PINE BLUFF WASTEWATER UTILITY
1520 South Ohio, Pine Bluff, AR 71601
(870) 535-6603/Fax: 535-6243/Website: pbwastewater.com

SANITARY SEWER EXTENSION

PROCEDURE & DETAILS

Revision: April, 2006

Volume 1, Edition 3

PURPOSE OF THIS MANUAL

The purpose of this manual is to provide information concerning the acceptable practices and procedures by the Pine Bluff Wastewater Utility concerning sewer line construction. This is a copy of the latest revision of Pine Bluff Wastewater Utility's Sanitary Sewer Extension Procedure Manual. This manual has been revised to mirror the existing practices, policies, and procedures with regard to sewer extension and guidelines.

In this manual you will find the Sewer Extension Procedure, Sewer Design Guideline and a Check-Off list. These documents have been included to detail the necessary procedures. Our manual contains certain minimum sanitary sewer specifications and construction details that must be followed. We have, also, included important testing procedures and forms for your convenience.

We recognize that some changes or revisions may be necessary prior to the publication of the next edition of this manual. Any recommended changes should be communicated to the Engineering Division at the Utility for approval by our Utility Commission. Final revisions will be communicated through letters, memo's or listed on our website at www.pbwastewater.com.

At Pine Bluff Wastewater Utility, we look forward to working with you on improvements and extensions to enhance our sewer system for benefit to all customers served within the City of Pine Bluff. Should you have questions or desire an explanation on the revisions as stated in this manual, please call our office at (870) 535-6603.

_____

Ken Johnson,
General Manager
April 2006

CERTIFICATE OF CONFORMANCE

The undersigned, sponsor of the sewer project designated

In accordance with the policy adopted by the Pine Bluff Wastewater Utility Commission, does hereby certify that the construction of the sewer facilities in said sewer project were completed in accordance with the approved plans and specifications of the Pine Bluff Wastewater Utility for said project; that the cost of the said project was the total sum of $_____; and that all bills and accounts for materials, labor and services have been paid in full.

Executed this _____day of _____, 20_____

_____

_____

ACKNOWLEDGEMENT

STATE OF ARKANSAS } SS

COUNTY OF _____}

BE IT REMEMBERED that on this day came before me, the undersigned, a Notary Public within and for the county and state aforesaid, duly commissioned and acting, to me well known as the Grantors in the foregoing instrument, and acknowledged that they each had executed the same for the consideration and purposes therein mentioned and set forth.

WITNESS my hand and seal as such Notary Public on this _____day of _____, 20_____

_____
NOTARY PUBLIC

My commission expires: _____

BILL OF SALE

STATE OF ARKANSAS } SS

COUNTY OF _____}

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned _____ for and in consideration of the permission and consent of the Pine Bluff Wastewater Utility, to connect the sewer facilities hereinafter described to the Pine Bluff Sanitary Sewer System and the sum of One Dollar to the undersigned cash in hand paid by the Pine Bluff Wastewater Utility, the receipt of which is hereby acknowledged, does hereby bargain, sell, convey, assign, transfer and deliver to the Pine Bluff Wastewater Utility the following described property:

The completed sewer project known as

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including all pipe, machinery, equipment, pumps, easements, fixtures and any and all other property installed in the completed sewer project mentioned above.

TO HAVE AND TO HOLD the same unto the Pine Bluff Wastewater Utility, its successors and assigns forever.

The undersigned does hereby warrant that all of the costs of the installation of the sanitary sewer project mentioned above have been paid in full and that the same is free from any and all encumbrances.

The undersigned does also warrant and guarantee all materials, equipment, and workmanship to be free of defects, deficiencies, failures, and errors for a period of twelve (12) months from the date of substantial completion as prescribed in the SANITARY SEWER DESIGN GUIDELINES provided by the Pine Bluff Wastewater Utility.

WITNESS our hands and seals this _____ day of _____, 20 _____

_____

_____

ACKNOWLEDGEMENT

STATE OF ARKANSAS } SS

COUNTY OF _____}

BE IT REMEMBERED that on this day came before me, the undersigned, a Notary Public within and for the county and state aforesaid, duly commissioned and acting, to me well known as the Grantors in the foregoing instrument, and acknowledged that they each had executed the same for the consideration and purposes therein mentioned and set forth.

WITNESS my hand and seal as such Notary Public on this _____day of _____, 20_____

_____
NOTARY PUBLIC

My commission expires: _____

SEWER MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That, _____, as Principal and, _____, as Surety are held and firmly bound unto the Pine Bluff Wastewater Utility, as Obligee, in the amount of _____ Dollars ($_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents:

Now, therefore, the condition of this obligation is such that if the Principal, upon receiving notice within a period of twelve (12) months from the date of acceptance of these sanitary sewer lines and appurtenances by the Pine Bluff Wastewater Utility, of defects, deficiencies, and/or errors in the following improvements: SANITARY SEWER PROJECT designated

_____

shall promptly correct said defects and perform the necessary maintenance in keeping with the requirements of the approved plans and specifications for this project then such obligation shall be null and void; otherwise, it shall remain in full force and effect. Any suit under this bond must be instituted before the expiration of three (3) months from the end of the period of notification referred to above.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators, or successors of Owner.

Signed and sealed this _____day of _____, 20 _____

_____

PRINCIPAL

By _____

_____

SURETY

By _____

Insurance Binder Attached

RIGHT OF WAY EASEMENT

Individual
Married
Corporation

KNOW ALL MEN BY THESE PRESENTS:

THAT I (WE), _____ and _____ Grantor (s) , for and in consideration of the sum of One Dollar ($1.00) cash in hand paid by the Pine Bluff Wastewater Utility Commission, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, do hereby grant, bargain, sell and convey unto the City of Pine Bluff, for the use and benefit of the Pine Bluff Wastewater Utility Commission, Grantee, and unto its successors and assigns forever, a perpetual right, privilege and easement for the purpose of (1) laying, constructing, operating, maintaining, repairing, replacing, reconstructing, testing, inspecting and adding sewer mains and sewer lines, whether one or more, and appurtenances thereto, now and at different times in the future; (2) keeping the easement clear of all buildings and other improvements of any kind that would conflict or interfere with the Grantee's use of the easement; and (3) having the right of free ingress and egress across adjacent lands of the Grantor(s) to the lands more particularly described below.

The easement herein conveyed is over, upon, under, and across lands situated in the City of Pine Bluff, Jefferson County, Arkansas, and is more particularly described as follows:

An easement……. (description here)

Grantor(s), at the risk of Grantor(s), reserves the right to otherwise use the easement for purposes not prohibited herein so long as such use does not conflict or interfere with the Grantee(s) use of the easement in any way.

To have and to hold said easement, rights and privileges unto the said Grantee, and unto its successors and assigns forever, for the purpose aforesaid.

And said Grantor(s) covenant(s) with said Grantee, its successors and assigns, the Grantor(s) will forever warrant and defend the title to said easement and rights against the claims of all persons whomsoever and that said Grantee, its successors and assigns, shall have at all times the quiet use and enjoyment of said easement and rights.

IN WITNESS WHEREOF, I hereunto set my hand and seal this _____day of _____, 20 _____

_____

_____

ACKNOWLEDGEMENT

STATE OF ARKANSAS } SS

COUNTY OF _____}

BE IT REMEMBERED that on this day came before me, the undersigned, a Notary Public within and for the county and state aforesaid, duly commissioned and acting, to me well known as the Grantors in the foregoing instrument, and acknowledged that they each had executed the same for the consideration and purposes therein mentioned and set forth.

WITNESS my hand and seal as such Notary Public on this _____day of _____, 20_____

_____
NOTARY PUBLIC

My commission expires: _____

SANITARY SEWER EXTENSION PROCEDURE

1. Preliminary approval for any proposed sanitary sewer extension must be granted by the Manager of the Pine Bluff Wastewater Utility. A vicinity map and site plan, in most cases, shall be sufficient to indicate the Owner/Developer's intentions. Preliminary approval does not constitute automatic final approval of any sewer extension. An Engineering Report may be required for any Project, regardless of size. Preliminary information provided by the Utility is normally limited to aerial maps showing the site location and the nearest available sewer lines, pump stations, and force mains. Elevations of manholes and size of existing pipes are given if known. The Owner/Developer is responsible for providing an Engineers design plan to be reviewed by the Utility Designated Engineer or Consulting Engineering Firm.

2. A proposed detailed CONSTRUCTION PLAN AND SPECIFICATIONS shall conform to the Utility's latest standards. At the discretion of the Utility, small projects may use the STANDARD DETAILS and SPECIFICATIONS as published by the Pine Bluff Wastewater Utility. Large projects may require submittal of DETAILED SPECIFICATIONS prepared by the project's Engineer. As required by state law, all construction plans and specifications must be designed, signed, and stamped by a Professional Engineer registered in the State of Arkansas. One complete set of the proposed Construction Plan is sufficient for the preliminary review.

3. After review by the Utility, corrections and adjustments to the PLAN and SPECIFICATIONS as detailed and/or directed by the Utility shall be resubmitted by the Owner/Developer. Final written approval of CONSTRUCTION PLANS and SPECIFICATIONS must be made by the Utility and the Arkansas Department of Health and Human Services, Engineering Sectio**n**, before construction of the project can commence.

4. A construction review fee of 0.5% of the estimated construction cost will be required for each project whose estimated construction cost exceeds $50,000. The construction review fee shall not exceed $1,000.

5. Before construction can begin, signed RIGHT-OF-WAY EASEMENTS shall be obtained by the Owner/Developer for all portions of the project located on or across private property. A MEMORANDUM OF UNDERSTANDING developed by PBWU may be substituted for a signed EASEMENT. PERMITS shall be obtained from the applicable department and/or agency for all portions of the project located on or across public property (i.e. streets, highways, parks, etc.). EASEMENTS and PERMITS shall be submitted to the Utility for review and approval prior to start of construction. Pump stations shall be located on property deeded to the City of Pine Bluff.

6. Projects valued at less than $20,000 may be installed by either an Arkansas licensed Master Plumber or an Arkansas licensed General Contractor. Projects valued at $20,000 or more must be constructed by an Arkansas licensed General Contractor with applicable project bonding and insurance as per State law. Arkansas State Licensing Law for Commercial Contractors Act 150 of 1965 and Act 162 of 1987 (as amended) requires the Installation Contractor to have a Contractors Licenses Classification of Municipal and Utility Construction.

7. The Utility's Designated Engineer or Utility Inspector shall be informed at least 24 hours before any construction is commenced on the project. During construction, no sewer pipe or appurtenances shall be backfilled, encased, or permanently covered until inspected by the Utility or its contracted representative. The project shall be subject to continuous and/or random inspection by the Utility or its contracted representative. All materials and/or work found to be in non-conformance with the PLANS AND SPECIFICATIONS shall be rejected. A project containing any uncorrected non-conformance materials and/or work will not be accepted by the Utility.

8. A Final Inspection and certain forms of testing on the project will be required as shown in the DETAILED SPECIFICATIONS and/or the SANITARY SEWER DESIGN GUIDELINES (QUICK FACT SHEET).

9. After completion of the construction phase of the project, the following items shall be submitted by the Owner/Developer to the Utility for its review and approval:

a. Testing results.

b. "AS-BUILT" PLANS.

c. CERTIFICATE OF CONFORMANCE certifying proper construction of the project (a blank form is available). This item must be completed and submitted to the Utility BEFORE the project is placed into service (i.e. no physical service line connections to and no introduction of sanitary wastes into the new sewer line(s) before the CERTIFICATE OF CONFORMANCE is completed and submitted to the Utility).

d. BILL OF SALE transferring ownership of the project assets to the Utility (a blank form is available). This item must be completed and submitted to the Utility BEFORE the project is placed into service (i.e. no physical service line connections to and no introduction of sanitary wastes into the new sewer line(s) before the BILL OF SALE is completed and submitted to the Utility).

e. SEWER MAINTENANCE BOND, if applicable.

f. EASEMENT: A signed RIGHT-OF-WAY EASEMENT shall be obtained by the Owner/Developer for all portions of the project located on or across private property. This item must be completed and submitted to the Utility BEFORE the project is placed into service.

10. Upon (a) completion of a properly constructed project, (b) the Final Inspection and approval, and (c) submittal of all items required above, the Utility will issue a formal letter of acceptance. PBWU will transmit a copy of the acceptance letter to the Arkansas Department of Health and Human Services Engineering Section, District #5.

11. A SANITARY SEWER EXTENSION CHECK OFF LIST will be maintained by the Utility through the duration of the project to track the progress of the project. A copy of Check Off List is attached hereto.

SANITARY SEWER EXTENSION
CHECK OFF LIST

Project Title _____

Developer's Information

Name: _____

Address: _____

City, St, Zip: _____

Phone, Fax: _____

Website: _____

		BY	DATE
1.	Preliminary Project Approval Given:	____	_____
2.	Construction Plans & Specs Received:	____	_____
3.	Construction Plans & Specs Approved:	____	_____
4.	R-O-W Easements Received/Approved:	____	_____
5.	Written Approval for Project Start:	____	_____
6.	Testing Completed & Accepted:	____	_____
7.	As-Built Plans Received & Approved:	____	_____
8.	R-O-W Easements Filed at Court House:	____	_____
9.	Certificate of Conformance Received:	____	_____
10.	Bill of Sale Received & Approved:	____	_____
11.	Maintenance Bond Received & Approved:	____	_____
12.	Project Final Inspection & Approval:	____	_____
13.	Written Approval Issued by Utility:	____	_____
14.	Project Accepted by Utility Commission:	____	_____

SANITARY SEWER DESIGN GUIDELINES
(QUICK FACT SHEET)

1. This is a sanitary sewer design fact sheet and is not intended to provide detailed plans and specifications for all aspects of sanitary sewer construction as required by the Pine Bluff Wastewater Utility. Detailed specifications are not included with this document due to their proneness to frequent change. Likewise, this document is dynamic and subject to change as deemed necessary by the Utility. A more detailed Policy document may be prepared and various Detailed Specifications and Detailed Standard Drawings may be available from the Utility if needed or desired. All materials and construction methods shall meet or exceed the Ten State Standards and the minimum requirements of the Arkansas Department of Health. The Ten State Standard is also used as a guideline by the Utility. As required by state law, all project plans and specifications must be designed, signed, and stamped by a Professional Engineer registered in the State of Arkansas. The Pine Bluff Wastewater Utility reserves the right to have all materials and construction methods conform to our applicable specifications and standards before the work will be accepted.

   The Sanitary Sewer Extension Procedure and Details of the Pine Bluff Wastewater Utility shall become a supplement to the Specifications of any Project designed by any Registered Engineer, Architect or Engineering Firm if said project is to be accepted by the PBWU. The most stringent specifications shall be used.

2. The attached SANITARY SEWER EXTENSION CHECK OFF LIST outlines the necessary procedures that must be followed to complete an acceptable project.

3. Certain standard and typical details are attached to the end of this document and shall be considered as the minimum acceptable for materials, work, and construction techniques allowed for projects to be accepted by the Pine Bluff Wastewater Utility. If not otherwise detailed or specified in this document or by the Utility's Designated Engineer, materials used and construction techniques employed shall comply with applicable AWWA and ASTM specifications, standards, and practices.

4. Sanitary sewer mains shall be sized for the anticipated load; the minimum size for main lines shall be eight (8) inch. Service lines shall be sized for the anticipated load; the minimum size for service lines shall be four (4) inch. All sewer main lines must begin and end in a manhole. Each separate property, lot, tract, residence, business, and/or industry served must have a main sewer line adjacent to the property and be serviced by a single/individual service line (unless it is determined by the UTILITY to allow an additional service tap.) Multiple residences, businesses, and/or industries may not connect to a single sewer service line. An Owner/Developer that builds more than one Apartment, etc. on a single lot, or track of property may connect the units to a 6" or 8" service line, so long as it meets the City and State Codes. This line will be owned and maintained by the Owner. No Developer may purchase a track of property and subdivide it into individual lots without providing a sewer main adjacent to each lot.

The sewer service line for one property, lot, and/or tract may not cross another separate property, lot, or tract without a FILED EASEMENT and/or the approval of the UTILITY. A property, lot, or tract is defined as the subdivided property occupied by a single residence, business, or industry. Service connections may not be made directly to any trunk sewer main 15" diameter or larger. Properties adjacent to a trunk sewer main must be served by a lateral main less than 15" in diameter.

5. Pipe for sewer mains and pipe for service lines located on the sewer main side of double cleanouts shall be ductile iron, cement lining, class 50; **OR** PVC SDR 26/PS115 solid wall gravity sewer pipe. Pipe material for trunk sewer line sizes 15" in diameter and above shall be considered on an individual project basis. Iron pipe shall be bedded in a 3" minimum thick bed of crushed stone under the pipe. PVC pipe shall be bedded as per the attached detailed drawings. Any pipe laid in extremely deep cuts or bad subgrade conditions may require special bedding. Any line with less than 36" of cover shall be ductile iron. All sewer main lines shall be laser aligned for grade and line and laid using industry standard techniques and construction methods acceptable to the Pine Bluff Wastewater Utility. All work shall be tested as required in paragraph 14 below.

   Pipe for force main shall be one of the following, as approved by PBWU:

   - Ductile Iron pipe with "push-on" joints, AWWA C151/A21.51-02, with cement mortar lining AWWA C104/A21.4-03, minimum pressure class 150 psi,
   - PVC Pressure Pipe, ASTM D2241, min. wall thickness ratio SDR21
   - PVC Pressure Pipe (DI o.d.) AWWA C900-97, min. wall thickness DR18

   Force main (except where ductile iron pipe is installed) shall have copper tracing wire wrapped around the pipe, at intervals not to exceed 20 feet, before backfilling. Pipe shall also have Detector Locator Tape (Conductive Tracer) placed flat in trench with warning message facing up, vertically above pipe and at a depth halfway between top of force main and finish ground surface.

6. Bedding shall be Class I crushed stone, granite or hard lime rock, ¾" nominal size. Also see service line bedding on Page 4:11. Other sizes and gradations of bedding material may be used only with written approval from the Pine Bluff Wastewater Utility.

7. Pipe trenches located under special and driving surfaces shall be totally backfilled with compacted Bottom Ash Blend (BAB), a 50% mix of Bottom Ash and Fly Ash. BAB is obtainable from a local provider. It should be placed in lifts not exceeding 18" thick. Paved surfaces shall be repaired as per the governing department/agency requirements. Do not place BAB against any metal without properly protecting the metal surface with approved plastic wrapping, paint, or other protectant.

8. Service and Main lines shall be laid to the minimum standards of (2 feet per second velocity). These grades are provided for your convenience:

Line Size	Minimum Grade
4”	1.0%
6”	0.60%
8”	0.40%
10”	0.28%
12”	0.22%
14”	0.17%
15”	0.15%
18”	0.12%
21”	0.10%
24”	0.08%
27”	0.067%
30”	0.058%
36”	0.046%
42”	0.037%

9. Manholes may be cast-in-place (see attached detailed drawing) or precast. Brick or block manholes are not allowed. Precast manholes shall be as manufactured by Peterson Concrete Tank Company or equal as per PBWU specifications. The detailed drawing of Cast-In-Place Manholes and the specifications for Precast Manholes are the Minimum Acceptable Specifications unless the Manager approves otherwise. Maximum spacing between manholes shall be 400 feet. All manholes shall have a preferred fall across the manhole invert of 0.10 feet, 0.05 feet minimum. When grades allow, all manholes shall be at least six (6.0) feet deep (from natural ground elevation to invert elevation). All pipe penetrations shall be made watertight with gaskets. All pipe penetrations into cast-in-place manholes shall be made watertight with approved CMA water stop gaskets. All construction joints and pipe penetrations in cast-in-place and precast manholes shall be filled smooth with a non-shrink grout and sand mixture. Inverts shall be smooth all around to prevent catching of debris. Manhole ring and cover shall be the Arkansas standard 250 pound set, 22” clear opening, 23 ½” diameter cover with an edge thickness of 1 ½”. Manholes located in flood prone areas shall be provided with an approved watertight, bolt-down ring and cover. Drop manholes shall be constructed when the invert of any two lines entering and leaving a manhole exceeds two ~~and one-half (2.5)~~ feet in elevation. All manholes shall be tested as provided in paragraph 14 below.

10. All iron castings and fittings shall be manufactured in an ISO certified factory.

11. All service lines shall have a double cleanout installed at a convenient and safe-from-harm location at or very near the property/lot line or easement line. All PVC service lines (from double cleanout to the main) shall be bedded with ¾” crushed stone, 4” under and to the top of the pipe. The Double cleanouts shall be constructed as per the attached detailed drawings. Double cleanouts will mark the change of ownership and maintenance

responsibility between the Owner/Developer and the Pine Bluff Wastewater Utility. Service lines run directly into a manhole shall also be constructed with a double cleanout.

12. Plugged service lines shall be marked as per the attached detailed drawings.

13. No ground water, surface water, or storm water shall be allowed to enter the sanitary sewer system through any component of the sewer system including cleanouts and traps.

14. All main sewer lines, plugged or capped service lines, and manholes shall be tested. Mains and service lines shall be air tested as per the generally accepted wastewater (Professional) or engineering standards for low air pressure sewer line testing. Main lines shall be hydro cleaned and video inspected by camera after completion of work. Pine Bluff Wastewater Utility will provide a TV video of any sewer main line extension performed by a Contractor up to (2) two line segments or a maximum of 500 L.F. in length, at no charge. Any project with more than (2) two line segments will be up to the sponsor of the project to provide TV video (VHS or DVD) format to the Utility at their cost. A TV log must accompany video showing Project Name, Manhole Numbers, Pipe Size and Wye locations/distances. TV video and log shall be recorded from downstream to upstream. Infiltration of ground water into new lines shall be not more than 50 gallons per inch per mile per day. All main lines constructed of flexible pipe material (i.e. PVC) shall be mandrel tested 30 days after backfill (hand pull, 5% maximum defection, using go/no-go mandrel). The mandrel must be stamped with the proper % of deflection for the type of pipe testing being conducted. If using an adjustable mandrel, a sizing ring must be provided for the size used. Manholes shall be vacuum tested as per industry standards. All testing, Low Air Pressure Sewer Line Testing, Vacuum Testing, and Hydrostatic Pressure Testing of Sewer Force Mains shall be by Industry Standards and use of the corresponding charts. The UTILITY Inspector shall be present for all testing. All test results shall be submitted to the Utility's Designated Engineer for review and approval.

15. Pump stations will not be allowed in any project unless physical limitations preclude the construction of an all-gravity system. A pump station may not be included in a project without the written approval of the Utility. If a pump station is required and approved, the Utility will provide or assist with general construction and capacity requirements for the station. Any Pump Station that will be turned over to the UTILITY to operate and maintain may be required to have SCADA or other ELECTRONIC monitoring equipment installed at the Developers expense. Final design of the pump station must meet with the approval of the Utility. Pump Stations shall, as a minimum, conform to the requirements of "Ten States Standards", with particular attention to the following:

    - A minimum of two submersible, wetwell mounted sewage pumps shall be installed in the station, with each pump sized to pump the design capacity of the pumping station. Station shall be equipped with an alternator to equalize the wear on the pumps. Pumps shall be capable of passing a 3" sphere. Grinder type pumps are not permitted for PBWU maintained stations.

- Wetwell level shall be sensed and utilized in starting and stopping pumping operations using an electronic level transducer, Consolidated or PBWU approved equal.

- Pump Stations shall be equipped with a PBWU approved emergency pump connection to permit connection of an auxiliary portable pump to the force main.

16. Any commercial building or facility to be connected to the sewer system that will have a food preparation kitchen or produce wastewater that may contain oil, grease, or like contaminates will be required to install a grease trap and/or oil separator. Any commercial building or facility to be connected to the sewer system that will produce wastewater that may contain dirt, sand, gravel, or like contaminates will be required to install a sediment/sand trap. Sizing of all traps and separators shall be performed by the Utility's Designated Engineer or Utility Inspector based on the anticipated sewer flow characteristics. Typical grease trap and sediment trap details and a Grease Trap Sizing Form are attached to this document. No grease trap or oil separator shall be installed without the installer having a written sizing form stating the approval of the trap and having gave the Utility Inspector prior notice and ample time for inspection. All traps shall be inspected by the Utility after installation.

17. The Pine Bluff Wastewater Utility's Designated Engineer or Utility Inspector shall be informed at least 24 hours before the commencement of any construction. The Owner/Developer's Engineer shall inspect all work on any project that consists of the construction of 1,000 linear feet or more of sewer mains. Our Inspector and Engineer will also conduct routine inspection of all work. If agreed upon in advance, the Utility will provide inspection on any project that consists of the construction of less than 1,000 linear feet of sewer mains. Irregardless of the size of any project, any inspection work performed by PBWU personnel on weekends and/or legal holidays will be subject to overtime fees charged to the Owner/Developer by the Utility. Irregardless of the size of any project, one (1) set of reproducible "As-Built" drawings shall be submitted on 22"X36" transparency medium by the Owner/Developer or his Engineer upon completion of the work to the Utility's Designated Engineer.

18. All work shall be performed in accordance with applicable OSHA and Arkansas Department of Labor safety rules, regulations, and standards. This requirement shall apply to all work, whether it is under contract with the Pine Bluff Wastewater Utility or with the Owner/Developer. State law requires that any project bid have a line item for job site/construction safety. PBWU is not responsible for the enforcing of the safety regulations for the Contractor. All traffic safety, including signing, barricades, safety netting, etc. is the responsibility of the Contractor.

19. The Owner/Developer shall provide Easements for all main lines located on private property. A sample Easement is included in this document. Easements or a Memorandum of Understanding shall be acquired before construction begins. Signed Easements forwarded to the Utility will be filed for recording at the Jefferson County Court House. For gravity lines less than ten (10) feet deep, minimum easement width

shall be twenty (20) feet. For gravity lines from ten (10) to fifteen (15) feet deep, minimum easement width shall be twenty-five (25) feet. For gravity lines exceeding fifteen (15) feet in depth, minimum easement width shall be determined by the Utility on an as-needed basis. For sewage force mains (pressure lines), minimum easement width shall be twenty (20) feet. Sewer lines to be placed in city street or state highway rights-of-ways must have location approval from the governing department/agency. Sewer lines shall not be placed on state highway rights-of-ways except for crossings (i.e. no parallel runs inside state R-O-W).

20. Final Inspection – Before a project is accepted for maintenance and connection of services is allowed, a Final Inspection will be made by the Utility. The final inspection will not be conducted until testing is completed and "As-Built" plans are submitted. After the inspection, a list of material, equipment, and workmanship defects, deficiencies, and errors in the project will be forwarded to the Owner/Developer or his Engineer. Defects, deficiencies, and errors must be corrected before the project will be accepted by the Utility.

21. Upon completion of the project, a CERTIFICATE OF CONFORMANCE shall be submitted by the Owner/Developer indicating the value of the project and certifying that all bills and accounts have been paid in full for the project. A sample Certificate of CONFORMANCE is included in this document.

22. Upon completion of the project, a BILL OF SALE shall be submitted by the Owner/Developer indicating that the project has been sold to the Pine Bluff Wastewater Utility with a twelve (12) month warranty on materials and workmanship. A sample Bill of Sale is included in this document.

23. Upon completion of the project and after the Final Inspection and all defects, deficiencies, and errors in the project have been corrected to the satisfaction of the Utility, a MAINTENANCE AND PERFORMANCE BOND in an amount equal to 50% of the construction cost of the project shall be submitted to the Pine Bluff Wastewater Utility. The bond shall be for materials and workmanship and any unfinished portion of the project that may become apparent during the twelve (12) month warranty period as detailed in paragraph 25 below. The bond shall be binding on the Owner/Developer or the Contractor. A sample Maintenance and Performance Bond is included in this document. If a project consists of less than 1,000 linear feet of sewer mains and with the approval of the Utility's Manager, the MAINTENANCE AND PERFORMANCE BOND may be waived. However, the Owner/Developer will still be required to warrant the project as detailed in paragraph 25 below.

24. Service connections from buildings and/or routine use of the sanitary sewer improvements may not commence until all of the above stated requirements are complete, received, and accepted by the Pine Bluff Wastewater Utility.

25. Warranty – The Owner/Developer shall warrant and guarantee all materials and equipment and work performed for a period of twelve (12) months from the date of

substantial completion. The Owner/Developer shall warrant and guarantee for a period of twelve (12) months from the date of substantial completion that the completed project is free from all defects and errors due to faulty materials and/or workmanship and that the Owner/Developer shall promptly make such corrections as may be necessary by reason of such defects and errors including the repairs of any damage to other parts of the wastewater collection system resulting from such defects and errors. The Pine Bluff Wastewater Utility will give notice to the Owner/Developer of observed defects with reasonable promptness. In the event that the Owner/Developer should fail to make such repairs, adjustments, or other work that may be made necessary by such defects and errors, the Pine Bluff Wastewater Utility may do so and charge the Owner/Developer the cost thereby incurred. When a MAINTENANCE AND PERFORMANCE BOND is required, it shall remain in full force and effect through the warranty/guarantee period. An inspection will be made by the Utility before the expiration of the warranty/guarantee period. A list of any defects or errors in materials, equipment, and workmanship found during this inspection will be forwarded to the Owner/Developer. If prompt corrective action is not made by the Owner/Developer, a claim by the Utility will be filed with the bonding company.

26. Assuming all material and work conforms to the requirements of the Pine Bluff Wastewater Utility, and the approval of the UTILITY COMMISSION, the Utility will accept ownership and maintenance of the new lines and appurtenances. This will include the main sewer lines, manholes, and service lines from the sewer main to the double cleanout.

VACUUM MANHOLE TESTING

The standard test of 10" Hg (Mercury) shall be used.

Start the vacuum pump assembly, open the inlet/outlet ball valve and evacuate the manhole to 10" Hg.

Close vacuum inlet/outlet ball valve, disconnect vacuum pump and monitor vacuum for the specified time period. (See Table Below) If the vacuum does not drop in excess of 1" Hg over the specified time period, the manhole is considered acceptable and passes the test.

VACUUM TEST TIMETABLE

DEPTH - FEET	DIAMETER - INCHES		
	48"	**60"**	**72"**
4'	10 sec.	13 sec.	16 sec.
8'	20 sec.	26 sec.	32 sec.
12'	30 sec.	39 sec.	48 sec.
16'	40 sec.	52 sec.	64 sec.
20'	50 sec.	65 sec.	80 sec.
24'	60 sec.	78 sec	96 sec.
*****	05 sec.	6.5 sec.	8.0 sec.
**Add "T" times for each additional 2' depth. (The values listed above have been extrapolated from ASTM designation C924-85.)			

Note: Repeat the above test procedure after backfilling for final acceptance test.

LOW PRESSURE AIR TESTING

1. For Testing: Clean pipe to be tested by propelling snug fitting inflated rubber ball through the pipe with water.

2. Plug all pipe outlets with test plugs. Brace each plug securely.

3. If the pipe to be tested is submerged in groundwater, insert a pipe probe by boring or jetting into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test shall be increased by this amount.

4. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig above back pressure, but less than 5.0 psig.

5. After an internal pressure of 4.0 psig above back pressure is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure, but less than 5.0 psig.

6. When pressure decreases to 3.5 psig above back pressure, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 3.0 psig. Minimum permissible pressure holding times for runs of single pipe diameter are indicated in the following table:

AIR TESTING

PIPE SIZE	TIME FOR VARIOUS PIPE LENGTHS								
	PIPE LENGTHS								
INCHES	50’	100’	250’	200’	250’	300’	250’	400’	450’
	TIME IN MINUTES & SECONDS								
6	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	9:26	9:26	9:26	9:26	11:52	13:51	15:49	17:48
12	11:20	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:47	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33

PRESSURE AND LEAKAGE TESTING OF FORCE MAINS

All force mains from the pump station to the discharge shall be pressure tested and tested for leakage prior to being accepted by PBWU and placed into service. Air testing of pressure pipe is prohibited. Force mains shall be hydrostatically tested as follows:

The pressure test shall be for a minimum of two (2) hours and shall be at a pressure of 150% of maximum working pressure or 50 psi, whichever is greater. (Minimum test pressure shall be 50 psi) The test shall be conducted in the presence of an authorized representative of PBWU, and shall be performed with a test pump and meter assembly specifically designed and manufactured for the purpose of pressure and leakage testing of water and sewage pressure pipelines. During the test period, the force main route shall be walked and carefully examined for evidence of leakage or surface disturbance, indicating movement of a blocked fitting. The test shall be as specified in the American Water Works Association (AWWA) Standard C600-99. The allowable leakage shall be the water required by the test pump to maintain the test pressure in the line continuously during the test, with a drop of line pressure of no greater than 5% of the test pressure. The leakage metered by the test assembly shall not exceed the allowable leakage as specified in AWWA C600-99, as calculated by the following formula:

$$L = SD\sqrt{P}/133{,}200$$

Where: L = allowable leakage in gallons per hour
S = length of pipeline section subject to test
D = nominal diameter of pipe subject to test
P = test pressure, psig
For closed valves subject to test, add 0.0078 gallons/hour/inch of nominal diameter of valve

Sample Calculation:

Force Main Diameter: 6 inches
Length of Test Section: 1,000 feet
Maximum Pressure during operation: 40 feet TDH = 17.32 psig. (Use minimum 50 psig)
2 – closed valves (discharge valves in Pump Station)

$L = SD\sqrt{P}/133{,}200 = (1{,}000 \times 6 \times \sqrt{50})/133{,}200 + 2 \times .0078 \times 6$
$= 42{,}426.41/ 133{,}200 + 0.09 =$

L = 0.41 gallons per hour, or 0.82 gallons for a two hour test.