weld, butt fusion and any other fitting and connection is to be soap bubble tested at the specified test pressure. The test pressure is to be measured with a dial type gauge and monitored during the course of the test to detect leakage. Upon completion of the test, furnish the Engineer with a written statement to indicate successful completion of the test. Pending acceptance of the test by the Engineer, the Engineer must also sign the statement.

6.2.2. **Pressure Test.** Perform all testing in the presence of CITY OF BOERNE personnel.

Pressurize the test section to the minimum test pressure of 90 PSIG minimum, 100 PSIG maximum, then the test pressure will be maintained through the addition of air for 1 hour to stabilize the test.

A test section will pass the pressure test if the pressure drop is less than 0.5 PSIG after pressurizing to the minimum test pressure and holding for 24 hr. Once the section has passed the test, leave the main under air pressure with the test gauge in place until CITY OF BOERNE connects the main to the existing system. Monitor pressure on a regular basis. If pressure is lost, investigate immediately to find cause and repair. After repairs have been made, repeat pressure testing.

A hydrostatic test is to be conducted in general conformance with API Recommended Practice (RP) 1110. Conduct air tests in conformance with API RP 1110 with regard to safety and instrumentation.

6.2.3. **Test Records.** Submit to the Engineer all documentation associated with all the tests, including a completed Form I, "Hydrostatic Test Record and Certification" of Appendix I, API RP 1110, (or substantially similar documentation), testing logs and all recorder charts. All documentation is to be labeled to identify the pipeline section that was tested, signed, and dated by the Contractor. Provide written confirmation to indicate successful completion of the test for the Engineer's approval.

6.3. **Tracer Wire Test.** Test all tracer wire in presence of representative of the City of Boerne. Hook up locator transmitter to tracer wire and ensure the receiver gets strong signal continuously along full length of pipe. Repair any wires that do not carry enough signal to provide strong locate signal

at any point along the pipe line. Add tracer wire locate boxes if necessary to ensure a strong locate signal along the full length of the pipe.

- 6.4. **Pipeline Records.** Provide copies of plan drawings showing the location of pipe installation with pipe lot numbers and lengths as marked on the pipes. Records must be kept so that specific portions of pipe can be relocated in the future. Provide copies of plan drawings with location and serial numbers of installed valves.
- 6.5. **Pipeline Availability (Test Period).** The gas main installation including the backfill will not receive final acceptance until all gas main construction has been completed and the main has been in satisfactory operation. This date will be established by the Engineer in writing. If it is determined by the Engineer that adjustments, repairs, replacements or other correction measures are needed, promptly perform the correction or replacement and retesting work necessary at contractor's expense including all work damaged by the correction or replacement of the defective work. Upon completion of the gas work, all subsequent test periods will be at the discretion of the Engineer.

7. MEASUREMENT

Measurement of completed and accepted work as described herein is as follows:

- 7.1. New service stubs for 1 in. through 4 in. diameter pipes placed in an open trench will be measured as each location shown on the plans and as directed. A service stub connected to the gas main located along the same side of the street as the property being serviced is referred to as a short side service stub. A service stub connected to the gas main located along the opposite side of the street from the property being serviced is referred to as a long side service stub. The following conditions apply for service stubs:
- 7.1.1. Service stubs installed from an existing gas main to 1 ft. inside property line for short side or long side service.
- 7.1.2. Service stubs installed from a new gas main to 1 ft. inside property line for short side or long side service.
- 7.2. Re-running and lowering service lines for 1 in. through 4 in. diameter pipes will be measured as each location shown on the plans and as directed. The conditions for service lines shown in Sections 6. (1)(a) and (b) will apply for re-running and lowering service lines.
- 7.3. Extending, connecting and pump testing an existing service line for 1 in. through 4 in. diameter pipe to a new gas main will be measured as each location shown on the plans and as directed.
- 7.4. Shortening, connecting and pump testing an existing service line for 1 in. through 4 in. diameter pipe to a new gas main will be measured as each location shown on the plans and as directed.
- 7.5. When there is a need for a new welded steel service tee or a steel ball valve to be welded, the new welded steel service tee or the steel ball valve will be measured for the welding required to install

each fitting for a 1-1/4 in. steel tee or a 2 in. or 4 in. steel ball valve. In most instances, the existing service tee and valve will be used when re-running a service line off an existing steel gas main.

- 7.6. Uncovering and capping service lines at the gas main will be measured as each location shown on the plans and as directed.
- 7.7. Installing a gas main of the size and type shown on the plans in an open trench will be measured by the foot along the top of the trench.
- 7.8. Installing a gas main of the size and type shown on the plans in a joint trench will be measured by the foot along the top of the trench.
- 7.9. Installing a casing for a service line or a gas main of the size shown on the plans in an open trench will be measured by the foot along the top of the trench. The size of the casing will be larger than the size of the service line or gas main, such as, using 3 in. casing for 1 in. pipe, 4 in. casing for a 2 in. pipe, etc. This does not include the pipe installed in the casing.
- 7.10. Boring for a service line or a casing of the size specified on the plans will be measured by the foot of pipe installed in the bore. The size of the casing will be larger than the size of the service line or gas main to be installed.
- 7.11. Installing a service line or gas main of the type and size shown on the plans into a previously installed casing will be measured by the foot of pipe installed in the casing. The size of the pipe will be a 1 in. pipe into a 3 in. casing, a 2 in. pipe into a 4 in. casing, a 4 in. pipe into a 6 in. casing, a 6 in. pipe into a 8 in. casing, a 8 in. pipe into a 12 in. casing, a 12 in. pipe into a 16 in. casing or a 16 in. pipe into a 20 in. casing.
- 7.12. Flowable backfill will be measured in accordance with Item 401, "Flowable Backfill," for the locations shown on the plans and locations directed by the Engineer.
- 7.13. Trench excavation protection will be measured in accordance with Item 402, "Trench Excavation Protection," for the locations shown on the plans and locations directed by the Engineer.
- 7.14. Excavation and backfill (except flowable backfill) and the work for cutting and restoring pavement will be measured in accordance with Item 400, "Excavation and Backfill for Structures." The sand used as part of the backfill will be considered subsidiary to this Item. All testing of the gas main installations will not be measured for payment but is to be considered subsidiary to the various natural gas pipeline pay items.
- 7.15. Mobilization (Equipment and Materials) will be measured in accordance with "NGP Mobilization," for one-time mobilization to and from the jobsite. Any additional mobilization requested by CITY OF BOERNE that requires an extra charge for mobilization, first refer this matter to the Engineer and do not proceed until authorization to do so has been obtained, in which event the provisions of Item 9, "Measurement and Payment," will be used to pay for this work.

- 7.16. The stopple fittings and the work for stopping the flow of gas will be measured in accordance with "NGP Stopples". The cost of the fittings used as part of the line stop will be included this Item and provided by the contractor.
- 7.17. Adjustment of a gas facility access cover to proposed grade will be measured as each location shown on the plans and as directed.
- 7.18. Reinforced concrete will be measured in accordance with Item 420, "Concrete Substructures" for the locations shown on the plans and locations directed by the Engineer.
- 7.19. Removal of the existing main will be measured by the foot along the top of the trench.

8. PAYMENT

The work performed and materials needed for the installation of the natural gas pipeline in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for the Items of work hereinafter described. These prices will be full compensation for preparation, excavation and backfill, for shaping and fine-grading the trench, for placing and connecting pipes, for coating the steel pipe, for installing all necessary fittings, for building and painting risers, for meter set-ups, furnishing materials not provided by CITY OF BOERNE, for all testing, disposition of surplus material and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

- 8.1. Payment for new service stubs for 1 in. through 4 in. diameter pipe placed in an open trench will be at the unit price bid for "Natural Gas Pipeline (New Short or Long Service)(Existing Main to Property Line)" and "Natural Gas Pipeline (New Short or Long Service) (New Main to Property Line)".
- 8.2. Payment for re-running and lowering service lines for 1 in. through 4 in. diameter pipe placed in an open trench will be at the unit price bid for "Natural Gas Pipeline (Short or Long Service)(Existing Main to Property Line)", "Natural Gas Pipeline (Short or Long Service)(Existing Main to Meter)" "Natural Gas Pipeline (Short or Long Service)(New Main to Property Line)" and "Natural Gas Pipeline (Short or Long Service)(New Main to Meter)". Removal of existing service lines will be subsidiary to this Item.
- 8.3. Payment for extending and connecting a service line for 1 in. through 4 in. diameter pipe to a new gas main will be at the unit price bid for "Natural Gas Pipeline (Service)(Extend to New Main)".
- 8.4. Payment for shortening and connecting a service line for 1 in. through 4 in. diameter pipe to a new gas main will be at the unit price bid for "Natural Gas Pipeline (Service)(Shorten to New Main)".
- 8.5. Payment for the welding required to install each fitting for a 1-1/4 in. steel tee or a 2 in. or 4 in. steel gate valve will be at the unit price bid for "Natural Gas Pipeline (Service)(Welded Fitting)(Tee)" or "Natural Gas Pipeline (Service)(Welded Fitting)(Valve)". This work includes the installation of a valve box.

- 8.6. Payment for uncovering and capping an existing service line at the gas main will be at the unit price bid for "Natural Gas Pipeline (Capping Service at Main)".
 - 8.7. Payment for installing a new gas main will be at the unit price bid for "Natural Gas Pipeline (Main)" of the type and size specified on the plans. This includes the placement of a tracer wire in the trench when plastic pipe is specified.
 - 8.8. Payment for installing a new gas main in a joint trench with another utility will be at the unit price bid for "Natural Gas Pipeline (Joint Trench)" of the type and size specified on the plans. This work includes appurtenances, additional padding, and the placement of a tracer wire in the trench when plastic pipe is specified.
 - 8.9. Payment for installing casing in an open trench for a service line or gas main will be at the unit price bid for "Natural Gas Pipeline (Casing)" of the type and size specified on the plans. This work includes the installation of casing vent pipes, insulators and end seals.
 - 8.10. Payment for boring the installation of a service line or a casing for a service line or a gas main will be at the unit price bid for "Natural Gas Pipeline (Boring)" of the type and size specified on the plans.
 - 8.11. Payment for inserting a service line or a gas main inside a casing will be at the unit price bid for "Natural Gas Pipeline (Insert)" of the type and size specified on the plans.
 - 8.12. Payment for flowable backfill used to backfill the trench will be at the unit price bid for "Flowable Backfill" under Item 401, "Flowable Backfill" by the cubic yard.
 - 8.13. Payment for trench excavation protection will be at the unit price bid for "(Trench Excavation Protection)" under Item 402, "Trench Excavation Protection."
 - 8.14. Payment for excavation and cutting and restoring pavement will be at the unit price bid under Item 400, "Excavation and Backfill for Structures."
 - 8.15. Payment for mobilization will be at the lump sum price bid for "(Gas Construction Contractor Mobilization)" under "NGP Mobilization."
 - 8.16. Payment for stopping gas flow will be at the unit price bid for "(Stoppling)" under "NGP Stopple."
 - 8.17. Payment for adjusting a gas facility access cover to proposed grade will be at the unit price bid for "Gas Valve Box Adjustment" or "Gas Test Station Adjustment). Excavation, demolition, or replacement of concrete pad for gas facility access cover assembly must be subsidiary to item "Gas Valve Box Adjustment or "Gas Test Station Adjustment" as deemed necessary by authorized CITY OF BOERNE personnel.
- Testing the natural gas pipeline for leakage, including all labor, materials and equipment necessary to perform the tests, will not be paid for directly but is to be subsidiary to the various natural gas pipeline pay items.

- 8.18. Payment for reinforced concrete will be at the unit price bid for "CL A Conc (Misc.)" under Item 420, "Concrete Substructures" by the square yard.
- 8.19. Payment for removing the existing main will be at the unit price bid for "Removal."