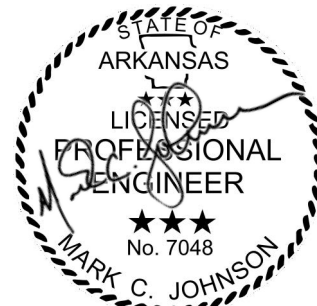
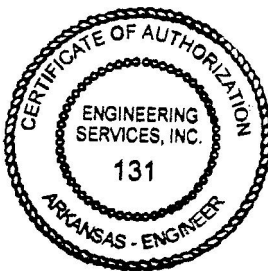




Water | Wastewater
Franchised Utility Permitting
Centertron, Arkansas

POTABLE WATER & SANITARY SEWER STANDARD SPECIFICATIONS



November 5, 2019

Note: Parts 1 through 5 and Sections 1.1 and 1.2 of Part 6 have been prepared under the direct supervision of the Professional Engineer affixing his seal and signature hereto. Section 1.3 of Part 6, Part 7 and Part 8 prepared by others.

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PART I - GENERAL REQUIREMENTS

SECTION 1 - GENERAL REQUIREMENTS

1.1 Description

This part of the specification stipulates general requirements for the preparation of reports, plans, specifications, methods of construction, inspection, testing, and final approval of any proposed water and/or sanitary sewer lines, appurtenances, or other structures that are within the jurisdiction of Centerton Utilities. Any deviations from the requirements set forth herein these specifications will be approved only by written authorization from Centerton Utilities. Special conditions may arise on any project that are not covered in these specifications or that may require special handling. In cases of such special conditions, complete detail as to materials, method of construction, or other procedures shall be submitted to Centerton Utilities for review and approval.

Standard construction details are incorporated and made a part of these specifications and shall become a part of the standard requirements for water and sewer line construction. The Standard Details are included in the appendices at the back of these specifications. Any omissions from these specifications or construction details are to be referred to the Recommended Standard for Sewage Works and Recommended Standards for Water Works referred to as the "10-State Standards". The Standards shall apply as a minimum standard in all cases.

Where reference is made to a particular industry specification (ASTM, etc.), it is hereby understood that reference is made to the latest specification revision in effect.

All materials and equipment for the construction of sanitary sewer and appurtenances and potable water and appurtenances governed by these specifications shall be of domestic manufacture. The use of any materials or equipment not manufactured in the United States of America must be approved in writing by Centerton Utilities.

1.2 Disclaimer

These specifications are intended to set forth minimum standards of quality for the construction of water and sewer facilities which are to be accepted by Centerton Utilities.

These specifications do not replace the Engineer's specifications and contract documents; however, construction of all water and sewer facilities must meet these standards of quality as a minimum.

Centerton Utilities shall not be responsible nor shall it bear any liability for the Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, nor, shall Centerton Utilities be responsible for any actions resulting from direction of the project by the Engineer.

Centerton Utilities shall not be responsible for the acts or omissions of the Contractor or any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any

of the work. Nothing contained in these specifications shall be construed as an endorsement or warranty by Centerton Utilities of any product, material, or workmanship. Centerton Utilities shall not be responsible nor shall it bear any liability or the failure of any material or method of construction.

1.3 Definitions

Centerton Utilities - The department of the City of Centerton under the jurisdiction of the Centerton Water and Sewer Commission, herein after referred to as “Centerton Utilities”, having full and complete authority to manage, operate, improve, extend and maintain the Centerton water distribution system and the sanitary sewage collection and transport system.

Public Works Director - The executive superintendent of Centerton Utilities.

Developer - Individual, partnership, corporation, or other legal entity such as an improvement district desiring to construct water and/or sanitary sewer facilities for immediate or contemplated future inclusion in Centerton Utilities’s systems.

Engineer - Individual licensed to practice engineering in the State of Arkansas who is responsible for the preparation of reports, plans, specifications and inspection of the work.

Contractor - The person, firm, or corporation with whom the Developer has entered into an agreement to construct the water and/or sewer facilities.

Resident Inspector - An authorized representative of the Engineer responsible for the inspection of construction for compliance with approved plans and contract documents.

Mainline - Those parts of the sewer collection pipe system and/or water distribution pipe system that are maintained by Centerton Utilities and provide service to individual private connections. The minimum diameter of all new mainline construction is eight inches.

The term “as specified” shall mean as specified by Centerton Utilities in plans, proposals, other specifications, and written or oral instructions.

The term “or equal” shall mean that the proposed material or item shall perform adequately the duties intended by the general design and is of same or equal design, substance, and junction to that specified by using the name of a product, manufacturer, or vendor. Use of the term “or equal” shall mean any party proposing to substitute an “equal” shall obtain an approval of Centerton Utilities. Centerton Utilities shall make final determination of such items or materials judged by to be “equal”.

The term “these specifications” shall refer to Centerton Utilities ‘Standard Specifications and Standard Details’ latest revision.

Abbreviations used throughout these specifications have meanings as follows:

ASTM	American Society for Testing and Material
AASHTO	American Association of State Highway and Transportation Officials
ADOT	Arkansas Department of Transportation
ANSI	American National Standard Institute
AWWA	American Water Works Association
CI	Gray Cast Iron
CS or CC	AWWA (Mueller Corporation Stop) Thread
DI	Ductile Iron
FIP	Female Iron Pipe
IP	Iron Pipe
MIP	Male Iron Pipe
PE	Polyethylene
psig	pounds per square inch (gauge)
SSPC	Steel Structures Painting Council

SECTION 2 - JURISDICTION

2.1 Description

This section defines the areas where these specifications apply. These specifications apply to all areas presently being served or proposed to be served with potable water and/or sanitary sewer service by Centerton Utilities.

2.2 Area of Jurisdiction

These specifications shall be adhered to for all extensions or expansions of potable water and sanitary sewer including the following:

- 2.2.1 All extensions of public water mains
- 2.2.2 All extensions of public sanitary sewer mains
- 2.2.3 Fire protection systems (from the public main to the discharge side of the backflow prevention device)
- 2.2.4 Backflow prevention systems
- 2.2.5 Irrigation systems (from the public main to the discharge side of the backflow prevention device)
- 2.2.6 Private sanitary sewer systems
- 2.2.7 Private sanitary sewer pretreatment systems

These specifications govern all areas now served or to be served by Centerton Utilities. These areas include the City Limits of Centerton, as may be changed from time to time, and any area outside of the City approved for service. A request for a main line extension outside the City must be submitted for approval to the Water and Sewer Commission, the Centerton Planning Commission and the City Council.

All plans for private commercial plumbing (commercial & industrial building plumbing, process plumbing, fire protection, irrigation, etc.) must be submitted to Centerton Utilities for determination of the adequacy of proposed backflow prevention. Plumbing permits will not be issued by the Centerton Building Inspection Department until Centerton Utilities has approved proposed backflow prevention devices.

SECTION 3 - PLANS AND SPECIFICATIONS

3.1 Description

This section covers the requirements for submission of plans and specifications to Centerton Utilities in order to obtain approval.

3.2 Pre-Design Meeting

To prevent waste of valuable resources and un-necessary re-designs, the consulting engineer and developer will be required to meet with Centerton Utilities personnel as designated to discuss proposed utility extensions before detailed plans are prepared. Those representing the development are encouraged to bring site locations maps, layout drawings, sketches, preliminary plans or any other document that will provide adequate understanding of what is proposed. Centerton Utilities will provide input as to what is required from the development for water and/or sewer extensions and/or service connections.

3.3 Preliminary Report

When requested by Centerton Utilities, the Engineer shall prepare and submit a preliminary engineering report prior to approval of construction plans. The report shall conform to accepted engineering criteria including the requirements of the Arkansas Department of Health and the Arkansas Department of Environmental Quality and shall contain data and facts as may be required by the Manager.

The size, scope, and contemplated land use of the proposed development as well as other relevant circumstances will be considered in determining the need for a preliminary report.

3.4 Construction Plans and Specifications

No water or sewer main extension may be approved for connection to Centerton Utilities's water system or sewer system which was constructed prior to approval of construction plans by Centerton Utilities or which was not constructed in accordance with approved plans. Construction plans shall conform to the requirements herein. Specifications prepared by the

project Engineer shall be in accordance with these specifications and requirements as a minimum. The submission of construction plans for approval shall be accompanied by a letter from the Engineer stating that materials and workmanship will be in accordance with these specifications and standard details.

All plans shall be drawn to a scale suitable for adequately showing the facilities proposed except as stipulated herein. All plans and profiles of sewer lines shall be drawn to scale with the profile vertical scale at 1" = 10' and plan horizontal scale for water and/or sewer lines of 1" = 50' or larger. All drawings shall be on 24" x 36" or 22" x 34" sheets. All elevations shall be based on Mean Sea Level. An overall project map shall accompany the construction plans. The project map shall be a minimum 24" x 36" size and shall be drawn to a scale of 1" = 100' or larger. It shall depict the entire project and show all proposed water and/or sewer lines properly labeled as to size and pipe material. All other utilities shall be shown along with the proposed road profile if applicable. A vicinity map at a scale of 1" = 2000' shall be furnished indicating location of the project in relation to arterial streets and major highways. All plans not prepared in accordance with this paragraph, without prior waiver of requirements, will not be reviewed or approved.

3.5 Changes From Approved Plans

Any changes from the approved construction plans and specifications must be authorized by the Manager or authorized representative of Centerton Utilities prior to the start of their construction.

3.6 Design Considerations

As a minimum, design and layout shall meet the scale requirements referred to above in 3.4. In addition, the following principals shall be adhered to:

3.6.1 Sanitary Sewer Mains:

- 3.6.1.1** No gravity sewer main conveying raw sewage shall be less than eight inches in diameter.
- 3.6.1.2** Where the difference in invert elevation between any two pipes, entering a manhole is 2.0 feet or more, an inside drop connection shall be utilized as shown on the standard detail sheets. Inside drop connections are permitted on a case by case basis, only. Drop manholes or manholes where force mains connect must be coated with an epoxy coating system as specified in Part 5-Section 6-Paragraph 6.4 of these specifications.
- 3.6.1.3** The minimum earth cover for sanitary sewer mains shall not be less than 36 inches, unless exception granted in writing by Centerton Utilities.
- 3.6.1.4** Where the earth cover over the pipe bells cannot be maintained

at least 3-feet (36-inches) the pipe material shall be ductile iron pipe as specified in Part 3, Division 1, Section 1 of these specifications. Sewers buried to depths of 20 feet or greater shall be ductile iron pipe only.

- 3.6.1.5** Sewer pipe material shall be of the types listed in Part 3 of these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless approved in writing by Centerton Utilities.
- 3.6.1.6** Location and depth of main extensions to serve parcels of property shall be planned so as to facilitate operation, maintenance, and extension.
- 3.6.1.7** All sewer main extensions without regard to length shall terminate in a standard manhole.
- 3.6.1.8** All service connections to new sewer mains shall be made with wyes of the same material as the sewer main.

3.6.2 Water Distribution Mains

- 3.6.2.1** The minimum inside diameter (I.D.) for public water mains shall be eight (8) inches.
- 3.6.2.2** Fire hydrants shall be installed so that spacing between hydrants shall not be greater than 500-feet within single-family and two-family residential developments. In commercial, mixed use, and multi-family residential developments fire hydrant spacing shall not be greater than 300-feet. The Fire Department may require additional hydrants and closer spacing during plan review. Fire hydrants placed in subdivisions should be installed at the lot lines to avoid conflicts with driveways. In rural areas within the city limits, fire hydrants shall be installed so that spacing between hydrants shall not be greater than 800-feet or as directed by the Fire Department. All fire hydrant location shall be approved by the Fire Department. New building construction shall not begin until a working Fire Department approved fire hydrant is available for fire protection.
- 3.6.2.3** All main extensions without regard to length shall terminate in a fire hydrant unless otherwise approved by the Manager or other authorized Centerton Utilities personnel. The termination shall be made with mj tee, fire hydrant assembly connected to

tee branch and gate valve with plugged discharge connected to the run of the tee.

- 3.6.2.4** The minimum earth cover shall not be less than 36 inches for mains and 30 inches for services.
- 3.6.2.5** A hydraulic analysis of the water distribution system may be required. The analysis shall depict design flows and residual pressures in the mains. Additional design data may be required, if in the opinion of Centerton Utilities, it is necessary for review and approval of plans.
- 3.6.2.6** Sufficient valves shall be provided on water mains to minimize inconvenience, facilitate expansion and minimize sanitary hazards during repairs, as determined by Centerton Utilities. Valves should be located at not more than 500 foot intervals in commercial districts or 800 foot intervals in other districts. Also, if possible, valves shall be provided so that no more than 20 residential water services shall be affected by main line shut downs.
- 3.6.2.7** All taps on existing mains for water main extension shall be approved and inspected by the Centerton Water Utilities.
- 3.6.2.8** Water pipe materials shall be of types listed in Part 2 of these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless approved in writing by Centerton Utilities.
- 3.6.2.9** In new development water mains and services and sewer mains and services shall be positioned per the City of Centerton Subdivision Utility Placement Specifications. The Utility Placement Specification can be found in Part 6 – Standard Details of these specifications.

3.7 Approval

Two (2) sets of complete construction plans shall be furnished to the Department after approval. A statement by the Engineer, that work will conform to these specifications and that professional construction inspection will be provided, must accompany the plans. A Construction Progress Schedule and Engineer Inspection Schedule may be required prior to commencing construction. Design data for all sewer extensions shall be furnished for the Department's review.

All plans must be submitted to and receive approval for construction from the Arkansas Department of Health before any utility work is started.

3.8 Conformity

All plans, specifications, and construction procedures shall conform to the standards as established by Centerton Utilities. All plans and specifications shall be prepared under the supervision of a Professional Engineer licensed in the State of Arkansas. The Engineer's seal and signature shall be placed on all plans and specifications. Plans will not be reviewed unless the Engineer's seal and signature are in place.

3.9 "As Built" Drawings (Plans of Record)

Upon completion of the project as shown on the final plans and specifications, two (2) complete sets of blue or black line prints "as-built" drawings shall be furnished to the Department for record purposes by the same Engineer who prepared and submitted the construction plans and specifications. The size and scale of the drawings shall be as outlined in Part 1. The "as-built" drawings shall show both in plan and elevation (MSL), the exact location, dimensions, size and type of pipe supplied of all facilities constructed. In addition, the as-built drawings should reflect the location, width, and type (i.e., water, sewer, or utility) of easement. In addition to the paper copy of "as-built" drawings, electronic "CAD" files along with GPS coordinates for each appurtenance (meter can, water valve, manhole cover, etc....) shall be supplied in an electronic format. No service shall be established without the submission and acceptance of the required as built plans.

3.9.1 Sanitary Sewer

All service taps and manhole stub outs must be shown on the "as-built" plans. Each service line shall be referenced with the sewer main stations in lineal feet and dimensioned to at least two reference points such as a power pole, hydrant, or a recognizable landmark, if available. The depth of the end of each service line shall be four feet below finish grade. GPS coordinates must be noted on the "as-built" drawings.

3.9.2 Water Distribution

All meter boxers with an indication of whether it is a single or double service, valves, and blow-offs must be shown on the "as-built" plans. Meter boxes shall be referenced by dimensioning to at least one lot corner. Valves and blow-offs shall be referenced by dimensioning to at least two permanent objects. GPS coordinates must be noted on the "as-built" drawings.

SECTION 4 - INSPECTION AND LAYOUT

4.1 Description

This section covers the requirements of inspection and layout for the construction of water and/or sanitary sewerage facilities.

4.2 Responsible Engineer

The Engineer who prepared and submitted the construction plans and specifications shall be responsible for construction layout, general direction, and resident inspection as described in more detail in the following sections. Continuous project responsibility shall be an express condition of plan approval. The Engineer's responsibility shall extend through submittal of "as-built" plans and full acceptance of the project by Centerton Utilities for maintenance.

4.3 General Direction

All water and/or sanitary sewerage facilities proposed shall be constructed under the general direction of the Engineer. General direction shall consist of, but not be limited to, periodic visits to the construction site to observe the progress and quality of the executed work to determine if the work is proceeding in accordance with the approved plans and specifications and with the standards set forth by Centerton Utilities.

Any defects, deficiencies or irregularities in the work found by the Engineer or reported by the resident inspector shall be reported to Centerton Utilities. Such actions, as deemed appropriate, and as approved by Centerton Utilities, shall be taken to correct such deficiencies.

All work performed subject to these requirements shall at all times be subject to the general inspection of Centerton Utilities. The frequency of visits and the number of hours required for Centerton Utilities personnel shall be governed by the quality of inspection being performed by the Engineer and resident inspector.

4.4 Resident Inspection

To insure conformance with the approved plans and specifications, resident inspection is required and shall be performed by qualified personnel under the direct supervision of the Engineer. The name of the resident inspector shall be furnished to Centerton Utilities prior to start of construction. It shall be the responsibility of the resident inspector to safeguard Centerton Utilities's interests by checking the construction work for compliance with the approved plans, specifications, and other standards. Any defects, deficiencies, or irregularities shall be reported to the Engineer. A job diary shall be kept outlining all aspects of the construction project and shall be made available to Centerton Utilities on a weekly basis.

4.5 Construction Layout

The layout and staking of the construction work shall be completed by trained and qualified survey personnel. The Engineer shall be responsible for verification of the Job Layout. Such layout and staking shall consist of alignment and grade stakes as required to construct the proposed extensions as approved for construction. The use of construction lasers is required for gravity sewer construction.

Where mains and service lines are adjacent to or under proposed streets, or which are located in areas where the final grade of the site has not been established before installation, the water main

or service line shall be staked for grade to insure a minimum cover of 36-inches for water mains and 36-inches for sewer mains after completion of all dirt work.

4.6 Preconstruction Conference

Centerton Utilities requires a preconstruction conference for all water and/or sewer projects. The conference will be held to discuss the scope of the project and other aspects such as scheduling, insurance, work hours, contractual commitment between Developer and Contractor, or other project aspects as Centerton Utilities may deem necessary. It is the Engineer's responsibility to contact Centerton Utilities to schedule said meeting.

4.7 Contract Requirements

Before any construction starts, the Developer or Owner of the proposed project, or his designated agent, will be required to enter into a "special contract for the extension of facilities". A typical contract is included in the appendix.

4.8 New Connection Fees

The Centerton Waterworks and Sewer Commission may, from time to time, set fees for the connection of water or sewer service. The developer/owner shall pay all such fees as required prior to the establishment of service.

4.9 Plan Review Fees

The Centerton Waterworks and Sewer Commission may, from time to time, establish fees to cover the review of plans and inspection of construction. All such fees are payable in advance of plan review.

SECTION 5 – RULES & REGULATIONS

5.1 Description

This section covers such rules and regulations as required by law for the completion of plans, specifications, and construction work on any and all proposed water and/or sanitary sewerage facilities.

5.2 Laws, Regulations, and Ordinances:

All Federal, State, County, and City Laws, Regulations, or Ordinances shall be complied with on all projects. This shall include, but is not limited to, obtaining of approval from the Arkansas Department of Environmental Quality. Responsibility for submission to, and approval by the Arkansas Department of Health and the Arkansas Department of Environmental Quality shall be the Engineer's, including payment of any applicable fees.

5.3 Permits and Licenses:

All permits and licenses required by any Federal, State, County, or Local Governing Body shall be obtained in strict accordance with the requirements of the governing agency. When required by the licensing agency, the Department will assist in application for permits and licenses, but the cost of any permit fee, or bond required will be borne by the Developer.

5.4 Performance and Payment Bond:

All corporations, firms or individual laying or installing water and/or sewer lines, except when being laid by Centerton Utilities personnel, shall have a contractor's license, specific water and/or sewer utility construction experience and shall post a performance and payment bond, in a form acceptable to Centerton Utilities for the amount of the contract to guarantee performance of the job in accordance with the plans and specifications within the time prescribed for such completion and for a period of one year after acceptance and becoming a part of the municipal system. Typical bond forms may be found in Part 8 – Standard Documents of these specifications.

SECTION 6 - EXISTING UTILITIES

This section covers the requirements with respect to existing public or private utilities.

6.1 Proximity:

All plans shall be drawn in such a manner that all known utilities are shown using the best available information including utility maps, field surveys, or other sources of information. Water and sewer lines shall be kept, where possible, a minimum horizontal distance 5' from all underground utilities with the following exception. A minimum horizontal distance of 10 feet shall be maintained between water and sanitary sewer lines and appurtenances. Exceptions shall be only as authorized by the Arkansas Department of Health, Division of Engineering.

6.2 Crossing of Water and Sewer Lines:

Water Mains necessarily in close proximity to sewers must be placed so that the bottom of the water line will be at least 18-inches above the top of the sewer at its highest point. If this distance must unavoidably be reduced, the water line or the sewer line must be encased in watertight pipe with sealed watertight ends extending at least ten feet either side of the crossing. Any joint in the encasement pipe is to be mechanically restrained. The encasement pipe may be vented to the surface if carrying water or sewer under pressure. Where a water line must unavoidably pass beneath a sewer line, at least 18 inches of separation must be maintained between the outside of the two pipes in addition to the preceding encasement requirement. Exceptions to this must be approved in writing by the Arkansas Department of Health.

SECTION 7 - EASEMENTS

7.1 Description:

This section covers the requirements of easements for the purpose of maintaining water and/or sanitary sewers lines where the proposed lines will be on private property or where the lines would not be within public rights-of-way. For utility placement in new subdivision/development construction see “City of Centerton Subdivision Utility Placement Specifications” found in Part 6 – Standard Details of these specifications.

7.2 Width of Easement:

Where water and/or sanitary sewer lines are not placed in public rights-of-way, a permanent easement shall be acquired for the Department and dedicated for all purposes necessary to operate and maintain main lines. The easement shall have a minimum width of 15-feet or two times the maximum depth to pipe flow line, whichever is greater. Common utility easements will be accepted provided that the easement is wide enough to accommodate the above requirements.

Where practicable, easements of maximum width possible will be provided to allow access to all manholes, fire hydrants, valves, and other appurtenances. Temporary construction easements of adequate width must be provided for off-site extensions.

7.3 Filing For Record

An example of a typical easement is provided in the Appendix. Easements shall be prepared in the same manner as the typical and submitted to Centerton Utilities for approval before being filed for record. Any proposed easement not approved by Centerton Utilities will not be accepted. Easements shall be properly executed and recorded by the developer. It is the responsibility of the Developer and Engineer to discover the necessity of any easements and to obtain same. One copy of the approved recorded easement or dedicated plat must be submitted to Centerton Utilities before construction will be accepted. All easements shall be in favor of the City of Centerton. Easements as shown on recorded plat shall be considered as public easements and adequate for this purpose.

7.4 Plans:

Construction plans should reflect the type, location, and dimensions of all proposed easements. As-built plans should reflect the type, location, and dimensions of all dedicated easements. Existing easements, as they relate to new construction, shall also be shown.

7.5 Engineer’s Statement:

The Engineer must provide a statement that all utility construction was performed within the easements provided by the development.

SECTION 8 - FINAL INSPECTION AND ACCEPTANCE

8.1 Description:

This section covers the requirements for final inspection and acceptance of the water and/or sanitary sewerage facilities upon completion of the project.

8.2 Acceptance Testing:

Methods of acceptance testing are outlined for potable water construction in Part 2, Division 3 and for sanitary sewer construction in Part 3, Division 3 of these standard specifications. All tests shall be conducted in the presence of the Engineer, the Contractor, and a representative of Centerton Utilities. The Engineer shall schedule said tests with Centerton Utilities at least twenty-four hours in advance of proposed testing times. All water and/or sewer services shall be in place before the mainline is tested. All tests shall be conducted during the normal working hours of Centerton Utilities.

8.3 Final Inspection:

Before water and/or sanitary sewer extensions are accepted for maintenance and service connections to these extensions approved, a final inspection will be made by Centerton Utilities personnel in the presence of the Engineer. The final inspection will not be conducted until "as-built" plans are submitted.

Final inspection will be made at the request of the Engineer. A list of material and workmanship defects, if any, will be forwarded to the Engineer. Defects noted must be corrected before acceptance. Improvements found not as depicted on the submitted "as-built" plans shall be rejected.

8.4 Maintenance Bond:

Upon completion of the project and after all defects have been corrected in accordance with the final inspection, a maintenance bond in a form acceptable to Centerton Utilities for an amount equal to 50% of the construction cost shall be submitted to Centerton Utilities (see appendix for sample form). The bond shall be for a period of not less than one year and shall cover all defects in materials and workmanship. The bond shall be binding on the owner, developer, or the contractor. If, in the judgment of Centerton Utilities construction of extensions which total less than five hundred (500) linear feet meet the applicable specifications stated herein the maintenance bond may be waived.

8.5 Acceptance:

No connection of customer facilities or other utilization of main extensions will be permitted by Centerton Utilities until a letter of acceptance is issued. The acceptance letter will not be issued until the following requirements are met:

- 8.5.1** Receipt of two copies of approved “as-built” plans and profiles of main extensions.
- 8.5.2** Satisfactory correction of all defects noted in final inspection.
- 8.5.3** Receipt of maintenance bond if applicable.
- 8.5.4** Receipt of all required easements.
- 8.5.5** Receipt of Engineer’s certification that all improvements have been constructed in accordance with the approved plans and specifications.
- 8.5.6** Receipt of an affidavit from the Owner or Developer that all materials, supplies and labor bills have been paid.
- 8.5.7** Receipt of Engineer’s report outlining the total capital cost for water and/or sewer facilities, including all engineering fees.
- 8.5.8** Testing requirements, including bacteriological samples, have been certified as acceptable.
- 8.5.9** Payment of all applicable fees.
- 8.5.10** Engineer’s certification that all main extensions are located in dedicated easements.

8.6 Inspection Before Expiration of Maintenance Bond:

An inspection will be made by Centerton Utilities before the expiration of the maintenance bond. A list of any defects in material or workmanship found during this inspection will be forwarded to the Developer’s engineer. If corrections are not made within a reasonable period of time, a claim will be filed with the bonding company. As soon as defects found during this inspection are corrected, Centerton Utilities will issue full acceptance of the project for maintenance. Sewer gravity mains shall be inspected by remote video inspection vehicle. Trace wires shall be tested for conductivity to provide location of all pressure pipe lines.

8.7 Use of Completed Portions:

Portions of the project completed will not be allowed to be put into service without written approval from the Department. Approval for the use of completed portions of the project will be granted only in the best interest of the Department. Use of completed portions of an incomplete project does not constitute acceptance of the project by Centerton Utilities.

SECTION 9 - SERVICE CONNECTION

9.1 Description:

This section describes certain requirements with respect to service line locations.

9.2 Minimum Size and Location of Services:

9.2.1 Sewer Services:

All service stubs wyes on new sewer mains shall be installed at the time of main line construction to facilitate connection of anticipated services to the sewer. All service stubs shall terminate with watertight plug or watertight cap. Unless anticipated service requires a larger line, all service stubs shall be 4" nominal diameter. Sewer services shall terminate at approximately 15-feet from back of curb. This shall be done by burying a 6-foot steel tee post at the end of the service stub and buried to the finish grade of the lot. All bends and fittings shall be SDR 26 PVC.

Sewer service connections to existing sewer mains must be made with sewer service tapping saddle. **Centerton Utilities must be contacted prior to design and construction for the type of saddle currently utilized.** The Contractor must expose the existing sewer main. Centerton Utilities personnel must install the tapping saddle and make the tap on the sewer main.

Each living unit (i.e...duplexes, triplexes, etc.) shall have separate sewer service lines. Apartment complexes shall be evaluated on a case by case basis by Centerton Utilities. Also, commercial property shall be required to install a separate sewer service per unit. The location shall be shown on the "as-built" drawings both in distance from manholes and in distance from property corners along the street right-of-way line or lot line. Service stubs shall be installed to provide sufficient vertical clearance from other utilities.

9.2.2 Water Services:

All water services shall be installed on the water main to facilitate connection of anticipated services. All water service meter boxes shall be within the dedicated easement or right-of-way. Unless anticipated services require a larger line, all service lines shall be 1" nominal diameter.

The meter box shall be field adjusted to final grade. Failure to do this may be sufficient reason to refuse utility service. All meter box adjustments or service repairs or replacements, due to lot development shall be the responsibility of the Developer or Owner.

Each living unit (i.e...duplexes, triplexes, etc.) shall have separate water service

lines. Apartment complexes shall be evaluated on a case by case basis by Centerton Utilities. Also, commercial property shall be required to install a separate water service per unit.

SECTION 10 - FACILITY EXTENSION

10.1 General

10.1.1 Fees

Any person (APPLICANT) who requests the installation of facilities must pay all costs connected with the installation, including applicable connection fees, except under certain circumstances where the installation includes facilities in excess of those required to serve the APPLICANT'S property determined by Centerton Utilities (see Section 11 - "Participation")

10.1.2 Changeability

The information furnished herein is subject to change, may not apply under certain circumstances and is not binding upon Centerton Utilities. **Centerton Utilities is not bound except by written contract.**

10.1.3 Construction Permission

No facilities may be constructed prior to applicant entering into a written contract with Centerton Utilities. See Appendix A for a typical contract form.

10.2 Requirements

10.2.1 Mains Twelve Inches or Smaller

A water or sewer main must be adjacent to property which requires service. If a main is not available or deemed inadequate by Centerton Utilities to provide the level of service necessary for the project, the main extension policy will be applied as if no main exists.

10.2.2 Cost of Extension

Unless the Commission participates in the cost of installation (see Section 11), it will be necessary for the APPLICANT to pay the cost of the extension of an adequately sized water main or sewer main to the property from a main on the existing system, where adequate capacity is available.

Where the property requiring service cannot be reached, as described in Section 10.2.1, it is considered that no main exists and main extension must be made before service can be provided.

10.2.3 Installation of Domestic Services Adjacent to Main

APPLICANT will be required to install domestic (and sometimes sprinkler and irrigation, if applicable) services to serve APPLICANT'S property adjacent to the main being installed.

10.3 Exceptional Requirements

It may be necessary for the applicant to install additional facilities other than water or sewer mains (i.e., tanks, pumps, lift stations, etc.) If hydraulic conditions warrant such, or such as required by Centerton Utilities, no water or sewer main extensions, either inside or outside the city, will be allowed until the time that additional facilities have been installed.

10.4 Plans Affecting Major Streets and Drainage

Plans which affect major streets and drainage must be approved by Centerton Planning Commission and the Centerton City Council.

10.5 County

Work within the County or within County road Right-of-Way within Centerton's Planning Jurisdiction requires Centerton Planning Commission approval in addition to the approvals required by the County.

10.6 Road Bore and Cut Permits (*Permits Required Before Work Begins*)

U.S. or State highway crossings (Bores) shall be installed in accordance with the requirements of the Arkansas Department of Transportation (ADOT) Utility Accommodation Policy and the detail shown on the Standard Detail Sheet. Permits shall be issued to Centerton Utilities before work begins.

City / County Paved Road Crossings (Bores) shall be installed in accordance with the requirements of the City of Centerton, other municipality or the Benton County Road Department and the Standard Details.

10.7 Arkansas Department of Health

All plans for the installation of potable water and sanitary sewer facilities must be approved by the Engineering Division of the Arkansas Department of Health (ADH) before construction can begin. Said plans must be approved by Centerton Utilities before submittal to ADH.

10.8 Arkansas Department of Transportation

All plans for the installation of water facilities within federal or state highway right-of-way are subject to prior approval and permitting.

10.9 Right-of-Way Requirements

If not installed in public right-of-way, the APPLICANT must furnish an easement acceptable to the Department. The required Right of Way Easement form is included in Part 8 – Standard Documents of these specifications.

SECTION 11 - PARTICIPATION

11.1 General

11.1.1 Need for Greater Capacity

Under certain circumstances, Centerton Utilities may determine that it is in the public interest that distribution/collection facilities be installed which have a capacity greater than that required for a particular tract or development. In such circumstances:

- 11.1.1.1** Centerton Utilities may pay a portion of additional installation cost; or,
- 11.1.1.2** The APPLICANT may pay the additional installation cost; or,
- 11.1.1.3** The APPLICANT and Centerton Utilities may share in the additional installation cost.

11.1.2 Cost Participation

All cost participation is subject to approval by the Commission and commitments to participate shall not be made prior to such approval and prior to execution of main extension contracts (see the Appendix for an example form).

11.1.3 Limiting Participation

In the event budgetary constraints require limiting participation, priority shall be granted those extensions located within the city limits of Centerton.

11.1.4 Applicant Will be Notified of Options Available

11.2 Requirements for Participation

11.2.1 Considerations

The following will be carefully considered in deciding when facilities are installed which merit participation:

- 11.2.1.1** Minimum criteria for water facilities established by the Department;
- 11.2.1.2** Type development proposed or anticipated within the general service area;
- 11.2.1.3** Anticipated rate of development;
- 11.2.1.4** Projected total demand (both fire and domestic);
- 11.2.1.5** Hydraulic gradient and characteristics of system;
- 11.2.1.6** Department's Master Plan for distribution/transmission facilities and collection and treatment facilities;
- 11.2.1.7** Budgetary constraints.

These considerations shall be applied to the general service area rather than a specific development or tract within the general service area.

11.2.2 Size of Mains

If, after determining the size mains required for a tract of development in accordance with the above criteria, Centerton Utilities desires to have larger mains installed, Centerton Utilities may participate in an amount represented by the cost differential between the main sizes required and those installed subject to the following limitations.

- 11.2.2.1** Limited to mains which are intended to "pass through" the development to provide transmission capacity to another area.
- 11.2.2.2** Single-Family and Low Density Multi-Family Residential limited to mains larger than 8 inches in diameter.
- 11.2.2.3** High Density Multi-Family, Commercial and Industrial-limited to mains larger than 12 inches in diameter.

11.2.3 What Centerton Utilities May Pay

- 11.2.3.1** Last Lot - Installing main necessary to extend from the point of termination of mains required to provide service to all lots or tracts within a development, if other improvements such as streets, storm sewers, sidewalks, etc. are extended (on both sides of the street) to the

development boundary. In the case of phased development by a common development entity, the development entity will be required to make such extensions without cost to the Department.

11.2.3.2 Cost of installing main across “gaps” which exist as a result of mains being extended to adjacent properties from opposite directions.

11.2.3.3 Other locations as may be determined by Centerton Utilities.

11.2.4 Participation Determination

The amount of participation will be determined by Centerton Utilities employing whichever method described below yields the lesser amounts.

11.2.4.1 Application of unit prices received by the APPLICANT in the case of facilities installed under a “Special Contract for Distribution or Collection System Facilities”.

11.2.4.2 Application of unit prices received by the Department for constructing of facilities of a similar nature.

11.3 Centerton Utilities Master Plan

In some cases there may be a need for a water or sewer main as a part of Centerton Utilities Master Plan. If this pipe line exceeds a reasonable cost to the Applicant, as determined by the Commission, and if funds are available, Centerton Utilities may, on Commission approval, move up the construction date if the Applicant makes an acceptable “contribution in aid of construction”. And extension made under these conditions will require a contract.

SECTION 12 - TAP FEES AND CONNECTIONS

12.1 General

Tap Fees to be latest fees established by the Centerton Waterworks and Sewer Commission. Fee schedules will be required.

12.2.1 Water

12.1.1.1 Fee schedules may be obtained from Centerton Utilities office. Some services may cost more than the published rate, due to local conditions. All services 1 ½" and larger will be charged on a “cost plus” basis, as determined by Centerton Utilities.

12.1.1.2 Applicant may be required to pay a deposit before work starts.

12.2.2 Sewer

12.1.2.1 Sewer connection fees schedules may be obtained from Centerton Utilities office. Some services may cost more than the published rates due to local conditions, as determined by Centerton Utilities.

12.1.2.2 This cost does not include excavation. The builder or owner responsible for excavation of sewer line.

12.2.3 Building Service Lines

Building service line construction is not included in service tap construction and fees.

12.2.4 Large Tap Fees

Large tap fees must be paid for prior to the tap being made. A rate schedule for large tap fees is available on request from Centerton Utilities.

12.2 Connection Fees

Connection fees help defray costs of water and sewer system improvements. Connection fees are collected by Centerton Utilities prior to the establishment of service. All connection fees are set aside in a separate fund to help pay for water and sewer main extensions, transmission mains, tanks, pumping stations, treatment works, or any other legal purpose. Connection fees may be included in the “Contract for Extension of Water and/or Sewer Facilities”, if the connection to the existing facilities includes such extensions. If water or sewer service only is required, the connection fee will be collected at the time the “Application for Service” is submitted to Centerton Utilities. Connection fees are separate and in addition to tap fees. Connection fees may be waived in the “Contract for Extension of Utilities”, if Commission participation (see Section 11 above) is approved.

12.2.1 Water Connection Fees

The current rate schedule may be obtained at Centerton Utilities business office.

12.2.2 Sewer Connection Fees

The current rate schedule may be obtained at Centerton Utilities business office.

12.2.3 Multiple Unit Housing

Connection fees for multiple unit housing will be assessed on a per unit basis.

12.2.4 Fees Are Subject To Change Without Notice

Water and Sewer Connection Fees are subject to change without notice.

12.2.5 Centerton Utilities Bound by Written Contract Only

Centerton Utilities is not bound except by written contract.

12.2.6 Failure to Collect Fees

Failure to collect connection fees at the time service is made does not constitute a waiver of such fees.

PART 2 - POTABLE WATER CONSTRUCTION

DIVISION I –MATERIALS

SECTION 1 - DESCRIPTION

1.1 General

These specifications are intended to set a standard of quality and design for all material used in the construction of water mains and appurtenances. Projects that would necessarily involve materials other than those included in this specification shall be subject to the approval of Centerton Utilities.

1.2 Approved Manufacture

All materials must be approved by Centerton Utilities. All materials shall be of Domestic (United States of America) manufacture.

1.3 References

Any reference to specifications published by other agencies shall refer to the latest edition or revision of such specifications.

2.4 No Lead Content

Components in contact with potable water shall comply with latest requirements of the Federal Safe Drinking Water Act and shall contain no lead.

SECTION 2 - POTABLE WATER PIPE

2.1 General

All pipe furnished shall be designed for the distribution of potable water. Lubricant furnished for push-on joints shall be non-toxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material and shall not impart taste or odor to water. The lubricant containers shall be labeled with the manufacturers' name.

2.2 Flanged Ductile Iron Pipe

The pipe shall have cement mortar lining and seal coat in accordance with ANSI A21.4 / AWWA C104. The pipe and flanges shall conform to ANSI A21.15 / AWWA C115, Class 250 psi.

2.3 Ductile Iron Pipe, 6"- 36"

Pipe shall conform to ANSI A21.51 / AWWA C151 and shall have cement mortar lining and seal coat conforming to ANSI A21.4 / AWWA C104. Joints shall conform to ANSI A21.11 / AWWA

C111 and may be mechanical joint or push-on joint unless otherwise specified.

2.4 Copper Pipe

At this time Centerton Utilities does not allow copper pipe to be utilized. Please contact Centerton Utilities prior to design and construction.

2.5 PVC C900 DR 18 and DR 14, 4" - 12"

Polyvinyl Chloride (PVC) Pressure Pipe shall conform to ANSI/AWWA C900 Latest Edition.

SECTION 3 - WATER PIPE FITTINGS

3.1 Mechanical Joint Fittings:

Mechanical joint fittings shall be designed for working pressure of at least 250 psi, shall be ductile iron and shall conform to ANSI A21.10 / AWWA C110. Joints shall conform to ANSI A21.11 / AWWA C111, latest revision. All fittings shall be furnished with gaskets, bolts, nuts and iron glands. All fittings except sleeves and plugs/caps shall be cement mortar lined in accordance with ANSI A21.4 / AWWA C104.

3.1.1 Mechanical Joint Retainer Glands

Mechanical joint retainer glands shall be made from ductile iron and shall be designed for a working pressure of at least 200 psi. The set screws shall be extended through the outer part of the gland. Glands shall be designed to meet standard mechanical joint fittings specifications (AWWA C110). The minimum number and minimum size screws shall be as stated in the following table:

Size Gland	Size Set Screw	Number Set Screws
6"	5/8"	6
8"	5/8"	9
10"	5/8"	16
12"	5/8"	16
16"	5/8"	24
20"	5/8"	28
24"	5/8"	32

3.1.2 Swivel Hydrant Adapters and Tees

Swivel hydrant adapters and tees shall be designed for a working pressure of at least 250 psi and to fit standard mechanical joint fittings (AWWA C110). One end of the swivel adapter and the branch of the tee shall be provided with a gland that may be rotated 360 degrees on the fitting. Lengths of swivel adapter shall be as specified.

3.1.3 Tapping Sleeves

Sleeves shall be designed for a working pressure of at least 200 psi. A test plug shall be furnished through the body for hydrostatic pressure testing on sleeves 4-inch and larger. Stainless Steel mechanical type sleeves are required for taps unless approved in writing by Centerton Utilities.

3.1.4 Steel Couplings

Couplings shall be mechanical type with follower rings and gaskets designed for a working pressure of at least 225 psi and to properly fit the type and class pipe specified. The bolts and coating shall conform to paragraph 3.1 above.

3.2 Mechanical Joint Compact Fittings

Mechanical joint compact or light weight fittings shall be ductile iron conform to the requirements of ANIS A21.53 / AWWA C153, latest revision, for "Ductile Iron Compact Fittings, 3 inch through 12 inch, for Water and Other Liquids". All fittings shall have a minimum pressure rating of 350 psi and shall have a standard thickness cement mortar lining in conformance with ANSI A21.4 / AWWA C104. Joints shall conform to ANSI A21.11 / AWWA C111, latest revision. All fittings shall be furnished with gaskets, bolts, nuts, and iron glands.

SECTION 4 - WATER SERVICES

4.1 Tapping Saddles:

All 1" service saddles shall be designed for a minimum working pressure of 200 psi. A rubber gasket shall be provided between the casting and pipe surface. Straps and bolts shall be high strength corrosive resistant alloy steel. Tapping saddles to be installed on PVC water mains shall be Ford S70 series or approved equal. Tapping saddles for ductile iron mains shall be Ford 202B series or approved equal. The outlet threads shall be compatible with AWWA CC 100 type 1" corporation stops.

4.2 Corporation Stops

Corporation Stops shall conform to AWWA C800 (latest edition) without a positive stop. The inlet shall be AWWA CC 100 tapered threads and the outlet shall be a compression coupling. The corporation stops shall be Ford F1000-NL or approved equal with precision machined

with conventional tapping machines.

4.3 Service Tubing

Service tubing shall be SDR 9 high density polyethylene such as “Drisco” pipe. Pipe stiffeners shall not be used with polyethylene service tubing.

4.4 Service Meter Sets

All Service Taps Must Be Made on the Main During Construction. Service lines must terminate at the location shown on the plans. Each living unit (*i.e...single family, duplexes, triplexes, commercial properties, etc.*) shall have a double meter set. Apartment complexes shall be evaluated by Centerton Utilities on a case by case basis. Single meter sets must be approved by Centerton Utilities.

4.4.1 Single Meter Set

Single meter sets shall be #P100 as manufactured by Little Groundhog Manufacturing or approved equal. Said meter set shall be comprised of the following components:

Meter Box -

Shell - SDR 51 PVC 18” diameter x 24” length

Lid - 1’-7” diameter 1/8” thick steel plate w/1” wide steel band welded to underside to fit inside diameter of PVC shell. Powder coated blue.

Bottom – 1’-7” square stainless steel 22 gauge sheet metal w/corners folded up and affixed to PVC shell with 3/16” pop rivets.

Service components –

One - Ford C86-34-NL ¾” Coupling

One - ¾” Brass FIP 45° Bend

One - Ford B43-232W-NL 5/8” Meter Ball Valve

One - Ford H531-323-NL ¾” Straight Check Valve

One - ¾” x 6” Brass Nipple

See Meter Set Detail.

4.4.2 Double Meter Set

Double meter sets shall be #P200 as manufactured by Little Groundhog Manufacturing or approved equal. Said meter set shall be comprised of the following components:

Meter Box -

Shell - SDR 51 PVC 18" diameter x 24" length

Lid - 1'-7" diameter 1/8" thick steel plate w/1" wide steel band welded to underside to fit inside diameter of PVC shell. Powder coated blue.

Bottom - 1'-7" square stainless steel 22 gauge sheet metal w/corners folded up and affixed to PVC shell with 3/16" pop rivets.

Service components -

One - Ford C86-44-NL 1" Coupling

One - 1" Brass FIP 45° Bend

One - Ford UA41-43-65-NL Angle U-branch

Two - Ford BA13-332W-NL 3/4" Angle Meter Valve

Two - Ford H531-323-NL 3/4" Straight Check Valve

Two - 3/4" x 6" Brass Nipple

See Meter Set Detail.

SECTION 5 - WATER VALVES

5.1 Gate Valve Manufacturers

Valves conforming to these specifications will be accepted from the following manufacturers:

- A.** Mueller Company, Decatur, Illinois
- B.** Waterous, St. Paul, Minnesota
- C.** Or of Equal Specifications.

5.2 Gate Valves, 6" through 12" with Resilient Seat:

Resilient seat gate valves 6" through 12" shall be designed for a working pressure of 200 psi. Valves shall conform to AWWA C515 with non-rising stem, O-ring stem seals, 2" square operating nut. Valves shall open when the operating nut is turned to the left (counter clockwise). Valve ends shall be as specified. The resilient seat may be bonded or mechanically attached to the gate. All interior metal surfaces shall be coated with a two-part thermosetting epoxy. If the depth of bury exceeds 4 feet, operator extensions shall be provided with the box to enable the operation of the valve with a standard 4 foot T wrench. Waterous, extra depth "Trench Adapter" or equal is required.

5.3 Butter Fly Valves

5.3.1. General

All butterfly valves shall be manufactured in accordance with the latest revision of AWWA C504 for Class 150B service. All valves shall be either Henry Pratt Groundhog as manufactured by the Henry Pratt Company or Centerton Utilities approved equal. Valves in sizes 3-24" shall have 304 stainless steel trim as standard.

5.3.2. Valve Body

Valve body shall be constructed of cast iron ASTM A-126 Class B and conform to AWWA C504 in terms of laying lengths and minimum body shell thickness. End connections shall be as specified on the plans.

5.3.3. Valve Disc

Valve disc shall also be made from cast iron ASTM A-126 Class B in sizes 20" and smaller. Sizes 24" and larger shall be built from ductile iron in conformance to ASTM A-536. Disc shall be furnished with Type 316 stainless steel seating edge to mate with the rubber seat on the body.

5.3.4. Valve Seat

Valve seat shall be Buna-N rubber located on the valve body. In sizes 20" and smaller, valves shall have bonded seats that meet test procedures outlined in ASTM D-429 Method B. Sizes 24" and larger shall be retained in the valve body by mechanical means without use of metal retainers or other devices located in the flow stream.

5.3.5. Valve Shaft

The shaft shall be Type 304 stainless steel conforming to ASTM A-276. Shaft seals shall be standard self-adjusting split V packing. Shaft seals shall be of a design allowing replacement without removing the valve shaft.

5.3.6. Valve Bearings

Bearings shall be sleeve type that is corrosion resistant and self-lubricating.

5.3.7. Valve Actuators

Actuators shall be fully grease packed and have stops in the open/close position. The actuator shall have a mechanical stop which will withstand an input torque of 450 ft. lbs. against the stop. The traveling nut shall engage alignment grooves in the housing. The actuators shall have a built in packing leak bypass to eliminate possible packing leakage into the actuator housing.

5.3.8. Painting

The Valve Interior and Exterior Surfaces except for seating shall be coated with Ameron Amerlock 370 in accordance with AWWA C550 and C504. All internal and/or external surfaces shall be covered with a polyamide cured epoxy coating applied over a sand blasted "new white metal surface" per SSPC-SP10 to a minimum of 6 mils in compliance with AWWA C550.

5.4 Air Release Valves

Air-Release Valves - shall be APCO No. 220-A, or equal, or as specified. See Standard Details.

SECTION 6 - VALVE BOXES

6.1 Valve Boxes (Standard Depth)

Valve Boxes (Standard Depth) shall be three-piece, screw type, 5 1/4" shaft, 6860 series, with drop cover marked "WATER", shall have a combined weight of at least 80 lbs., manufactured by Tyler Pipe or equal. The normal base shall contour to the size valve.

6.2 Valve Boxes (Extra Depth)

Valve Boxes (Extra Depth) shall be two-piece, screw-type, 5 1/4" shaft, with extension length appropriate for depth of bury, drop cover marked "WATER", and shall be 6850 Series, manufactured by Tyler Pipe or equal. **If the depth of bury exceeds 4 feet, an operator extensions shall be provided with the box to enable the operation of the valve with a standard 4 foot T wrench.**

SECTION 7 - FIRE HYDRANTS

7.1 Required Fire Hydrant Features

Fire hydrants shall be Traffic Model fire hydrants conforming to AWWA C502-80 or latest revision, and equipped as follows:

Working Pressure	Minimum 150 psi
Size of Valve Opening	Minimum 5-1/4"
Diameter of Inlet Connection	6"
Type of Inlet connection	Mechanical Joint
Number & Size of Hose Connection	2 @ 2-1/2" & 1 @ 4-1/2"
Nozzle Arrangement	All in same horizontal plane
Nozzle Cap Chains	Each cap
Operating Threads	Oil W/O-Ring Seals
Seat Rings	Bronze to Bronze
Direction to Turn to Open	Left (counterclockwise)
Color of Hydrant	White
Shape & Size of Operating Nut & Nozzle Cap Nut	5-sided, 1 1/2" from flat to point
Operating Nut	Bronze

7.2 Approved Fire Hydrants

Fire hydrants shall be traffic model Mueller Centurion # A-423, Waterous Pacer, Clow Medallion or approved equal. Hydrants shall be white in color.

7.3 Design Specifications:

The hydrant shall be of the dry top design. Stem threads shall be sealed from the waterway in both the open and closed position. The thrust collar of the operating nut and the thrust collar bearing surfaces of the bonnet shall be automatically lubricated each time the hydrant is operated or thrust collar bearing surfaces of the bonnet shall be bronze bushed to reduce corrosion. A weather cap shall be provided.

7.4 Fire Hydrant Placement

Fire hydrants shall be installed so that spacing between hydrants shall not be greater than 500-feet within single-family and two-family residential developments. In commercial, mixed use, and multi-family residential developments fire hydrant spacing shall not be greater than 300-feet. The Fire Department may require additional hydrants and closer

spacing during plan review. Fire hydrants placed in subdivisions should be installed at the lot lines to avoid conflicts with driveways.

In rural areas within the city limits, fire hydrants shall be installed so that spacing between hydrants shall not be greater than 800-feet or as directed by the Fire Department.

Fire hydrant placement shall be approved by the Fire Department. New building construction shall not begin until a working Fire Department approved fire hydrant is available for fire protection.

SECTION 8 - POLYETHYLENE MATERIAL FOR PIPE ENCASEMENT

8.1 Polyethylene Pipe Encasement

Polyethylene material for the encasement of ductile iron pipe shall conform to ANSI A21.5/AWWA C105.

8.2 Sealing Tape

Polyethylene pipe encasement shall be sealed at joints and/or to pipe with tape such as Polyken #900, or Scotchrap # 50, or equal, at least 2-inches wide.

SECTION 9 - TRACE WIRE FOR NON-METALLIC PIPE

9.1 Trace Wire

Trace wire shall be insulated 10-gauge solid copper wire and must be placed in the water main trench above the pipe protection cover initial backfill per AWWA C605 (latest revision). Trace wire must not be placed against, or taped or fastened to the pipe. Trace wire shall be tested to prove connectivity and location for entire length(s) of installed utility mains. All trace wire splices and connections shall be made with water-proof locking manufactured connectors.

SECTION 10 - WATER AND SEWER LINE SEPARATION

10.1 Protection of Water Supplies

There shall be no physical connections between the potable water supply system and a sewer, or appurtenance there to which permit the passage of any sewage or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

10.2 Horizontal Separation

Sewers, manholes, wet wells, etc., shall be laid at least ten (10) feet horizontally from any existing or proposed water main and vice versa. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Arkansas Department of Health, Division of Engineering, may allow deviation on a case by case basis, if supported by data and

pertinent facts from the Engineer and agreed to by Centerton Utilities.

DIVISION II - POTABLE WATER CONSTRUCTION PROCEDURES

SECTION 1 - DESCRIPTION

1.1 General

This part of the specifications shall set forth minimum acceptable construction procedures for the installation of potable water facilities under the jurisdiction of Centerton Utilities. Construction procedures other than those outlined in this specification shall meet with the approval of the Department. Complete specifications covering any unusual or special construction procedure not listed in this specification shall be submitted to the Department for approval prior to the beginning of construction.

SECTION 2 - EXCAVATION

2.1 Trench Excavation - General

The trench shall be excavated so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of the pipe laying as set out elsewhere in these specifications.

The trench shall be so braced and drained that the workmen may work therein safely and efficiently. It is essential that the discharge of any trench dewatering pumps be conducted to natural drainage channels, drains, or storm sewers. The contractor shall be responsible for any discharge permits that may be required.

The contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.

All excavation shall be dewatered before any construction is begun. Concrete shall be placed only upon dry firm foundation material and pipe shall be laid only in dry trenches.

2.1.1 Trench Depth

Trenches for potable water mains shall be excavated to at least 4 inches below the grade required to provide proper alignment, pipe embedment and minimum earth cover. All water mains shall have at least 36 inches cover. All excavation below the established pipe grade shall be backfilled to the proper grade with pipe bedding material. All pipe bedding material shall be tamped so as to provide a uniform and continuous bearing support for the pipe at every point along the pipe barrel.

2.1.2 Bell Holes

The bedding material under each bell shall be excavated or shaped sufficiently to allow the pipe to rest throughout its length. Bell hole excavation shall also be sufficient to allow proper placing of the joint compound, where joint compound is used. No weight of dirt or pipe shall be supported by the bell of the pipe.

2.1.3 Trench Width

The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified. The trench width shall not exceed the maximum widths shown on the Standard Detail Sheet in the Appendix at any point from the trench bottom to a point 12 inches above the barrel of the pipe.

If the contractor over excavates the trench, he shall provide additional pipe bedding gravel or concrete necessary to prevent crushing of the pipe due to excessive earth loads.

2.1.4 Trench Length

Centerton Utilities shall have the right to limit the amount of trench excavated in advance of the pipe laying. In general, such excavation shall not exceed 300-feet, and trench excavated to grade shall not exceed 100-feet.

2.1.5 Pipe Clearance in Rock

Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves, and fittings for pipes 24 inches in diameter or less, and 9 inches for pipes larger than 24 inches in diameter. Every trench in rock shall be fully opened at least 50 feet in advance of the place where pipe is being laid or concrete or masonry work is in progress.

2.1.6 Excavation in Poor Soil and Refilling to Grade

Where the bottom of the trench is found to be unstable soils or to include ashes, cinders, all types of refuse, vegetable or other organic materials, or large pieces of fragments of inorganic material which in the judgment of Centerton Utilities Engineer should be removed, the Contractor, at his own expense, shall excavate and remove such unsuitable material to the width and depth ordered by Centerton Utilities Engineer.

Before the pipe is laid, the sub-grade shall be made by backfilling with crushed stone (ADOT Class 8) in 6 - 8 inch un-compacted layers. The layers shall be thoroughly tamped by hand or machine to the density of adjacent undisturbed soil so as to provide a uniform and continuous bearing and support for the pipe at

every point between the bell holes.

2.1.7 Wet Excavation

When water or unstable soil is encountered in the bottom of the trench, the Contractor will be required to excavate below grade a minimum of six inches, and the trench will be brought back to grade with ADOT Class 8 crushed stone or crushed stone with no particles larger than 3/4-inch. The layers shall be thoroughly tamped and formed to provide a uniform and continuous bearing and support for the pipe at every point between the bell holes. Pipe shall not be installed in standing water unless specifically approved by Centerton Utilities personnel. The placement of soil berms across the trench at no more than 100-foot spacing may be required to prevent water flowing along the trench.

2.1.8 Removal of Water and Muck

The Contractor shall provide sufficient pumps and other necessary equipment to keep the trench free of water which may accumulate. If the bottom of the trench becomes soft and muddy, the Contractor shall remove all such soft material and replace it with bedding material as described above in paragraph 2.1.6.

2.1.9 Deviations Occasioned by Other Structures

Whenever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade only after approval of the change by Centerton Utilities, or the Engineer may arrange with the owners of the structures in conflict for the removal, relocation or reconstruction of the obstruction.

2.1.10 Bracing and Shoring

The sides of any excavation, when deemed necessary, shall be properly supported with shielding, bracing, shoring, or sheeting as the need may be. Such bracing, shoring, or sheeting shall be withdrawn the work progresses in such a manner as not to endanger life and property and to allow for backfilling of the trench in accordance with these specifications.

In case the excavation is close enough to buildings or other foundations as to endanger their stability by removing such bracing, then they shall be made secure and left in place, and the line trench shall be backfilled and thoroughly tamped with the bracing in place.

Where the trench walls are sloped away from the trench to prevent slides or cave-ins, it will be permissible to cut the trench banks on a slope above an elevation two (2) feet above the crown of the pipe. It is the responsibility of the contractor to

maintain the excavation free from slides or cave-ins, safe for workman and to comply with federal labor requirements for trench safety. No observation of any project by the Engineer or representative of Centerton Utilities will reduce the Contractor's responsibility. Contract document shall include all OSHA requirements.

2.1.11 Use of Explosives

In the event the use of explosives is necessary for the efficient prosecution of the work, the Contractor shall notify the Engineer in advance of their use and shall exercise every precaution to protect completed work, neighboring property, or other underground structures. Any damage to public or private property resulting from the use of explosives shall be the liability of the Contractor. It shall be the responsibility of the Contractor to obtain all necessary permits.

The Contractor shall notify all owners of neighboring property or public utility property of intention to use explosives at least eight hours before blasting is done close to such property. Any observation of this project by a representative of Centerton Utilities does not in any way reduce the responsibility of the Contractor for damage resulting in the use of explosives. In all cases, where explosives are necessary, the Contractor shall obtain appropriate permits from governmental agencies prior to their use.

2.1.12 Disposal of Excavated Materials

Excavated material shall be piled adjacent to the work to be used for backfilling, if suitable. All excavated material which is unsuitable for backfilling and any excess material shall be disposed of in a manner approved by the Engineer.

SECTION 3 - PIPE EMBEDMENT, PROTECTION COVER & TRENCH BACKFILL

3.1 General

This section covers the minimum requirements for embedment, pipe protection cover and backfill of potable water lines, sanitary sewer lines, and sanitary sewage force mains.

3.2 Pipe Embedment

All pipe shall be bedded in materials containing a significant percentage of fine particles and maximum particle size of $\frac{3}{4}$ -inch. ADOT Class 8 crushed stone is acceptable. Other crushed stone products such as chips or grit are acceptable as long as there is no standing water in the trench. Materials excavated from trenches can be used for pipe embedment if and only if said materials are mechanically screened or processed with grinding/screening equipment so that maximum particle sizes are $\frac{3}{4}$ -inch or less.

3.3 Pipe Protection Cover

All pipe shall have a protective covering of the same material as used for embedment. The pipe protection cover shall extend to a minimum of 12-inches above the top of the pipe.

3.4 Trench Backfill

Backfilling of pipelines shall include the refilling and consolidation (compaction) of the fill in the excavation up to the surrounding ground surface or road grade at crossings. All pipeline trench backfill shall be placed in layers of appropriate thickness not to exceed 24" and compacted by hand or approved mechanical methods. All trench backfill (except that under paved areas) shall be compacted to a minimum density of 85% of the maximum density of the adjacent undisturbed soil as determined in accordance with ASTM D2922. Trench backfill shall proceed concurrently with pipe installation. There shall be no more than two full joints of pipe exposed in a trench at all times.

The trench, excavated area around manholes, fittings, and other appurtenances shall be backfilled with excavated material free from rock larger than three inches, cinders, ashes, refuse, vegetable, or organic material, frozen soil, or other deleterious materials that in the opinion of the Engineer or Centerton Utilities are unsuitable.

3.5 Paved Areas

Where pipelines are placed under existing or proposed paved areas, the pipe bedding, protection cover and trench backfill to sub-grade elevation shall be crushed stone with no particles greater than 3/4-inch compacted to 95% Modified Proctor.

3.6 Street Right-of-Ways

For open cut crossings of County Roads, City Streets and paved driveways the pipe bedding, protection cover and trench backfill to sub-grade elevation shall be crushed stone with no particles greater than 3/4-inch compacted to 95% Modified Proctor. The entire trench shall be backfilled with said crushed stone to the subgrade elevation under all pavements and graveled shoulders. Areas with vegetative cover within street and road right-of-ways will be backfilled with said crushed stone to a point 12 inches below finish grade. The remaining 12-inches shall be backfilled with the soil materials removed from the trench or top soil as required to enable re-establishment of vegetative cover.

3.7 Service Lines

Water service lines and sewer service lines shall be bedded, protected and backfilled in the same manner as pipe as described in the preceding paragraphs. Water service line crossings shall be encased in PVC pipe. 2-inch PVC pipe encasement is allowed for a single 1-inch service crossing. 3-inch PVC pipe encasement is allowed for two 1-inch service crossings at the same location. Water service encasement shall extend a minimum of 10-feet behind back-of-curb.

SECTION 4 - PIPE INSTALLATION

4.1 Description

This section covers the laying of pipe for potable water lines. All materials shall be in accordance with these specifications.

4.2 General

4.2.1 Alignment and Grade

All water mains shall be laid and maintained to the required lines and grades as shown on the plans with fittings, valves and hydrants, and other appurtenances at the required locations, spigot centered in bells, and all valve and hydrant stems plumb.

4.2.2 Ductile Iron Pipe

Ductile iron pipe and ductile iron pipe fittings shall be installed in accordance with AWWA C-600, or latest revision, (Installation of Ductile Iron Water Mains and Their Appurtenances).

4.3 Weather/Temperature Restriction

Pipe installation shall not take place until the temperature is at least 32° Fahrenheit and rising. Pipe installation shall cease when temperatures are 35° Fahrenheit and falling.

4.4 Water Pipe Laying

All pipe and fittings shall be installed to the line and grade as detailed on the plans. Subject to the approval of Centerton Utilities, other fittings may be added to or substituted for those shown on the plans, should the need therefore arise during construction. This permissive stipulation in no way shall relieve the Contractor of the responsibility for furnishing and installing all fittings required for a complete and proper installation of pipeline as detailed on the plans.

All dirt and other foreign matter shall be removed from the inside of pipe and fittings before they are lowered into the trench. They shall be kept clean during and after placement and care shall be taken to keep dirt out of the jointing space. At the end of each day's work, or when pipe laying is discontinued for an appreciable period, or, if the ditch is muddy, or if it begins to rain open ends of pipe shall be closed with a watertight plug or cap firmly secured in place.

All pipe and fittings shall be lowered carefully into the trench in such a manner as to prevent damage to pipe, fittings or linings. Neither pipe nor fittings shall be dropped or dumped into the trench.

Cutting of pipe, where needed, shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.

Unless otherwise directed by the Engineer, pipe shall be laid with bell ends facing in the direction of laying. For lines on an appreciable slope, bells shall, at the direction of the Engineer, face upgrade. Whenever necessary to deflect pipe from a straight line in either the horizontal or vertical plane, to avoid obstructions, or for other allowable reason, the degree of deflection of any joint shall be not greater than that which will provide adequate gasket space entirely around the spigot end of pipe. The joint opening shall be approximately 1/8 inch. Joint Deflections shall not exceed the maximum recommended by the pipe manufacturer or 5 degrees, whichever is less.

4.5 Potable Water Service Lines, Polyethylene

All water service lines shall be sleeved in an adequately sized PVC encasement pipe when in road right-of-ways or when under paved areas. All service lines shall have a minimum earth cover of 30 inches over the top of the pipeline. Polyethylene water services lines shall be used. The polyethylene water service line shall be "Drisco" DR 9, 200 psi. Pipe stiffeners shall not be used with polyethylene service pipe.

SECTION 5 - PIPE JOINTS

5.1 Description

This section covers the installation of pipe joints. Joint materials shall be as supplied and or recommended by pipe manufacturer.

5.2 Pipe Joint Installation

All pipe joints other than those specified herein shall be made in strict accordance with the manufacturer's recommendation and as approved. All joints shall be made watertight in accordance with the latest ASTM Standards. Excavation for bells or other joint protrusions shall be made to insure that the bottom of the pipe firmly rests against the bedding for entire length of the pipe.

5.3 Pipe Joint Lubricant

Lubricant furnished for push-on joints shall be non-toxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material and shall not impart taste or odor to water. The lubricant containers shall be labeled with the manufacturers' name.

5.4 Installation of Slip-Type or Push-On Joints

Prior to jointing, the bell and spigot end of the pipes shall be cleaned thoroughly by whatever means necessary to remove all foreign matter and attain the required cleanliness. A wire brush shall be used as necessary. Particular care shall be exercised to clean the gasket seat. Joints shall be made in strict accord with the recommendations of the pipe manufacturer. The rubber gasket shall be cleaned and inserted in the gasket seat within the bell. Apply lubricant in accordance

with the manufacturer's recommendations. The spigot end of the pipe shall be inserted in the bell of the pipe to which connection is being made, and forced to a firm contact with the shoulder of the bell. When this initial insertion is made, the alignment of the added pipe shall deviate from true alignment not more than 5 degrees for 4-inch pipe, not more than 3 degrees for 12-inch pipe; deviations for intermediate size pipes shall be in conformance with the stated maximum deviations.

5.5 Installation of Mechanical Joints

Pipe employed in making mechanical joints shall have a complete pipe wall thickness cross-section. Beveled or tapered pipe ends shall not be inserted into mechanical joints. Beveled or tapered pipe ends shall be removed with the pipe end cut square or at 90° to the pipe centerline axis. The spigot end of pipe and the bell of fitting and the rubber gasket shall be cleaned thoroughly as specified for pipe joints in paragraph 5.3 above. The glands shall be cleaned in a like manner. After the gland and gasket are placed on the spigot end of the pipe, a sufficient distance from the end to avoid fouling the bell, the spigot end shall be inserted in the fitting bell to firm contact with the bell shoulder. The rubber gasket then shall be advanced into the bell and seated in the gasket seat. Care shall be exercised to center the spigot end within the bell.

The gland shall be brought into contact with the gasket, all bolts entered, and all nuts made hand tight. Continued care shall be exercised to keep the spigot centered in the bell. The joints shall be made tight by turning the nuts with a wrench, first partially tightening a nut, then partially tightening the nut 180 degrees there from and working thus around the pipe with uniformly applied tension until the required torque is applied to all nuts. Joint deflections shall not exceed the maximum recommended by the pipe manufacturer.

Required torque ranges and indicated wrench lengths for standard cast iron bolts are as stated in the following table:

Pipe Size (Inches)	Bolt Size (Inches)	Range of Torque (Foot Pounds)	Length of Wrench (Inches)
6-24	3/4	75 - 90	10
30-36	1	100 - 120	14

The torque loads may be applied with torque-measuring or torque indicating wrenches, which may also be used to check the application of approximate torque loads applied by a man trained to give an average pull on a definite length of regular socket wrench.

SECTION 6 - PIPE FITTINGS

6.1 Description

This section covers the installation of pipe fittings, valves, plugs, caps, etc. for water lines and the installation of pipe fittings for sanitary sewer force mains.

6.2 Pipe Fitting Installation

All pipe fittings shall be installed in strict accordance with the manufacturer's recommendations. Joints caused by the installation of fittings shall meet with the requirements of SECTION 5 - PIPE JOINTS. All pipe fittings shall meet with requirements of Part 2, Division 1.

6.3 Fire Hydrant Installation

All fire hydrants shall be installed at the location shown on the plans or at the direction of the Engineer and shall be installed in accordance with the Standard Details as set forth in these specifications.

6.3.1 Examination of Materials

Prior to installation, all hydrants shall be inspected for direction of opening, cleanliness of inlet elbow, handling damage, and cracks.

6.3.2 Placement

All hydrants shall stand plumb and shall have their nozzles with, or at right angles to, the street with the pumper nozzle facing the curb. Hydrants shall be set to established grade with the pumper nozzle centerline at least 18 inches above the final grade, unless otherwise directed by Centerton Utilities.

6.3.3 Location

Unless otherwise shown on the plans, hydrants shall be placed as follows: When placed beyond the curb, valves and hydrants shall be located out of paved or sidewalk areas and so that no portion of the hydrant or nozzle cap is within 18 inches of the gutter face of the curb. When set in the lawn space between the curb and sidewalk, or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 12 inches of the sidewalk. The location of all hydrants and appurtenances shall be within the street right of way or dedicated utility easement. There must be a minimum of 8 feet clearance on all sides of a fire hydrant from any appurtenance or structure.

6.3.4 Connection to Mains

Each hydrant shall be connected to the main with a 6 inch ductile iron pipe branch and independent six (6) inch gate valve as shown on the Standard Detail of these specifications. The valve shall be installed plumb and shall not be allowed to rotate from plumb during placement in the trench.

6.3.5 Hydrant Drainage

Whenever a hydrant is set in any soil, pervious or impervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with sand over the reaction backing to at least 6 inches above the waste opening in the hydrant, and to a distance 1 foot around the barrel. No drainage system shall be connected to a sewer.

6.3.6 Thrust Blocking for Hydrants

All plugs, caps, tees, and bends shall be provided with reaction backing or shall be restrained joint pipe. The fitting must be braced against unexcavated earth at the end of the trench with 3000 psi PC concrete as shown in the Standard Details. Locking retainer glands may be required, as determined by Centerton Utilities. See the Standard Details.

6.4 Locking Retainer Glands

Locking retainer glands or other necessary means of thrust restraint shall be installed at designated locations where, in the opinion of Centerton Utilities, they are needed.

6.5 Location of Valves

Valves in water mains shall be located as shown on the plans and valve boxes shall be set to finished grade. **If the depth of bury exceeds 4 feet, an operator extension shall be provided with the box to enable the operation of the valve with a standard 4 foot T wrench.** Valves shall not be installed in sidewalks or where sidewalks are to be constructed.

6.6 Valve Boxes

A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve with the box cover flush with the surface of the finished pavement or other grade as may be directed. Valve boxes shall be installed as shown in the Standard Details.

6.7 Valve Box Collar

Valve box lids outside of paved areas shall have a 2 foot square cast-in-place or pre-cast round concrete collar placed around them. Grout/mortar shall be used as necessary to ensure that the concrete collar firmly adheres to the valve box. After the valve box lid has been adjusted to final grade, the collar shall be centered on the valve box lid and shall be 6 inches thick. The top of the pad shall be flush with the top of the box and the surrounding ground. Collars shall not be constructed until cleanup has been completed and the soil has been compacted.

6.8 Dead Ends

All dead ends on water mains shall have ductile iron plugs or caps and be suitably restrained and/or blocked as shown on the plans or directed by the Engineer. Blow off assemblies are not allowed as a means of flushing at the end of dead ends lines unless approved in writing by Centerton Utilities. Fire hydrants meeting the requirements of Part 2, Division 1, Section 7, will be required in all cases unless otherwise approved by Centerton Utilities.

DIVISION III - POTABLE WATER MAIN TESTING

SECTION 1 - DESCRIPTION

1.1 Description

This section outlines the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and water tightness. All pressure pipelines shall be tested in accordance with Section 4 of AWWA C600, latest edition, and as specified herein.

1.2 General

All newly constructed water and/or sewer mains, appurtenances and ancillary construction must be tested before Centerton Utilities can accept same for operation and maintenance. Testing for materials and construction methods shall be at the Developer's expense. Centerton Utilities has the authority to require any test outlined in these specifications as well as additional testing if in the opinion of Centerton Utilities the situation warrants further testing to demonstrate that the quality of materials and construction procedures meet the requirements of these specifications. Water main testing shall not take place until all sewer testing has been completed.

Trace wire shall be tested to prove connectivity and location for entire length(s) of installed utility mains.

In all cases, pressure lines shall be tested hydrostatically. All tests shall be made in the presence of the Engineer and a representative of Centerton Utilities. All required tests must be successfully passed before new utilities can be accepted by the Department. All testing must be scheduled at least 24-hours in advance with Centerton Utilities. See Part 2, Division 3 for potable water and sewer force main testing requirements.

SECTION 2 - HYDROSTATIC TESTING

2.1 Pressure Test

After the pipe has been laid, all newly laid pipe or any valved segment thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing and not less than 150 psi. The minimum duration of the pressure test will be two hours. Water services shall be tested with the water mains.

2.2 Leakage Test

The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, or any valved segment thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test segment over a period of time. Leakage is not acceptable. If any test of constructed pipe indicates leakage, the Contractor shall, at his own expense, locate and make repairs as necessary.

2.3 Tapping Sleeve & Valve

Tapping sleeves and valves must be installed and pressure tested before the tap is made on the existing pipeline. The test shall be conducted with the tapping valve closed and a second time with the tapping valve open. The sleeve must be supplied with pipe thread testing port and plug to allow connection of testing apparatus. The exterior of the tapping sleeve must be visible during the test. The test must be conducted at least 1.5 times the normal static pressure in the existing pipeline but no less than 200 psi. The test pressure shall be maintained for 15 minutes and there shall be no visible leakage. The pipeline tap shall be performed only after the pressure test has been successfully completed and the testing apparatus is disconnected from the testing port. Centerton Utilities personnel must observe tapping sleeve pressure tests.

2.4 Visible Leakage

All visible leaks are to be repaired regardless of the amount of leakage.

2.5 Acceptance of Installation

New water main construction must be free of leakage. New water main construction will not be accepted if leakage is present.

SECTION 3 - DISINFECTION OF POTABLE WATER LINES

3.1 General

All newly installed water mains shall be disinfected in accordance with ANSI/AWWA C601, Section 5.2 (Continuous Feed Method), and as specified herein. Only Centerton Utilities personnel are allowed to operate valves in or attached to existing water mains.

3.2 Methods

All pipes are to be disinfected after laying. Disinfection is completed by holding a chlorine solution of at least 50 ppm strength in the pipe for 24 hours. At the end of the 24 hour period, the treated water shall contain no less than 25 ppm of chlorine throughout the length of the main.

As the heavily chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect new appurtenances and pipe branches. Extreme care should be taken by the Contractor to prevent heavily chlorinated water from flowing back into water mains in active service. The cost of the water and chemicals shall be borne by the Developer.

3.2.1 Discharge of Highly Chlorinated Water

The contractor shall be responsible for the procurement of all necessary permits and compliance with same as required by ADEQ, EPA, or the U.S. Corps of Engineers.

3.3 Flushing

After the lines have been disinfected, they shall be thoroughly flushed until chlorine residual measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use, or less than 1ppm.

3.4 Sampling

Two consecutive bacteriological samples shall then be collected from each respective segment of the new main and shall be submitted to the Arkansas Department of Health for analysis. The time interval between consecutive samples should be at least 24 hours. **The samples shall be collected by the Contractor and then delivered daily to Centerton Utilities for forwarding to the Arkansas Department of Health (ADH). The results shall be mailed to Centerton Utilities from ADH.**

The lines shall not be placed in service until the results of two consecutive daily samples showing negative report for coliform bacterial (safe) are received by the Engineer or Contractor and are submitted to Centerton Utilities.

3.5 Adjustment to Final Grade

All meter boxes, valve boxes, fire hydrants, or any other water main appurtenance purposed to remain at the surface shall be adjusted to match final grade.

PART 3 – SANITARY SEWER CONSTRUCTION

DIVISION I – SANITARY SEWER MATERIALS

SECTION 1 - SANITARY SEWER PIPE

1.1 Description

All gravity sewer pipes shall be Ductile Iron, Polyvinyl Chloride (PVC) Type PSM or approved equal. The minimum acceptable size of all gravity sewer mains is eight (8) inch diameter. All pipe installed shall be of the type, size, class, and thickness as indicated in these specifications and on the design plans. The strength of pipe used shall be based on standard engineering design principles and manufacturer or trade association recommendations. Only pipe materials listed in this section shall be used for sanitary sewer mains and service lines unless specifically authorized by the Utilities Director of Centerton Utilities.

1.2 Ductile Iron Gravity Sewer Pipe, 8" - 36"

Ductile iron pipe shall conform to ASTM Standard A 746-82 (Ductile Iron Gravity Sewer Pipe) or ANSI/AWWA C 151/A 21.54-81 or latest revision. Pipe shall be pressure class 350 or thickness class 50 whichever classification provides the greatest wall thickness. Pipe shall be lined with American Polybond lining, 401 Epoxy ceramic, or approved equal. Pipe shall be manufactured with the type joints specified. Joints shall conform to ANSI/AWWA C111/A21.11 and may be mechanical joint or push-on joints unless otherwise specified.

1.3 Polyvinyl Chloride (PVC) Gravity Sewer Pipe

All Pipe segments shall be straight and true in alignment and shall be furnished in thirteen (13) feet lengths. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint and integral bell.

1.3.1 PVC Gravity Sewer Pipe 8" - 15"

PVC pipe for gravity sewers shall conform to the latest revision of ASTM Designation D3034 (Type PSM) and shall be a minimum Standard Dimension Ratio (SDR) of 26. The pipe shall have minimum pipe stiffness (F/dY) of 115 psi at 5% deflection as defined in ASTM D2412.

1.3.2 PVC Gravity Sewer Pipe 18" – 36"

PVC pipe for larger gravity sewers shall be PS115 conform to the latest revision of ASTM Designation D3034 (Type PSM) and shall have minimum pipe stiffness (F/dY) of 115 psi at 5% deflection as defined in ASTM D2412.

1.4 Cell Classification

Plastic pipe shall be made of a plastic having a cell classification of 12454-B or approved equal as defined in ASTM D1784. All pipe and fittings shall be tested in accordance with ASTM Designations D 2412, D 215D, and D 2444.

1.5 Sanitary Sewer Service Lines

1.5.1 General

Service lines are defined as that portion of the sanitary drainage system which extends from the city sewer main to the stub out at the property line. The owner is responsible for adequate operation and maintenance of this line per Arkansas State Plumbing Code. All service lines shall meet with the requirements of this section of the specifications for pipe and joint material except as outlined below. Service lines shall be bedded as required for mains.

Each living unit (i.e...single-family, duplexes, triplexes, etc.) shall have separate sewer service lines. Apartment complexes shall be evaluated on a case by case basis by Centerton Utilities. Also, commercial property shall be required to install a separate sewer service per unit.

The minimum size of any service line shall be 4 inch nominal diameter. Sizes of service lines for multi-family or commercial applications shall be as a minimum as required by the Arkansas State Plumbing Code unless otherwise directed by Centerton Utilities.

Service lines may be constructed of SDR 26 polyvinyl chloride (PVC) pipe, or ductile iron pipe.

1.5.2 Ductile Iron Pipe Service Lines

Ductile iron pipe shall be used for sewer service lines connected to ductile iron sewer mains and shall meet the requirements of Paragraph 1.2 above. For new sewer main construction service line connections to ductile iron sewer mains shall be made with cast iron fittings.

1.5.3 PVC Service Lines

Plastic pipe for sanitary sewer services shall be SDR 26 PVC pipe. For new sewer main construction service line connections PVC sewer mains shall be made with PVC fittings.

1.5.4 Sewer Service Tapping Saddles

Centerton Utilities must be contacted prior to design and construction for the type

of tapping saddle currently utilized for new service connections on existing sewer mains.

1.6 Pipe Joints

All joints shall be as shown on the plans and as specified herein.

1.6.1 Ductile Iron Pipe Joints

All joints shall be push-on or mechanical, unless otherwise specified, and shall conform to the requirements of ANSI/AWWA C111/A21.11-80.

1.6.2 Polyvinyl Chloride (PVC) Pipe Joints

Joints shall be push-on, elastomeric gasket type conforming to ASTM D3212 and ASTM F-477. The use of solvent or chemically welded joints is prohibited for any use in the sewer system.

1.7 Steep Grades

Ductile iron pipe shall be used on all sewer or force main pipe when the grade is fifteen percent (15%) or greater. Sewers or force mains on twenty percent (20%) slopes or greater shall be anchored securely with concrete anchors or equal, spaced as follows:

1.7.1 20% to 35% Grade

Not over 36 feet center to center on grades 20 percent and up to 35 percent;

1.7.2 35% to 50% Grade

Not over 24 feet center to center on grades 35 percent and up to 50 percent;

1.7.3 Grades >50%

Not over 16 feet center to center on grades 50 percent and over.

1.7.4 Anchor Block

See Standard Details for Anchor Block Detail

1.8 Sewer Pipe Fittings

1.8.1 Standard Fittings

When SDR 26 PVC plastic pipe is utilized for gravity sewer mains all bends and fittings shall be SDR 26 PVC. When ductile iron pipe is utilized for gravity sewer

mains all bends and fittings shall be ductile iron. Ductile iron fittings shall be employed in force main construction.

All bends, tees, plugs, adapters, or other fittings shall meet with the requirements of the type of pipe used and all joints shall meet with the requirements for the joints listed above. PVC sewer bends or other fittings shall be one piece molded construction with:

1.8.1.1 Elastomeric gaskets conforming to ASTM 3212

1.8.1.2 Self-cleansing sanitary flow

1.8.1.3 Design meeting ASTM 3034 standards

1.8.2 Special Fittings

All special fittings shall be in accordance with the pipe manufacturer's recommendations as approved. Connections between different kinds of pipe shall be detailed on the plans and shall be as such to provide self-cleaning sanitary flow and watertight joints and connections.

SECTION 2 - MANHOLES

2.1 Description

This section covers materials to be used in the construction of standard manholes, drop manholes, and watertight manholes.

2.2 Concrete

Concrete used in the construction of manholes shall conform to the requirements of Part 4, Section 9-Concrete and Reinforcing Steel.

2.3 Mortar

Mortar shall be composed of one (1) part Portland cement to two (2) parts fine aggregate, by volume. Cement and fine aggregate shall conform to the requirement of Part 4, Section 9 Concrete and Reinforcing Steel. Masonry cement shall be strictly prohibited for use in any part of manhole construction.

2.4 Brick Manholes

Brick manholes are explicitly prohibited for use in the municipal sanitary sewage collection system.

2.5 Precast Manholes

Precast manholes are explicitly prohibited for use in the sanitary sewage collection system. Centerton Utilities may allow the use of a precast manhole only in the event that extreme circumstance may warrant said use. Written approval from Centerton Utilities must be obtained before a precast manhole can be purchased and/or brought onto a construction site.

2.6 Cast-in-Place Manholes

Cast-in-place manholes shall be constructed of 3000 psi (at 28 days) concrete conforming to the requirements of Part 4, Section 9- Concrete and Reinforcing Steel.

2.7 Drop Type Manholes

Internal drop manholes are not allowed without prior written approval of Centerton Utilities. External drop manholes are not allowed. Pipe and fitting materials used in the construction of drop manholes shall conform to the requirements of Section 1.8 above and all other applicable parts of this specification. Drop manholes or manholes where force mains terminate must be lined with an epoxy coating system per Part 5 – Sanitary Sewer Pumping Stations, Section 6, of these specifications.

2.8 Manhole Rings and Covers

All castings for manhole rings and covers shall be American made and must be of the best quality gray cast iron, free from cracks, holes, scale, shrinkage, distortion, and other defects which might make them unfit for their intended use. They shall be of workmanlike finish, shall be non-rocking, shall have all bearing surfaces machined smooth and shall be of such quality that a blow from a hammer will produce an indentation on a rectangular edge of the casting without flaking of the metal.

Manhole rings and lids shall have a combined weight of not less than 250 lbs. and shall have a minimum access (inside diameter) of 24 -inches. The manhole lids shall be of solid construction without any openings or any type except two (2) concealed pick holes which shall be located on direct opposite sides of the manhole lid. The concealed pick holes shall be of such design as not to allow infiltration into the manhole. Manhole lids shall have “SANITARY SEWER” or “CITY OF CENTERTON - SANITARY SEWER” cast on the lids.

2.8.1 Traffic Model Manhole Rings and Lids

Castings shall be as specified above except the minimum weight shall be 400 lbs. 540 lbs. rings and lids may be required by Centerton Utilities in certain situations.

2.8.2 Watertight Manhole Rings and Covers

Watertight manhole rings and covers where required on the plans shall be approved on a case by case basis.

2.9 Water Stops

Water stops for pipe connections to manholes shall be Fernco Concrete Manhole Adapters, or equal, furnished in the appropriate size for the type and class of pipe used. Water stops are required for all sewer pipes entering or exiting manhole walls or bases.

DIVISION II - GRAVITY SEWER MAIN CONSTRUCTION

SECTION 1 - GRAVITY SEWER LINES

1.1 General

Each joint of pipe shall be inspected carefully before being placed in the trench. Any joint found to be cracked, or otherwise damaged as to impair its usefulness, shall be plainly marked in such a manner that the marking will not rub or wash off. Damaged joints shall be removed from the site as soon as feasible.

All sewer pipes shall be laid with the bell up-stream. Each pipe shall be laid to plan line and grade, or to line and grade directed by the Engineer, using laser grade light. Care shall be taken that each spigot is centered properly in the bell of the proceeding pipe and properly seated, and each pipe is solidly bedded. As the work progresses, the pipes shall be cleaned of all dirt and other foreign matter. They shall be maintained clean until accepted or put in service. At the end of each day's work, and when for any reason the laying of pipe will be discontinued for an appreciable period, the open ends of pipe line shall be closed temporarily with a watertight plug or cap.

The cutting of pipe for any reason shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.

Pipe shall be lowered carefully into the trench in such manner the spigot and bell will not become contaminated. Spigot and bell shall be checked for cleanliness immediately before insertion of spigot into bell.

Proper facilities shall be provided for lowering joints of pipe into trenches. Under no circumstances shall pipe be laid in water and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Full responsibility for the diversion of drainage and for dewatering of trenches during construction shall be borne by the Contractor.

Spigot and bells shall be cleaned thoroughly before the application of lubricant and attachment of the preformed joint gasket. Application of lubricant and attachment of the gasket shall be in strict accordance with the manufacturer's recommendations.

Pipe shall not be placed in the trench without excavating for bells so that the entire barrel of the pipe is uniformly supported on the pipe bedding.

Pipe shall be supported to proper line and grade, and secured against upheaval or floating during

the placement of concrete bedding, when required.

The trench shall be excavated so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of the pipe laying as set out elsewhere in these specifications.

The trench shall be so braced and drained that the workmen may work therein safely and efficiently. It is essential that the discharge of any trench dewatering pumps be conducted to natural drainage channels, drains, or storm sewers. The contractor shall be responsible for any discharge permits that may be required.

The contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.

All excavation shall be dewatered before any construction is begun. Concrete shall be placed only upon dry firm foundation material and pipe shall be laid only in dry trenches.

Pipe shall not be installed unless ambient temperature is at least 32° F and rising.

1.2 Connection to Existing Sewer Mains

Connection to existing sewer lines shall not be made until the newly constructed facilities meet with all required standards on construction, pass all required tests, and are approved by Centerton Utilities for connection.

1.3 Trench Depth

Trenches for sewer mains shall be excavated to at least 4 inches below the grade required to provide proper alignment, pipe embedment and minimum earth cover. All sewer mains shall have at least 36 inches cover. All excavation below the established pipe grade shall be backfilled to the proper grade with pipe bedding material. All pipe bedding material shall be tamped so as to provide a uniform and continuous bearing support for the pipe at every point along the pipe barrel.

1.4 Bell Holes

The bedding material under each bell shall be excavated or shaped sufficiently to allow the pipe to rest throughout its length. Bell hole excavation shall also be sufficient to allow proper placing of the joint compound, where joint compound is used. No weight of dirt or pipe shall be supported by the bell of the pipe.

1.5 Trench Width

The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the

backfill to be placed and compacted as specified. The trench width shall not exceed the maximum widths shown on the Standard Detail Sheet in the Appendix at any point from the trench bottom to a point 12 inches above the barrel of the pipe.

If the contractor over excavates the trench, he shall provide additional pipe bedding material or concrete necessary to prevent crushing of the pipe due to excessive earth loads.

1.6 Trench Length

Centerton Utilities shall have the right to limit the amount of trench excavated in advance of the pipe laying. In general, such excavation shall not exceed 300-feet, and trench excavated to grade shall not exceed 100-feet.

1.7 Pipe Clearance in Rock

Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves, and fittings for pipes 24 inches in diameter or less, and 9 inches for pipes larger than 24 inches in diameter. Every trench in rock shall be fully opened at least 50 feet in advance of the place where pipe is being laid or concrete or masonry work is in progress.

1.8 Excavation in Poor Soil and Refilling to Grade

Where the bottom of the trench is found to contain unstable soils or to include ashes, cinders, all types of refuse, vegetable or other organic materials, or large pieces of fragments of inorganic material which in the judgment of Centerton Utilities and/or Engineer should be removed, the Contractor, at his own expense, shall excavate and remove such unsuitable material to the width and depth ordered by Centerton Utilities and /or Engineer.

Before the pipe is laid, the sub-grade shall be made by backfilling with acceptable bedding materials 6-inch to 8- inch un-compacted layers. The layers shall be thoroughly tamped by hand or machine to the density of adjacent undisturbed soil so as to provide a uniform and continuous bearing and support for the pipe at every point between the bell holes.

1.9 Wet Excavation

When water or unstable soil is encountered in the bottom of the trench, the Contractor will be required to excavate below grade a minimum of six inches, and the trench will be brought back to grade with crushed stone with no particles larger than ¾-inch. The layers shall be thoroughly tamped and formed to provide a uniform and continuous bearing and support for the pipe at every point between the bell holes. The placement of soil berms across the trench at no more than 100-foot spacing may be required to prevent water flowing along the trench.

1.10 Removal of Water and Muck

The Contractor shall provide sufficient pumps and other necessary equipment to keep the trench

free of water which may accumulate. If the bottom of the trench becomes soft and muddy, the Contractor shall remove all such soft material and replace it with bedding material as described above in 1.8.

1.11 Deviations Occasioned by Other Structures

Whenever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade only after approval of the change by Centerton Utilities, or the Engineer may arrange with the owners of the structures in conflict for the removal, relocation or reconstruction of the obstruction.

1.12 Bracing and Shoring

The sides of any excavation, when deemed necessary, shall be properly supported with shielding, bracing, shoring, or sheeting as the need may be. Such bracing, shoring, or sheeting shall be withdrawn as the work progresses in such a manner as not to endanger life and property and to allow for backfilling of the trench in accordance with these specifications.

In case the excavation is close enough to buildings or other foundations as to endanger their stability by removing such bracing, then they shall be made secure and left in place, and the line trench shall be backfilled and thoroughly tamped with the bracing in place.

Where the trench walls are sloped away from the trench to prevent slides or cave-ins, it will be permissible to cut the trench banks on a slope above an elevation two (2) feet above the crown of the pipe. It is the responsibility of the contractor to maintain the excavation free from slides or cave-ins and safe for workman and to comply with federal labor requirements for trench safety. No observation of any project by the Engineer or representative of Centerton Utilities will reduce the Contractor's responsibility. Contract documents shall include the mandate for compliance to all OSHA requirements related to trench/excavation safety.

1.13 Use of Explosives

In the event the use of explosives is necessary for the efficient prosecution of the work, the Contractor shall notify the Engineer in advance of their use and shall exercise every precaution to protect completed work, neighboring property, or other underground structures. Any damage to private property resulting from the use of explosives shall be the liability of the Contractor. It shall be the responsibility of the Contractor to obtain all necessary permits.

The Contractor shall notify all owners of neighboring property or public utility property of intention to use explosives at least eight hours before blasting is done close to such property. Any observation of this project by a representative of Centerton Utilities does not in any way reduce the responsibility of the Contractor for damage resulting in the use of explosives. In all cases, where explosives are necessary, the Contractor shall obtain appropriate permits from governmental agencies prior to their use.

1.14 Disposal of Excavated Materials

Excavated material shall be piled adjacent to the work to be used for backfilling, if suitable. All excavated material which is unsuitable for backfilling and any excess material shall be disposed of in a manner approved by the Engineer.

SECTION 2 - PIPE EMBEDMENT, PROTECTION COVER & TRENCH BACKFILL

2.1 General

This section covers the minimum requirements for embedment, pipe protection cover and backfill of potable water lines, sanitary sewer lines, and sanitary sewage force mains.

2.2 Pipe Embedment

All pipe shall be bedded in materials containing a significant percentage of fine particles and maximum particle size of ¾-inch. Other crushed stone products such as chips or grit are acceptable.

2.3 Pipe Protection Cover

All pipe shall have a protective covering of the same material as used for embedment. The pipe protection cover shall extend to 12-inches above the top of the pipe.

2.4 Trench Backfill

Backfilling of pipelines shall include the refilling and consolidation (compaction) of the fill in the excavation up to the surrounding ground surface or road grade at crossings. All pipeline trench backfill shall be placed in layers of appropriate thickness not to exceed 24" and compacted by hand or approved mechanical methods. All trench backfill (except that under paved areas) shall be compacted to a minimum density of 85% of the maximum density of the adjacent undisturbed soil as determined in accordance with ASTM D2922. Trench backfill shall proceed concurrently with pipe installation. There shall be no more than two full joints of pipe exposed in a trench at all times.

The trench, excavated area around manholes, fittings, and other appurtenances shall be backfilled with excavated material free from rock larger than three inches, cinders, ashes, refuse, vegetable, or organic material, frozen soil, or other deleterious materials that in the opinion of the Engineer or Centerton Utilities are unsuitable.

2.5 Paved Areas

Where pipelines are placed under existing or proposed paved areas, the pipe bedding, protection cover and trench backfill to sub-grade elevation shall be ASTM Class 67 crushed stone.

2.6 Street Right-of-Ways

For open cut crossings of County Roads, City Streets and paved driveways the pipe bedding, protection cover and trench backfill to sub-grade elevation shall be ASTM Class 67 crushed stone. The entire trench shall be backfilled with the class 67 crushed stone to the subgrade elevation under all pavements and graveled shoulders. Areas with vegetative cover within street and road right-of-ways will be backfilled with the class 67 stone to a point 12 inches below finish grade. The remaining 12-inches shall be backfilled with the soil materials removed from the trench or top soil as required to enable re-establishment of vegetative cover.

2.7 Service Lines

Sewer service lines shall be bedded, protected and backfilled in the same manner as pipe as described in the preceding paragraphs.

SECTION 3 - MANHOLES

3.1 General

This section covers the construction methods for manholes, drop manholes, and watertight manholes. Generally, manholes shall not be poured when temperatures are below freezing unless concrete insulation blankets are employed to prevent the concrete from freezing.

3.2 Excavation and Backfill

3.2.1 Excavation

Excavation for manholes shall be of such dimension and depth as to allow the construction of the manhole as shown in the Standard Details. The area of excavation for the base shall be only that necessary to provide an adequate base with its sides and bottom poured against undisturbed earth. All over excavation below the required grade shall be filled with concrete poured monolithically with the base. Up to 3-inches of crushed stone leveling course may be placed in the excavation.

3.2.2 Base

The concrete base shall have a minimum thickness of eight (8) inches below the invert and shall be poured on undisturbed earth. The base shall be poured monolithically with the barrel. The base shall have a minimum diameter of two (2) feet greater than the outside of the finished manhole barrel.

3.2.3 Backfill

Backfilling of pipelines entering manhole connections shall be done in accordance with the requirements of the pipe material and backfilling around manholes up to

12 inches above the base will be done with pipe protection cover. Backfill of manholes shall be compacted to a density of not less than 90% modified proctor as defined in AASHTO Designation T-180. 90% density shall be obtained the entire depth of excavation except that in public streets or roadways where a density of 95% shall be obtained.

Backfill around manholes shall not be completed until adequate strength has been obtained to support the backfill without damage to the manhole. Backfill will not be allowed on manholes until the concrete is at least 48 hours old except as approved by Centerton Utilities. Manholes must be vacuum tested prior to backfilling.

3.3 Inverts

The invert of the manhole shall be hand placed and shaped from the concrete poured for the base prior to the initial set of the concrete base. The invert shall be shaped and smoothed so that the manhole will be self-cleaning and free of areas where solids may be deposited as sewage flows through the manhole and from service lines. The sidewall depth of the invert shall be approximately half the diameter of the abutting pipe and the shape shall approximate the bottom half of the pipe. The bottom flow line of the invert shall connect the flow line of all main sewer pipes entering the manhole bottom. Inverts shall be shaped, formed, and brushed smooth from the concrete poured for the base prior to the initial set of the base. Inverts shall be smooth.

No pipeline will be laid entirely through the manhole barrel and broken out. In all cases the pipe or pipes shall extend entirely through the manhole wall so that a joint occurs approximately three (3) feet outside the manhole wall. The pipe may extend through the barrel into the manhole no more than 4" and the invert must be shaped throughout from all inlet pipes to the outlet pipe. The invert shall be shaped to permit the entry of inflatable plugs and TV-grout seal equipment.

Additional smoothing of manhole inverts may be necessary. Centerton Utilities will allow Strong QSR for invert repair and manholes smoothing. Mortar for smoothing inverts shall be mixed in the proportions by volume of one (1) part cement to two (2) parts sand. If carefully done, mortar may be mixed in a mortar box. Mortar shall have a workable consistency, but shall be as dry as feasible.

3.4 Connections to Manholes

Pipe connections to manholes are a constant source of potential trouble. In order to insure that pipe will not break immediately adjacent to the manhole, excavation for the manhole bottom shall be limited to the area to be filled with concrete. The contractor shall support the pipe stub entering the manhole all the way to un-disturbed earth by backfilling under the pipe and up to mid-spring line with concrete. A water stop sleeve or collar shall be used on all pipes entering manhole walls.

3.5 Manhole Barrels

The minimum thickness of manhole barrels shall be 8 inches. The barrel shall be poured

monolithically with the base. The manhole barrel shall be of such construction so that the finished manhole will have an inside diameter of four (4) feet plus or minus (½) inch. Other than shallow manholes, (I.E., manholes less than 4 feet in depth), the top segment or cone shall be concentric.

3.6 Forms

Prior to setting the forms in place, any water that may have accumulated in the excavated area shall be pumped out and the concrete base thoroughly cleaned, if required, of dirt and debris. All concrete shall be poured in the dry. The forms shall be removed after the initial set of the concrete so that holes may be cut in the manhole base. After these pipes have been put in place, the barrel shall be repaired using a grout mixture. If honeycombing of the barrel is found to be present after removal of the forms they shall be repaired as directed by the Engineer. Manholes with excessive honeycombing will not be accepted by Centerton Utilities.

3.7 Manhole Height

Manholes are to be built to the established final grade unless otherwise noted on the plans or directed by the Engineer. The manhole rings and covers shall be attached preferably by being cast into the top of the manhole or by being grouted to the completed manhole. If manhole rings are grouted to completed manholes, a key way shall be formed in the top of the manhole outside of where the manhole ring will rest.

Construction joints with formed key way are required should the entire barrel of the manhole not be poured monolithically.

Mortar for grouting manhole rings to manholes shall be mixed in the proportions by volume of one (1) part Portland cement to two (2) parts sand. Masonry cement is prohibited for use. Tops of the manhole rings covers shall be level except in public rights of way where the top shall be set flush with pavement, sidewalks, or other surface areas.

3.8 Drop Manholes

Drop manholes shall not be utilized without prior written approval by Centerton Utilities.

If approved in writing, drop manholes shall be constructed at all manholes where the difference in invert elevation between incoming and outgoing sewers is 2.0 feet or more. Drop manholes shall be constructed of the same material and dimensions as are standard manholes, the only difference being in the inlet arrangements as shown in the Standard Details. Drop manholes or manholes where force mains connect must be coated with an epoxy coating system as specified in Part 5-Section 6-Paragraph 6.4 of these specifications.

3.9 Sealed Manholes

Construction of watertight manholes shall be of the same materials and dimensions as are standard manholes, the only difference being in the manhole ring and lid as shown on the Standard Details.

3.10 Manhole Details

All manholes shall be constructed in accordance with the standard manhole details in Part 6 – Standard Details.

3.11 Connection to Existing Manholes

3.11.1 Construction Complete and Approved Before Connection

Connection to existing manholes shall not be made until all other manholes and sewer lines have been completed, cleaned, tested, inspected, and approved for connection by Centerton Utilities unless specifically allowed by Centerton Utilities.

3.11.2 Diversion of Sewage

When the flow of sewage must be diverted around construction, the Contractor shall intercept the sewage flow at the existing manhole, at the first upstream manhole from the construction, and shall provide suitable pumping equipment and manpower and rerouting conduit to pump the sewage around the involved construction in a safe and sanitary manner. Discharge shall be into an appropriate manhole downstream from the construction.

3.11.3 Connection to Existing Manhole by Concrete Hole Saw

Connection to the existing manhole shall be made using a circular diamond tip concrete cutting hole saw. If the area is to be broken out, break-out shall be in small increments and with sharp tools to minimize damage to the manhole. Subject to these requirements, the details of making this connection, including securing the end of pipe in place, shall be as proposed by the Engineer and approved by Centerton Utilities. **Centerton Utilities requires usage of Oakum, water stop sleeve, and Strong QSR.**

3.12 Water Tightness

All manholes constructed shall be watertight and show no visible evidence in infiltration or leakage. Manholes shall be tested in accordance with this specification and any manhole that is not water tight will not be accepted by Centerton Utilities.

DIVISION III – SANITARY SEWER TESTING

Gravity sewer lines shall be air tested, manholes shall be vacuum tested, and PVC gravity sewer lines shall be mandrel tested at the completion of initial construction. Prior to the end of the 1-year warranty period sewer mains shall be pressure cleaned and video inspected. The contractor is liable for repair of any discovered defect.

SECTION 1 - PRESSURE TESTING OF GRAVITY SEWER

1.1 General

All gravity sanitary sewer main extensions shall be pressure tested as required by Centerton Utilities for water tightness by low pressure air loss as described herein.

1.2 Procedure

1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
2. Pipe air supply to the pipeline to be tested in such a manner that the air supply may be shut off, pressure observed, and air pressure released from the pipe without entering the manhole.
3. Add air slowly to portion of pipe under test until the internal pressure of the line is raised to +/- 4 psig, but less than 5 psig.
4. Shut the air supply off and allow at least two minutes for the air pressure to stabilize.
5. The test is to be started when the pressure has stabilized and is at or above the starting test pressure of 3.5 psig.
6. Determine the time in seconds with a stop watch for the pressure to fall 0.5 psig so that the pressure at the end of the time is at least 3.0 psig.
7. Compare the observed time with the minimum allowable times in the chart for pass/fail determination located in the Appendix.

1.3 Safety Precaution

The low pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is over pressurized or plugs are installed improperly. It is extremely important that the various plugs be installed so as to prevent the sudden expulsion of a poorly inflated plug. As an example of the hazard, a force of 250 pounds is exerted on an 8 inch plug by an internal pressure of 5 psi. Observe the following precautions:

1. No one shall be allowed in the manholes during the test or when a plugged pipe is under pressure.
2. Gauges, air piping manifolds, and valves, shall be located outside of the manhole above ground.

3. Install and brace all plugs securely.
4. Do not over pressurize the lines.

1.4 Observation

All gravity sewer lines must pass the air test before being accepted by Centerton Utilities. Air test results will not be accepted unless a representative of Centerton Utilities is present during the test.

1.5 Test Equipment

All necessary equipment to perform the air test in accordance with this specification shall be provided by the Contractor. The test gauge shall preferably have incremental divisions of 0.10 psi and have an accuracy of at least plus or minus 0.04 psi. In no case shall a test gauge be used which has incremental divisions of greater than 0.25psi. The gauge shall be of sufficient size in order to determine this accuracy.

SECTION 2 - PVC PIPE DEFLECTION TESTING

2.1 General

All PVC sewer lines shall be mandrel tested in accordance with these specifications prior to acceptance by Centerton Utilities.

2.2 Allowable Deflection

The maximum allowable pipe deflection shall not exceed five percent (5%) of the inside diameter.

2.3 Mandrel

The mandrel (go/no-go) device shall be cylindrical in shape and constructed with either 9 or 16 evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The contact length of the mandrel's arms shall equal or exceed the nominal diameter of the sewer to be inspected. Critical mandrel dimensions shall carry a tolerance of plus or minus 0.01 inch. The mandrel and all necessary equipment for the mandrel test shall be provided by the Contractor.

2.3.1 Procedure

The mandrel shall be hand-pulled by the contractor through all PVC sewer lines no earlier than 30 days after the trench has been completely backfilled. Any segments of the sewer not passing the mandrel shall be uncovered and the Contractor shall re-bed, re-round, or replace the sewer to the satisfaction of the Engineer and/or Centerton Utilities. Any repaired segment shall be re-tested.

2.3.2 Mandrel O.D. (Outside Diameter)

The outside diameter of the mandrel shall be set according to the following table:

Nominal Diameter (in)	Mandrel O.D. (in)
8	7.12
10	8.87
12	10.55
15	12.89

2.4 TV Inspection of Gravity Sewer Mains

Centerton Utilities requires, at the Developer's expense, to inspect all gravity sewer lines with TV inspection unit. These tests shall be performed by Centerton Utilities personnel. Based on the results found, the Developer shall be required to correct all deficiencies as directed by Centerton Utilities.

2.5 Adjustment to Final Grade

Manhole tops or any other sewer main appurtenance purposed to remain at the surface shall be adjusted to match final grade.

2.6 Contractor's Warranty

Centerton Utilities reserves the right to require mandrel test any PVC sewer pipe before acceptance, and also prior to expiration of the first year of operation. If a previously accepted line fails a mandrel test performed during the first year of operation, the defects must be corrected at the Contractor's expense.

SECTION 3 - MANHOLE TESTING

3.1. General

All sanitary sewer manholes shall be tested in accordance with these specifications prior to acceptance by Centerton Utilities. If a manhole fails the test, the Contractor shall locate the leak and make proper repairs and re-test. Centerton Utilities reserves the right to refuse leaking manholes, in which case the Contractor will replace the manhole at his expense.

3.2. Manhole Vacuum Testing

The contractor shall demonstrate at his expense the water tightness of all manholes, at the direction of the engineer, by a vacuum test, performed by the Contractor and witnessed by Centerton Utilities personnel or Engineer's representative. The manhole vacuum test shall be performed

with suitable apparatus made for such purpose and shall draw a vacuum of 10 inches of Mercury (Hg). The test shall pass if the vacuum remains at 10" Hg or drops to not less than 9"Hg in one minute.

DIVISION IV - SANITARY SEWER FORCE MAIN

SECTION 1 - SANITARY SEWER FORCE MAINS

1.1 General

All sanitary sewage force mains shall be of equal design, material, and construction as potable water pipe unless stated otherwise herein.

1.2 Minimum Size

Force mains smaller than 4" I.D. are not allowed.

1.3 PVC Pipe

4" to 8" diameter force mains shall be C900 PVC, DR 18 or DR 14 as required. Any other type or designation of plastic pipe must be approved in writing by Centerton Utilities. Plastic pipe used for force main construction must be marked "Sanitary Sewer" and/or "Force Main" or installed with a continuous plastic tape or ribbon with "Sanitary Sewer" and/or "Force Main" printed continuously on one side. The plastic tape or ribbon shall be installed on top of and adjacent to the pipe.

1.4 Ductile Iron Pipe

Force mains larger than 8-inch diameter shall be constructed of class 350 ductile iron pipe with American Polybond lining, 401 Epoxy Ceramic, or approved equal.

1.5 Fittings

All fittings employed in the construction of sanitary sewer force mains shall be mechanical joint ductile iron and lined with American Polybond lining, 401 Epoxy Ceramic, or approved equal. Said fittings shall be installed with locking retainer glands such as Megalug or approved equal.

1.6 Valves

Plug valves shall be used in sanitary sewer force mains. Plug valves shall be non-lubricated, resilient-seated, eccentric valves. Plug valves shall conform to the latest revision of ANSI/AWWA C517-05. All materials shall be new. Plug valve body and cover shall be composed of cast iron in conformance with either ASTM A126 Class B or ASTM A48 Class 40. All buried valves shall have mechanical joint ends conforming to ANSI/AWWA C111/A21.11, and all exposed valves measuring 4 inches in diameter and larger shall have Class 125 flat face flanged ends, at a minimum, conforming to ANSI B16.1 or ANSI/AWWA C110/A21.10. At a

minimum, valves measuring 4 inches to 12 inches in diameter shall have 175 psig bodies and valves measuring 14 inches and greater in diameter shall have 150 psig bodies.

1.7 Air Release Valves

Air release valves shall be installed as directed by Centerton Utilities. Said valves shall be APCO 401 Sewage Air/Vacuum valves or approved equal.

1.8 Construction

Sanitary sewer force mains shall be constructed in the same manner as detailed for potable water main construction in these specifications.

1.9 Testing

Sanitary sewer force mains shall be pressure tested in the same manner as potable water mains as detailed in these specifications.

PART 4 - CONSTRUCTION COMMON TO WATER & SEWER

SECTION 1 - PROJECT CLEANUP

1.1 General

Cleanup shall be considered an important part of any project, and adequate equipment and qualified personnel shall be applied to this phase of the work from the very beginning of the project. There are generally four classifications of cleanup to be used on this project, as set out below.

Class I Cleanup - Areas of construction within lawns, gardens, or other well-kept areas including street rights of way that are kept as lawns by adjacent landowners.

Class II Cleanup - Areas of construction within fields, meadows and street rights of way which are mowed or cultivated (garden excepted).

Class III Cleanup - Areas of construction that are heavily brushed or wooded, steep rocky slopes, or other areas where it is not practical for the area to be cultivated.

Special Clean-up - Unless otherwise noted under paragraph 1.4 below, no special cleanup will be required.

1.2 Methods of Cleanup

The method of cleanup for each of the classes defined above shall be as set out below.

1.2.1 Class I Cleanup (Lawns, Gardens, etc.)

The trench shall be backfilled in accordance with the Pipe Specifications. After the topsoil has been spread over the damaged areas, the Contractor shall proceed immediately to hand rake the entire construction area to remove all rock 1 inch or larger in diameter. Debris of every type shall be removed and all damaged tree limbs shall be pruned. After the area has been raked and accepted by the Engineer, the area shall be seeded at the rate of 0.25 pounds per 100 square feet, using the following seed mixture (percent expressed in terms of weight).

Lawn Fescue	50%
Rye Grass (Annual)	40%
White (Common)	5%
Red Clover (Common)	5%

During or after seeding is complete, all areas shall be covered with 10-20-10 fertilizer at the rate of 250 pound per acre, or approximately one-half pound per

100 square feet. No watering will be required. However, after seeding and fertilization, the entire area shall be rolled with a roller of sufficient size and weight to achieve a smooth finished surface prior to mulching.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.

Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

Where the existing ground cover contains grasses such as Bermuda grass, Zoysia, etc., grasses not included in the prescribed seed mixture, the Contractor shall be responsible for cutting, removing and stockpiling the existing sod on the job site. After constructing the line and backfilling the trench, the sod shall be replaced to a condition equal to or better than that prior to construction. In the event that insufficient sod has been stored, or sod has been lost or destroyed, the Contractor shall be responsible for providing and installing new ground cover of the existing type in accord with technical specifications for "Sodding", included in these specifications, to complete the cleanup.

"Before and after" photographs shall be provided of lawns, gardens, etc. as directed by the Engineer.

1.2.2 Class II Cleanup (Fields, Meadows, etc.)

The trench shall be backfilled in accordance with the pipe specifications. After the backfill is completed and the surface over the trench left slightly rounded, the area shall be machine raked to remove all rock to a condition equal to the existing surface on the better side of the adjacent existing right of way. All excess excavated material shall be removed from the site, including excess material which has accumulated around fence post, trees, mailboxes, etc. All areas which have been disturbed, such as that caused by equipment tracks, shall be carefully backfilled and repaired as through it were a part of the actual trench excavation. Seeding and fertilizing of these areas is required using the seed mixture and application rates set out below (percent expressed in terms of weight).

Field Fescue	50%
Rye Grass (Annual)	40%
White Clover (Common)	3%
Red Clover (Common)	7%

After the area has been accepted by the Engineer, the area shall be seeded at the rate of 0.15 pounds per 100 square feet. During or after seeding is completed, all

areas shall be covered with 10-20-10 fertilizer at the rate of 250 pounds per acre, or approximately one-half pound per 100 square feet. No watering will be required. However, after seeding and fertilization, the entire area shall be rolled with a roller of sufficient size and weight to achieve a smooth finished surface prior to mulching. Where the existing field grass is Bermuda, or other type not specified above, the Contractor shall place such topsoil as required, and shall seed with the existing type grass so that an equivalent ground cover will be provided.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.

Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

1.2.3 Class III Cleanup (Steep, Wooded or Rocky Areas)

The trench shall be backfilled in accordance with the pipe specifications. After the trench backfill is complete, all damage brush of every type shall be cut just below ground surface and all damaged limbs shall be trimmed. All brush and debris shall be disposed of by the Contractor and the entire area shall be machine raked so that the area of construction is in a condition equal to the existing surface on the better side of the existing adjacent right of way.

When directed by the Engineer, the area of the trench line shall then be seeded and fertilized at the rate of 0.15 pounds per 100 square feet using the same seed mixture, fertilizer and application rates as set out under Class II Cleanup, except that tall fescue (Kentucky 31) shall be used in place of field fescue.

Straw mulch consisting of good grade clean straw, free of weeds or seed and of a quality approved by the Engineer prior to use, shall be placed over damaged and seeded areas and shall be uniformly spread so as to provide a thickness of approximately 2 inches when first spread.

Straw mulch shall be applied using an asphalt mixing blower. Asphalt shall be added to the straw in sufficient quantity to bind mulch together. Placing straw and top spraying with asphalt will not be permitted.

1.2.4 Special Cleanup

In cases where lines cross through or near to existing septic tank lateral fields, any damage caused by the Contractor to such field shall be repaired at the Contractor's expense. Where septic tank leaching fields are known to exist, they shall be brought to the Contractor's attention. This does not relieve the Contractor from

the responsibility of assuring himself there are no other private utilities in the areas of construction.

1.2.5 All Areas Disturbed by Construction

All work within the construction area shall be cleaned up to the satisfaction of the Owner and the Engineer. In general, all rocks, trash or rubbish of any nature shall be removed from the site of the work.

During construction, the Contractor shall at all times keep work areas in a clean, neat and workmanlike condition. Excess pipe, excavation, brush and materials of construction shall be removed and disposed of as the work progresses. In built-up areas, including lawns, the job site shall be cleaned up immediately behind construction. Streets and driveways blocked by excess materials after basic construction is completed will not be tolerated.

If the trench should settle while the Contractor is still on the job or within one year of the project completion date, the Contractor shall make the required repairs at his cost in accordance with the continuing responsibility provisions of these specifications.

1.2.6 Restoration of Damaged Surfaces and Property

Where any pavement, trees shrubbery, fences, poles, or other property and surface structures have been damaged, removed or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the contract documents, state laws, municipal ordinances or the specific direction of the Engineer, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor.

1.2.7 Access after Construction

Unless otherwise directed by the Engineer, all areas shall be graded after construction so as to be accessible by four wheel drive vehicle.

1.2.8 Erosion Control

The Contractor shall terrace slopes where, in the opinion of the Engineer, potential erosion problems may arise after construction.

1.3 Sodding

The work to be included in this section of the specifications shall consist of providing all materials, labor, equipment, tools, supplies and incidentals necessary for completion of sodding of areas required to replace sod disturbed by construction activities.

The Contractor shall furnish the following specified materials for work under this specification.

1.3.1 Fertilizer

Fertilizer shall be a commercial grade, uniform in composition, free flowing and suitable for application with mechanical equipment, delivered to the site in labeled containers conforming to current Arkansas Fertilizer Laws and bearing the analyses of the available nutrients which shall be 10-20-10 (nitrogen-phosphorous-potash). Fertilizer shall be applied to areas seeded at a rate of 290 pounds per acre or 0.15 pounds per 100 square feet.

1.3.2 Seed

Annual Rye grass seed for over-seeding shall be labeled in accord with current rules and regulations of the Arkansas Plant Board and shall have a minimum of 98 percent pure seed and 85 percent germination by weight and contain no noxious weed seeds.

1.3.3 Water

Water shall be of irrigation quality, free of impurities which would be detrimental to plant growth.

1.3.4 Execution

Sodding shall be installed by the Contractor as required on the plans. The areas to be sodded shall be graded as specified elsewhere in these specifications to the configuration shown by the Plans. The top 3- inches of the finished grade shall be topsoil, also as specified elsewhere in these Specifications.

Immediately prior to the placement of sod, the surface shall be scarified and have applied fertilizer as herein specified. The fertilizer shall be incorporated in the top 1 inch of the topsoil. The surface shall be moist and firm, but in an uncompacted condition at the time the sod is placed.

Sod shall be moist when placed, and shall be laid along contour lines, by hand, commencing at the lower elevation of the area to be sodded and working upward. Transverse joints of sod strips shall be staggered, and the sod strips carefully placed to produce tight joints.

At the edges of the areas to be sodded the sod shall be toed into the surface and backfilled with topsoil to provide a smooth transition from sodded areas to non-sodded areas.

The sod shall be compacted and watered as directed by the Engineer, and re-compacted after it is placed. The compaction shall be accomplished by use of a lawn roller or tamper, with care being taken to avoid damage to the sod strips.

Water shall be applied to sodded areas as directed by the Engineer for a period of three weeks.

1.4 Adjustment to Final Grade

All meter boxes, valve boxes, fire hydrants, manholes or any other water main or sewer main appurtenance shall be adjusted to match final grade.

SECTION 2 - ARKANSAS HIGHWAY CROSSINGS

2.1 General

The work to be included under this section of the specifications shall consist of providing all material, labor, equipment, tools, supplies, and incidentals necessary to bore and insert a casing pipe, or to open cut as required, existing Arkansas State and Federal Highway(s).

2.2 Materials

2.2.1 Carrier Pipe

The carrier pipe shall be in conformance to those sections of these specifications governing ductile iron and PVC sewer mains and/or water mains.

2.2.2 Casing Pipe

Unless otherwise shown on the plans, casing pipe shall be constructed by boring and inserting a casing pipe of the type and thickness, diameter and length as specified or shown on the plans.

2.3 Permit Application

All water and sewer utility construction within State or Federal Highway right-of-ways must be permitted by the Arkansas Department of Transportation (ADOT). Water and sewer improvements to be operated and maintained by Centerton Utilities must be permitted in the name of Centerton Utilities with the construction covered by Centerton Utilities standing bond. The application process shall be coordinated through Centerton Utilities. The Engineer is responsible for the preparation of the permit application with accompanying sketches/plans. The completed application shall be delivered to Centerton Utilities for review. Centerton Utilities Manager or designated representative will sign the application and transmit to ADOT. Work within highway right-ways cannot take place until a permit has been received by Centerton Utilities. A copy of the permit issued by the ADOT shall be kept on the job site at all times.

2.3.1 Bond Posted

Centerton Utilities maintains a standing bond with the Arkansas Department of Transportation.

2.3.2 Location of Utilities

The Contractor shall be responsible for the location of all utility lines situated within the area of construction.

2.3.3 Traffic Control

It shall be the responsibility of the Contractor to provide sufficient flagmen, signs, barricades, lights and other items required to insure complete safety of the public and the workmen at all times.

Traffic control on state or federal highways shall be conducted and maintained as set forth in the manual on Uniform Traffic Control Devices as published by the U. S. Department of Transportation, Federal Highway Administration.

2.3.4 Borings

The crossing shall be made by boring or tunneling and inserting a casing pipe. The top of the casing pipe shall be a minimum of 4.0-feet below the low points of the roadbed cross-section (including ditches) or 4.0 feet below the top of the pavement at any location along the casing pipe, whichever gives the greater depth. If rock is encountered and all available means of the crossings by boring or tunneling have been exhausted, the Engineer will make application to the Arkansas Department of Transportation to make the installation by the open cut method.

2.3.5 Open Cut

If approval to open cut is received, the Contractor shall proceed with the installation in full accordance with all provisions and special conditions set forth by the Arkansas State Highway and Transportation Department. Any cost of deposits or bonds above and beyond Centerton Utilities's standard standing bond for open cutting shall be borne by the Contractor. Since the return of the deposit required by ADOT depends upon returning the roadbed to its original or better condition, The Contractor will be required to complete this item of construction to the satisfaction of the ADOT.

2.3.6 Restoration of Property

Any highway property disturbed by the installation of the facility shall be restored to its original or equivalent condition including establishing sod as required by the ADOT District Engineer.

SECTION 3 - STREET AND COUNTY ROAD CROSSINGS

3.1. General

This item shall consist of obtaining permits and posting bonds and/or deposits which may be required by the City of Centerton, other municipality or Benton County, and providing all labor, equipment, tools, supplies and incidentals necessary for the crossing (bore), maintaining and restoring streets and roads to the satisfaction of the permitting entity. The work shall include every item of work necessary for a complete and acceptable installation.

3.2. County Road Permits

Centerton Utilities maintains a standing bond with the Benton County Road Department (BCRD). All water and sewer utility construction within Benton County road right-of-ways must be permitted by the Benton County Road Department. All water and sewer construction to be operated and maintained by Centerton Utilities must be permitted in the name of Centerton Utilities with the construction covered by Centerton Utilities's standing bond. The application process shall be coordinated through Centerton Utilities. The Engineer is responsible for the preparation of the permit application with accompanying sketches/plans. The completed application shall be delivered to Centerton Utilities for review. Centerton Utilities Manager or designated representative will sign the application and transmit to BCRD. Work within county road right-of-ways cannot take place until a permit has been received by Centerton Utilities. A copy of the permit issued by the BCRD shall be kept on the job site at all times.

3.3. Pavement Repair Determined by Governing Authority

All permanent repairs of streets, roads, alleys, sidewalks, or other public rights-of-way shall meet with the construction requirements of the governing authority or private owner and shall also meet the requirements of all local Ordinances, Regulations, Permits, or Codes governing such repairs. Permanent repairs shall be constructed as soon as practically possible after water and/or sewer construction is completed.

3.4 Pavement Repairs to be Made With Concrete

All pavement repairs shall be made with concrete except when the governing authority or private owner dictates otherwise. The width of the repair shall be equal to the pipe line trench width plus 18-inches on each side of the trench. The repair shall be made with 3000 psi concrete. The repair shall be a minimum of 8-inches thick or match the thickness of the existing pavement if greater than 8-inches. The concrete repair shall include 6x6 W2.9/W2.9 welded wire mesh vertically centered in the concrete.

3.5. Service Crossings

Service Crossings of all existing roads whether private / public or dirt / asphalt / concrete shall be bored and not "cut" to cross the road to the main side of the road.

3.6. Referenced Materials and Construction

The following specifications are hereby referenced and made a part of these specifications. The specifications are contained in the 'Standard Specifications for Highway Construction' latest edition, published by the Arkansas Department of Transportation. These specifications are available on-line, or may be obtained from the Arkansas Department of Transportation.

3.7. Execution

Centerton Utilities shall obtain permits for work in State and federal highway right-of-ways and county road right-of-ways. The Contractor shall obtain all other permits, and post required and/or deposits with the permitting entity. Street crossings in the City of Centerton shall be performed in accordance with City of Centerton.

The Contractor shall provide and maintain during his construction activities adequate barricades, construction signs, torches, lanterns and guards as required to protect persons from injury and to avoid property damage. All materials pipes, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences and/or barricades and shall be protected by adequate torches and lanterns. Execution of adequate safety precautions set forth in these specifications is the sole responsibility of the Contractor.

The Contractor shall carry on the work in manner which will cause the least interruption to traffic, and may close to through travel not more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways.

The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for a proper maintenance of traffic.

All areas excavated for the construction of sewer line, force mains and water lines and appurtenances within city streets and/or county roads shall have bedding, pipe protection cover and backfill placed as specified elsewhere in these specifications.

All unpaved driving surfaces shall be replaced with Class 7 crushed stone base as specified elsewhere in these specifications and as shown on plans details. Crushed stone base (Class 7) shall be placed and compacted to 95 percent of modified proctor density (ASTM D 1557-78), as shown on the plans detail.

All street and county road right-of-ways disturbed by water construction and /or sewer construction shall be restored to their original or equivalent condition as required by the governing authority.

SECTION 4 - CREEK CROSSINGS

4.1 General

The work to be included under this section of the specifications shall consist of providing all

materials, labor, equipment, supplies and incidentals necessary for the construction sewers, force mains and water lines crossing creeks as shown on the plans.

4.2 Permit Application

When open cut wet crossings are proposed applications for a Corps of Engineers Section 404 permit and ADEQ Short Term Activity Authorization permit are required. The Contractor will be responsible for compliance with the terms of the permits as issued. This may include the restriction of construction activity to certain times of the year as well as the quantity of fill which may be placed in the creek during construction.

4.3 Materials

4.3.1 Restrained Joint Pipe

Restrained joint pipe shall be as specified by the Engineer.

4.3.2 Concrete

Concrete for pipe encasement shall be as specified elsewhere in these specifications.

4.4. Construction

Creek crossings shall be made at the locations shown on the plans and shall be made in conformance to these plans and specifications.

4.4.1 General.

The creek crossings shall generally consist of excavating the trench to a depth of approximately 7-feet below the stream bed or to solid rock prior to laying any pipe. From this information, the Engineer will determine cover necessary and using this information, compute grade for the pipe. The depth of bury may vary depending on actual conditions. Centerton Utilities may require the installation of valves on both sides of the creek crossing and a leak detection meter assembly if the normal sustained water surface width exceeds 15-feet.

4.4.2 Excavation.

The pipe shall be laid with 5 feet cover if no rock is encountered in the excavation. However, if rock is encountered in the excavation, the pipe shall be laid with the crown 2 feet below the top of the rock.

4.4.3 Placement of the Pipe.

Mechanical joint pipe may be installed by pulling or other method recommended

by the pipe manufacturer and approved by the Engineer. In any event, the allowable tensile stresses induced in the pipe shall not exceed limits recommended by the pipe manufacturer. If the pipe is pulled, the pipe manufacturer shall provide closure pieces with cable eyes as required.

SECTION 5 - PAVED SURFACE REPAIR

5.1 General

The work to be included under this section of the specifications shall consist of providing all labor, equipment, tools, supplies, and the incidentals necessary for the repair of driving surfaces, curb and gutter, and sidewalks. This specification is intended for any driving surface, paved or unpaved, including but not limited to streets, roads, driveways, and parking lots.

This specification does not apply to state or interstate highways or driving surfaces within railroad rights of way unless otherwise directed by the Engineer.

5.2 ADOT Specifications Inclusion by Reference

The latest edition of “Standard Specifications for Highway Construction”, published by the Arkansas Department of Transportation are hereby referenced and made a part of these specifications.

These specifications are available on-line, or may be obtained from the Arkansas Department of Transportation.

5.3 Temporary Repair

As soon as excavations in paved surfaces are backfilled temporary driving surfaces shall be placed and maintained in good drivable condition until permanent pavement repairs are constructed. Temporary paved driving surface shall consist of compacted asphalt concrete cold plant mix of the same thickness as the proposed permanent repair. Temporary pavement repairs shall be maintained as required to facilitate traffic and not impede drainage. Temporary pavement repairs of any other description and/or construction must be approved by the Engineer and Centerton Utilities.

5.4 Permanent Repair

All permanent repairs of streets, roads, alleys, sidewalks, driveways or other public rights-of-way shall meet the construction requirements of the governing authority or private owner and shall also meet with the requirements of all local Ordinances, Regulations, Permits, or Codes governing said repairs. See Standard Details for pavement repair in the Appendix.

Permanent repairs shall be constructed as soon as practically possible after water and/or sewer construction is completed. Pavement repairs shall be made with concrete unless dictated otherwise by the governing authority or property owner. The width of the repair shall be equal to

the pipe line trench width plus 18-inches on each side of the trench or all sides of the excavation. The repair shall be made with a minimum of 8" thick 3000 psi concrete with six percent entrained air and shall include 6x6 W2.9/W2.9 welded wire mesh centered vertically in the repair. The repair thickness shall match the thickness of the existing pavement if it is thicker than 8-inches.

5.5 Pavement Repair Materials

5.5.1 Concrete

Concrete shall be as specified elsewhere in these specifications.

5.5.2 Prime Coat.

Prime coat material shall be Grade MC-30 as stated in the Arkansas Department of Transportation Standard Specifications.

5.5.3 Tack Coat.

Tack coat material shall be Grade SS-1, as set forth in the Arkansas Department of Transportation Standard Specifications.

5.5.4 Hot-Mixed, Hot-Laid Asphaltic Concrete.

The hot-mix asphalt surface course shall conform in composition and to weights and gradation of Type 2 asphalt as set forth in the Arkansas Department of Transportation Standard Specifications, using asphalt cement viscosity grade AC-30.

5.5.5 Crushed Stone Base.

Crushed stone base shall be as specified elsewhere in these specifications. The Contractor shall submit suppliers' certificates stating that the materials provided are in conformance with these specifications.

5.5.6 Curb and Gutter Joint Sealer.

Curb and gutter joint sealer shall be Type 1, Type 2, or Type 3 in accordance with the Arkansas Department of Transportation Standard Specifications.

5.6 Construction

5.6.1 Pavement Removal, Pipe Protection Cover and Backfill.

The pavement shall be removed, pipe protection cover placed, and trench backfilled in accordance with the pipe specifications according to the type of pipe

being installed.

All pavements which have been removed or damaged shall be repaired in accordance with these specifications.

5.6.2 Asphaltic Pavement Repair.

After the trench has been backfilled and compacted, as specified elsewhere in these specifications, permanent repair shall be made as follows. The existing pavement shall be saw-cut and removed to a point 18 inches beyond the trench line limits, or as directed by the Engineer, and brought to grade 6 inches below the top of the existing pavement. This area shall then be resurfaced by applying asphaltic cement prime coat at the rate of 0.25 gallon/square yard, followed by a minimum course of hot-mixed, hot-laid asphaltic concrete of thickness as shown on the plans detail, laid to an elevation matching the existing finished grade. The hot-mixed, hot-laid asphaltic concrete shall be compacted to 92 percent of theoretical density.

One nuclear density meter test per asphaltic patch or repair shall be performed. The cost of determining the compacted density shall be at the expense of the Contractor. Any unacceptable patch or repair shall be re-compacted and re-tested at the Contractor's expense.

5.6.3 Unpaved Driving Surface Repair.

After the trench has been backfilled and compacted as specified elsewhere in these specifications, the surface shall be brought to the existing grade with additional compacted Class 7 crushed stone base.

5.6.4 Barricades, Guards and Safety Provisions.

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the roadway. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. Execution of all safety precautions previously set forth in these specifications is the sole responsibility of the Contractor.

5.6.5 Maintenance of Traffic and Closing of Streets

The Contractor shall carry on the work in a manner which will cause the least interruption to traffic, and may close to through travel not more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways.

The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for a proper maintenance of traffic.

5.6.6 Piling Excavated Material for Reuse

All excavated material which is to be reused shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.

5.6.7 Removal of Excess Material

All excess excavated material shall be loaded in trucks during the excavating operation, hauled from the job site, and disposed of at the option of the Contractor.

5.6.8 Cleanup

Cleanup of areas behind the curb and gutter and around sidewalks shall be as specified elsewhere in the specifications.

SECTION 6 - DUMPED STONE RIPRAP

6.1 General

The work to be included under this section shall consist of providing all materials, labor equipment, tools and supplies and incidentals necessary to construct riprap bank stabilization where required as shown on the plans.

6.2 Materials

6.2.1 Riprap

Material for dumped stone riprap shall be from a quarry source approved by the Engineer. Material for dumped stone riprap shall be reasonably free from overburden spoil and reasonably well graded between the maximum and minimum rock piece sizes specified. Based on any one hauling unit shipment or delivery, the maximum piece size shall be not greater than 18 inches in any dimension and at least 50 percent of the material by weight shall consist of pieces weighing 35 pounds or more. Dirt or fines passing a ½ inch sieve accumulated from quarrying or loading operations shall not exceed five percent of the total weight.

6.2.2 Filter Blanket

Filter blanket shall be Class 7 stone base as specified elsewhere in these specifications.

6.3 Execution

6.3.1 Sub-Grade

The pipe backfill shall be constructed as specified elsewhere in these specifications. The toe trenches shall be excavated directed by the Engineer. The sub-grade shall be stripped of vegetation and smoothed to conform to the general shape of the stream bank prior to construction activities.

6.3.2 Filter Blanket

The filter blanket material shall be spread uniformly to the thickness required by the Engineer. Placement of the filter blanket shall be by a method which will prevent damage to the sub-grade and which will prevent segregation of the filter blanket material. Compaction of the filter blanket will not be required. However, it shall be finished to a smooth surface of uniform depth.

6.3.3 Dumped Stone Riprap

This term shall consist of a protective layer of riprap placed in accordance with these specifications and to the thickness, line grade and location shown on the plans or as directed by the Engineer. Dumped stone riprap shall be placed in such a manner as to produce a reasonably well graded, smooth surface mass of rock with the minimum practicable percentage of voids, and shall be constructed to the lines and grades as directed by the Engineer. Material shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing the underlying material. Placing dumped riprap in layers will not be permitted. The larger stones shall be well distributed and the entire mass of stones shall be roughly graded to conform to the gradation specified. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand-placing to a limited extent may be required but only to the extent necessary to secure the results specified immediately above. Placing riprap by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. Particular care shall be exercised by the Contractor to restore the area where rock is stockpiled to pre-construction conditions. These areas shall be cleaned up and seeded as specified elsewhere in these specifications for pipeline cleanup and seeding.

6.3.4 Backfill of Toe Trenches

After the riprap placement is completed, the toe trenches shall be backfilled and

cleaned up and seeded as specified elsewhere in these specifications for pipeline cleanup and seeding.

SECTION 7 – FENCE CONSTRUCTION & REPAIR

7.1 General

The work to be included under this section of the specifications shall consist of providing all materials, labor, equipment, tools, supplies and incidentals necessary for the construction or repair of existing fences affected by construction. The work shall include every item of construction necessary for a complete and acceptable installation as shown on the plans and hereinafter specified.

7.2 Yard Fence Materials and Construction

Repair/replacement of yard fencing shall be made with all new materials and construction matching the existing fence as nearly as possible. Differences in materials or construction must be approved by Centerton Utilities.

7.3 Farm Fence Materials and Construction

Unless otherwise required by these specifications, all farm type fences shall be five strand barbed wire, steel “T” post and treated wood corner and brace posts.

7.3.1 Posts

All corner and brace post assemblies shall be constructed of treated wood, first quality, and of such length that they may be embedded in concrete to a depth not less than 30 inches. All line post shall be metal “T” posts.

7.3.1.1 End, Corner, Brace Assembly and Gate Posts

Posts shall be 6 inches minimum diameter, 7 feet in length, creosoted or pressure treated Grade A southern yellow pine. Cross brace post shall be 4 inches minimum diameter.

7.3.1.2 Line Post

Line posts shall be 1-1/4 inches by 1-1/4 inches by 5 feet 6 inches minimum length painted steel “T” type posts. Minimum weight per foot shall be 1.44 pounds. All “T” posts used at one location shall be the same color and same brand.

7.3.2 Wire

Barbed wire shall be used in all locations unless specific requirements call for other

types of wire.

7.3.2.1 Barbed Wire

Barbed wire shall be zinc coated, two strand twisted No. 12-1/2 ASW gauge galvanized steel wire with four point barbs of No. 14 ASW gauge galvanized steel wire. Wire shall conform to Federal Specifications FF-F-221, Type A.

7.3.2.2 Bracing wire

Bracing wire shall be smooth No. 9 gauge galvanized soft wire and shall be zinc coated.

7.3.2.3 Staples

Staples shall be No. 9 galvanized steel wire and shall be 1-1/2 inches long.

7.3.3 Gates.

Gates shall be constructed to the height and width as shown on the plans. Perimeter framework shall be 1-1/2 inches in diameter, Schedule 40 black pipe with all joints welded. Interior horizontal members shall 3/4 inch diameter, Schedule 40 black pipe with vertical braces of 3/16 inch x 2 inch steel straps welded to each member as shown on the plans. Gates shall be primed with a rust-inhibiting primer and shall be painted as set out elsewhere in these specifications. Color will be selected by Centerton Utilities or its representative. Each installation of a farm gate alone shall be furnished with a single 42 inch length of 5/16 inch steel chain with the chain attached to the post by means of 3 inch x 1/4 inch lag screw. All padlocks will be provided by Centerton Utilities.

7.3.4 Concrete.

Where specified or shown on the plans, all concrete shall conform to requirements as set out elsewhere in these specifications.

SECTION 8 - BACKFILL DENSITY TESTS

8.1 Description

This section covers the testing of backfill around newly constructed manholes, water and sewer lines, service lines, and other structures to insure proper fill and compaction.

8.2 Requirements

Backfilling of pipelines shall include the refilling and consolidation (compaction) of the fill in the

excavation up to the surrounding ground surface. In unpaved areas pipeline trench backfill shall be placed in layers of appropriate thickness not to exceed 24" and compacted by hand or approved mechanical methods. Trench backfill of unpaved areas shall be compacted to a minimum density of 85% of the Standard Proctor density of the adjacent undisturbed soil as determined in accordance with ASTM D6938.

Unless dictated otherwise by a governing authority or property owner, trenches in existing or proposed roads, streets and other paved areas shall be entirely backfilled with Class 67 crushed stone.

When a governing authority or property owner dictates trench backfill for paved areas with AHTD Class 7 crushed stone, the entire trench up to a point 2-feet below existing or proposed subgrade shall be backfilled and compacted to 90 percent Modified Proctor Density as determined by AASHTO T-180. The remaining 2-feet shall be backfilled with AHTD class 7 placed in 6-inch lifts and compacted to 95% Modified Proctor Density as determined by AASHTO T-180. Density shall be verified in the field by the use of a calibrated nuclear density gauge, with a minimum of three tests per project, or 1 per 100 feet, whichever is greater.

8.3 Method of Testing

8.3.1 Moisture Density Relation

The moisture density relations of material shall be determined in the laboratory in accordance with AASHTO Designation T-99 or Designation T-180, as specified.

8.3.2 Field Density

Field density of backfill shall be determined in accordance with ASTM D6938.

SECTION 9 - CONCRETE AND REINFORCING STEEL

9.1 Description

This section covers the construction methods for concrete and reinforcing steel. All material shall conform to the requirements of this Section - Concrete and Reinforcing Steel.

9.2 Pre-Cast Concrete Structures

Pre-cast concrete structures are not allowed and shall not be installed for any potable water or sanitary sewer construction.

9.3 Ready-Mix Concrete

All concrete for poured-in-place manholes and other structural applications shall be ready-mixed concrete. Ready-mixed concrete shall conform to ASTM Standard D 94 and to applicable portions of these specifications for on-site mixing. The concrete shall be delivered and placed within one hour after all materials, including mixing water, shall have been placed in the mixing

drum. Each batch shall be accompanied by a load ticket and with a copy for the inspector showing the concrete type, mixing proportions, and time mixing began.

9.4 Reinforcing Steel

Steel reinforcing shall be free from rust, scale, and from mortar, dirt, or other objectionable coatings. It shall be placed accurately in accordance with details shown on the plans and properly secured in position.

9.5 Vibration

All structural concrete must be vibrated as it is placed. The use of form vibrators is not acceptable. Internal vibrators shall be capable of transmitting vibration to the concrete at frequencies not less than 4,500 impulses per minute. Duration of vibration shall be limited to the time necessary to provide satisfactory consolidation without causing segregation. The vibrator shall not be inserted into the lower courses previously vibrated. Vibrators shall be applied in a substantially vertical position and at uniformly spaced points not further apart than the visible effectiveness of the vibrator. Vibration shall be supplemented by such spading as the Engineer may require. The slump of concrete shall be the minimum that is practical. When vibration is used to consolidate the concrete, the slump shall not exceed 4".

9.6 Application of Structural Concrete Other Than Manholes

Utilization of reinforced or non-reinforced concrete for structural uses other than poured-in-place manholes shall be subject to individual design and specification of the responsible Engineer to meet the specific needs of the project. Design and specification shall be in keeping with current engineering practice, applicable codes of practice, and subject to the review and approval of Centerton Utilities.

SECTION 10 - CONCRETE TESTING

10.1 Description

This section covers the testing of concrete used in the construction of sanitary sewer manholes and other concrete structures.

10.2 Testing Requirements

10.2.1 Composite Samples

Composite samples shall be taken in accordance with ASTM C172, (Standard Method of Sampling Fresh Concrete).

10.2.2 Number of Test Cylinders Required

Mold and laboratory cure three test cylinders from each test required in

accordance with ANSI/ASTM C31, (Standard Method of Making and Curing Concrete Tests Specimens in the Field).

10.2.3 Tests Required

Test the specimens in accordance with ANSI/ASTM C39, (Standard Test Method for Compressive Strength of Concrete Specimens). One cylinder shall be tested at 7 days and the remaining two cylinders shall be tested at 28 days.

10.2.4 Slump

The slump of the normal-weight concrete sample for each strength test shall be determined in accordance with ANSI/ASTM C143, (Standard Test Method for Slump of Portland Cement concrete).

10.3 Acceptance

Should the test cylinders fail at less than the specified concrete strength, the Contractor shall reconstruct the concrete structure at his cost. The Contractor shall then be responsible for the expenses involved in re-testing the concrete.

10.4 Routine Testing

Testing will be required on all job sites where 50 cubic yards of cement are placed or as directed by the Engineer. The cost of all testing made at the request of Centerton Utilities will be borne by the Contractor. The Engineer shall furnish Centerton Utilities copies of any and all concrete testing performed by the Engineer or his representative during the course of the work.

SECTION 11 – ENCASEMENT PIPE

11.1 Steel Encasement Pipe

Steel encasement pipe shall be of the dimensions as shown in the Standard Details. The pipe shall be new smooth wall pipe with beveled ends. Unless otherwise required by Centerton Utilities the minimum wall thickness of steel encasement pipe shall be 0.25-inches. Greater wall thicknesses may be required dependent on depth of installation, structural loading and installation circumstance.

The encasement pipe steel shall have 35,000-psi minimum yield strength. The pipe shall conform to ASTM A-53 / ASTM A283 / ASTM A-135, Grade B, CW, physical tests only (hydrostatic test not required). A letter of compliance from the manufacturer shall be supplied upon request.

All pipe less than or equal to 24-inch diameter shall be Type E (electric-resistance welded, Grade B) or Type S (seamless, Grade B). All pipe greater than or equal to 26-inch diameter shall be Type E (electric-resistance welded, Grade B) or Type S (seamless, Grade B) or Rolled Plate

(straight seam, Grade B material) or Spiral Welded. Rolled plate pipe shall have only one longitudinal seam per section; sections shall be no shorter than 96-inches long except one short piece will be allowed to complete a specified installation length.

11.2 PVC Encasement Pipe

Any use of PVC encasement must be specifically approved by Centerton Utilities. PVC Encasement pipe may be used for small diameter (4-inch or smaller) pressure main open cut crossings of gravel roads, parking areas and creeks. All PVC encasement pipe shall conform to the polyvinyl chloride pipe specifications contained in these specifications. PVC encasement pipe shall be, SDR 17 Pressure Class 250 or C900 DR 18 with the same diameters as required for steel encasement as shown in the standard details.

11.3 Casing Spacers

Casing Spacers will be required on water pipes two (2) inches and larger, sewer force mains and gravity sewer pipe. The spacers shall be fusion bonded epoxy coated carbon steel or T-304 stainless steel casing spacers Model SI or SSI as manufactured by Advance Products and Systems, Inc., of Lafayette, Louisiana, or approved equal.

11.4 Restrained Joint Pipe

Manufactured restrained joint pipe shall be required for all water main and force main carrier pipe installed within encasement pipe.

PART 5 – SANITARY SEWER PUMP STATIONS

SECTION 1 - GENERAL REQUIREMENTS

1.1 General

This Section pertains to general requirements for the design and construction of submersible pump sewage pump stations.

1.2 Design by Engineer

The sewage pump station shall be designed by a Professional Engineer licensed by the state of Arkansas.

1.3 Minimum Requirements

Pump stations requirements presented herein are general in nature and are the minimum necessary design and operation conditions acceptable to Centerton Utilities. Any proposed alteration of pump station design, construction and operation from the standards set forth herein must be approved by Centerton Utilities before construction can begin.

1.4 Submersible Pumps Required

Submersible pumps shall be used. Each pump station shall be equipped with at least two pumps. The pumps shall run in an alternating lead-lag operation scenario. A third pump complete and ready to be installed and run shall be supplied to Centerton Utilities. Each pump shall be capable of handling normal flow conditions. Each pump station shall include cast-in-place concrete wetwell, separate cast-in-place concrete valve vault, valves, piping, hatches, guide rails, pump removal components, control panel, level controls, connection to Centerton Utilities SCADA system, interconnecting electrical wiring, incoming power supply, and all other features regularly and normally required as a part of a complete and functional facility. All work shall be in accordance with site requirements, details in the Drawings, these Standards and the equipment manufacturer's recommendations.

1.5 Electrical Voltage Requirement

All Pump Stations shall be designed for and operate at voltage and phase configuration acceptable to Centerton Utilities. Generally pump stations with 25 horsepower or larger pumps shall be designed and constructed for 480 V, three (3) phase power. No deviation from this requirement shall be permitted without the express prior written approval of Centerton Utilities. Costs for electrical extensions or upgrades must be borne by the developer.

1.6 Electric Power Coordination

Pump motors must be specified to operate at voltages available from the electric power company providing service as acceptable to Centerton Utilities.

1.7 SCADA System Connection

The station shall be equipped to be connected to Centerton Utilities SCADA system to allow monitoring and control of all pump station functions. The equipment necessary to make the connection to the SCADA system including possible software upgrades shall be purchased and installed by Centerton Utilities at the developer's or contractor's expense.

1.8 Sole Source Provision of Equipment

All of the mechanical and electrical equipment shall be an integral package provided by one supplier whether the pump manufacturer and/or manufacturer's local vender or other representative so as to provide undivided responsibility. Centerton Utilities reserves the right to reject any and all proposed pump station equipment as well as the right to require specific equipment brands and pump station construction.

1.9 Submittals

Three (3) sets of shop drawings, detailed specifications, pump warranty, and performance characteristics for all of the equipment and fixtures to be furnished and installed shall be submitted to Centerton Utilities for review and approval. The Shop Drawings and equipment data shall be submitted with a cover letter, Contractor's stamp of approval, and Engineer's stamp of approval indicating that he has reviewed, checked, and approved the data submitted. Centerton Utilities will review the submittal and render a decision in writing as to the acceptability of the equipment. Without prior written Centerton Utilities approval, the item of work may not be accepted.

1.10 Exceptions to Requirements

Any exceptions to this Standard or associated approved Plans shall be submitted in writing and clearly stated. The exceptions must be approved by Centerton Utilities prior to proceeding with the work.

1.11 Stainless Steel Hardware

All mounting and fastening hardware shall be stainless steel.

1.12 Weather Exposure

All components of the pump station that are exposed to weather shall be constructed of material that is resistant to corrosion and will not require surface protection throughout the expected life of the lift station. In general, these materials are stainless steel, aluminum, fiberglass reinforced polyester (FRP), and ultraviolet stabilized PVC.

1.13 Epoxy Coating

All valves and ductile iron fittings shall be epoxy coated inside and out. All ductile iron piping coming in contact with wastewater or installed in the wet well, dry well or valve pit shall be coated with epoxy inside and out. Acceptable interior epoxy for ductile iron pipe shall be Protecto 401, or approved equal. Acceptable field applied exterior coating of ductile iron pipe shall be Raven 405, or approved equal. All stainless steel hardware and accessories shall be protected from field applied coating of the epoxy.

SECTION 2 - PUMP STATION SITE

2.1 Site Area, Grading and Surface

The pump station site shall have area sufficient to allow Centerton Utilities to operate and maintain the pump station. The area required shall be determined by Centerton Utilities depending on the diameter and depth of the wet well, other equipment, operating conditions and any extenuating circumstances. Maximum slope across the site shall be no greater than 5% in any direction. As a minimum the entire pump station site shall be surfaced with 12-inches of compacted crushed stone. If deemed necessary Centerton Utilities may require that the entire site be surfaced with asphalt or concrete pavements.

2.2 Access Drive

The pump station shall be provided with a 10-foot wide access drive to the nearest public road and right-of-way. The access drive shall be constructed and surfaced in the same manner as the pump station site.

2.3 Site Ownership

The pump station site shall be deeded to Centerton Utilities. The deeded property shall include the access to the site from the public right-of-way. The access shall be a minimum of 15-foot wide.

2.4 Site Fencing

The pump station site shall be secured by a minimum 6' high wooden fence. Posts shall be a minimum of 3" SCH 40 galvanized steel. Gate posts shall be a minimum of 4" SCH 40 galvanized steel. Rails shall be 16-gauge galvanized steel, 2" x 4" nominal dimensions. Pressure treated wood shall be installed in the rails to anchor the pickets. All pickets shall be constructed of cedar or treated pine, and shall be a minimum of 1"x6"x6'. All hardware used to anchor the pickets to the steel rails shall be designated for use with cedar and treated lumber. A 12' wide double gate with lockable hasp shall be provided. A 3' wide man gate with lockable hasp shall be provided.

SECTION 3 - WETWELL SIZING

3.1 Wetwell Diameter

Wetwell diameter shall be sufficient to allow placement of all pumps and equipment and to allow efficient pump operation. Minimum allowable diameter is 6-feet.

3.2 Wetwell Depth

The wetwell depth shall be sufficient to provide a volume above the low water pump cutoff level equal to the combined pumping rate for two pumps running simultaneously for 10-minutes of run time plus 1-foot of additional depth below the lowest pipe invert discharging into the wetwell.

3.3 Structural Dimensions

The thickness of the wetwell bottom, sides and top shall be large enough in conjunction with steel reinforcement to withstand all forces that may come to bear on the wetwell. The weight of the concrete for all parts of the empty wetwell must be large enough to overcome the buoyant force with a safety factor of 1.5.

3.4 Operational Levels

Pump on and off levels and alarm levels shall be calculated by the design Engineer but are subject to change by Centerton Utilities.

3.5 Level Sensors

The pump station shall be equipped with pressure transducers and backup float switch system for measuring water levels and controlling lift station functions.

SECTION 4 - PUMP STATION WARRANTY

Pump station warranty shall be two (2) years from the date of acceptance per Centerton Utilities maintenance bond requirements.

SECTION 5 – PUMP STATION EQUIPMENT

5.1 Pumps

Pumps shall be of the submersible type for handling raw unscreened sewage. Pump volute, motor and seal housing are to be high quality gray cast iron. Impeller shall be either cast iron or cast bronze of a non-clog design capable of handling minimum three (3) inch

sphere solids, fibrous material, heavy sludge, and other matter found in normal sewage applications. Impeller shall have pump-out vanes on the back shroud of the impeller to keep pumped material away from the seal area and increase operating life. Impeller shall be either slip fit or taper fit with key to securely lock the impeller to the driving shaft. The pump volute shall be fit with a replaceable bronze wear ring to minimize wear on the impeller and help achieve longer balanced operating life. All fasteners shall be of stainless steel.

5.2 Pump Mating Surfaces

All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber O-rings. Sealing shall be accomplished when metal-to-metal contact is made, resulting in controlled compression of the rubber O-rings without requirement of a specific torque limit.

5.3 Pump Shaft Seals

The pump shall be provided with a mechanical rotating shaft seal system running in an oil reservoir having separate, constantly lubricated lapped seal faces. The lower seal unit between the pump and oil chamber shall consist of one (1) stationary seat and one (1) rotating ring held in place by its own spring. The lower seal shall be removable without disassembling the seal chamber. The upper seal between the motor and the seal chamber shall be of the same design with its own separate spring system. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable. The shaft sealing system shall be capable of operating submerged to pressures equivalent to two hundred (200) feet. No seal damage shall result from operating the pump unit out of its liquid environment. The seal system shall not rely upon the pumped media for lubrication.

5.4 Seal Chamber

The seal chamber shall also be equipped with a seal failure sensor probe which will sense water intrusion through the lower seal. This sensor is to be connected to an alarm in the control panel to indicate lower seal failure.

5.5 Pump Motor Construction

The stator winding, rotor and bearings are to be mounted in sealed submersible type housing. Insulation utilized in the stator windings shall be Class F with maximum temperature capability of 155°C. Motor housing shall be filled with a high dielectric oil to give superior heat transfer and allow the bearing to run in a clean, well lubricated environment; or the housing shall be air filled with grease lubricated bearings. The pump and motor are to be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets. Stator shall be securely held in place with a removable end ring and threaded fasteners so that it may be easily removed in the field without use of heat or press. Shaft shall be of stainless steel and supported by ball bearings. Heat sensing units attached to the motor windings shall be provided and connected to the control panel to shut down pump if overheating occurs.

5.6 Pump Cables

Pump motor cable and heat sensor/seal failure sensor cable shall be suitable for submersible pump applications and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors and shall be of adequate size to allow motor voltage conversion without replacing the cable. Cable of the proper length shall be provided to eliminate need for splices or junction boxes between pump and "control panel". There shall be no power or control cable junctions or splices inside of wet wells. The cable shall enter the motor through a cord cap assembly which is double sealed allowing disassembly and disconnect of the wires and the motor and still not damage the sealed characteristics of the motor housing. Each individual conductor shall be color coded in accordance with generally accepted industry standards. The color coding shall designate the application of the conductor.

5.7 Pump Mounting Base

The pump mounting base shall include adjustable guide rail supports and a discharge connection with a one hundred twenty-five (125) pound standard flange. The base and the discharge piping shall be permanently mounted in place. The base plates shall be anchored in place utilizing epoxy type anchors with stainless steel studs and nuts as manufactured by HILTI Fasteners, Inc. or equal.

5.8 Pump Rails

A rail system shall be provided for easy removal of the pump and motor assembly for inspection and service. The system shall not require a man to enter the wetwell to remove the pump and motor assembly. Two (2) rails of two (2) inch stainless steel pipe shall be provided for each pump. The guide rails shall be positioned and supported by the pump mounting base. The guide rails shall be aligned vertically and supported at the top by attachment to the access hatch frame. One (1) intermediate guide rail support is required for each fifteen (15) feet of guide rail length for stainless steel pipe.

5.9 Pump Rail Guides

The pumps shall be equipped with sliding brackets or rail guides. To insure easy removal of the pumps, the rail guides attached to each pump shall not encircle the rails. A stainless steel lifting chain or manufacturer's pump removal system of adequate length for the basin depth shall be provided for each pump. Each pump shall be equipped with a permanent, stationary lifting bail or lifting handle with a minimum clearance of 12" between the top of pump and bottom of handle.

5.10 Pump Rail Alignment

The rails and the rail guides shall function to allow the complete weight of the pumping unit to be lifted on dead center without binding and stressing the pump housing. The rail system shall function to automatically align the pumping unit to the discharge connection by

a simple downward movement of the pump. No twisting or angle approach will be considered acceptable. The actual sealing of the discharge interface must be metal-to-metal contact. No sealing gaskets will be permitted.

5.11 Pump Warranty

Pump warranty shall be provided by the pump manufacturer and shall warrant the units being supplied to the Owner against defects in workmanship and materials for a period of five (5) years under normal use, operation and service. The warranty shall be in printed form and apply to all similar units. A copy of the warranty statement shall be submitted with the approval drawings.

SECTION 6 - WETWELL, VALVE PIT AND ACCESSORIES

6.1 Cast-in-Place Concrete Construction

The basin and valve pit are to be constructed of cast-in-place concrete. Minimum valve vault and wetwell diameter shall be 6'-0". The basin, valve pit, flat tops, and base slabs shall be constructed of cast-in-place reinforced concrete. All joints between the wetwell bottom, walls and subsequent wall pours shall be constructed with water stops and formed key ways. Pipe penetrations through wetwell walls shall be constructed with pipe water stops. The actual arrangement of the structures is to be as shown in the approved Plans.

6.2 Wetwell Vent

The wetwell basin top shall be provided with a six (6) inch stainless steel vent having a downward pointing inlet with insect screen over the inlet opening. Vents through wetwell walls are not allowed.

6.3 Finish Grade

The elevations of the top slabs for wetwell and valve vault shall be at least 6-inches above surrounding grade.

6.4 Interior Surface Coating

All concrete surfaces within the wet well shall be coated with one of the products listed below. These products shall only be applied by personnel thoroughly familiar with handling of the coating material, and in accordance with the manufacturer's specifications, recommendations and requirements.

6.4.1 Acceptable Coating Products

Raven Ultra High-Build Epoxy Coating, designated as Raven 405, with an average thickness of 100 mils and a minimum thickness of 80 mils.

Warren Environmental Systems, designated as S-301, with an average thickness of 100 mils and a minimum thickness of 80 mils.

6.4.2 Minimum Requirements

All epoxies shall meet the following minimum requirements:

Flexural Strength	ASTM D790	6,000 psi
Compressive Strength	ASTM D695	8,000 psi
Tensile Strength	ASTM D638	4,000 psi
Tensile Elongation	ASTM D638	4%
Adhesion	ASTM D4541	Concrete Substrate Failure

6.5 Wetwell Aluminum Access Hatch

Aluminum access hatch frame and door assembly(ies) with safety grating assembly are to be supplied and installed in the wetwell top. The size, number and installation configuration of the access hatches shall be determined by the size, number and installation configuration of the pumps. The access hatches shall provide at least 6-inches clear opening beyond the pumps on all sides. Said access hatches shall allow installation and removal of the pumps and shall support the guide rails. The doors shall be provided with lifting handle, automatic safety latch to hold door in the open position and a hasp suitable for padlock. The doors shall have a non-skid finish and be designed for light, medium, or heavy duty, depending on the location of the pumping station.

6.6 Valve Vault Aluminum Access Hatch

An aluminum single door access hatch frame and door assembly similar to the one described above shall be provided for use as entry to the valve pit. Minimum opening for the valve vault entry shall be thirty-six (36) inch by thirty-six (36) inch.

6.7 Valves

A swing check valve with external swing arm and a full port (100% area) eccentric plug valve shall be installed in the valve pit in each pump's discharge piping. A minimum clearance of twelve (12) inches shall be allowed from the bottom of the valves to invert of the pit. A 2-inch PVC drain pipe shall be installed to drain the valve pit back to the wetwell. A check valve shall be installed in said drain line to prevent backflow from the wetwell.

6.8 Ductile Iron Yard Piping

All yard piping within the pump station site shall be centrifugally cast class 350 ductile iron pipe with American Polybond lining, 401 Epoxy Ceramic, or approved equal.

SECTION 7 - ELECTRICAL DESIGN

7.1 Coordination with Electric Utility

The design Engineer must coordinate with the Electric Utility Company providing service in the location where the pump station is to be constructed to ascertain what voltages can be provided to allow correct pump motor and electrical equipment specification. Centerton Utilities must approve proposed electric voltage and phase conditions before design proceeds.

7.2 Control Panel Circuit Breaker

A single main fusible or breaker disconnect switch of adequate size to provide power for the "control panel" and its related components shall be provided by the Contractor.

7.3 Disconnect Switch Housing

The disconnect switch shall be housed in a NEMA 4X stainless steel enclosure with an external operation handle capable of being locked in the ON position.

7.4 GFI Convenience Outlet

The pump station site shall include a GFI convenience outlet with 20 amp breaker and suitable transformer or power supply to provide 110 volt single phase power to the convenience outlet.

7.5 Electric Conduit

Schedule 40 electrical conduits of sufficient size shall be provided through the wetwell and to the control panel for pump power cables, sensor cables and control cables. Sensor and control cables shall not be placed in the same conduit as power cables. There shall be no wiring splices between the control panel and equipment in the wetwell. Conduits shall be sealed at entry to the control panel to prevent movement of sewer gases into the control panel.

7.6 Electric Connections

All electrical contacts and connection lugs shall be heavy duty.

7.7 Rigid Conduit

All vertical conduit and transitions from horizontal to vertical runs shall be rigid metallic conduit. Horizontal conduit runs below grade may be either Schedule 40 PVC or rigid metallic conduit. All conduit fittings shall be threaded metal.

SECTION 8 - CONTROL PANEL

8.1 General

The control panel shall be built in a NEMA 4X stainless steel enclosure and shall be suitable for the specified horsepower and voltage for the pumping equipment. The outer door of the panel shall be hinged dead front with provisions for locking with a padlock. Inside shall be a separate hinged panel to protect all electrical components. H-O-A switches, run lights, circuit breakers, etc. shall be mounted such that only the faces protrude through the inside swing panel and no wiring is connected to the back side of the inside swing panel. The control panel shall be located so as to provide safe access to the panel while wetwell hatch doors are opened, and shall be positioned so as not to be between the access drive and the wetwell.

8.2 Electrical

A circuit breaker and magnetic starter with three (3) leg overload protection and manual reset shall be provided for each pump. Starters shall have auxiliary contacts to operate both pumps on override condition. A separate circuit breaker shall be supplied for power to the control circuit. The control panel shall include an extra circuit breaker of adequate size to provide 115 volt, single phase power for the remote monitor panel. The control panel shall include a control voltage transformer to reduce supply voltage 115 volt, the float circuit and associated relays which shall be provided with 24 volt control voltage. An alternating relay shall be provided to alternate pumps on each successive cycle of operation. A green run light and H-O-A switch shall be provided for each pump. A terminal strip shall be provided to make field connections of pump power leads, level control, seal sensor leads, heat sensor leads, and remote monitor panel interconnections.

8.3 Time Delay Relay

A time delay relay shall be provided to delay start of second pump should power outage occur.

8.4 Pump Heat Sensor Connection

The control panel shall incorporate connections for heat sensors which are installed in the pumps. The connection shall disconnect the starter upon high temperature signal and will automatically reconnect when condition has been corrected.

8.5 Seal Failure Sensor Connection

The control panel shall incorporate connections for seal failure sensors which are installed in the pumps. The panel will have a seal failure alarm light for each pump. This alarm indicates failure of the lower mechanical seal in the pump. This will be an alarm light only and will not shut down the pump.

8.6 Hour Meter

The control panel shall include an hour meter for each pump to register the elapsed operating time of each pump.

8.7 High Water Alarm

The control panel shall have a high water alarm built into the main enclosure. The high water alarm shall consist of a flashing alarm light with red Lexan plastic cover or red glass globe with metal guard mounted on top of the enclosure such that it is visible from all directions. An alarm horn shall be mounted on the side of the enclosure. A push to test horn and light button as well as a push to silence horn button shall be provided and mounted on the side of the enclosure.

8.8 Condensate Heater

The control panel shall include a condensate heater to protect against condensation inside the enclosure. The heater shall be placed so as not to damage any other component or wiring in the control panel.

8.9 Lightning Protection

The control panel shall include lightning protection and a phase monitor relay to shut down the control circuit and protect the equipment due to loss of phase or phase reversal. The three (3) phase sequence voltage relay shall be of the 8-pin connector type.

8.10 Alternator Selector Switch

The control panel shall incorporate an alternator selector switch to allow selection of automatic alternation or manual selection of the lead pump.

8.11 Domestic Manufacture and Local Availability

All component of the control panel shall be American made and available from local sources. In particular, items such as circuit breakers, overload protection, relays, etc. shall be available and in stock by local sources.

8.12 Compatibility of Equipment

In order to maintain unit responsibility and warranty on the pumping equipment and control panel, the control panel must be accepted in writing by the pump manufacturer as suitable for operation with the pumping equipment.

8.13 Operation and Maintenance Manuals

Three (3) operation and maintenance manuals shall be submitted to Centerton Utilities. Manuals shall include, at a minimum:

1. Operation instructions;
2. Maintenance instructions;
3. Recommended spare parts list;
4. Lubrication schedules;
5. Structural diagrams;
6. As-built wiring diagrams; and
7. Bill of materials.
8. Copy of design engineer's pump operating point calculations, population assumptions, average daily flow, and peaking factor

SECTION 9 - GENERATOR SET

9.1 General

The pump station shall include an on-site backup power generator. The generator and lift station combination must include switching and control gear such that the backup power source is activated automatically without human action. The generator shall be powered by diesel fuel and supplied with double wall steel belly tank sized to run all pumps at full load for 48 hours. The generator must be capable of operating the lift station at full capacity, i.e., with the largest pumps, impellers, and motors, and the greatest number of pumps, that the lift station can physically contain, with all of the above operating at full speed simultaneously.

9.2 Generator Set

9.2.1 Generator Size/Rating

The generator set shall be minimally rated at the kW rating as indicated on the drawings when operating at voltage required by pump motors with 0.8 lagging power factor. The generator set shall be capable of this rating while operating in an ambient temperature condition of 122°F (50°C).

9.2.2 Starting Loads

The generator set shall be capable of starting motor loads as indicated on the drawings along with a minimum station load of 5 kW and a maximum voltage dip of 25%.

9.2.3 Engine Speed

The engine shall deliver power at a governed speed of 1800 rpm.

9.2.4 Fuel Tank

All fuel tanks shall be of double wall construction. Further fuel spill protection measures such as containment vessels, earthen berms, etc. will be required if deemed necessary by Centerton Utilities.

9.3 Sound Attenuated Protective Weather Enclosure

9.3.1 Manufacturer Experience

Manufacturer shall have a minimum five years of experience in the design and construction of weather-protected generator-set enclosures.

9.3.2 Modular Construction

The enclosure panels shall be assembled with modular, bolt-together construction.

9.3.3 Required Features

Enclosure shall include the following features:

1. Foam insulation on all interior surfaces
2. Sound level not to exceed 68 dba within 7 meters of enclosure surface in any direction
3. All exterior and interior surfaces finished with baked-on powder-coat
4. Bottom flange with multiple mounting holes
5. Stainless steel door hardware and lift-off hinges
6. Lockable doors
7. Gasketed access doors

9.4 Automatic Transfer Switch (ATS)

9.4.1 Transfer Switch Manufacture

It is the intent of this specification to secure automatic transfer switches that have been prototype tested, factory built, production tested, and site tested, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein. Automatic transfer switches with number of poles, voltage and current ratings as shown on the plans shall be provided. Each ATS shall consist of an inherently double-throw power transfer switch unit and a control module interconnected to provide complete automatic operation. All equipment shall be new and of current production by a domestic firm that manufactures the generator, controls, and transfer switch. The company selected will assemble the standby generator set and system as a matched unit so that there is one-source responsibility for warranty, parts and service through a local representative with factory-trained personnel.

9.4.2 Transfer Switch Sizing/Rating

ATS shall be sized as indicated on the drawings to match the generator and power requirements of pump motors including starting loads.

9.5 Sizing Calculations

Submit motor starting calculations and generator sizing calculations for approval.

9.6 Scada Signals

The generator set shall provide the following status signals to the SCADA package:

1. Generator status
2. Generator general alarm

SECTION 10 - PUMP OPERATION

10.1 Pump Operation

10.1.1 Lead Pump Start

On wet well level rise, the lead pump shall start at the lead pump ON elevation. With the lead pump operating, the wet well level shall lower to all pumps OFF and turn off the pump. The alternating relay in the control panel shall index on stopping of the pump so that the lag pump will start on the next operation.

10.1.2 Lag Pump Start

If the wet well level continues to rise when lead pump is operating, the override switch shall energize and start the lag pump. Both lead and lag pumps shall operate together until low level switch turns off both pumps. If level continues to rise when both pumps are operating, alarm level switch shall energize and signal the alarm.

10.1.3 Pump Start Failure Override

If one pump should fail for any reason, the second pump shall operate on the override switch.

10.1.4 Low Level Alarm

If the pumps fail to turn off for any reason after receiving the signal for all pumps OFF, a low level alarm shall signal.

10.1.5 Control Level Adjustment

All level controls shall be adjustable for level setting from the surface.

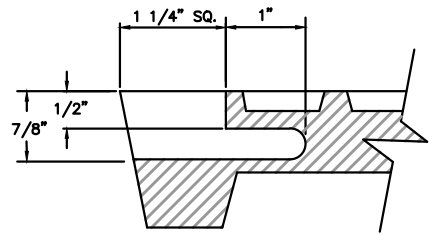
SECTION 11 – PUMP STATION TESTING

11.1 Pump Testing

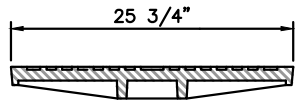
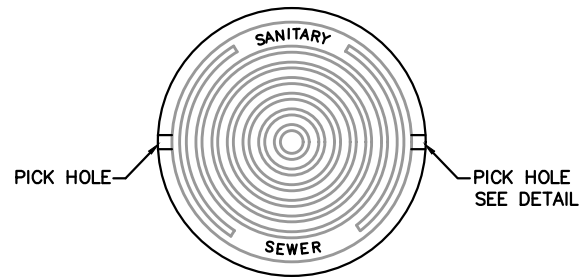
All pumps shall be flow tested to ascertain pumping rate. Actual pumping rates must meet or exceed the design specified maximum flow rate for the pump station.

11.2 Electrical Components

All electrical components including emergency generator and transfer switch must be tested and proved to operate as designed and approved.

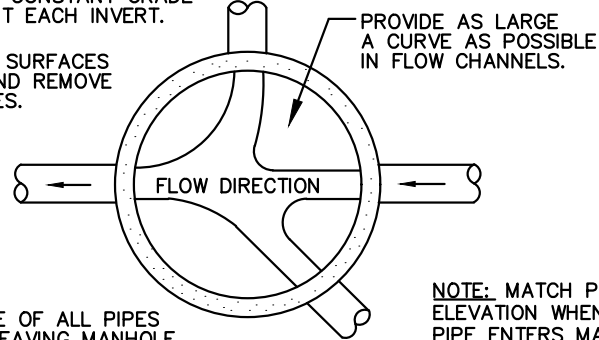


PICKHOLE DETAIL



CONSTRUCT FLOW CHANNEL FOR ALL PIPE ENTERING MANHOLE, INCLUDING SERVICES. MAINTAIN A CONSTANT GRADE THROUGHOUT EACH INVERT.

BRUSH FINISHED SURFACES OF CONCRETE AND REMOVE ALL SHARP EDGES.

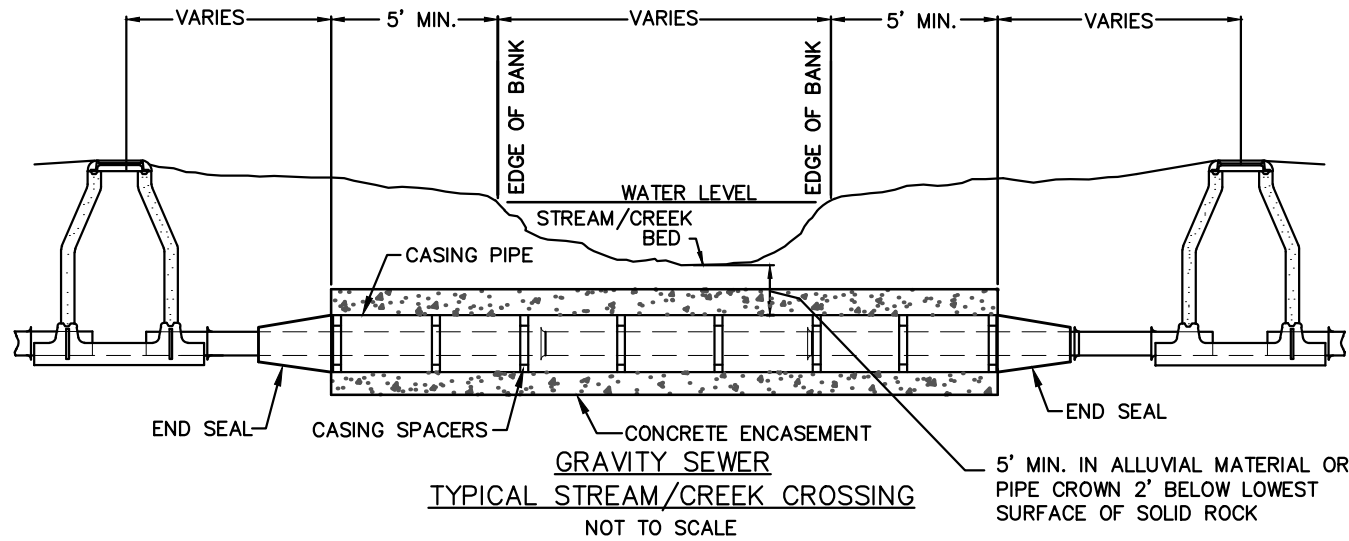


NOTE: CENTERLINE OF ALL PIPES ENTERING AND LEAVING MANHOLE SHALL PASS THROUGH THE CENTERS OF THE MANHOLES.

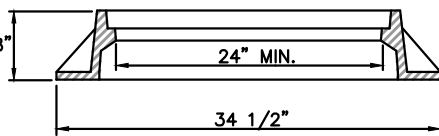
NOTE: MATCH PIPE CROWN ELEVATION WHEN SMALLER PIPE ENTERS MANHOLE

MANHOLE BOTTOM DETAIL

MANHOLES FOR 8" THROUGH 24" SEWERS (MANHOLES FOR SEWERS LARGER THAN 24" REQUIRE INDIVIDUAL DESIGN)



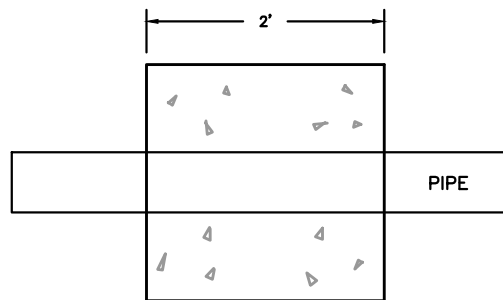
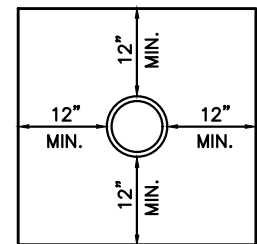
GRAVITY SEWER TYPICAL STREAM/CREEK CROSSING NOT TO SCALE



MANHOLE FRAME & COVER

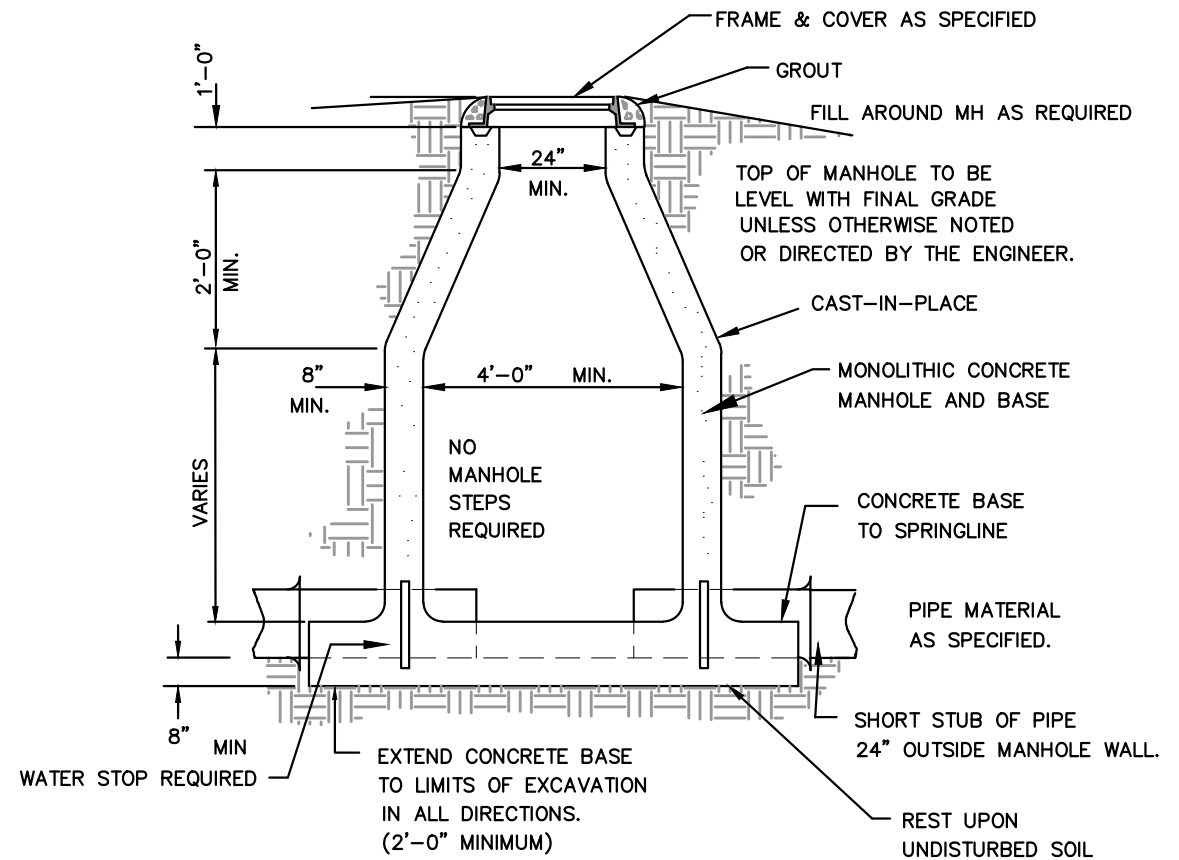
NOTE: MINIMUM WEIGHTS:
COVER: 110 LBS.
FRAME: 146 LBS.

MINIMUM COMBINED WEIGHT: 270 LBS.
(SEE SPECS FOR ADDITIONAL REQUIREMENTS)

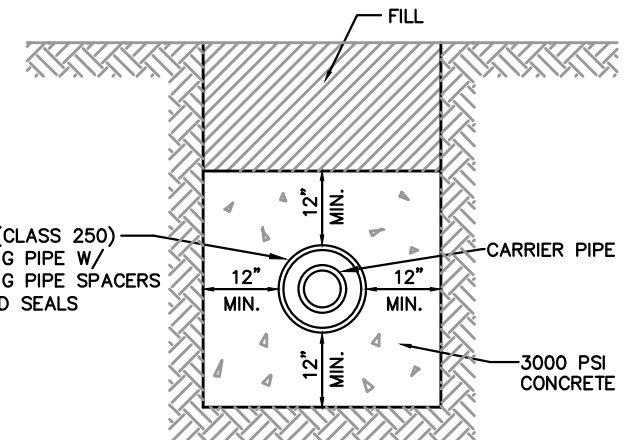


CONCRETE ANCHOR DETAIL

NOT TO SCALE



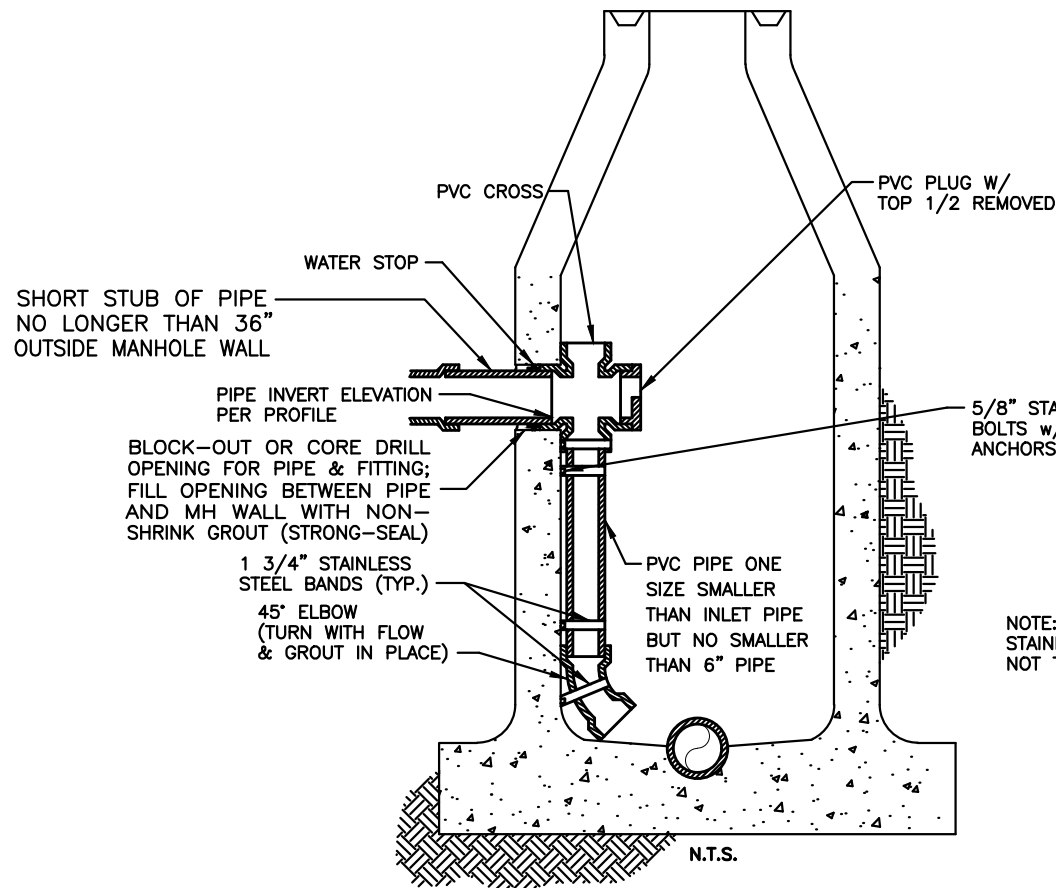
CAST IN PLACE MANHOLE DETAIL



CONCRETE ENCASEMENT AT STREAM CROSSING W/ PVC CASING PIPE

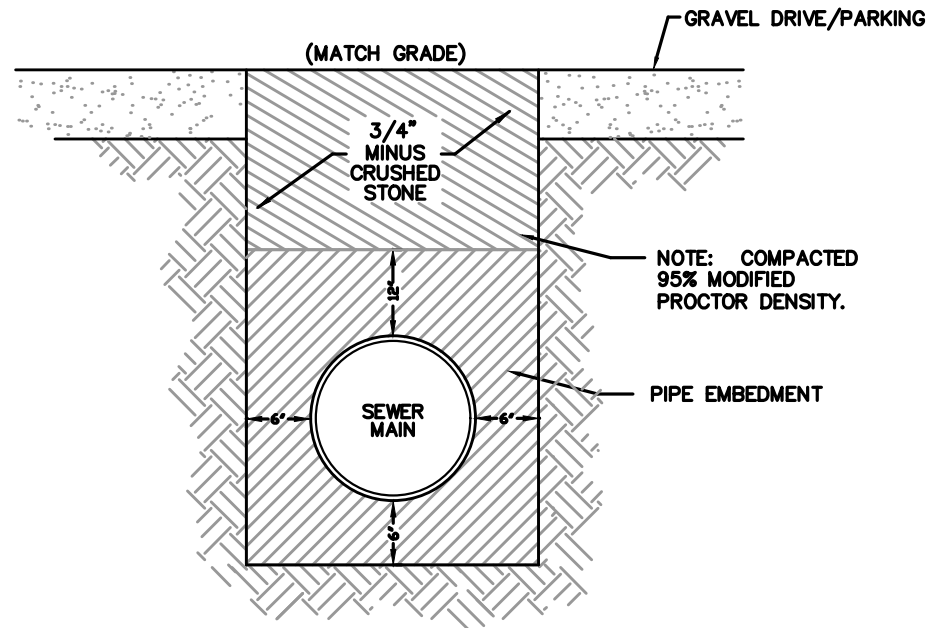
REVISION	DATE	DESCRIPTION

SCALE: NTS
DATE: SEPT. 2019
W.O. #



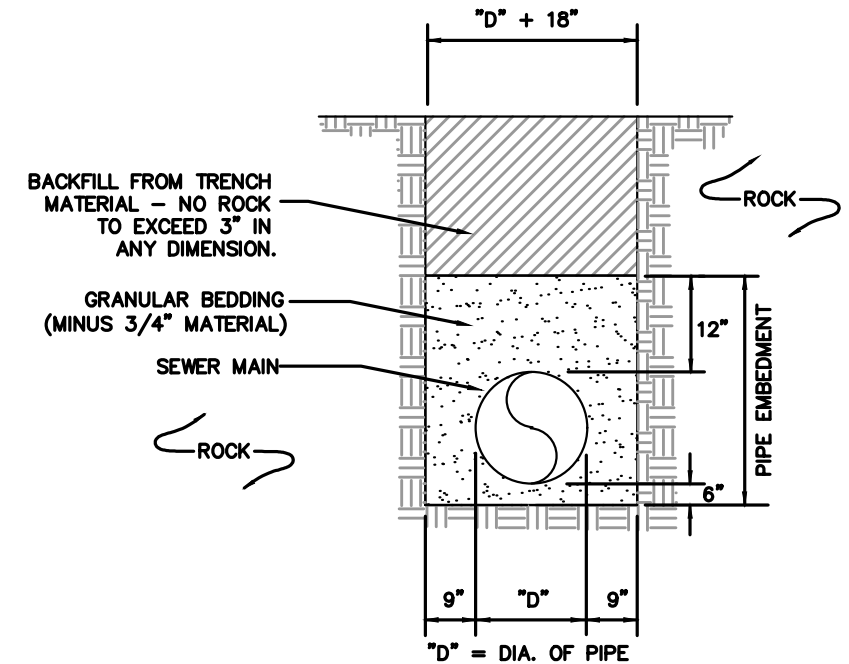
INTERIOR DROP MANHOLE

- 1) EXTERIOR DROP MANHOLES NOT ALLOWED.
- 2) CENTERTON UTILITIES MUST APPROVE USE OF DROP MANHOLE



GRAVEL DRIVE AND GRAVEL PARKING LOT CROSSING
(FOR NON-PAVED ROADS & DRIVEWAYS)

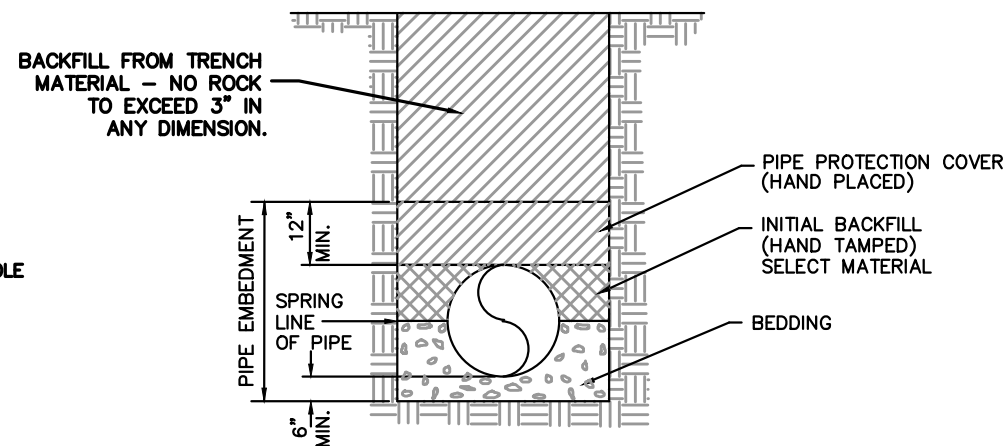
NOTE: DISTANCE BETWEEN STAINLESS STEEL STRAPS NOT TO EXCEED 3'



TYPICAL ROCK EXCAVATION AND BEDDING FOR SEWER MAIN

BEDDING NOTES:

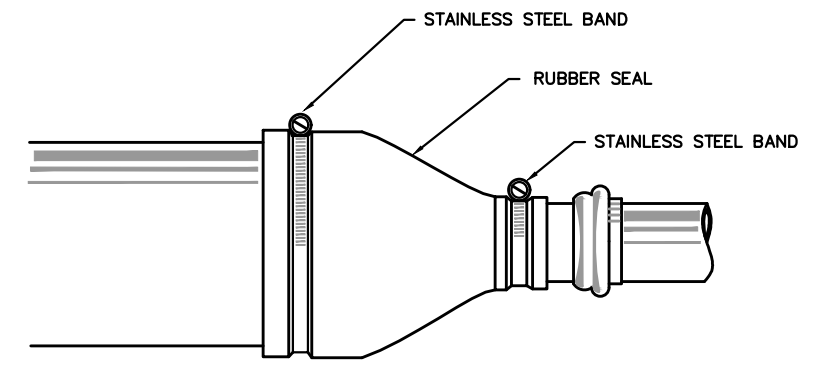
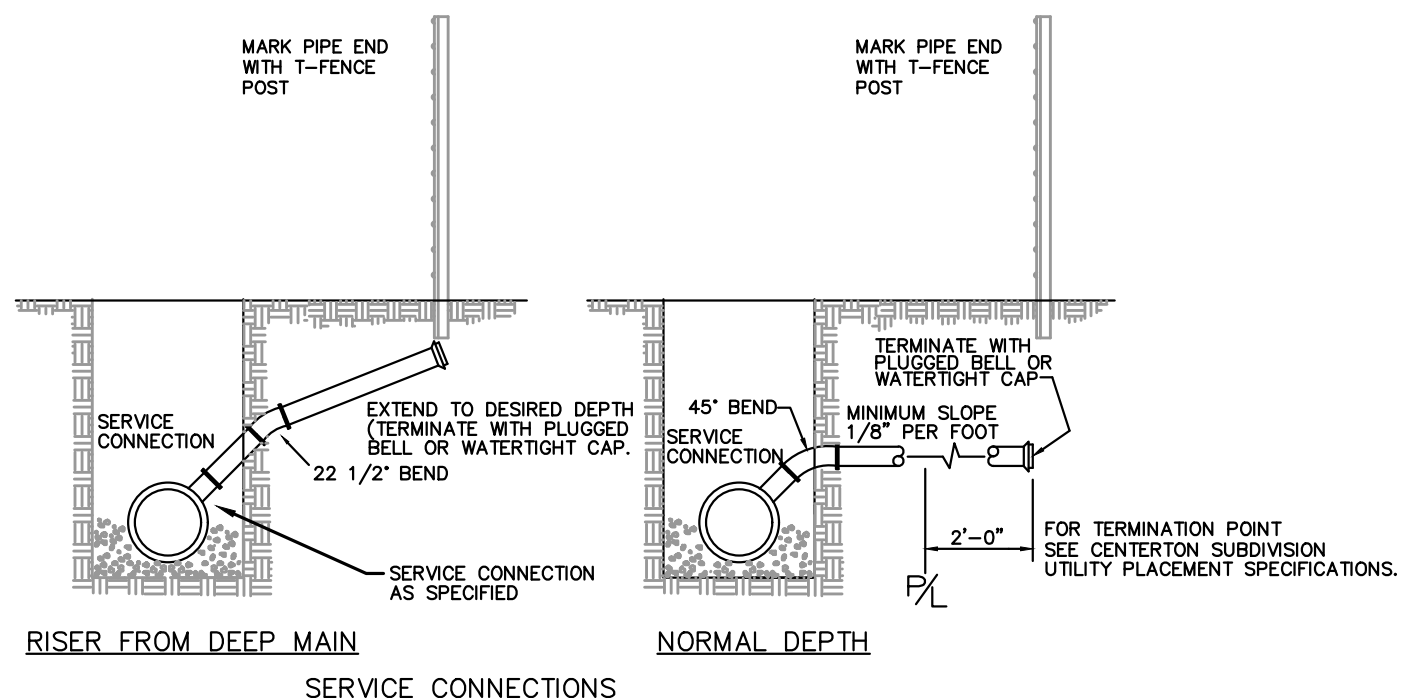
- 1) PIPE EMBEDMENT SHALL BE 3/4" MINUS CRUSHED STONE.
- 2) FINAL BACKFILL SHALL HAVE NO PARTICLE SIZE IN EXCESS OF 3" IN ANY DIMENSION.
- 3) MINIMUM TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" MEASURED AT THE SPRINGLINE TO ENABLE BACKFILL MATERIAL TO BE INSTALLED IN THE HAUNCHING AREA. IN NO CASE SHALL THE TRENCH WIDTH BE LESS THAN 18" WIDE.



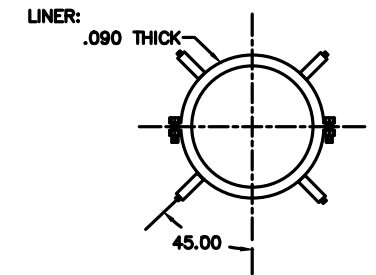
PVC SEWER PIPE BEDDING DETAIL

REVISION	DATE	DESCRIPTION

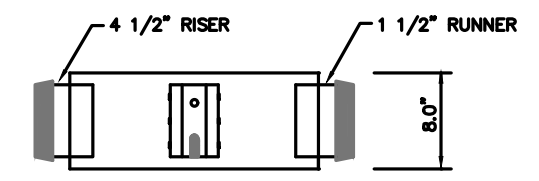
SCALE: NTS
DATE: SEPT. 2019
W.O. #



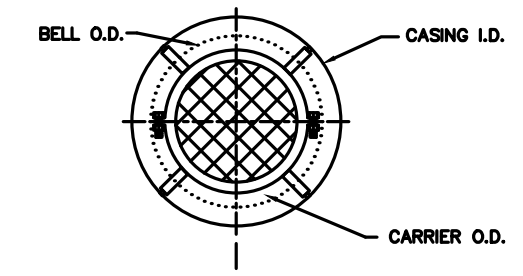
SLIP-ON END SEAL



TOP VIEW



CASING SPACER



ASSEMBLED VIEW

ENCASEMENT/ CARRIER PIPE SIZING DETAIL

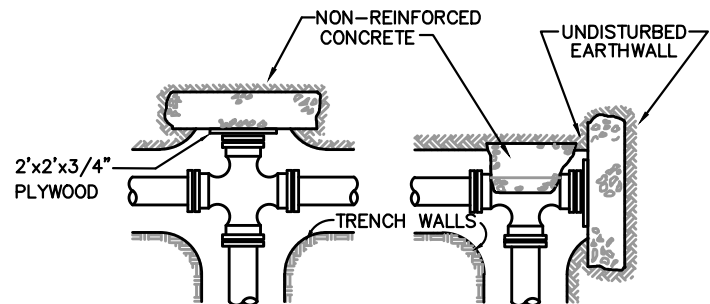
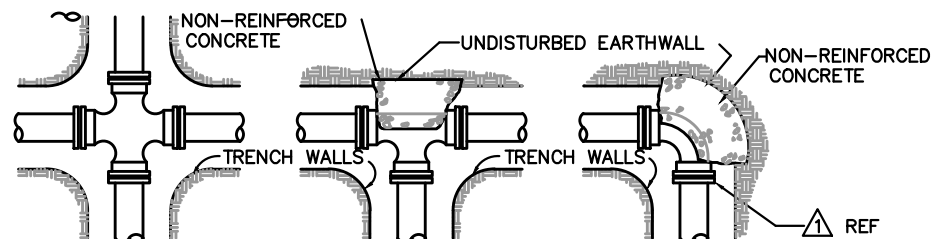
SEWER MAIN SDR 26			STEEL ENCASEMENT			DUCTILE IRON			STEEL ENCASEMENT		
ND.	O.D.	BELL O.D.	ND.	ID.	O.D.	ND.	O.D.	BELL O.D.	ND.	I.D.	O.D.
4	4.215	5.0	8	8.250	8.625	4"	4.80	7.00	10	10.374	10.75
6	6.275	7.2	10	10.374	10.75	6	6.90	9.13	12	12.250	12.75
8	8.400	9.5	12	12.250	12.75	8	9.05	11.50	16	15.438	16.00
10	10.500	11.8	14	13.438	14.00	10	11.10	13.63	18	17.376	18.00
12	12.500	14.2	16	17.376	18.00	12	13.20	15.75	20	19.312	20.00
15	15.300	17.3	20	19.312	20.00	14	15.30	18.63	24	23.188	24.00
						16	17.40	20.75	26	25.124	26.00
						18	19.50	23.00	28	27.062	28.00
						20	21.60	25.25	30	29.062	30.00
						24	25.80	29.63	34	32.876	34.00



STANDARD DETAILS
CENTERTON UTILITIES
CENTERTON, ARKANSAS

REVISION	DATE	DESCRIPTION

SCALE: NTS
DATE: SEPT. 2019
W.O. #



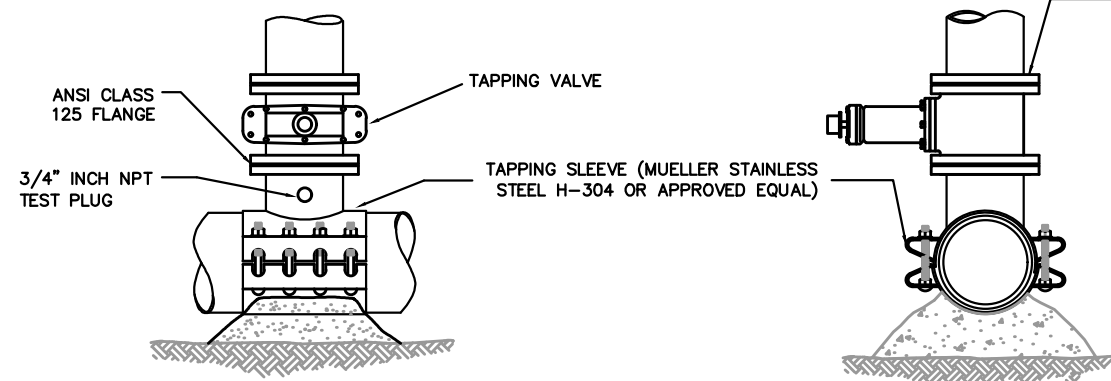
BLOCKING DETAILS

REACTION BACKING TABLE				
SIZE	REQUIRED SQ. FT. OF UNDISTURBED EARTH WALL FOR REACTION BACKING			
	TYPE OF FITTINGS			
	TEE	90°	45°	22 1/2°
2"	1	1	1	1
3"	1	1	1	1
4"	1	2	1	1
6"	3	3	2	1
8"	4	4	3	2
10"	7	7	4	2
12"	10	10	5	3
14"	13	13	7	4
16"	17	17	9	5
18"	21	21	12	6
20"	26	26	14	7
24"	38	38	20	10
30"	59	59	32	16
36"	85	85	46	23

90° BEND
45° BEND SIMILAR
22 1/2° BEND SIMILAR

NOTES:

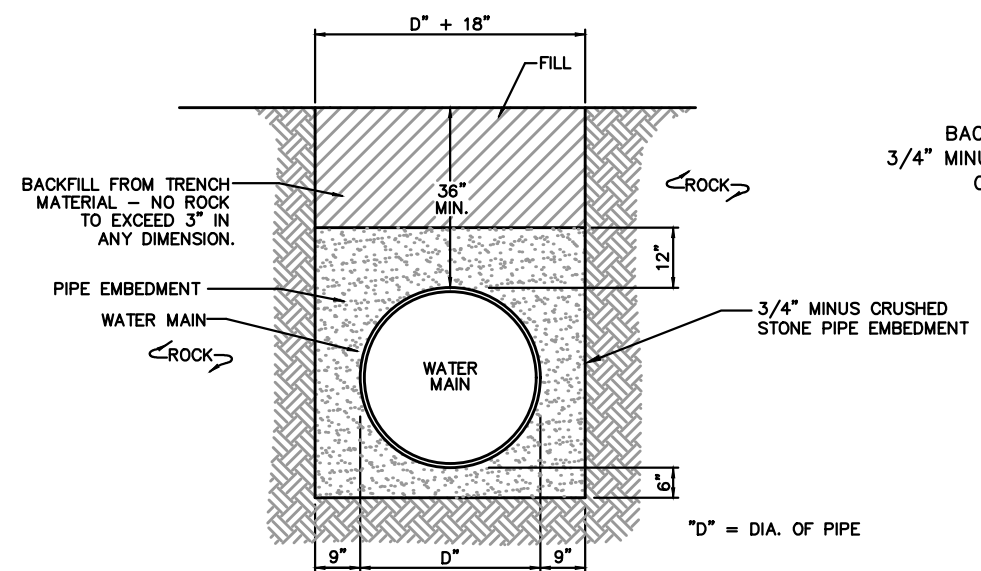
- ALL FITTINGS SHALL BE MECHANICAL JOINTS.
- DO NOT COVER BELLS OR FLANGES WITH CONCRETE.
- WRAP ALL FITTINGS WITH VISQUEEN.
- BACK ALL TEES ACCORDING TO SIZE OF BRANCH.
- BACKING FUTURE LINE EXTENSIONS SHALL BE SUCH THAT LATER REMOVAL IS POSSIBLE.
- ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL OR VERTICAL, SHALL BE BACKED.
- REACTION BACKING TABLE IS BASED ON 150 PSI AND SOIL BEARING PRESSURE OF 2,500 LB./SQ. FT. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS DIRECTED BY THE ENGINEER.
- ALL FITTINGS SHALL BE INSTALLED USING MEGA-LUGS OR A RESTRAINED FITTING.



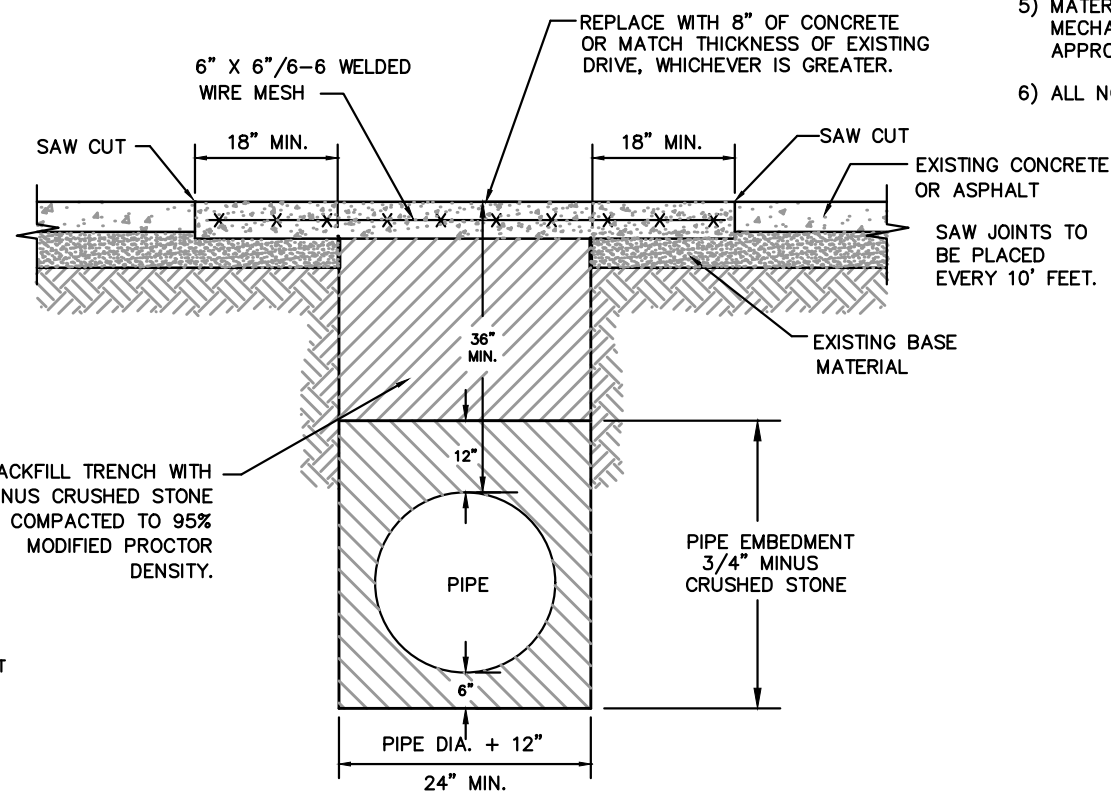
TYPICAL DETAIL OF TAPPING VALVE AND SLEEVE

BEDDING NOTES:

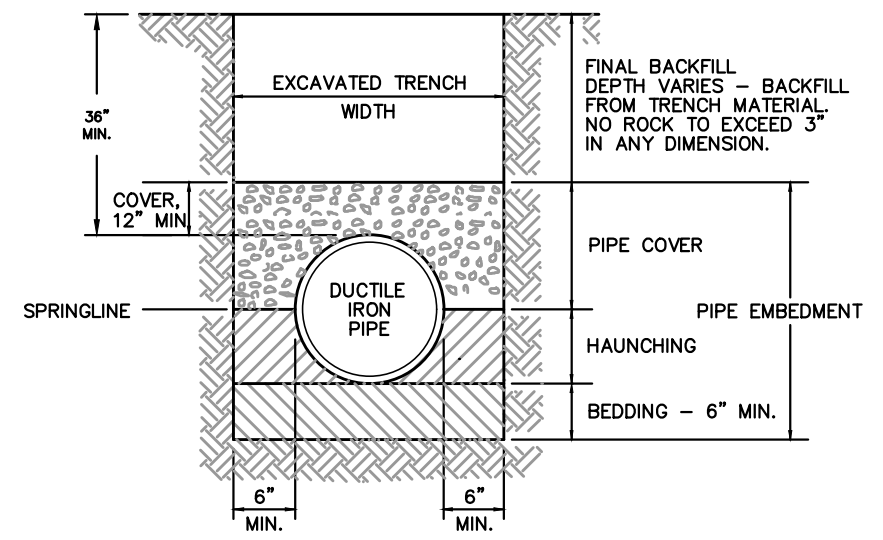
- PIPE EMBEDMENT SHALL HAVE NO PARTICLE SIZE IN EXCESS OF 3/4 IN ANY DIMENSION.
- FINAL BACKFILL SHALL HAVE NO PARTICLE SIZE IN EXCESS OF 3" IN ANY DIMENSION.
- MINIMUM TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" MEASURED AT THE SPRINGLINE TO ENABLE BACKFILL MATERIAL TO BE INSTALLED IN THE HAUNCHING AREA. IN NO CASE SHALL THE TRENCH WIDTH BE LESS THAN 18" WIDE.
- PIPING SHALL HAVE A MINIMUM COVER OF 36 INCHES OVER THE TOP OF THE PIPE.
- MATERIAL EXCAVATED FROM TRENCH CAN BE USED FOR PIPE EMBEDMENT IF MECHANICAL SCREENING PROCESSING YIELDS ACCEPTABLE GRADATION. MUST BE APPROVED BY OWNER/OWNERS REPRESENTATIVE.
- ALL NON-METALLIC PRESSURE PIPE SHALL BE INSTALLED WITH 10-GAUGE TRACE WIRE.



TYPICAL ROCK EXCAVATION AND BEDDING FOR WATER MAIN



CONCRETE AND ASPHALT STREET/DRIVE/PARKING REPAIR



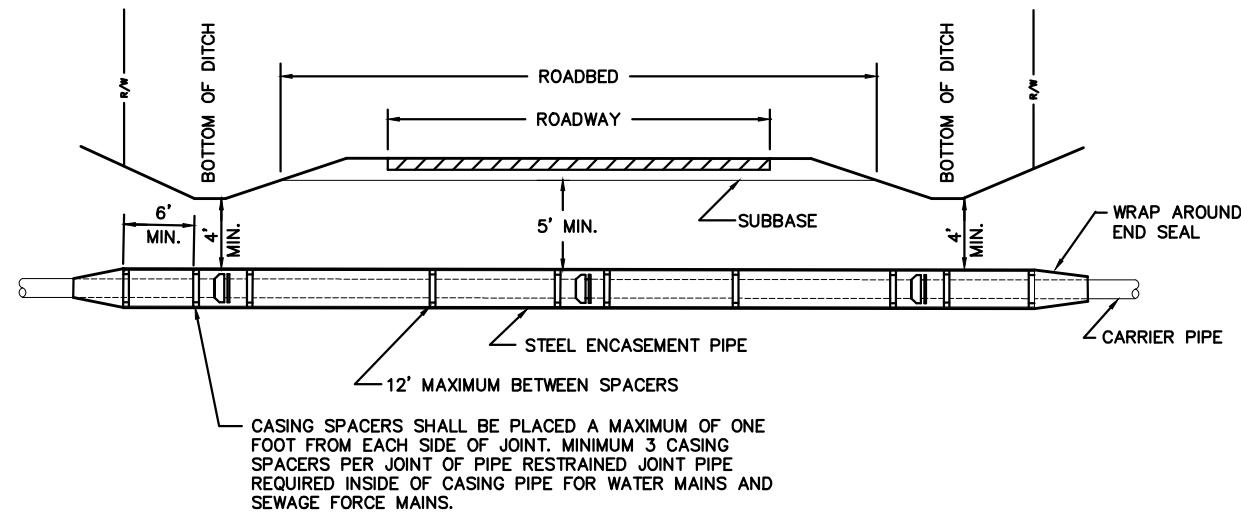
TYPICAL DUCTILE-IRON PIPE TRENCH DETAIL



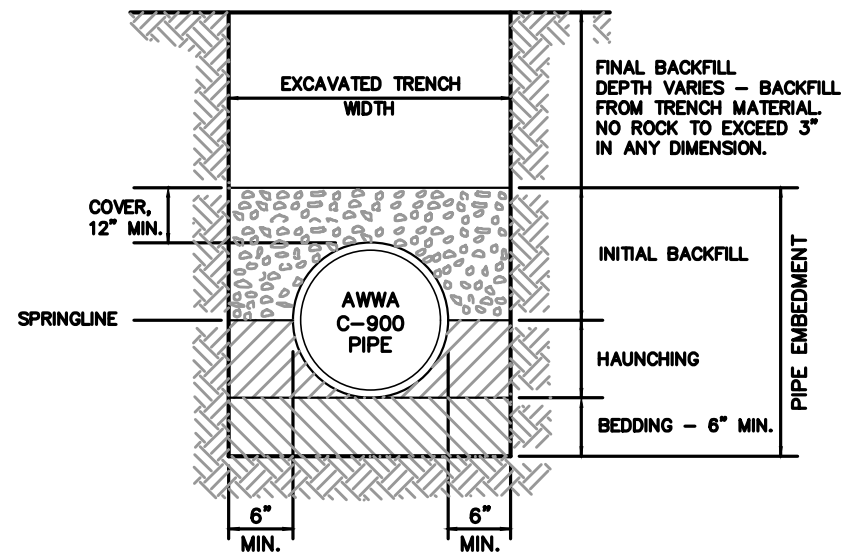
**STANDARD DETAILS
CENTERTON, ARKANSAS**

REVISION	DATE	DESCRIPTION

SCALE: NTS
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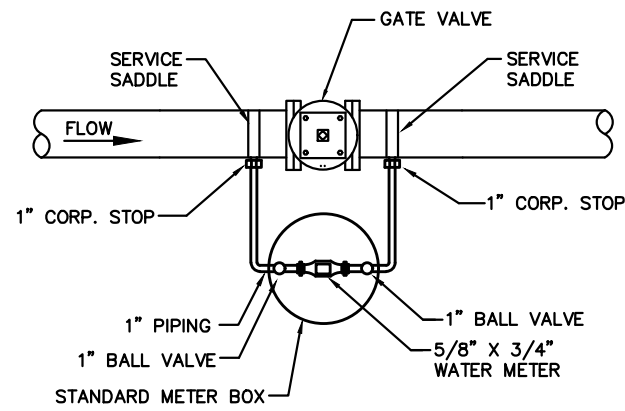
TYPICAL ENCASED HIGHWAY/PAVED ROAD CROSSING



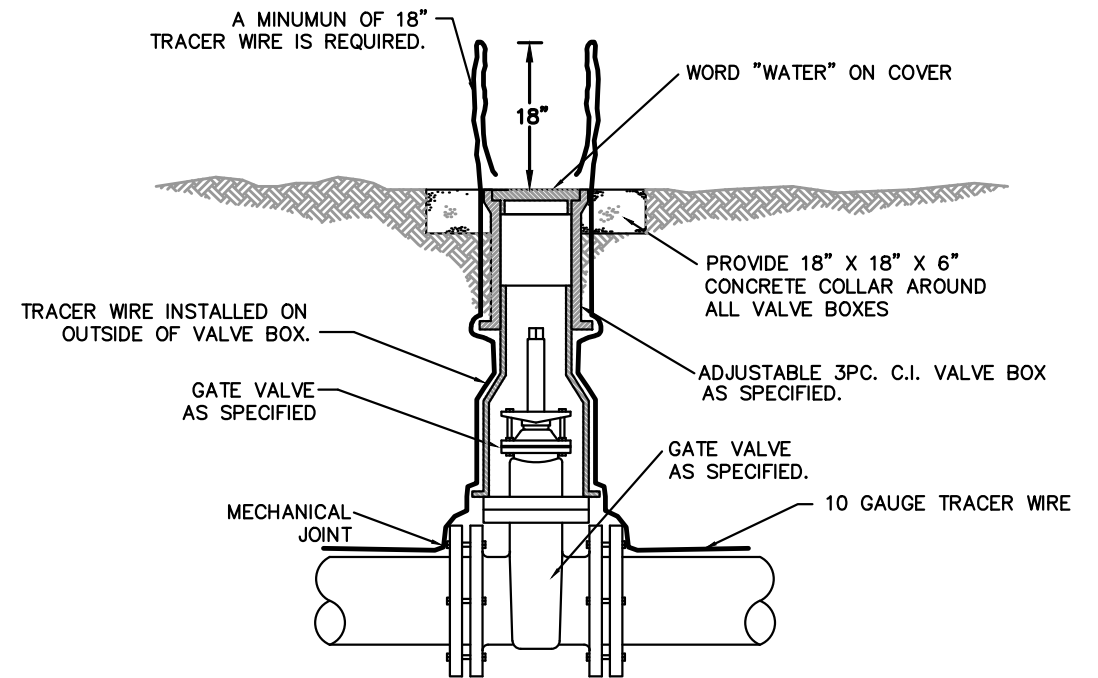
TYPICAL PVC BEDDING DETAIL

NOTES:

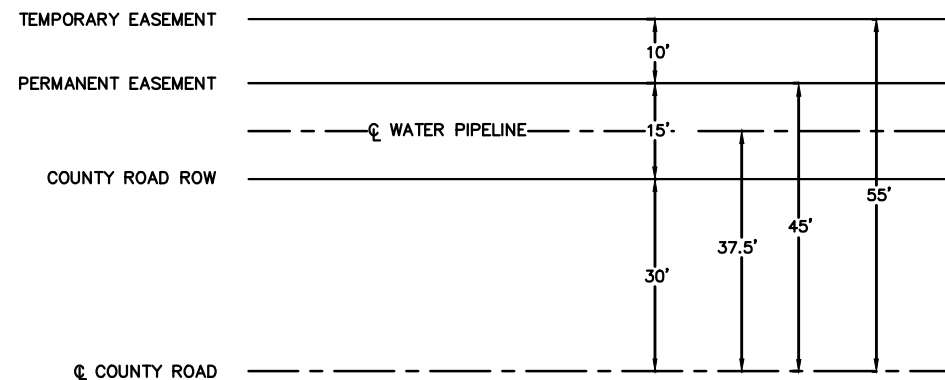
- 1) PIPE EMBEDMENT SHALL BE 3/4" MINUS CRUSHED STONE.
- 2) FINAL BACKFILL SHALL HAVE NO PARTICLE SIZE IN EXCESS OF 3" IN ANY DIMENSION.
- 3) HAULED IN BEDDING MATERIAL MAY BE REQUIRED TO MEET THE REQUIREMENT FOR EMBEDMENT AS DESCRIBED ABOVE, THE CONTRACTOR SHALL FURNISH AND INSTALL SUITABLE MATERIAL.
- 4) MINIMUM TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" MEASURED AT THE SPRINGLINE TO ENABLE BACKFILL MATERIAL TO BE INSTALLED IN THE HAUNCHING AREA. IN NO CASE SHALL THE TRENCH WIDTH BE LESS THAN 18" WIDE.
- 5) MATERIAL EXCAVATED FROM TRENCH CAN BE USED FOR PIPE EMBEDMENT IF MECHANICAL SCREENING PROCESSING YIELDS ACCEPTABLE GRADATION. MUST BE APPROVED BY OWNER/OWNERS REPRESENTATIVE.
- 6) ALL NON-METALLIC PRESSURE PIPE SHALL BE INSTALLED WITH 10-GAUGE TRACE WIRE.



**LEAK DETECTION METER DETAIL
PLAN VIEW**



**TYPICAL GATE VALVE AND
VALVE BOX INSTALLATION DETAIL**



**TYPICAL EASEMENT AND
PIPELINE LOCATION DETAIL FOR COUNTY ROADS
(NOT SUBDIVISION)**

REVISION	DATE	DESCRIPTION

SCALE: NTS
DATE: SEPT. 2019
W.O. #

**SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015***

(Adapted from UNIBELL Handbook of PVC Pipe, Third edition)

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specified Minimum for Length (L) Shown (min:sec)								
				100 ft	150ft	200ft	250ft	300ft	350 ft	400ft	450ft	
4	01:53	597	0.190L	01:53	01:53	01:53	01:53	01:53	01:53	01:53	01:53	01:53
6	02:50	398	0.427L	02:50	02:50	02:50	02:50	02:50	02:50	02:50	02:51	03:12
8	03:47	298	0.760L	03:47	03:47	03:47	03:47	03:48	04:26	05:04	05:42	05:42
10	04:43	239	1.187L	04:43	04:43	04:43	04:57	05:56	06:55	07:54	08:54	08:54
12	5:40	199	1.709L	05:40	05:40	05:42	07:08	08:33	09:58	11:24	12:50	12:50
15	07:05	159	2.671L	07:05	07:05	08:54	11:08	13:21	15:35	17:48	20:02	20:02
18	08:30	133	3.846L	08:30	09:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51
21	09:55	114	5.235L	09:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	80:07
33	15:35	72	12.296L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	96:57
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	115:23
42	19:74	57	20.942L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04	157:04
48	22:67	50	27.352L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09	205:09

*Q is the allowable leakage rate in cu.ft/min/ft² of inside surface area of pipe.

City of Centerton Subdivision Utility Placement Specifications

Curb Side

Street

Curb Side

First 5' From Curb	City	5' Green Space	Fire Hydrant set at 4' off curb within the green space
5' to 10' From Curb	ROW	5' Sidewalk	No valves or Obstructions within sidewalk
15' From Curb	Water and Sewer (Meter Cans/Sewer Taps)(Main @12')		Water Sewer main line at 12' and services stay within 15' of curb
18' From Curb	Electric / Light Conduit		Transformer and meter loop to stay closer to curb side
25' From Curb	Gas		
28' to 30' From Curb	Cable and telecommunications		
Total Structure Setback (Right of Way 25') (Back of Curb 35')			

*** Water meters and sewer taps are to be as close to the edge of the 7' side setback as possible to allow room for electrical services.

*** Gas Service lines are to be tapped as close to the 7' side setback as possible.

*** Electric Transformer must be placed on the property line at closer to the curb then the house.

*** Fire hydrants must be placed on the property line at 4' from curb and the valve back at the main.

*** Telecommunication/cable boxes must be within 7' of side setback.

*** Water mains must be kept at a finished grade depth of 36" to the top of the main

*** Electric lines must be kept at a finished grade depth per that utilities requirements. (SWEPCO/AEP or Carroll Electric)

*** Gas lines must be kept at a finished grade depth per that utilities requirements. (Black Hills)

*** **NOTHING** may be outside the 7' side setbacks

*** If there is any issue with the placement of any appurtenance, contact the appropriate department for possible waiver (NO waivers allowed without approval)

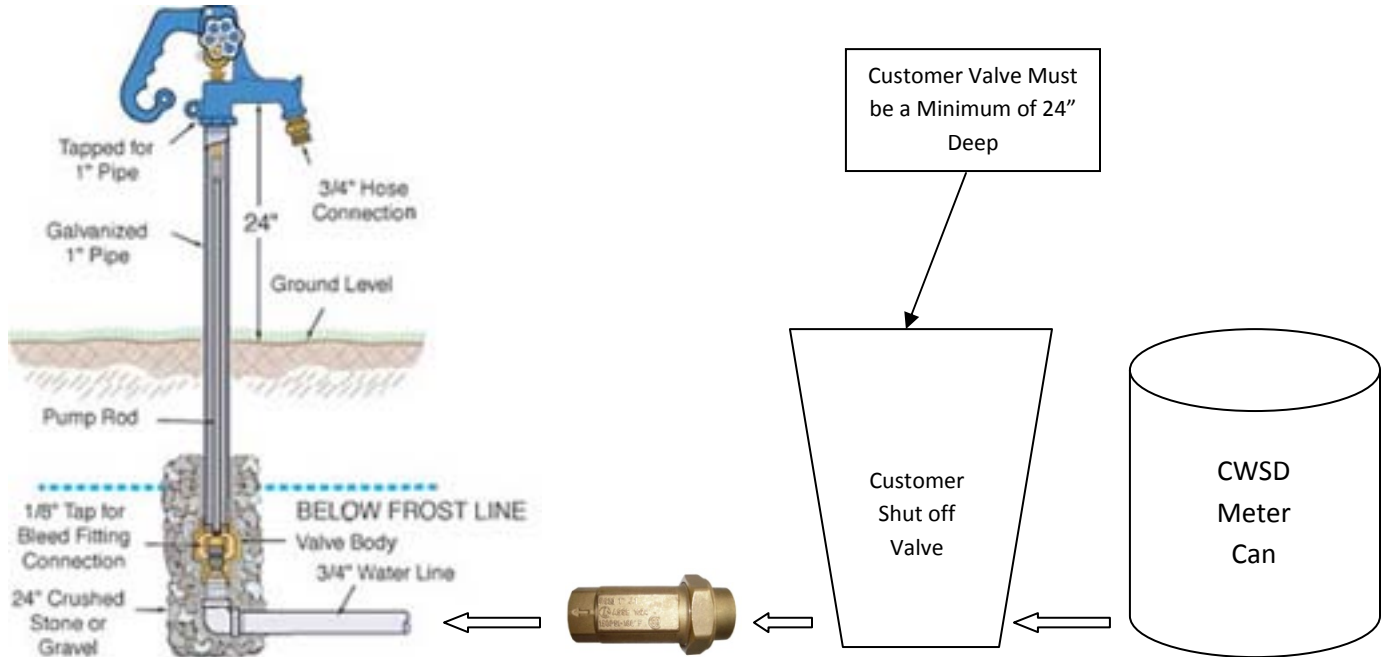
CWSD Freeze Proof Hydrant

Installation Requirements

A Dual Check, not a double check, shall be installed anywhere in a customer's service line, after the shut-off valve and before the bury hydrant. Preferably in an accessible location for future maintenance and replacement.

Multiple hydrants require one in line before all hydrants or one at each hydrant.

These are required whether the hydrant is temporary or permanent.



Dual Check assemblies are manufactured by many different companies. Below is just for example purposes.

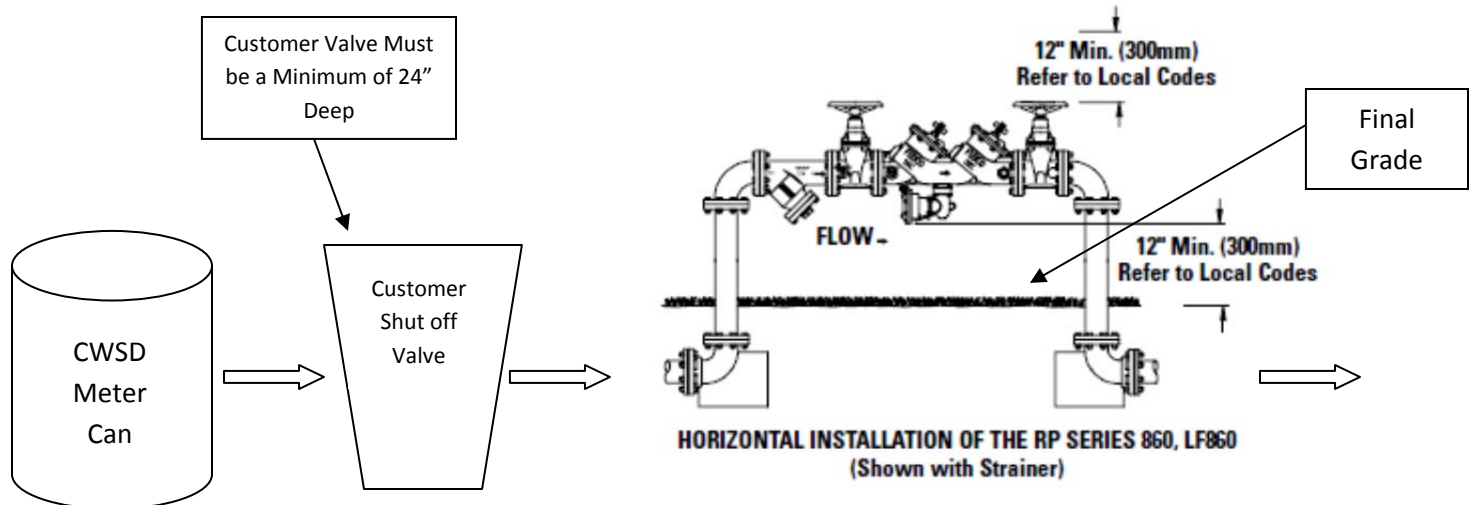


CWSD Reduced Pressure Backflow Preventer (RPBP)

Installation Requirements

The vent of the relief valve on the RPBP should be installed between 12" and 18" above the ground or high water mark, whichever is greater. And 24" clear on all sides.

A cover must be installed for freeze protection in the winter.



It should be situated so that the discharge of water from the relief valve does not create an aesthetic problem.

It is essential that the air inlet port not be blocked or flooded. (Discharge of water from the assembly should not cause the port to become flooded.)

The RPBP shall never be installed in a pit.

The RPBP should be installed horizontally with the relief valve pointed downward so that it can drain easily.

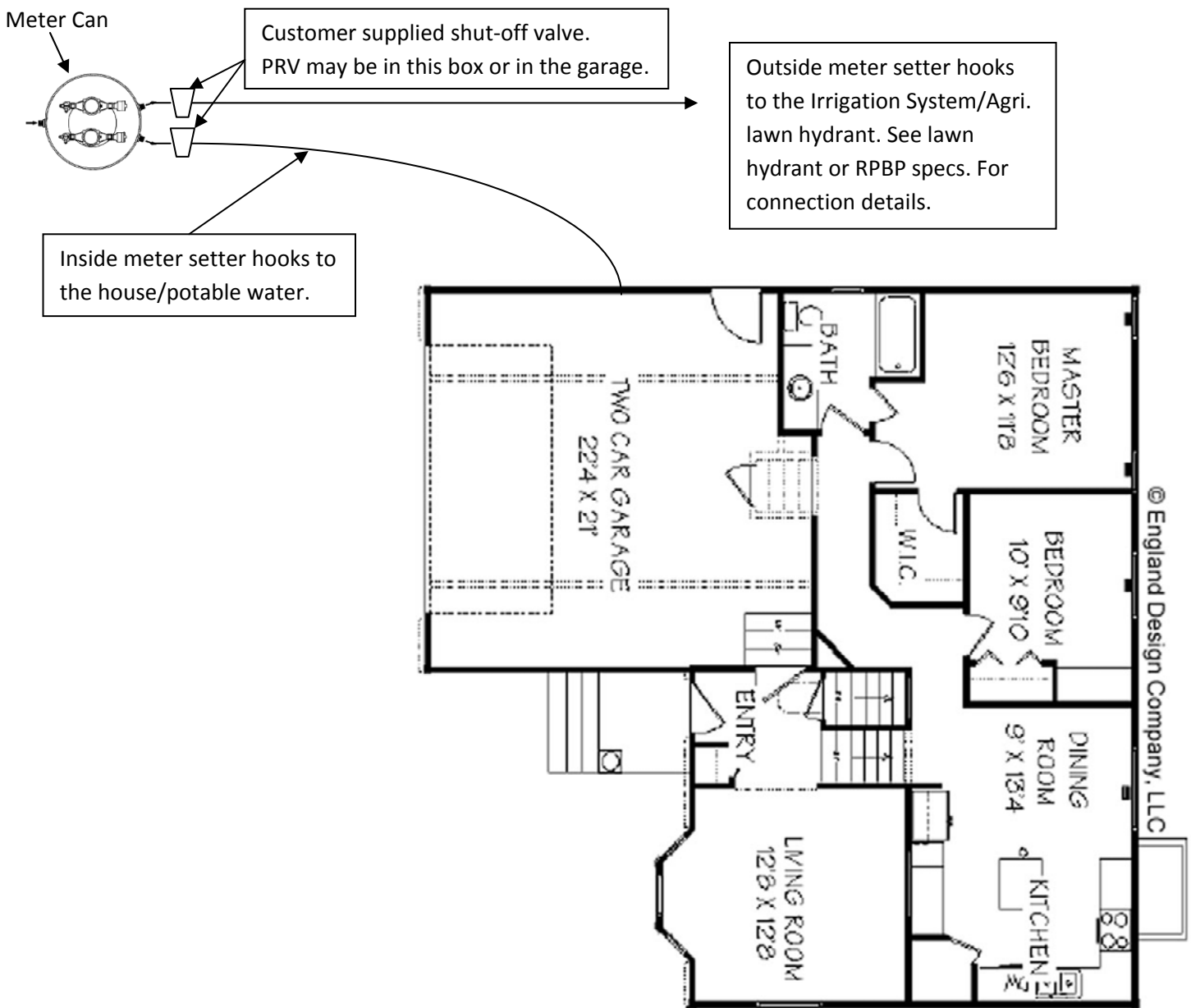
A separate ball valve assembly, located on the customer side just off the CWSD meter can, shall be installed. (See diagram above)

The RPBP should be installed on a separate meter other than the residential meter.

Permits are to be pulled at Centerton City Hall and inspections performed by inspector before meter is turned on.

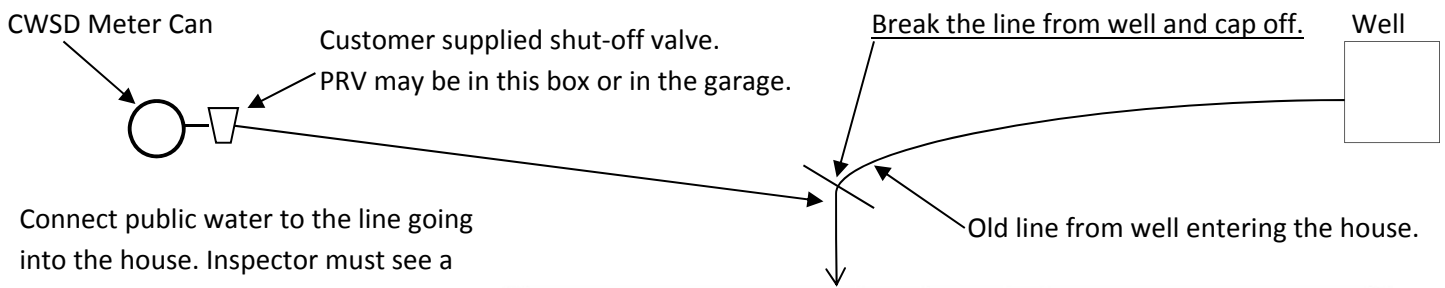
The RPBP shall be tested within 10 days of placing in service and records of inspection turned over to the CWSD and the property owner.

ALL RP devices are to be tested annually and results of those tests turned over to the CWSD and the property owner.

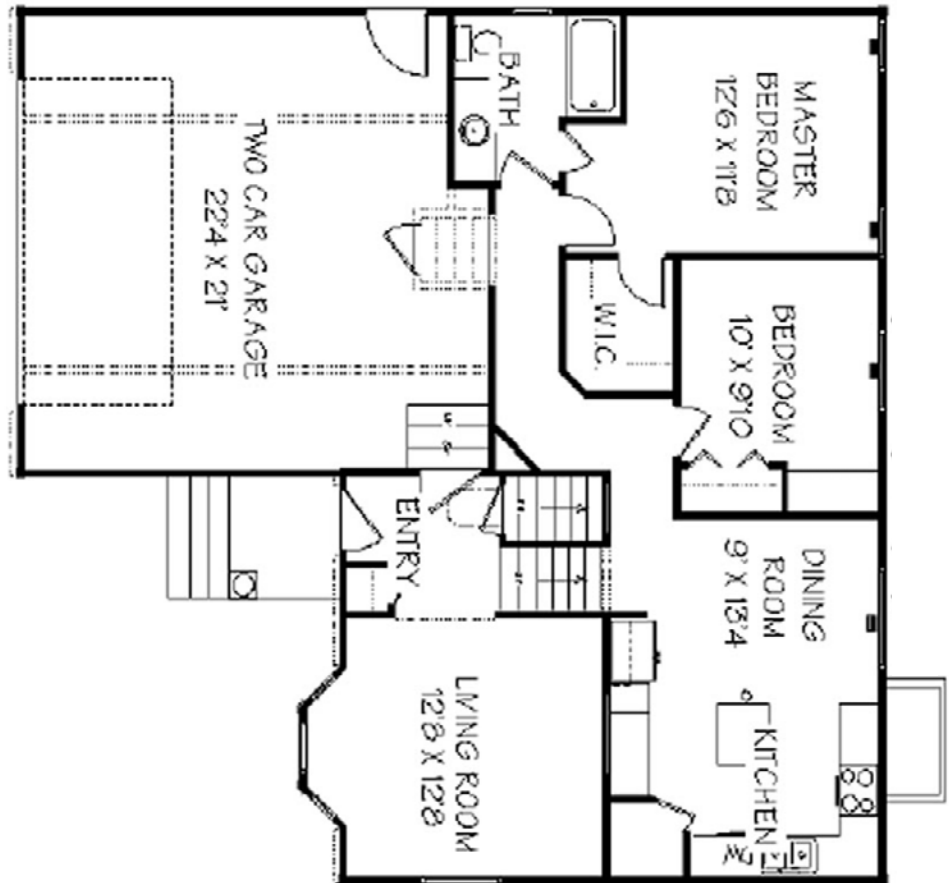


CWSD water meter hook-up guidelines.

The meter setter closest to the house is used for potable water and the meter setter furthest is used for the Irrigation/Agri. service.



Connect public water to the line going into the house. Inspector must see a clear break from the old line coming from the well. Old well can be used for irrigation or other means just not tied to the line coming from CWSD in any way. Cross Connection prevention is extremely important to CWSD and is mandated by state law.



Breaking from well and transferring service to public water requirements.

Customer line from the meter can to the connection point, must be 24" deep. No physical connection between city water and a well, (unknown source) is allowed. A valve is required on the customer's side next to the meter can, within 5 feet, in a separate can owned and maintained by the property owner. Customer's pressure regulator can be in their can after their valve or located inside the house after the valve in the house if the meter can is a substantial distance from the house.

Inspector MUST SEE where the old line from the well is disconnected from the house. DO NOT COVER or the results will be a failed inspection and re-inspection fees may be required.

CITY OF CENTERTON, CENTERTON WATER & SEWER DEPARTMENT

RIGHT OF WAY EASEMENT

Parcel #: _____

KNOW ALL MEN BY THESE PRESENTS:

That in consideration of One Dollar (\$1.00) and other valuable considerations paid to _____ hereinafter referred to as GRANTOR, by the City of Centerton, hereinafter referred to as GRANTEE, the receipt of which is hereby acknowledged, the GRANTOR does hereby grant, bargain, sell, transfer and convey unto the GRANTEE, its successor and assigns, a perpetual easement with the right to erect, construct, install and lay, and thereafter use, operate, inspect, repair, maintain, replace and remove a water line or a sanitary sewer line over, across and through the land of GRANTOR situated in Benton County, State of Arkansas, and adjacent and parallel to existing city streets, county roads or state highways, described as follows:

Insert Legal Description

Together with the right of ingress and egress over the adjacent land of the GRANTOR, their successors and assigns, for the purposes of this easement.

The said GRANTOR is to fully use and enjoy the premises except for the purpose hereinbefore granted to said GRANTEE, which hereby agrees to bury all pipes, to a sufficient depth so as not to interfere with cultivation of soil, and to pay any damages which arise to growing crops or fences from the construction, maintenance and operation as determined by (3) disinterested persons, one thereof to be appointed by the said Grantors; one by the said Grantee; and the third by the two so appointed as aforesaid, and the written award of such three persons shall be final and conclusive.

The consideration hereinabove recited shall constitute payment in full for any damages to the land of the GRANTOR, their successors and assigns, by reason of the installation, operation, and maintenance of the structures or improvements referred to herein. The GRANTEE covenants to maintain the easement in good repair so that no unreasonable damage will result from the use to the adjacent land of the GRANTOR, their successors and assigns.

The grant and other provisions of this easement shall constitute a covenant running with the land for the benefit of the GRANTEE.

IN WITNESS WHEREOF, the GRANTORS have executed this instrument this _____ day of _____, 20____.

ACKNOWLEDGMENT

STATE OF ARKANSAS

COUNTY OF BENTON

Before me, the undersigned, a Notary Public in and for said County and State on this _____ day of _____, 20____ personally appeared _____, to me known to be the identical persons who executed the within and foregoing instrument and acknowledge to me that they executed the same as their free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal the day and year last above written.

Notary Public

My Commission Expires: _____

**ALL UTILITY EASEMENT FORMS SHALL
BE APPROVED BY CWSD PRIOR TO USE.**

Centerton Water & Sewer Department

SPECIAL CONTRACT FOR

**FACILITIES EXTENSIONS
(PETITION FOR SERVICE)**

This agreement is made this _____ day of _____, 20____
between the City of Centerton Water Works and Sewer Commission (hereinafter called the Utility)
and _____ (hereinafter called Applicant).

A plan is attached to and incorporated in this agreement, showing water mains, sewer mains and appurtenances thereto (hereinafter called Facilities) which Applicant wishes to have installed to serve the property designated on the plans and to be known as _____
Centerton, Benton County, Arkansas.

WITNESSETH:

1. Applicant agrees to furnish all labor and materials and bear the entire cost of constructing Facilities.
2. Applicant shall cause to be prepared detailed plans and specifications for Facilities which incorporate the Utility's material and installation requirements. No work may be commenced until the plans and specifications are approved by the Utility in writing. After approval, the plans and specifications become a part of this agreement and applicant agrees to perform the work in strict adherence therewith. All plans and specifications shall be prepared under the direct supervision of an Engineer licensed to practice in the State of Arkansas (hereinafter call Engineer). The construction work shall be continuously supervised or inspected by the Engineer or by individuals who are under the Engineer's direct supervision and who are competent to supervise or inspect the work being performed. The Engineer shall submit written inspection reports to the Utility and the Applicant during the process of the construction of the Facilities. Applicant shall hire the Engineer and bear all engineering costs. Nothing herein shall preclude the Utility, at its discretion, from inspecting the work periodically.

3. Applicant shall give notice of Applicant's proposed Facilities by submitting the plans for Facilities which have been approved by the Utility to the appropriate planning agency for review as follows: (1) The City of Centerton Planning Commission if any part of the project is located within the territorial jurisdiction of said Planning Commission; (2) The Benton County Planning Commission if any part of Facilities are to be located outside of the territorial jurisdictions of the Centerton Planning Commission or any other municipality's planning commission; (3) The Centerton City Council if Facilities are to be located outside of the Centerton city limits. Applicant shall not commence construction of Facilities prior to review and approval by aforesaid agencies having jurisdiction.
4. In addition to conformance to the Utility's requirements, all plans and specifications for Facilities shall conform to the requirements of the Arkansas Department of Health and any other federal, state, county, or local government agencies having jurisdiction over any part of the work covered herein, including those agencies having jurisdiction over construction within the right-of-way of public road, streets and highways. Applicant is responsible for complying with the requirements of aforesaid agencies for review, and paying the cost of all fees and other expenses in connection therewith. Applicant shall not commence construction of facilities prior to approval of the plans and specifications by the aforesaid agencies and furnishing the Utility written evidence of such approval. Applicant shall construct Facilities in such manner that will not interfere with any proposed future street, highway and drainage improvements.
5. Applicant shall obtain or cause to be obtained all permits required in connection with the construction of facilities except those permits specifically requiring the Utility be designated as permittee. In which case the Applicant shall prepare and submit to the Utility all documents necessary for such permits. Applicants shall pay the cost of all fees, bonds and other expenses in connection with obtaining permits, shall be responsible for conforming with all provisions thereof, and shall coordinate all post-construction inspections required by the issuer of permits.
6. Streets and easements where the facilities are to be constructed shall be opened up and graded by Applicant to +/-0.10 foot of final grade. Property lines adjacent to the location for Facilities shall be staked by applicant prior to commencing construction of Facilities. If right-of-ways not now in existence are required for

Facilities, easements thereof, in a form acceptable to the Utility, shall be acquired by the Applicant and conveyed to the City of Centerton, Arkansas for the use and benefit of the Utility.

7. The total connection fee applicable to the Applicant's property is _____

_____. Said connection fees must be delivered to the Utility before any service will be established, in addition to any other amounts specified herein.

8. The term Facilities also includes service lines shown on the approved plans.

9. After completion of the construction of Facilities, Applicant shall file with the Utility (2) two sets of plans and (1) one CD containing final "As-Built" Drawing in AUTOCAD format prepared by the Engineer in reproducible form which depicts Facilities as finally constructed including reference distance to mains, including service lines, valves, and other appurtenances from property corners, street right-of-ways, permanent structures or objects in accordance with the Utility's standard practices, and a certification from the Engineer showing the total construction costs of Facilities, and if requested by the Utility, a copy of invoices for materials used in the construction of facilities. The Engineer shall also certify that all work was completed in accordance with the plans and specifications. Facilities shall not be accepted by the Utility until such plans, certificates and documents are submitted and approved.

10. Upon completion of the construction of Facilities and acceptance by the Utility, ownership of Facilities shall vest by this agreement in the City of Centerton, Arkansas, for the use of the Utility without the necessity of any other conveyance. Facilities shall become a part of the water distribution and sewer collection systems of the Utility, except as may be specified in addendum hereto. The Utility shall have the rights to connect to and to make extensions from Facilities without payment to or permission of Applicant.

11. This is an agreement for installation of Facilities and is not a contract for water or sewer service. Applicant acknowledges that (1.) the furnishing of water and collection of sewer by the Utility are governmental functions and that the Utility

does not agree to furnish any specific amount of water or water pressure; (2.) water will be delivered only to customers who enter into separate service contracts with the Utility, but the right to contract, and the type of service to be rendered, shall always be subject to such rules, regulations and policies of the Utility as may be in effect from time to time; and (3.) water furnished under such separate service contracts will be supplied to such customers at whatever pressure and quantity available from time to time without liability for damages due to high or low pressure or stoppage of flow.

12. If within one year after acceptance of Facilities by the Utility, any part of Facilities is damaged, or valve boxes or manholes are covered or removed; or if within one year, any part of the Facilities requires relocation, in the opinion of the Utility, due to construction of street, road, highway or drainage improvements, or other structures, Applicant shall after written notice from the Utility, promptly remedy the defects or relocate Facilities to the satisfaction of the Utility. Upon applicant's failure to perform said work in a timely manner, the Utility shall have the option of performing said work at Applicant's expense.
13. Neither the Utility's inspection, acceptance or use of Facilities shall constitute acceptance of any part of facilities which is defective or not in accordance with the plans and specifications, and if applicant breaches any provision of this contract with respect to the quality of the work, labor, materials, equipment or performance, whether initial or corrective, the Utility may bring an action of law, or inequity, for damages resulting from said breach at any time following discovery thereof until the expiration of the statute of limitations for written contracts.
14. Applicant designate _____, as Engineer, who will provide the engineering services described herein.
15. Applicant acknowledges that providing water service from Facilities, or connections thereto, will not be commenced by the Utility prior to Applicant fulfilling all its obligations in strict accordance with the terms of this agreement including the payment of the amounts due to the Utility.
16. All prior negotiations are merged into this agreement and all written addends hereto; said documents shall constitute the entire agreement of the parties.

17. The Utility and Applicant acknowledge and agree that the provisions are severable and if any of these provisions shall contravene, or be invalid under the laws of the United States, the State of Arkansas, or any other jurisdiction, such contravention or invalidity shall not invalidate the whole agreement, but it shall be construed as if not containing the particular provision or provisions held to be invalid and the rights and obligations to the parties shall be construed and enforced accordingly.

18. Estimated total construction cost _____

Final total construction cost _____

Centerton Water and Sewer
Department:

By

Title

Applicant:

By

Title

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____,
hereinafter called Principal, and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, and held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter call Owner in the total aggregate penal sum of

_____ Dollars (\$_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, date the _____ day of 200__, a copy of which is hereto attached and made a part hereof for the construction of:

(Insert Project title and/or brief description)

NOW THEREFORE, if the Principal shall well, truly, and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during the one (1) year guaranty period, and if the Principal shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no charge, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract, or to the work, or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be un-satisfied.

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20____.

****NOTE:** Date of bond must not be prior to date of contract. If Contractor is partnership, all partners should execute bond.

****IMPORTANT:** Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Arkansas.

Principle

By

(Seal)

Title

(Principal) Secretary

Address

ATTEST:

Witness as to Principal

Address

Surety

By Attorney-in-fact

Address

ATTEST:

Witness as to Surety

Address

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called Owner and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of

_____ Dollars (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of :

(Insert project title and/or project description)

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of work provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and for all labor cost incurred in such work including that by subcontractor, and to any mechanic or material man lien holder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

The Surety agrees the terms of this bond shall cover the payment by the Principal of not less than prevailing hourly rate of wages as found by the Arkansas Department of Labor or as determined by the court on appeal to all workmen performing work under the contract.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract, or to the work to be performed thereunder, or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of this contract, or to the work, or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in three counterparts, each of which shall be deemed an original, this the _____ day of _____, 20____.

****NOTE:** Date of bond must not be prior to date of contract. If Contractor is partnership, all partners should execute bond

****IMPORTANT:** Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Arkansas.

Principle

By

Title

(Seal)

(Principle) Secretary

Address

ATTEST:

Witness as to Principal

Address

Surety

By Attorney-in-fact

Address

ATTEST:

Witness as to Surety

Address

WATER AND SEWER MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That, _____, as
Principal and,

, as Surety

are held and firmly bound unto Centerton Water & Sewer Department, as Oblige, in the amount of _____ Dollars (\$ _____) for the payment whereof Principal and Surety bind themselves, their heir, executors, administrators, successor, 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 one year from the date of acceptance by Centerton Water & Sewer Department of potable water and/or sanitary sewer mains and appurtenances, of defects or necessary maintenance in the following improvements:

WATER AND/OR SANITARY SEWER LINES AND APPURTENANCES
THERE TO THAT SERVE _____,

shall promptly correct said defects and perform the necessary maintenance in keeping with the requirements of Centerton Water & Sewer Department in accordance with the SPECIFICATION REQUIREMENTS FOR THE CONSTRUCTION OF WATER AND SEWER FACILITIES as adopted by the City of Centerton pursuant to City Ordinance And subsequent amendments thereto and any additional requirements of Centerton Water & Sewer Department imposed at the time of the acceptance of said improvements.

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

Signed and sealed the _____ day of _____, 20_____.

PRINCIPLE _____

BY _____

ADDRESS _____

SURETY _____

BY _____

ADDRESS _____
