EUDORA
EUA
UTILITIES ASSOCIATION
Eudora, Mississippi

Subdivision Developer Packet
June 2021

EUDORA UTILTIES ASSOCIATION, INC.

Application for Subdivision Water Service

The undersigned Owner/Developer of a proposed _____ lot subdivision in DeSoto County, Mississippi located at _____ to be named _____ hereby applies for water service from ____ Eudora Utilities Association, Inc. in accordance with the Service Extension Policy of the published "Rules, Regulations, Policies, And Procedures of Eudora Utilities Association, Inc. of DeSoto County, MS".

This application is subject to the following requirements and conditions:

1. A request for service for new subdivisions will require a non-refundable cash deposit of $350.00.

2. Owner/Developer shall furnish master layout of streets and lots, including future phases, to the engineer for the water association. An electronic copy is preferred.

3. Engineer for Association will prepare an Opinion of Probable Cost. If Opinion of Probable Cost is approved by Owner/Developer, a cash deposit representing 80% of the preliminary engineering fee shall be paid to the Association.

4. Engineer will prepare construction plans and contract documents **and the Association will receive proposals from contractors for construction**.

5. Eudora Utilities Association, Inc. will contract with a responsible contractor for construction of the water system improvements in accordance with Contract Documents for the Association.

6. All connections to the existing water system shall be made as per the water association/engineer instructions, including meter taps on existing water lines.
7. All preliminary and construction engineering and construction cost, including contingencies, shall be paid by Owner/Developer.

8. All easements required must be secured by and at the expense of the Owner/Developer.

9. The Association will supply and maintain the water meters.

10. Prior to connecting individual houses, each individual resident owner must pay a fee for a water meter hookup, which includes non-refundable membership fee and deposit as a guarantee of payment of monthly water bills. The deposit will be refunded to the

homeowner when service is terminated and all fees, bills and costs due the Association have been paid.

11. All water service is subject to the tariff and service rules and regulations of the Association as the same may be amended and changed from time to time.

12. The engineer for the Association is:
Elliott & Britt Engineering, PA
P.O. Box 308
Oxford, Mississippi 38655
Fax (662) 234-3835

13. The construction is expected to begin on or before:_____

14. The Developer shall be responsible for payment of System Development Fees, which are at present $1,000 per lot.

15. Special Conditions:_____

_____

This the _____ day of _____ 201__.

_____
_____
_____
_____
Name, Address and Telephone Number of Owner/Developer

APPROVED:
Eudora Utilities Association, Inc.
By:_____
Authorized Representative

Execute two copies

TECHNICAL SPECIFICATIONS
FOR
WATER DISTRIBUTION IMPROVEMENTS

EUDORA UTILITIES ASSOCIATION, INC.

DESOTO COUNTY, MISSISSIPPI

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TECHNICAL SPECIFICATIONS
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1. **SCOPE OF WORK**:

1.1 **General**: The work to be performed shall consist of furnishing all labor, tools, equipment, and materials and performing all work necessary for, or incidental to, the completion of and making ready for operation the water distribution system improvements as depicted on the Contract Drawings and specified herein.

1.2 **Standards**: Any reference to a specification or designation of the American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American Standards Association (ASA), Commercial Standards (CS), National Sanitation Foundation (NSF), or other standards, codes, or orders refers to the most recent or latest specification or designation.

1.3 **Quality Control**: The Contractor shall be responsible for providing quality control for all work and materials under the jurisdiction of North Panola Utility District. The Contractor shall provide a copy of test reports and a certification that all materials incorporated into the work comply with the Specifications set forth herein.

1.4 **Project Inspection**: The Contractor shall allow access to the project site at all times to the Engineer and officials of the Utility for inspection of the project. The Utility's Engineer will inspect and test construction in progress of all public improvement projects. When construction is completed in substantial conformity to the Contract Documents, including the Contract Drawings and Technical Specifications, the Engineer will recommend approval of the work to the Utility and advise the State regulatory agencies of project completion.

1.5 **Location of Water Mains**: All water mains shall be located within a utility easement, or within the right-of-way of a street as noted on the plans. Water lines shall not be installed until final grading of the water line location has been completed.

1.6 **Maintenance of Traffic**: Vehicular traffic shall be maintained on traveled roads and streets during construction of water lines, unless temporary closures are authorized by the Engineer. A traffic control plan must be prepared by the Contractor and approved by the Engineer prior to commencement of construction which will interfere with traffic.

1.7 **Protection and Repair of Property**: Protection and repair of all property, including all expense, shall be the responsibility of the Contractor. The Contractor shall erect and maintain all necessary fences, barricades, lights and danger signals as necessary for the protection of the public.

` Buildings, trees, fences and other public properties not schedules for demolition shall be protected during construction. Grass sod and other property damaged or destroyed shall be replaced in like kind at the expense of the Contractor.

1.8 **Workmanship:** All work accomplished under this Contract shall be accomplished in strict accordance with all OSHA and Mississippi State Department of Health regulations.

1.9 **Underground Utilities**: The Contractor shall be responsible for have all existing underground utilities located within the project site. The Contractor shall coordinate excavation work with other utilities as necessary to protect existing utilities. Mississippi State Law, The Underground Facilities Damage Prevention Act, requires two working days advance notification through the Mississippi One-Call System Center before excavating using mechanized equipment or explosives (except in the case of emergency). The One-Call System phone number is 1-800-227-6477. The Contractor is advised that there is a severe penalty for not making this call. Not all utility companies are members of the Mississippi One-Call System; therefore the Contractor is advised to contact all non-member utilities as well as the One-Call System.

2. **MATERIALS**: All materials for use on the project shall be new. Technical data for all materials shall be submitted to the Engineer for approval prior to shipment of materials to the project site. All equipment and materials stored outdoors, prior to installation, must be placed on pallets, skids, runners, platforms or other suitable supports at least six inches above ground. Only those materials set forth on the Bid Form and/or the Construction Drawings are approved for incorporation in the project. When set forth on the Construction Drawings and/or Bid Form, materials which are required to be used shall conform to the following specifications:

2.1 **Ductile Iron Pipe**: Ductile Iron Pipe (DIP) shall conform to American National Standard ANSI A21.51-1976 (AWWA C151). The ductile iron pipe shall be designed for 350 psi working pressure for Laying Condition Type I and shall be ANSI Thickness Class 50/51. Rubber gasket joints shall meet all requirements of ANSI A21.11 (AWWA C111). All pipe shall have an inside lining of cement mortar conforming with ANSI A21.4, (AWWA C104). An equivalent enamel lining may be used in place of cement-mortar. All ductile iron pipe shall be domestic manufacture and if requested, the manufacturer shall furnish the Engineer with certified test certificates stating that all materials furnished are in accordance with the above specifications.

2.2 **Ductile Iron Pipe, Restrained Joint:** Ductile Iron Pipe (DIP) with push-on restrained joints shall be manufactured in accordance with the requirements of ANSI A21.51/AWWA C151. All pipe shall be Thickness Class 51 with 350 psi working pressure. Push-on joints shall be in accordance with ANSI A21.11/-AWWA C111 and suitable for restrained joint use with 350 psi working pressure. Pipe shall be U. S. Pipe TR FLEX pipe or equal.

All pipe shall have an inside lining of cement mortar conforming to ANSI A21.4/AWWA C104. An equivalent enamel lining may be used in place of cement-mortar. All pipe shall be domestic manufacture and if requested, the manufacturer shall furnish the Engineer with test certificates stating that all materials furnished are in accordance with the above specification.

2.3 **Polyvinyl Chloride (PVC) Pipe:** Class 200 PVC pressure pipe with rubber gasket joints shall conform to Commercial Standard CS256 for Type 1120 material made to SDR 21 dimensions. All pipe shall be belled end. All pipe and fittings shall be approved by the National Sanitation Foundation and stamped with this approval.

C-900 pipe shall conform to AWWA Standard C-900 and shall have outside diameter (OD) dimensions of ductile iron pipe with wall thickness of DR Series 18 and Pressure Class of 150 psi. Class 200 and Class 160 pipe with solvent welded joints and pipe with rubber gasket joints shall conform to Commercial Standard CS256 for Type 1120 material made to SDR 21 or SDR 26 dimensions, as appropriate. All pipe shall be either coupled at one end by the manufacturer and the coupling shall be included in the unit linear foot price in the bid proposal or shall be belled end. All pipe fittings shall be approved by the National Sanitation Foundation and stamped with this approval. Rubber gasket joints shall be approved by the Engineer prior to installation.

Schedule 40 plastic pipe shall conform to the United States Department of Commerce Standard No. CS207 Type 1. Individual water service lines from 2" to 4" in diameter shall be Schedule 40 PVC and shall conform to the United States Department of Commerce Standard No. CS207 Type 1. Individual service lines 1½" and smaller shall be polyethylene as designated in Section 2.6.

2.3.1 **Molecular Oriented Polyvinyl Chloride (PVCO) Pipe** shall be manufactured in accordance with the requirements of ASTM F-1483. Pipe shall be manufactured from Rigid Polyvinyl Chloride compound with a cell classification of 12454 B (PVC 1120) in conformance with ASTM D 1784. The cell class of the Molecular Oriented PVC pipe shall be 13554B (PVC1135) once the expansion is complete. The gasketed joint system shall conform to ASTM D 3139 and ASTM F-477.

Pipe shall be manufactured with steel pipe (IPS) outside diameters (O.D.) in nominal sizes 6" through 12". The pipe shall be joined by means of a rubber ring bell joint which shall be an integral and homogeneous part of the pipe barrel and conform to ASTM D 3139. Iron Pipe Size Pressure Rated 200 PSI (IPS PR 200 PSI) pipe shall meet or exceed all performance requirements of ASTM D 2241, with pressure rating of 200 psi."

2.4 **Polyethylene (PE) Pressure Pipe** shall conform to AWWA C906-90, DR 9.

2.5 **Pipe Fittings**: All ductile iron pipe shall have ductile iron fittings. All P.V.C. pipe four (4) inches in diameter and larger shall have ductile iron fittings; all P.V.C. service pipe 3" through 2" in diameter shall have Schedule 40 P.V.C. fittings.

2.5.1 Ductile Iron Fittings shall be either push-on or mechanical joint fittings having a working pressure rating of 350 psi. Fittings shall be in accordance with all applicable requirements of ANSI/AWWA C110/A21.10 with the exception of the manufacturer's proprietary design dimensions. Joint components shall be in accordance with the requirements for push-on or mechanical joints in ANSI/AWWA C111-/A21.11. Fittings shall be cement lined and seal coated with an asphaltic material in accordance with ANSI/AWWA C104/A21.4.

2.5.2 Ductile iron compact fittings may be mechanical joint or push-on joint. Mechanical joints shall meet the requirements of ANSI/AWWA C153/A21.53. Glands, bolts, nuts, and gaskets shall be in accordance with requirements of ANSI/AWWA C153/ A21.53. Push-on joint shall meet the requirements of ANSI/AWWA C111/A21.11. Fittings shall be cement lined and seal coated with an asphaltic material in accordance with ANSI/AWWA C104/A21.4.

2.5.3 Restrained joint fittings shall be ductile iron in accordance with applicable requirements of ANSI/AWWA C110/A21.10 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.
Restrained joint fittings shall be U.S. Pipe TR Flex fittings or approved equal.

2.5.4 P.V.C. fittings shall be Schedule 40. Fittings shall have joints compatible with the type pipe joint required. All threaded fittings shall be Schedule 80. All P.V.C. pipe fittings shall be approved by the National Sanitation Foundation and stamped with this approval.

2.6 **Polyethylene Service Tubing**: Polyethylene service tubing shall be made of very high molecular weight (VHMW) pipe resin (PE 3408) and shall be copper tube size OD, SDR 9, and conform to ASTM D-2737. All tubing shall have pipe liners for use with compression connections. Polyethylene service tubing shall be Driscopipe 5100 Ultra-Line as manufactured by Phillips 66 Company, or approved equal.

2.7 **Casing Pipe**: Steel casing pipe for highway and aerial crossings shall have the following minimum wall thicknesses:

Casing Diameter	Minimum Wall Thickness (inches)
2"	0.154
4"	0.156
6"	0.156
8"	0.188
10"	0.188
12" - 18"	0.250
20" - 24"	0.281
30" - 36"	0.375
42" - 48"	0.500

Steel casing pipe 12" in diameter and greater shall be new or in good condition and will conform to ASTM Specification A-252, Gr.2 or better. PVC casing pipe shall be Class 160 pressure pipe as a minimum.

2.8 **Gate Valves**: All gate valves shall have end connections compatible for connection to the type of pipe specified. Valves shall be rated for zero leakage at 200 psi water working pressure and have a 400 psi hydrostatic test for structural soundness. Valves shall be furnished with "O" ring seals using two O-rings. All valves installed underground in standard valve boxes shall have a 2 inch square operating nuts and shall open **left**.

Gate valves 4 inches and larger nominal diameter shall be resilient seated wedge type with non-rising stem, epoxy coated to AWWA C550, cast iron body design. These valves shall comply with AWWA Gate Valve Standard C-509 as latest revised, and shall be Mueller A-2370, M & H Style 3067-NRS, or as pre-approved by Lewisburg Water Association, Inc.

Gate valves 2 inches, 2 ½ inches and 3 inches in nominal diameter shall be resilient seated wedge type with non-rising stem, epoxy coated to AWWA C550, cast iron body design. These valves shall comply with AWWA Gate Valve Standard C-509 as latest revised, and shall be Mueller A-2360, or as pre-approved by Lewisburg Water Association, Inc.

2.9 **Valve Boxes**: All valve boxes for underground gate valves shall be cast iron, two piece, screw type, 5-1/4 inch shaft, Type 461-S as manufactured by the Tyler Company, or as pre-approved by Eudora Utilities, Inc. The Contractor shall supply boxes with the correct base for all valves and in correct lengths for field

conditions.

2.10 **Water Service Components**:

2.10.1 **Corporation Stops** shall be Ford Ball Corporation Stops, F1000 Series or as pre-approved by Eudora Utilities, Inc.

2.10.2 **Service Clamps** shall be brass with outlet tapped with AWWA taper and designed for use on IPS PVC pipe, Ford Style No. 202B, or as pre-approved by Eudora Utilities, Inc.

2.10.3 **Meter Boxes** shall be manufactured by DFW and shall be Model 37C-12-Body with 37-C-1-Lid conforming to AWWA Specifications.

2.10.4 **Water Meters** shall be supplied by Eudora Utilities, Inc.

2.10.5 **Meter Yokes** shall be Ford 70 Series, or as pre-approved by Eudora Utilities, Inc., for 3.4" x 5/8" meters and integral check valve.

2.10.6 **Backflow Preventers** shall be of the double check type, Watts No. 7-10-U3, or as pre-approved by Eudora Utilities, Inc.

2.10.7 **Service Pressure Reducer** shall be model preapproved by Eudora Utilities, Inc..

2.11 **Concrete**: Concrete for pavement repair shall develop a compressive strength of 3,000 pounds per square inch at 28 days.

2.12 **Asphalt**: Asphalt for pavement repair shall meet the requirements of the Mississippi Standard Specifications for State Aid Road and Bridge Construction for Hot Bituminous Pavement, Type SC-1.

2.13 **Clay-Gravel**: Clay-gravel for driveway repair shall meet the requirements of the Mississippi Standard Specifications for State Aid Road and Bridge Construction for Granular Material, Class 4, Group C.

2.14 **Blow-Off Assemblies**: Blow-Off assemblies may be required on dead-end lines where future phases of a project are planned or are possible. The assemblies shall be placed on these dead-end lines as directed by the Engineer. Size and location of the assemblies shall be as depicted on the Contract Drawings. Each assembly shall consist of a valve, valve box, riser piping and concrete pads. Valves, pipe and materials shall meet specifications as set forth herein.

2.15 **Fire Hydrants**: Fire Hydrants shall comply with AWWA Specification C-502 and shall be of the compression type, closing with the line pressure. The depth of bury shall be such that the "depth of bury" marking shall coincide with the existing ground line. Hydrants shall be furnished with a sealed oil reservoir located in the

bonnet so that all threaded and bearing surfaces are lubricated when the hydrant is operated. The hydrant shoe shall have at least two drain outlets. Hydrants shall have a six inch shoe with type connection to be determined by the type of pipe used. Hydrants shall be furnished with a breakable feature that will break cleanly upon impact and not allow the hydrant to flood when the barrel is broken. This shall consist of a two part breakable safety flange with a breakable stem coupling. Anchor tees will be required to anchor the tee to the fire hydrant valve. An anchor coupling will be required between the valve and the fire hydrant. Three-way fire hydrants shall have a 5 ¼" valve opening with two 2 ½ inch hose nozzles and one 4 ½ inch pumper nozzle, Waterous, or as pre-approved by Lewisburg Water Association, Inc. Two-way fire hydrants shall have a 4 ½" valve opening with two 2 ½ inch hose nozzles, Waterous, or as pre-approved by Lewisburg Water Association, Inc. Main valves shall be replaceable without digging. Threading for all nozzles and connections shall be National Fire Underwriters Standard. All hydrants shall have a one inch, five sided bronze operating nut.

2.16 **2 1/8" Post Type Fire Hydrant** : This type hydrant shall be placed on dead end lines with no future expansion. They shall comply with AWWA Specification as mentioned above. They shall be Mueller A-411 or as pre-approved by Eudora Utilities, Inc.

2.17 **1" Frost Proof Hydrant** : This hydrant shall be placed at the location as if specified by Eudora Utilities, Inc.. This hydrant will be for water sampling only.

2.18 **Tapping Sleeve & Valve**: Tapping sleeves shall be Mueller H-615 or as pre-approved by Eudora Utilities, Inc. Tapping valves shall be Mueller H-681 or as pre-approved by Eudora Utilities, Inc.

2.19 **Tracer Wire** shall be AWG No. 12 solid copper insulated wire, Type THHW.

3. **INSTALLATION**: Installation under this section shall conform to the following specifications:

3.1 **Excavation**: The Contractor shall perform all excavation of every description and of whatever substances encountered to the depth specified in the Plans or as directed by the Engineer. The bottom of all trenches shall be carefully shaped, graded and aligned in accordance with the instructions of the Engineer and to his complete satisfaction before any pipe is placed. Care shall be taken not to excavate below the depth specified. However, in the event excessive excavation should occur, the bottom of the trench shall be filled back to grade with approved material and thoroughly compacted in a manner satisfactory to the Engineer. All trenches shall be excavated to a depth to maintain minimum cover over the installed pipe as follows:

3.1.1 30" for ordinary pipe laying conditions

3.1.2 36" under existing creeks, ditches, and other waterways with transition

depths as required

3.1.3 Depth as indicated on Contract Drawings for road crossings and/or other locations as required by special conditions.

The width of the trench shall be of adequate size to provide adequate room for making joints and to assure that the barrel of the pipe rests uniformly and in continuous contact with the supporting ground for its entire length.

When rock is encountered, the Contractor shall excavate to a depth at least 4 inches below the required grade and backfill to grade with 4 inches of sand cushion.

Pipe shall not be laid when water is in the trench. The Contractor shall not excavate more trench than can be pumped dry with the available pumping facilities.

A tolerance of 6 inches from the established grade may be permitted, when approved by the Engineer, if excessive breaks in alignment at the joints prevent proper installation of the pipe.

If the established grade conflicts with other utilities, the water line grade shall be changed to avoid the conflict.

3.2 **Sheeting and Bracing**: The Contractor shall furnish and place, to the satisfaction of the Engineer, such sheeting and bracing as may be required to support the sides of the trench and to protect the workmen and pipe or adjacent structures from injury by the sloughing or caving of the trenches. Approval of protective sheeting and bracing by the Engineer will not extend to the Engineer any liability for such protective measures which later prove defective. The sheeting and bracing may be removed as the trench is backfilled, or may be left in place when necessary to prevent damage. In the event the sheeting or bracing is left in place, it shall not extend nearer than 1 foot to the surface of the ground. In no case will extra compensation be allowed for furnishing, placing, or removing any sheeting and bracing. The cost of this work shall be included in the unit price bid for installing the pipe.

3.3 **Pipe Laying**: Pipe, appurtenances and fittings shall be laid to the alignment and at the locations as depicted on the Contract Drawings or as directed by the Engineer. Pipe shall not be laid on County rights-of-way, either dedicated or maintained, without approval by the Utility and an approved permit in writing by the County Engineer. Any pipe crossing County roads shall be encased in approved casing and shall not be installed until an approved permit is obtained. All pipe and fitting shall be handled with care in such a way as not to damage the pipe or lining. The inside of the bell and the outside of the spigot shall be cleaned before jointing. Each piece of pipe shall be inspected and swabbed if necessary to remove any foreign matter.

When pipe laying ceases for any period of time, the end of the pipe shall be securely closed to prevent the entrance of water, mud, animals or any other objectionable matter.

Poured-in-place concrete thrust blocks shall be installed at all fittings to prevent movement from hydrostatic pressure. Concrete shall be 3000 psi mix conforming to ASTM Specification C94 composed of Portland cement, fine and coarse aggregate and water. Thrust blocks shall be constructed between the fitting and undisturbed soil with adequate density to prevent movement of the fitting under test pressure.

All pipe and fittings shall be joined in accordance with manufacturers recommendations. Only those lubricants which are supplied or recommended by the manufacturer shall be used.

As soon as each joint of pipe is laid, it shall be backfilled and compacted to the springline of the pipe to provide stability and prevent further movement.

3.4 **Backfill**: Backfill of trenches shall be carefully performed to protect pipe, fittings, hydrants and appurtenances and to prevent excessive future settlement. Trenches shall be backfilled with fine, loose earth, free of large clods or stones, to a depth of 12 inches above the pipe and carefully compacted. The remainder of the backfill material shall then be placed and neatly windrowed above the trench. Trenches shall be refilled and dressed after sufficient drying time following each rain. Trenches on slopes which are too steep to hold compacted backfill during heavy rainfall must have additional protection using sandbags stacked in the trench.

Backfill in areas to be paved or under dirt or gravel traffic or pedestrian areas shall be compacted in layers not to exceed 8 inches until the trenches have been completely filled. Each layer shall be mechanically tamped to a density of 94 percent of standard proctor. Disposal of excess material shall be the responsibility of the Contractor.

3.5 **Setting Fittings, Valves, and Fire Hydrants**: All fittings, valves and fire hydrants shall be set at the locations and in the manner as depicted on the Contract Drawings. **Fittings for water lines four inches in nominal diameter and larger shall be ductile iron fittings as specified herein.** Valves and fire hydrants shall be set in a vertical position at 90 degrees to a horizontal plane. Valves shall be set in a poured-in-place concrete cradle; fire hydrants shall be backed with concrete as set forth above for fittings. An adequate amount of clean washed stone shall be set around the base of the fire hydrant to the bottom flange of the barrel to allow the hydrant to bleed through the drain holes without erosion of the soil or stoppage of the drain holes.

Omissions or unsatisfactory installation of any of these items shall be corrected

by the Contractor at no additional cost to the Owner.

3.6 **Pavement Repair**: Pavement repair shall consist of preparation and compaction of granular material and construction of a 6 inch concrete slab as depicted on the Contract Drawings. Pavement to match existing pavement shall be placed on the concrete slab.

3.7 **Highway Crossings**: Where water mains cross paved highways or county roads, they shall be installed inside steel or PVC casing as directed by the Engineer. The casing shall have an inside diameter large enough to accommodate the water main freely. The casing shall be placed in a manner acceptable and approved by the State Highway Department or County Road Department. Installation may be accomplished by wet or dry boring a hole, as approved by the governing agency, to receive the casing pipe and jacking the casing through the road bed. Care shall be used to prevent damage to the road bed or surface and any repairs necessary as a result of the operation shall be the responsibility of the Contractor.

Upon completion of the installation of the casing, the carrier pipe shall be installed in the casing in such a manner as to avoid any undue stress or damage to the pipe or its coating. The carrier pipe shall be free of tension at all points in the casing.

3.8 **Tracer Wire:** AWG No. 12 solid copper wire shall be wrapped around the pipe in such a manner that allows one complete revolution of wrap, in every ten feet of pipe length. Wire shall be looped around the outside of all valve boxes and other appurtenances in such a manner that there is no interference with the operation of the appurtenances.

3.9 **Coordination with Interested Parties Other Than The Utility**: The Contractor shall duly notify and coordinate all work with interested parties such as the Mississippi State Highway Department, the County Road Department, Gas Transmission Companies, and any railroad company involved. No work which affects these interested parties will commence until satisfactory coordination has been achieved.

4. **HYDROSTATIC TESTING**: Prior to final acceptance by the Owner, distribution lines must be tested for pressure and leakage in accordance with the requirements outlined below and on the following pages.

4.1 **PRESSURE TEST**:

4.1.1 **TEST PRESSURE RESTRICTIONS**:

(1) A hydrostatic pressure of at least 1.5 times the working pressure of the section being tested shall be applied, and shall be based upon the elevation of the lowest point in the section.

(2) The hydrostatic test pressure shall not be less than 1.25 times the working pressure of the highest point of the section under test.

(3) Pressures specified in (1) and (2) above shall be corrected to the elevation at which the test gage is installed.

(4) The duration of the test shall be not less than two hours.

(5) Test pressures shall not vary by more that ± 5 p.s.i.

(6) Test pressures shall not exceed pipe or thrust restraint designs.

(7) Test pressures shall not exceed twice the rated pressure of valves or hydrants when these are used to isolate the test section.

(8) Test pressures shall not exceed the rated pressure of the valves if resilient-seated butterfly valves are used in the section being tested.

4.1.2 **PRESSURIZATION**: Each valved section of line shall be filled with water slowly and the specified test pressure as outlined in 4.1.1 above shall be applied by means of a pump connected to the pipe in a manner satisfactory to the owner. Where possible, the connection should be made at the lowest point in the section under test.

4.1.3 **AIR REMOVAL**: Before applying the specified test pressure, air shall be completely expelled from the pipe, valves, and hydrants. If permanent air relief valves are not located at the high points, the Contractor shall install corporation stops at such points, so that the air can be expelled as the line fills with water. After the air has been expelled, the corporation stops shall be closed and the pressure applied. At the conclusion of the pressure test, the corporation stops shall be removed and the holes plugged, or, at the discretion of the owner they may be left in place.

4.1.4 **EXAMINATION**: All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test repeated until it is satisfactory to the owner.

U.S. GALLONS REQUIRED TO FILL PIPE IN LENGTHS SHOWN BELOW

NOMINAL DIAMETER	100 FOOT SECTION	1000 FOOT SECTION	NOMINAL DIAMETER	100 FOOT SECTION	1000 FOOT SECTION
2	16	160	16	1044	10,440
2 ½	26	260	18	1322	13,220
3	37	370	20	1632	16,320
4	65	650	21	1799	17,990
6	147	1470	24	2350	32,500
8	261	2610	27	2974	29,740
10	408	4080	30	3672	36,720
12	588	5880	33	4443	44,430
14	800	8000	36	5288	52,880

*Quantities are based upon the nominal diameter of the pipe and will vary somewhat from actual quantities.

4.2 **LEAKAGE TEST**: A leakage test should, and normally will, be conducted concurrently with the pressure test. Leakage is defined as the quantity of "make-up" water that must be injected in the newly laid pipe, or any valved section thereof, to maintain pressure within 5 p.s.i. of the specified test pressure after air in the pipeline has been expelled, and the pipe filled with water.

4.2.1 **ALLOWABLE LEAKAGE**: No pipe installation should be accepted if the leakage is greater than that determined by the following equation:

$$L = \frac{ND\sqrt{P}}{7400}$$

L = Allowable leakage in gallons per hour
N = Number of joints in the length tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during the test in pounds per square inch gage (p.s.i.g.). This normally is 150 p.s.i.g. since most systems in Mississippi are designed for 80 p.s.i.g. working pressure. However, the test pressure may be more or less, depending upon the design pressure for the section being tested.

The length of the test should be sufficient to disclose any weak points in the line, but in no case should the length of the test be less than two (2) hours after the line has been brought to full test pressure.

The following table provides information concerning allowable leakage for various types of pipe. This information is for pipe tested at 150 p.s.i.g. based upon the above formula.

ALLOWABLE LEAKAGE IN GALLONS PER HOUR AT 150 P.S.I.G. PRESSURE

DIAMETER (Inches)	PVC PIPE (1000 ft.)		D.I. PIPE (1000 ft.)	
	20 Foot Joints	40 Foot Joints	18 Foot Joints	20 Foot Joints
2	.17	.08	.19	.17
2 ½	.21	.10		
3	.25	.12	.28	.25
4	.33	.16	.37	.33
6	.50	.25	.55	.50
8	.66	.33	.74	.66
10	.83	.41	.92	.83
12	1.00	.49	1.10	1.00
14			1.29	1.13
16			1.47	1.16
18			1.66	1.50
20			1.84	1.60
21				
24			2.21	2.00
27				
30			2.76	2.50
33				
36			2.31	3.00

* Represents a leakage of 30 gpd per mile of pipe per inch of pipe diameter for pipe in 13 foot length.

When testing against closed, metal seated valves, an additional leakage per closed valve of 0078 gallons per hour per inch of nominal diameter may be added to the above figures. When hydrants are in the test section, the test shall be made against the closed hydrant.

4.2.2 **MEASUREMENT OF WATER USED**: Water which is introduced into the line to determine leakage shall be measured by use of a calibrated water meter. The meter must have the capability of accurately measuring the low flows which may be required to maintain the test pressure on the line. A displacement type meter with sweep hand should be used with the sweep hand representing not more than ten gallons.

4.2.3 **ACCEPTANCE**: Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that shown in Section 4.2.1, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

4.3 **RECORD OF TESTING**: The Owner's engineer or authorized representative shall maintain a written record showing the results of testing for each section of line. The following information will be included as a minimum:

(1) Name of owner, engineer, and contractor performing work.
(2) Identification of the section being tested.
(3) Date of the test.
(4) Length of the section being tested and the nominal diameter of the pipe.
(5) Test pressure p.s.i.g.
(6) Duration of the test in hours.
(7) Amount of water added during the leakage test in gallons.
(8) Total number of leaks on the section being tested.
(9) Date leaks were repaired.
(10) Brand name of pipe used.
(11) Pressure rating (SDR and p.s.i.).
(12) A similar set of data for any section of line which is retested.

A form similar to the following may be utilized, and is to be completed and a copy furnished to the Owner at the time of final acceptance.

HYDROSTATIC TESTING OF WATER MAINS

Remarks:

Test Designation _____
Date Tested _____
Brand Name of Pipe _____
Pipe Pressure Rating _____
Location of Test Pump _____

CALCULATION OF ALLOWABLE LEAKAGE

			A	B	C	
Line Diameters Being Tested	Line Lengths (Actual Footage)	Length of Pipe Joints (20' / 40')	Line Lengths (1000's of Feet)	Allowable Leakage From Chart Gals./Hour/1000 ft.	Test Duration (Hours)	Allowable Leakage (Gallons) (Col. A x Col. B x Col.C)
TOTAL ALLOWABLE LEAKAGE IN GALLONS						

1. Water Meter Reading at End of Pump Up _____ Gallons
2. Test Pressure at Pump at Beginning of Test _____ PSI
3. Test Pressure at Pump at End of Test _____ PSI
4. Pressure Loss (2) - (3) (5 PSI Max.) _____ PSI
5. Water Meter Reading After Pumping Lines Back to Original Test Pressure _____ Gallons
6. Gallons of Leakage (5) - (1) _____ Gallons
7. Gallons Leakage Allowed From Computations _____ Gallons

Circle Test Result **PASS** **FAIL**

Signature of Engineer's Representative _____

NOTE: Show the results of retesting as a separate set of data.

5. **DISINFECTION**: After completion of installation and testing, the water lines shall be thoroughly flushed to remove dirt and foreign matter and be disinfected in accordance with AWWA C651-92, Continuous Feed Method.

When the pipes are disinfected, at least one sample of water shall be extracted from every dead-end line and every major looped line for examination by the Mississippi State Department of Health to determine whether the system is free of organisms of the Coli-Aerogenes group. Water samples will be collected by a representative of the Health Department, the Certified Operator for the Utility, or the Professional Engineer for the project. The results of these samples should indicate no coliform bacteria and should not show confluent growth. If the samples submitted contain such organisms, the piping shall be disinfected again and redisinfected, if necessary, until the system is free of organisms of the Coli-Aerogenes group.

All arrangements, materials and labor required for complete disinfection and testing of the system shall be furnished by the Contractor at no expense to the Owner.

6. **SEPARATION BETWEEN WATER AND SEWER LINES**: It is essential to maintain adequate clearance between water supply and sewage lines. A minimum separation of ten (10) feet horizontally and eighteen (18) inches vertically below the water line shall be maintained. If such separation is not possible, special precautions, as directed by the Engineer, shall be taken by the Contractor to prevent possible contamination of waterworks facilities.

7. **CLEAN-UP**: In areas where the water mains have been backfilled, the Contractor shall clear the right-of-way and surrounding ground, and shall dispose of all waste materials and debris resulting from his operations. He shall fill and smooth holes and ruts and shall repair all miscellaneous and unclassified ground damage done by him and shall restore the ground to such stable and suitable conditions as may reasonably be required, consistent with the condition of the ground prior to construction.

8. **MEASUREMENT**:

8.1 The length of **pipe**, installed and accepted, will be determined by measurements along the centerline of the pipe. No deductions will be made for space occupied by valves or fittings. There will be no compensation for extra depth in installation of pipe unless approved in advance by change order.

8.2 Lengths of **steel or PVC casing pipe** installed and accepted will be determined by measurement along the centerline of the casing pipe. Limits for payment of bored casing will be no more than two (2) feet beyond the face of the boring pit on each side. Carrier pipe in casings will not be included in this item, but will be measured as water line.

8.3 **Valves and boxes** shall be measured as units per each, with the exception of **blow-off assemblies** and **pressure reducing assemblies** where valves and boxes are included as a part of the measurement and payment for the total assembly. Valve markers, concrete, and gravel bedding for valves will not be measured for payment; the cost of these items shall be included in the Contract unit price for valves and boxes.

8.4 **Ductile Iron Fittings** shall be measured per pound in accordance with catalog weights for fittings used. Weight of glands, bolts, and gaskets will not be measured for payment.

8.5 **Connections to Existing Water Mains** shall be measured as units per each. This shall include all labor and equipment required to connect the new water main to the existing water main. PVC and miscellaneous fittings such as adapters and transition fittings will not be measured for payment and shall be included in the Contract unit price for connection to the existing water line. Ductile iron fittings for 4 inch diameter and larger lines will be measured separately for payment. Disconnections from the existing water system are considered as incidental to connection and the price for this work shall be included in the unit price for connections.

8.6 **Corporation Stops** shall be measured as units per each.

8.7 **Service Saddles** shall be measured as units per each.

8.8 **Meter Boxes** shall be measured as units per each.

8.9 **Meters Yokes** shall be measured as units per each.

8.10 **Wet Taps** shall be measured as unit prices per each. This shall include the tapping sleeve and the valve and all the labor, equipment, and miscellaneous fittings necessary for making the tap.

8.11 **Blow-Off Assemblies** shall be measured as units per each. This shall include all labor, equipment, and materials required for complete installation of the blow-off assembly as indicated by the Contract Drawings.

8.12 **Fire Hydrant Assemblies** shall be measured as units per each. Each unit shall include labor, equipment, and miscellaneous fittings required to install the fire hydrant, and blocking of the fire hydrant with poured-in-place concrete thrust block and wash gravel for weephole drainage as shown on the Contract Drawings. This item shall also include the anchor tee, pipe lead, gate valve, and anchor coupling.

8.13 **2 1/8" Post Type Fire Hydrant**: shall be measured as stated above.

8.14 **1" Frost Proof Hydrant**: shall be measured as units per each.

8.15 **Tracer Wire** shall be measured per linear foot.

9. **PAYMENT**: All work under this Contract shall be measured and paid for in accordance with units of measure and unit prices for the materials specified on the Bid Form and in accordance with measurement descriptions detailed in Section 8. **Estimated quantities are shown for the purpose of comparing price proposals and providing a reasonable estimate of total cost for the work. It shall be the responsibility of the Contractor to arrive at correct quantities for use in ordering materials.**

   All items of work which are shown on the Contract Drawings or are specified herein shall be accomplished in accordance with these Contract Documents. All items of work for which a separate pay item is not shown on the Bid Form shall be absorbed items and the cost of these items shall be included in the unit prices bid for items shown on the Bid Form.

10. **WARRANTY**: The Contractor shall provide a written warranty for materials and workmanship for a period of one year after final acceptance by the Utility. The warranty shall be secured by a Performance Bond as set forth in the General Conditions of the Contract.