SECTION 804
SEWER FORCE MAINS

804-1 DESCRIPTION: This Work shall consist of furnishing all labor, materials, equipment, and incidentals required to remove and dispose of existing sewer force mains if required, and install new sanitary sewer force main pipelines, fittings and taps of existing lines. The Contractor shall be responsible for safely storing materials needed for the Work until they have been incorporated into the completed Project. Contractor shall keep the interiors of all pipes, fittings, and other accessories free from dirt and foreign matter at all times.

When an item for "Sewer Force Main" is included in the contract, the Contractor has the option of furnishing either ductile iron pipe or PVC pipe, unless otherwise noted.

804-2 MATERIALS: Materials shall conform to the following Sections and Subsections.

Sanitary Sewer Bedding Material	801-3
Sanitary Sewer Backfill Material	801-3
Polyvinyl Chloride (PVC) Pipe and Fittings	1016-2.1
High Density Polyethylene (HDPE) Pipe and Fittings	1016-2.2
Ductile Iron Pipe and Fittings	1016-2.3
Valves	1019-7

804-3 SUBMITTALS:

a. Action Submittals:

1. Traffic Control Plan (if required)

2. Pipe:

i. Information on gasket polymer properties.
ii. Application methods, application requirements, and chemical resistance data for coating and lining products.
iii. Fitting data sheets.
iv. Joint and fitting restraints.

3. Air Release/Vacuum Valves:

i. Product data sheets for make and model.
ii. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
iii. Maximum recommended test pressure; maximum and minimum recommended working pressures of air release/vacuum valves, isolation valves, flanges, connecting piping, and fittings.
iv. Recommended seating materials for specified operating pressures.

4. Valves:

i. Shop Drawings:
ii. Product data sheets for each make and model. Indicate valve Type Number, applicable Tag Number, and facility name/number or service where used.
iii. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
iv. Sizing calculations for open-close/throttle and modulating valves.

b. Informational Submittals:

1. Pipe:

i. Certificates:

1. Manufacturer’s Certificate of Compliance for each type of pipe that products furnished meet requirements of this section.
2. Manufacturer’s written recommendations for pipe handling and installation.

ii. Field Leakage Testing Plan: Submit at least 15 days in advance of the testing and include at least the following:

A. Testing dates.
B. Piping systems and sections to be tested. Must conform to maximum test section limits provided in the Contract Documents.
C. Test type.
D. Method of isolation.
E. Method of conveying water from source to system being tested.
F. Calculation of maximum allowable leakage for piping section(s) to be tested.
G. Method for disposal of test water, if applicable.

2. Air Release/Vacuum Valves:

i. Manufacturers’ Instructions:

A. Installation and testing of products specified.
B. Pipeline tapping and service saddle installation.

ii. Operation and maintenance data.

3. Valves:

i. Tests and inspection data.
ii. Operation and Maintenance Data.
iii. Manufacturer’s Certificate of Proper Installation.

4. Tapping:

i. Submit qualifications of the personnel who will perform the tapping operation:

A. Foreman shall have a minimum of five years experience in tapping pressurized lines.
B. Operator shall have at least one year experience in operating the tapping machine on taps of similar pipe material.

5. If a tap is required, a detailed description of the entire pipe tapping procedure, including detailed plan of excavation, traffic control plan, preparations prior to making the tap, the tapping procedure, procedure for connecting new lateral, backfill of the site and surface restoration shall be submitted for approval prior to beginning the work. The Engineer's review of the excavation procedure will be for general progress of the work and shall not be construed as an approval

of the structural adequacy of the excavation's stabilization system.

6. If a tap and/or tie-in is required on prestressed concrete force main pipe, a representative from the pipe manufacturer must be present.

804-4 PRODUCTS:

a. All products used will be selected from the Qualified Products List (QPL) or approved equal. They may also be visually inspected by the Engineer at the Site for conformance to the Specifications. At Engineer's discretion, Contractor may be required to supply certified mill tests, samples, or other suitable form of verification that the material meets the required specifications.

b. Provide sewer force main pipes with Ductile Iron Pipe (DIPS) diameters shown on the Contract Documents. Diameters shown on the Drawings and listed in the pay items represent the required DIPS diameters, regardless of pipe material, unless otherwise noted.

c. The Work shall not begin until all submittals have been reviewed and approved. Also, the Work shall not begin until all of the equipment and materials required to perform the Work are in the possession of the Contractor.

804-5 CONSTRUCTION:

a. All Work shall be performed in compliance with L.R.S. 40:1749.11-22, "Louisiana Underground Utilities and Facilities Damage Prevention Law", OSHA regulations and applicable codes, ordinances, and standards of governing authorities having jurisdiction. All such work shall be adequately described in the Traffic Control Plan.

b. Open excavations shall be barricaded and posted with warning lights in accordance with State and local requirements. Structures, utilities, sidewalks, pavements, and other facilities shall be protected from damage caused by settlement, lateral movement, undermining washout, and other hazards created by earthwork operations.

c. Sewer flow bypassing required for construction shall comply with Section 813.

d. Contractor shall conform to surface restoration requirements stipulated in Section 4-5.

804-5.1 Trenching, Bedding and Backfill: Trenching, bedding and backfill shall be as specified in Section 801.

804-5.2 Installation:

a. Pipe: Force mains shall be installed at the lines and grades required by the Contract Documents. All fittings shall be at the required locations and the spigots well centered in the bells and fully engaged as evidenced by pipe witness marks.

1. Pipe laying shall begin at downstream end of line. Bell ends of pipe shall face upstream. Bell holes shall be provided at each joint to permit the joint to be constructed properly and supported along its full length of the pipe by the trench bedding. Allowing the pipe to be "bridged" by the bell is not acceptable.

2. Pipe laying shall not advance backfilling by more than 100 feet without approval by the Engineer.

3. Restrained joints shall be used at canal crossings, horizontal and vertical bends, tees, crosses, valves and other specified locations.

4. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other approved means. This provision shall apply during lunch as well as overnight. If water is in the trench, the plug shall remain in place until the trench is pumped completely dry.

5. In all cases walking or working on the completed pipelines, except as may be necessary in tamping or backfilling will not be permitted until the trench has been backfilled to a point one foot above the top of the pipe. The backfilling of the trench and tamping of the backfill shall be carried on simultaneously on both sides of the pipe to ensure the completed pipeline will not be disturbed and injurious side pressures do not occur.

6. All PVC, Ductile Iron and HDPE pipe shall be installed with a 12-gauge stranded copper wire attached to the pipe for tracing purposes and polyethylene utility marking tape one foot above the pipe. Utility marking tape shall be green in color with black lettering and read "CAUTION – BURIED SEWER LINE BELOW". Approved waterproof mechanical copper connectors shall be used for all splicing.

7. Unless otherwise indicated by the Contract Documents, all force mains shall have at least 36 inches of cover. The Engineer shall approve any exceptions.

8. Contractor shall provide and use tools and facilities that are satisfactory and that will allow the Work to be done in a safe and convenient manner. Suitable equipment shall be used to lower all pipe and fittings into the trench one piece at a time. Each piece shall be lowered carefully so that neither it nor any protective coating or lining it may have will be damaged. Under no circumstances shall force main materials be dumped or dropped.

9. Pipes and fittings shall not be lowered into the trench until they have been swabbed to remove any mud, debris, etc., which may have accumulated within them. After the pipe has been lowered, all unnecessary materials shall be removed from it. Before any pipe is laid, the outside of its spigot end and the inside of its bell shall be cleaned and left dry and oil-free.

10. Pipe shall be cut so fittings can be inserted in a workmanlike manner and without any damage to the pipe. The manufacturer's recommendations shall be followed concerning how to cut and machine the ends of the pipe in order to leave a smooth end at right angles to the pipe's axis. A "chop" saw shall be used for ductile iron pipe, PVC and HDPE pipe. The Engineer may consider other methods for 12-inch diameter and larger pipe. After cutting ductile iron pipe, the Contractor shall touch up the epoxy lining to the satisfaction of the Engineer.

11. Wherever pipe must be deflected from a straight line (in either the vertical or horizontal plane) in order to avoid obstructions, or wherever long radius curves are permitted, the amount of deflection shall not exceed that necessary for the joint to be satisfactorily made, nor more than 75 percent of that recommended by the pipe manufacturer, and shall be approved by Engineer. Bend fittings shall only be used when the pipe deflections are inadequate, according to manufacturer's recommendations, or as directed by Engineer. Pipe bending of PVC pipe shall not be allowed, fittings or joint

deflections shall be utilized.

12. Except for HDPE pipe, joint restraints shall be installed wherever the force main changes direction (at tees and bends), at dead ends, or at any other point recommended by the manufacturer or required by Engineer. Restrained joints for ductile iron and PVC force main shall be in accordance with Section 1016-2.

13. All pipe shall be jointed in the exact manner specified by the manufacturer of the pipe and jointing materials.

14. Air release/vacuum valves shall be located at all high points on the pipeline as shown on the Contract Documents or as directed by Engineer.

15. Force main outlets shall be installed in manholes as shown on the Contract Documents.

16. Under no circumstance shall pipe laid on blocks be permitted.

17. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat workmanlike manner, using pipe wrap, without damage to the pipe or components to leave a smooth end at right angles to the axis of the pipe. Flame cutting of pipe will NOT be allowed.

18. Connections of force main into manhole shall be in accordance with subsection 802-6 and as shown on City-Parish Standard Detail 804-01.

b. Air Release/Vacuum Valve Installation shall:

1. Be in accordance with manufacturer's printed instructions.

2. Orient valve in vault for easy access.

3. Replace valves that drip or do not function properly.

4. Valve shall be placed inside a valve manhole as shown on the Contract Documents.

c. Valve Vault:

1. Place operator access as shown on the Contract Documents.

2. Install finished grade at top of vault to conform to slopes and elevations of adjacent ground and grade to drain away from vault.

3. Valve vaults shall be required for valves 20 inches or larger. Valves smaller than 20 inches shall be buried in accordance with Section 1019.

d. Valves: Valves used shall comply with the requirements of the Contract Documents. The Contractor shall not substitute size, type, manufacturer, or material without the approval of the Engineer. The Contractor shall record GPS coordinates (+/- 1 meter accuracy) based on the La. State Plane Coordinate System (south), for each valve installed and submit to the Engineer. All information below only applies if the specified type or criteria is identified in the Contract Documents.

1. Flange Ends:

i. Flanged valve bolt holes shall straddle vertical centerline of pipe.
ii. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.

2. Screwed Ends:

i. Clean threads by wire brushing or swabbing.
ii. Apply joint compound.

e. PVC Valves:

a. Install using solvents approved for valve service conditions.

b. Valve Installation and Orientation:

i. General:

A. Install valves so handles operate from fully open to fully closed without encountering obstructions.
B. Install valves in location for easy access for routine operation and maintenance.
C. Install valves per manufacturer's recommendations.

f. Gate and Ball Valves:

a. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished grade, unless otherwise shown.

b. Install operating stem horizontal in horizontal runs of pipe having centerline elevations greater than 4 feet 6 inches above finished grade, unless otherwise shown.

g. Eccentric Plug Valves:

a. Unless otherwise restricted or shown on Contract Documents, install valve as follows:

i. Liquids with suspended solids service with horizontal flow: Install valve with stem in horizontal position with plug up when valve is open. Install valve with seat end upstream (flow to produce unseating pressure).
ii. Liquids with suspended solids service with vertical flow: Install valve with seat in highest portion of valve (seat up).

h. Check Valves:

a. Install valve in horizontal or vertical flow (up) piping to open in the direction of flow.

b. Install swing check valve with shaft in horizontal position.

i. Extension Stem for Valve Operator: Where the depth of the valve is such that its centerline is more than 3 feet below grade, furnish an operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the surface of

the ground and/or box cover. Extension stem shall be pinned to the operating nut; set screws are not acceptable.

j. Torque Tube: Where operator for quarter-turn valve is located on floor stand, furnish extension stem torque tube of a type properly sized for maximum torque capacity of the valve.

k. Floor Box and Stem: Steel extension stem length shall locate operating nut in floor box.

Warranty: Should defects appear under proper use within a period of 1 year after the sewer force main has been accepted by the Owner, caused solely by faulty manufactured, material or workmanship, the Contractor shall repair or replace the sewer force main at no additional cost to the Owner.

804-6 CONNECTIONS TO PIPELINES: This Work shall consist of locating and excavating to an existing pipeline and all connection operations. Tapping is the act of connecting to a pressurized pipeline and Tie-in is the connection to a re-routed or inactive pipe. The Work includes any shoring and bracing necessary to protect the pipeline and surrounding property and structures, both public and private. Such excavation stabilization as is necessary shall comply with Section 801.

a. Locate all connections so that no portion of the sleeve or saddle, as applicable, will be located within five feet of the end of the segment of pipe being tapped.

b. Contractor shall notify the Engineer prior to any connection to be performed.

804-6.1 Tapping:

a. Proper precautions shall be taken to instruct the workmen of the correct procedures to be used for tapping pipelines under pressure. Performed incorrectly, this action could result in serious injury and/or property damage. The Contractor shall be responsible for all claims of damage or loss resulting from improper taps. Contractor shall also indemnify the Owner from any damage claims.

b. Depending on the location of the proposed tap, the Engineer may require that the tapping operation be performed during periods of lowest operating pressure. The Contractor shall coordinate his operations through the Engineer to ensure that the tapping operation is performed during periods that least impact the Owner's operation of the pipeline.

c. The Engineer shall be notified at least 48 hours in advance of the start of each tapping session at the site. The excavation and other preparatory work shall be complete prior to the performance of the tap. Work shall be coordinated with the Engineer so that any operational changes that may be required during the actual tapping operation can be planned. The Owner shall be given a second notification with as much advance notice as possible of the date that the tap will be made, but in no case shall this notification be less than 24 hours before beginning the actual tapping operations.

d. All tapping sleeves shall be installed in accordance with the instructions supplied by the sleeve manufacturer on the pipe at the location authorized by the Engineer or indicated by the Contract Documents.

e. The tapping assembly shall be aligned properly to prevent damage to the tapping valve and sleeve or saddle during insertion and withdrawal of the cutter head. The operation shall be supported on solid earth and this support shall be protected throughout the tapping operation.

804-6.2 Tie-in:

a. Prior to Tie-in Contractor shall pressure test new force main in accordance with Section 804-8.

b. After the pipeline is de-pressurized, the Contractor may proceed with connection operations.

c. The pipeline shall be cleaned of all residual materials and properly prepared for the connection fitting assemblies. These assemblies shall create the appropriate size connection as shown on the Contract Documents.

d. Connections must be performed according to the manufacturer's recommendations with the appropriate fitting for the existing pipe.

804-6.3 Backfill and Restoration of the Site: Excavation, backfill and associated functions shall be performed as per the Contract Documents and in accordance with the direction outlined in relevant portion of Section of 801.

804-7 REMOVAL AND/OR ABANDONMENT OF EXISTING FORCE MAIN: This section addresses the removal and/or abandonment of the existing force main and all appurtenances which are being removed (or abandoned) as detailed on the Contract Documents.

a. Abandon Force Main: If certain portions of the existing force main are shown to be abandoned in place on the Contract Documents, the Contractor shall be responsible for evacuating or "swabbing" the existing force main pipe of all sewage before it is abandoned. This sewage shall be treated as hazardous material and disposed of using the proper criteria from the La. Department of Environmental Quality. Subsequently, either the entire length of the pipe shall be completely filled with flowable fill and capped as noted on the Contract Documents or as directed by the Engineer.

b. Plug and Abandon Force Main: If an existing sewer force main is shown to be plugged and abandoned in place on the Contract Documents, the Contractor shall be responsible for evacuating or "swabbing" the existing sewer pipe of all sewage before it is abandoned. This sewage shall be treated as hazardous material and disposed of using the proper criteria from the La. Department of Environmental Quality. Subsequently, the pipe shall be plugged approximately 18 inches into each end of the pipe and capped as noted on the Drawings or as directed by the Engineer.

c. Remove Force Main: If certain portions of the existing force main are shown to be removed on the Contract Documents, the Contractor shall completely remove the force main and appurtenances. The removal trench shall be backfilled in accordance with the provisions of Section 801 or as directed by the Engineer. The Contractor shall be responsible for evacuating or "swabbing" the existing force main pipe of all sewage before it is removed. This sewage shall be treated as hazardous material and disposed of using the proper criteria from the La. Department of Environmental Quality.

d. Remove and/or Abandon Force Main:

    1. If certain portions of the existing force main are shown as remove and/or abandon in place on the Contract Documents, the Contractor has the option to either completely remove the force main and appurtenances or abandon the force main. The Contractor shall be responsible for evacuating the existing force main pipe of all sewage before it is abandoned or removed. This sewage

shall be treated as hazardous material and disposed of using the proper criteria from the La. Department of Environmental Quality.

2. If removed, the removal trench shall be backfilled in accordance with the provisions of Section 801 or as directed by the Engineer.

3. If abandoned, the entire length of the pipe shall be completely filled with flowable fill.

e. The force main appurtenances which are removed shall be delivered to the Department of Public Works or otherwise properly disposed of as directed the Engineer.

f. Demolish and remove existing concrete structures to three feet minimum below surrounding grade. Fill remainder of structure with sand, using care to ensure that all voids are filled.

804-8 ACCEPTANCE TESTS: Upon completion of backfilling, pipelines shall pass the following tests.

a. Pipe:

1. All newly installed and backfilled pipe shall be subjected to a leakage test, conducted in the presence of Engineer.

2. Test pressure shall be 150 percent of system operating pressure based on pressure as measured at the most elevated point in pipeline or 100 psi, whichever is greater.

3. The force main shall be slowly filled with water, and the specified test pressure shall be applied (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) with a pump connected to the pipe in a manner satisfactory to Engineer.

4. The Contractor shall furnish all necessary apparatus to perform pressure testing including but not limited to the pump, water, pipe, temporary valves, temporary fittings, connections, gauges, and thrust restraints and blocking. Thrust collars shall be used to restrain the force main where needed to restrain the pipe near the blind flange required for testing. The required number of thrust collars would be dependent on the magnitude of the thrust force to be restrained and the allowable load per collar. The Contractor shall be responsible to design the thrust collar based on the soil conditions at the collar location. The Contractor shall submit thrust restraint calculations for approval. The Contractor may elect to install restrained joint force main of adequate length to restrain the pipe for testing purposes at no additional cost to the Owner. The Contractor may choose to test at points shown to be restrained on the plans (within the stipulated testing limits), however any thrust restraints or restrained joint force main beyond the limit shown on the plans required for testing purposes will be at no additional cost to the Owner.

5. Before applying the specified test pressure, all air shall be expelled from the pipe. If necessary, Contractor shall make taps at the points of highest elevation before testing, and shall insert plugs after the test has been completed.

6. The leakage test shall be conducted by measuring, through a calibrated meter, the amount of water which enters the test section for a period of at least

2 hours. No installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

For PVC Pipe:

$$L = \frac{ND\sqrt{P}}{7{,}400}$$

L = allowable leakage, gallons/hour
N = number of joints in length of pipe tested
D = nominal diameter of the pipe, inches

P = average test pressure during the leakage test, psig

7. The following table has been developed for the commonly used sizes of ductile iron pipe and PVC pipe with nominal laying lengths of 20 feet, under a test pressure of 150 psi. The leakage formulas above may be used when conditions differ from those stated parameters.

Allowable Leakage Per 100 Feet (gallons/hour)		
Pipe Diameter (Inches)	**Ductile Iron Pipe**	**PVC Pipe**
4	0.033	0.033
6	0.050	0.050
8	0.066	0.066
12	0.099	0.099
16	0.132	0.132
Greater than 16	Use formula above.	Use formula above.

8. For HDPE Pipe:

   i. Make-up Water Allowance: Maximum allowable make-up water at conclusion of test phase shall not exceed recommended amounts stated in the following table. The table is based on test pressure equal to 1.5 times pressure class of pipe. If lower pressure is used for test, allowances shall be reduced by ratio of test pressure to pressure class of pipe.

Make-Up Water Allowance for Test Phase (U.S. Gallons per 100 feet of Pipe)		
Nominal Pipe Size (inches)	**1-Hour Test (gallons)**	**2-Hour Test (gallons)**
3	0.10	0.15
4	0.13	0.25
6	0.30	0.60
8	0.50	1.0
10	0.75	1.3
12	1.1	2.3
14	1.4	2.8
16	1.7	3.3
18	2.2	4.3

Make-Up Water Allowance for Test Phase (U.S. Gallons per 100 feet of Pipe)		
Nominal Pipe Size (inches)	**1-Hour Test (gallons)**	**2-Hour Test (gallons)**
20	2.8	5.5
24	4.5	8.9
28	5.5	11.1
32	7.0	14.3
36	9.0	18.0

ii. Note: No observed leaks.

8. Any cracked or defective pipes or fittings discovered in consequence of this leakage test shall be replaced with sound material in the manner specified at no cost to Owner. The test shall be repeated until the results are satisfactory to the Engineer.

b. Valves:

1. Air Release Valve:

i. May be either tested while testing pipelines, or as a separate step.
ii. Isolation valves shall be in open position during pipeline test.

2. Isolation Valves: Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other.

3. Air Release/Vacuum Valves: Inspect valves as pipe is being filled to verify venting and seating is fully functional.

4. Verify leak-free performance during testing.

5. Valve Test and Inspection:

i. Valve may be either tested while testing pipelines, or as a separate step.
ii. Test that valves open and close smoothly under operating pressure conditions. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
iii. Count and record number of turns to open and close valve; account for any discrepancies with manufacturer's data.

c. Tap Testing: No testing other than the pressure test is required. However, the testing requirements for the connection pipeline shall include testing of the restrained joint section, including the connection to the tapping valve. The entire tapped connection shall be visually inspected and any visible leaks repaired. Testing shall be in accordance with the requirements described as noted above.

d. Contractor shall coordinate testing plan with surface restoration requirements of Section 4-5. Any removal or replacement of temporary or final surface restoration by the Contractor to investigate leaks shall be done so at no additional cost to the Owner.

804-9 MEASUREMENT:

a. **Sewer Force Main:** Sewer force main pipe (ductile iron, PVC and HDPE) for payment will be the contract quantities, adjusted as required due to plan errors or plan changes. Measurement for new sewer force main pipe shall be made by type and diameter of pipe to the nearest linear foot installed.

b. **Restrained Joint Sewer Force Main:** Restrained joint sewer force main pipe (ductile iron or PVC) for payment will be the contract quantities, adjusted as required due to plan errors or plan changes. Measurement for restrained joint sewer force main pipe shall be made by type and diameter of pipe to the nearest linear foot installed.

c. **Valves**: Valves will be measured per each including the valve box and fittings. Air Release/Vacuum valves will be measured per each according to its size as detailed in the drawings, including all appurtenances described herein and the air release/vacuum valve manhole.

d. **Abandon Force Main:** Abandonment of force main will be measured on a lump sum basis upon completion of all work indicated on the Contract Documents. Abandonment shall include any equipment, cleaning, and flowable fill throughout the full length of pipe in accordance with the plans and specifications.

e. **Plug and Abandon Force Main:** Plug and abandonment of force main will be measured on a lump sum basis upon completion of all work indicated on the Contract Documents. Plug and abandonment shall include any equipment, cleaning, and flowable fill required to cap the pipe ends (18 inches min.) in accordance with the plans and specifications.

f. **Remove Force Main**: Removal of force mains will be measured on a lump sum basis upon completion of all removal work indicated on the Contract Documents including appurtenances. Removal work shall include any equipment, trenching, and backfilling required to remove the existing force main in accordance with the plans and specifications.

g. **Remove or Abandon Force Main**: Removal or abandonment of force mains will be measured on a lump sum basis upon completion of all removal work indicated on the Contract Documents including appurtenances. Removal work shall include any equipment, trenching, and backfilling required to remove the existing force main in accordance with the plans and specifications. Abandonment in-place with this item shall include insertion of flowable fill throughout the full length of pipe.

h. **Force Main Tap:** Force main taps will be measured per each tap and diameter as indicated on the Contract Documents.

i. **Force Main Tie-In:** Force main tie-ins will be measured per each tie-in and diameter as indicated on the Contract Documents.

j. **Fittings:** Fittings will be measured by published fitting weights, minus accessories, (in pounds or tons as specified in the Bid Item) in accordance with AWWA C110 published fitting weights.

804-10 PAYMENT:

a. **Sewer Force Main:** Payment for this Item will be full compensation for equipment, excavation, bedding, pipe, connections, testing (see 804-8) and backfill, in accordance with the Contract Document. Sand-aggregate for bedding and initial backfill material and useable excavated soil for secondary backfill, as shown on City-Parish Standard Detail 801-01 shall be included in this pay item. When required, special bedding and

backfill material such as #57 Stone Backfill, #610 Stone Backfill, CLSM Backfill, Sand-Aggregate for Secondary Backfill, and Select Material for Backfill required for Work associated with Sewer Pipe will be paid for under the relative pay item in Section 801.

b. **Restrained Joint Sewer Force Main:** Payment for this Item will be full compensation for equipment, excavation, bedding, restrained joint pipe, connections, restrainer glands, testing (see 804-8) and backfill, in accordance with the Contract Document. Sand-aggregate for bedding and initial backfill material and useable excavated soil for secondary backfill, as shown on City-Parish Standard Detail 801-01 shall be included in this pay item. When required, special bedding and backfill material such as #57 Stone Backfill, #610 Stone Backfill, CLSM Backfill, Sand-Aggregate for Secondary Backfill, and Select Material for Backfill required for Work associated with Sewer Pipe will be paid for under the relative pay item in Section 801.

c. **Valves**: Payment for this Item will be made at the contract unit prices for equipment, excavation, valve box, connections, testing, limestone bedding and backfill, and geotextile fabric, in accordance with the Contract Document. In the case of air release/vacuum valves, the valve manhole, frame and cover, and tee connection are also included. Payment will be made at the contract unit prices for each complete valve assembly.

d. **Abandon Force Main:** Payment for this Item will be full compensation for equipment, bypass pumping, abandonment of valve vaults, connections, cleaning, and flowable fill throughout the full length of pipe, in accordance with the Contract Document. Payment will be made for completely filled pipe only.

e. **Plug and Abandon Force Main:** Payment for this Item will be full compensation for equipment, bypass pumping, abandonment of valve vaults, connections, cleaning, and flowable fill at the pipe ends (18 inches min.), in accordance with the Contract Document.

f. **Remove Force Main**: Payment for this Item will be a lump sum full compensation for equipment, bypass pumping, removal of valve vaults, connections, cleaning, excavation, backfill and delivery/disposal, in accordance with the Contract Document. Payment will be made for completely removed pipe and appurtenances.

g. **Removal or Abandon Force Main**: Payment for this Item will be a lump sum full compensation for equipment, bypass pumping, removal/abandonment of valve vaults, connections, cleaning, excavation, backfill, delivery/disposal, and flowable fill throughout the full length of pipe, in accordance with the Contract Document. Payment will be made for removed pipe and/or completely filled abandoned pipe.

h. **Force Main Tap:** Payment for this Item will be full compensation for equipment, labor, excavation, bedding, tapping sleeve and tapping valve, testing and backfill, in accordance with the Contract Document.

i. **Force Main Tie-in:** Payment for this Item will be full compensation for equipment, labor, excavation, bedding, pipe, fittings, connections, testing and backfill, in accordance with the Contract Document.

j. **Fittings:** Payment for this item will be full compensation for all fittings, and accessory kits, in accordance with the Contract Document.

804-11 PAY ITEMS:

Pipe Diameter (D.I.P.S.) Schedule

(as Shown on Drawings)

A	=	4" Pipe	N	=	27" Pipe
B	=	6" Pipe	O	=	30" Pipe
C	=	8" Pipe	P	=	32" Pipe
D	=	10" Pipe	Q	=	36" Pipe
E	=	12" Pipe	R	=	42" Pipe
F	=	14" Pipe	S	=	48" Pipe
G	=	15" Pipe	T	=	54" Pipe
H	=	16" Pipe	U	=	60" Pipe
I	=	18" Pipe	V	=	64" Pipe
J	=	20" Pipe	W	=	66” Pipe
K	=	21" Pipe	X	=	72” Pipe
L	=	24" Pipe	Y	=	76” Pipe
M	=	26" Pipe	Z	=	80” Pipe

Item No.	Item	Unit
804000_	Unrestrained Joint Sewer Force Main (diameter)	Linear Foot
804010_	Unrestrained Joint Ductile Iron Sewer Force Main (diameter)	Linear Foot
804020_	Unrestrained Joint PVC Sewer Force Main (diameter)	Linear Foot
804030_	HDPE Sewer Force Main (diameter)	Linear Foot
804031_	FPVC Sewer Force Main (diameter)	Linear Foot
804040_	Restrained Joint Sewer Force Main (diameter)	Linear Foot
804041_	Restrained Joint Ductile Iron Sewer Force Main (diameter)	Linear Foot
804042_	Restrained Joint PVC Sewer Force Main (diameter)	Linear Foot
8041000	Abandon Force Main (w/flowable fill in-place)	Lump Sum
8041100	Plug and Abandon Force Main (cap each end)	Lump Sum
8042000	Remove Force Main	Lump Sum
8043000	Remove or Abandon Force Main	Lump Sum
8044000	Valve Vault	Each
8045000	Fittings	Lbs
8045001	Fittings	Tons
804600_	Check Valve (diameter)	Each
804700_	Gate Valve (diameter)	Each
804800_	Plug Valve (diameter)	Each

804900_	Air Release/Vacuum Valve (diameter)	Each
804910_	Force Main Tap (diameter)	Each
804920_	Force Main Tie-In (diameter)	Each