City of Pea Ridge Water Utilities

2023 Standard Specifications and Details

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Physical Address:	Mailing Address:	Phone Numbers:	Website Address:
885 N. Curtis Avenue Pea Ridge, AR 72751	P.O. Box 29 Pea Ridge, AR 72751	Office Phone: 479-451-1109 Emergency Phone: 479-721-1009	www.pearidgewater.com

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Craig Corder
Digitally signed by Craig Corder
Date: 2023.02.24 12:46:57-06'00'

ccorder 02/24/2023

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 20822
WILLIAM J. SMITH

2/2/2023

CERTIFICATE OF AUTHORIZATION
HALFF ASSOCIATES INC.
#1470
ARKANSAS-ENGINEER

Approved by Arkansas Department of Health - xx/xx/xxxx	
City Council Approved – xx/xx/xxxx	Ordinance – xx-xxx

City of Pea Ridge Water Utilities - 2023 Standard Specifications and Details

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SECTION 1 GENERAL INFORMATION

1.1 All Materials Shall Be Domestically Made

Any deviation to require DEPARTMENT approval, and certificate(s) of materials origin shall be provided at the pre-construction meeting or upon request and after a review of submittals, a written approval may be granted by City of Pea Ridge Water Utilities (PRWU).

1.2 The intent of this publication is to simplify and expedite the process of water and sewer construction within the jurisdiction of the City of Pea Ridge Water Utilities. This publication specifically applies to but is not limited to "Subdivision" and "Large Scale Development". All rules and regulations set forth by the ADH - Division of Engineering, shall be the minimum standard of all construction and development practices to be approved by the Pea Ridge Water Utilities. In such case as the standard specifications herein set forth exceeds the Arkansas Department of Health rules and regulations and the "Recommended Standards for Waterworks" recommended guide by the Great Lakes – Upper Mississippi River Board of State Sanitary Engineers (Ten States Standards), this document as approved by the City Council of Pea Ridge, Arkansas shall govern.

1.3 These general and detailed specifications shall govern the handling and installation of pipe and appurtenances for the City of Pea Ridge Water Utilities. Specifications stipulate 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 Pea Ridge Water Utilities. Any requested deviation from the specifications herein set forth, shall be reviewed on a case-by-case basis by PRWU and approved or denied by written authorization of the MANAGER/INSPECTOR.

1.4 Special conditions may arise on projects that are not covered in these specifications or that may require special handling. In case of such special conditions, complete detail as to materials, method of construction or other procedures shall be submitted to the Pea Ridge Water Utilities for review and approval. Standard construction details are incorporated and made a part of the specifications and shall become a part of the standard requirements for water line, sewer line and lift station construction. The standard details are included in these appendices at the back of these specifications. Where reference is made to a particular industry specification (ASTM, AWWA, etc.) it is hereby understood that reference is made to the latest specification revision in effect.

1.5 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 the Pea Ridge Water 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. The Pea Ridge Water Utilities shall not be responsible nor shall it bear any liability for CONTRACTOR'S means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, nor shall the Pea Ridge Water Utilities be responsible for any actions resulting from direction of the project by a City of Pea Ridge ENGINEER/INSPECTOR. The Pea Ridge Water Utilities shall not be responsible for the acts or omissions of the CONTRACTOR, Subcontractor, 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 the Pea Ridge Water Utilities of any product, material, or workmanship. The Pea Ridge Water Utilities shall not be responsible nor shall it bear any liability for the durability of any material or method of construction. Material used on any project shall be warranted against defects and workmanship by responsible CONTRACTOR for one calendar year from date of acceptance.

SECTION 2 DEFINITIONS AND ABBREVIATIONS

2.1 DEPARTMENT or PRWU: Refers to the City of Pea Ridge Water Utilities, under the jurisdiction of the Pea Ridge City Council, hereinafter referred to as "DEPARTMENT" or "PRWU"; having full and complete authority to manage, operate, improve, extend and maintain the City water distribution system and sewer collection system

2.2 MANAGER: City of Pea Ridge Water Utilities Manager.

2.3 DEVELOPER: Industrial 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 the city system.

2.4 CITY ENGINEER: Engineering firm, under contract with City of Pea Ridge Water Utilities, for review, guidance, recommendations, and approval of submitted plans for the expansion of the existing distribution and/or collection system.

2.5 ENGINEER: Individual registered to practice Engineering in the State of Arkansas who is responsible for the preparation of reports, plans, specifications, and inspection of the work herein approved.

2.6 CONTRACTOR: The person, firm or corporation with whom the DEVELOPER has entered into an agreement to construct the water and/or sewer improvements.

2.7 CITY INSPECTOR: City of Pea Ridge Water Utilities Inspector responsible for inspection, and notification of proposed reconstruction or alterations and inspections involving the City of Pea Ridge water and sewer system.

2.8 RESIDENT INSPECTOR: An authorized representative of the ENGINEER responsible for the inspection of construction for compliance with approved plans, specifications, and other contract documents.

2.9 NORMAL WORK SCHEDULE: The DEPARTMENT'S normal work schedule is Monday through Friday 7:30 AM to 4:30 PM except HOLIDAYS.

2.10 HOLIDAYS: New Year's Day, Martin Luther King Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Friday following Thanksgiving Day, Christmas Eve and Christmas Day, and days of office closure as prescribed by Mayor of Pea Ridge.

2.11 TERMS: "As specified" shall mean as specified by the DEPARTMENT in plans, proposals, specifications, and other written instructions.

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

2.11.2 The term "these specifications" shall refer to the "Design Materials and Construction Specification of Water and Sewer Facilities", latest revision, written by the DEPARTMENT. It is the responsibility of the CONTRACTOR, ENGINEER, DEVELOPER or OWNER, etc. to obtain copies and to comply with the latest revision of these specifications.

2.12 Abbreviations used throughout these specifications have meanings as follows:

ASTM American Society for Testing and Materials

AASHTO	American Association State Highway & Transportation Officials
ARDOT	Arkansas Highway Transportation Department
ADH	Arkansas Department of Health
ADL	Arkansas Department of Labor
ANSI	American National Standards Institute
AWWA	American Water Works Association (Latest Revision)
CTS	Copper Tubing Size
CI	Gray Cast Iron
CS or CC	AWWA (Mueller Corp Stop Thread)
DEQ	Arkansas Department of Energy and Environment, Division of Environmental Quality
DI	Ductile Iron
DFT	Film Thickness
FCCCHR	Foundation for Cross Connection Control & Hydraulic Research
FIP	Female Iron Pipe
HDPE	High Density Polyethylene
ID	Inside Diameter
IP	Iron Pipe
MIP	Male Iron Pipe
NFPA	National Fire Protection Association
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
PE	Polyethylene
POTW	Publicly Owned Treatment Works
PSI/PSIG	Pounds per Square Inch (gauge)
PVC	Polyvinyl Chloride
SSPC	Steel Structures Painting Council
USACE	U.S. Army Corps of Engineers

SECTION 3 LAWS, REGULATIONS, AND ORDINANCES

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

3.2 All Federal, State, County and City Laws, Regulations or Ordinances shall be complied with on all projects. This shall include, but not be limited to the obtaining of approval from ADH, DEQ, and USACE. Submission to and approval by ADH, DEQ, and USACE shall be the ENGINEER'S responsibility, including payment of any applicable fees. Approved plans and specifications shall be submitted to the DEPARTMENT for file and inspection prior to the pre-construction meeting.

SECTION 4 PERMITS AND LICENSES

4.1 All permits and licenses required by a Federal, State, County or City shall be obtained in strict accordance with 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. The DEPARTMENT shall charge 10% of the bond fee as a handling charge. Permits for boring of state highways will be permitted via the DEPARTMENT as to obtaining permission from ARDOT. The project

ENGINEER shall provide footage's, profiles, and any other documented information necessary to the DEPARTMENT for State boring permits. Project ENGINEER may obtain permit and obtain ARDOT permit without going through the DEPARTMENT. ARDOT will require a check for the full amount of bond to ARDOT. Project ENGINEER to submit copy of approved permit to DEPARTMENT when received. PRWU reserves the right to issue a 'HALT WORK' or a 'CEASE and DESIST' order until such time as a ARDOT permit is received by DEPARTMENT.

SECTION 5 PLANS And SPECIFICATIONS

5.1 Record Drawing Standards

5.1.1 Prior to final inspection of the project, one (1) complete set of "As-Built" drawings shall be in PDF format and furnished or emailed to the DEPARTMENT for record purposes by the same ENGINEER who prepared and submitted the construction plans and specifications. Change of ENGINEERING firm shall warrant re-submittal to CITY, DEPARTMENT and ADH. CITY and DEPARTMENT shall be notified in writing of change in Engineering Firm, additional requirements considered on a case-by-case basis. Record Drawing Standards shall be as outlined below:

5.1.2 Record Drawings shall be received prior to final inspection in paper and digital formatted copies. If found to be incorrect during inspections, CAD drawings shall be revised and a new PDF will be created and both sent to the DEPARTMENT.

5.1.3 The Record Drawings must be printed from the AutoCAD files supplied to the Engineering Department concurrently with the Record Drawings. These plans shall have been corrected to show all field changes made to the approved drawings. Hand marked copies prepared by the contractor will not be accepted for "Record Drawings".

5.1.4 Record Drawings shall include the site plan, construction plan sheets, and any supplementary drawings and shop drawings. Plan of lift stations or other special features should be shown if applicable. "Record Drawing" is to be stamped in large clear print on plans.

5.1.5 Public vs. Private Infrastructure shall be delineated on the PDF plans as well as the digital and data (.shp & .csv) files. Public vs. Private utilities shall clearly be identified on the PDF plan when both are present. If private utilities are present, then two (2) sets of data files will be required with the submittal. One set for public only, as outlined in these standards, and the other shall include private infrastructure only.

5.1.6 Piping line work for both water and sewer infrastructure shall be drawn as continuous segments without breaks. Breaks shall only occur at constructed locations of valves, manholes or other assets along a pipe segment.

5.1.7 Material Quantity Table – Utility Sheet to include a material quantity table of all public infrastructure that was installed during construction for each project. Table information shall quantify the entire water and sewer infrastructure that was constructed including all water and sewer lines, bends, tees, hydrants, valves, meter sets, and manholes as shown in **Table 5.8 – Material Quantity Table**.

5.1.8 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" = 5'** and plan horizontal scale for water and/or sewer lines of **1" = 30'** or larger. All drawings shall be no larger than **24" X 36"** sheets. All elevations shall be based on mean sea level. An overall project map shall be a

minimum **24" X 36"** and 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" = 2,000'** shall be furnished indicating the location of the project in relation to arterial streets and major highways. Reduced size drawings may be allowed for inspection purposes after all approvals have been obtained.

5.2 CAD File

5.2.1 Submit one or more AutoCAD / Civil 3D (.dwg format AND .dxf) drawing files that contain the entire utility infrastructure (water and sewer,) that was constructed with the project, as well as all other pertinent reference lines, project information, and survey control data. The following layers are requested to be used for all "Water" features: "WATER & WATERTXT" and the following layers are requested to be used for all "SEWER" features; "SEWER & SEWERTXT." The infrastructure shall be drawn in the file at the as-built locations as surveyed and certified by the Professional Land Surveyor. The AutoCAD file(s) shall be placed into a folder named "CAD" on the submitted media. Please note: the delivered CAD files should not be of the Plan/Profile sheets, but should be the overall working drawing in "model space" that is registered to AR North State Plane, NAD 1983.

5.3 Shape Files

5.3.1 Submit as-built data for direct import into the PRWU's Geographic Information System (GIS). Submit four (4) shape (.shp) files; One (1) shape file (points), named "WTR_F" that contains all of the water infrastructure features that was constructed with the project; One (1) shape file (lines), named "WTR_L" that contains all of the water infrastructure lines that was constructed with the project; One (1) shape file (points), named "SWR_F" that contains all of the sanitary sewer infrastructure features that was constructed during the project; One (1) shape file (lines), named "SWR_P" that contains all of the sanitary sewer infrastructure lines that was constructed during the project. Each shape file shall include all features and line work that was constructed with the project only. Correctly name the files as outlined above. The shape files shall match the data files (.csv).

5.4 Data Files

5.4.1 Data shall consist of files in an ASCII Comma Separated Value (CSV) file format. The preferred horizontal coordinate system for the digitally submitted data as described below shall be AR NORTH State Plane (NAD83), U.S. Survey Feet. The preferred vertical coordinate system for the digitally submitted data as described below shall be North American Vertical Datum, 1988 (NAVD 1988), U.S. Survey Feet. All of these file(s) shall be placed into a folder named "DATA" on the submitted media.

5.5 Water Features

5.5.1 The file shall be named "Water Features" and contains various elements that connect and control the distribution of water within and among various water lines. These features include both buried fittings (bends, crosses, end caps, reducers, and tees) and features that are accessible and/or visible at the surface (meters, valves, and hydrants). Buried features should be located similar to the method our utility locators use: (a paint dot is placed on the pavement at the approximate location of the feature and then surveyed location is taken at the paint mark.) Water line locations are required only if the water line curves. These locations shall be surveyed at 25 foot stations along the length of the water line.

Each line of the file shall contain the following information:

ID, Type, Northing, Easting, Elevation, Description (all on first line of the file)

Where:

ID - A unique ID number assigned to each feature noted on the as-built plan and profile sheets (e.g. GV1, HYD1, etc.)

Type - The type of feature. Provide the following codes as indicated in the table below:

5.5.2 Water Features Descriptions

FEATURE DESCRIPTION	TYPE
AIR RELEASE VALVE	ARV
BACKFLOW PREVENTER	BFP, RPZ, RPA, etc.
BEND	BEND
BLOW OFF	BLOW OFF
CROSS	CROSS
DEMARCATION VALVE	DMV
ENCASEMENT	ENCASE
END CAP	CAP

FEATURE DESCRIPTION	TYPE
FIRE DEPARTMENT CONNECTION	FDC
FIRE HYDRANT	HYDRANT
POST INDICATOR VALVE	PIV
REDUCER\INCREASER	REDUCER
TEE\TAPPING SLEEVE	TEE
WATER VALVE	VALVE
WATER LINE	WATERLINE
WATER METER	METER

NORTHING – North coordinate value (+\- 2.0’ if buried, +\- 0.1’ otherwise).

EASTING – East coordinate value (+\- 2.0’ if buried, +\- 0.1’ otherwise).

ELEVATION – Elevation, collected as follows (+\- 2.0’ if buried, +\- 0.1’ otherwise).

5.5.3 Water Feature Elevation Locations

FEATURE TYPE	ELEVATION LOCATION
BEND/BLOWOFF/ CROSS/END CAP	Surface, at the mark that indicates the approximate location
REDUCER/TEE	of the buried feature.
HYDRANT	Top of the fire hydrant
METER/VALVE	Center of the access structure (Can, Tube, or Vault).
WATERLINE	Surface, at the mark that indicates the approximate location of the buried line, at 25 ft stations. Only required if water line is curved.

5.5.4 Water Feature Descriptions

FEATURE TYPE	DESCRIPTION
BEND	Degree of Bend (e.g. 11.25/22.5/45/90)
BLOWOFF	Size (in inches) of the blowoff
CROSS	Size (in inches) of each water line that connects to cross (e.g. 12x12x8x8)
ENDCAP	Size (in inches) of the water line.
HYDRANT	Manufacturer & year of manufacture. This information will be on hydrant.

METER	Size (in inches).
REDUCER	Size (in inches) of the lines on either side of reducer (e.g. 6x8).
TEE	The size (in inches) of each line connected to tee (e.g. 8x8x6)
VALVE	The size (in inches) and type of valve (e.g. 6 GV, 8 BFV).
WATERLINE	No Description required.

5.5.6 Water Lines

The file shall be named "Water Lines" and shall contain the following data. There is one line of data for each water line that connects two water features.

ID, Size, Material, FeatureID1, FeatureID2 (all on the first line of the file).

Where:

ID – A unique number assigned to each section of water line noted on the as-built plan and profile sheets (e.g. 'WL1').

Material – Water line material.

Size – The size (in inches) of the water line.

FeatureID1 – The ID of the feature on the near end of the water line as shown on the as-built plans (e.g. GV1).

FeatureID2 – The ID of the feature on the far end of the water line as shown on the as-built plans (e.g. HYD1)

Example File Format:

ID	MATERIAL	SIZE	FeatureID1	FeatureID2
WL1	PVC	8	GV1	GV2
WL2	PVC	8	GV12	GV1

5.6 Sewer Features

The file shall be named "Sewer Features" and shall contain information about manholes, cleanouts, and other features listed in the table below. There is one line of data for each sewer feature.

Buried features such as force main bends and tees should be located similar to the method our utility locators use: (a paint dot is placed on the pavement at the approximate location of the feature and then surveyed location is taken at the paint mark.)

Force main locations (see the "FORCEMAIN" type in the table below) are required only if the force main curves. These locations will be surveyed at 25 foot stations along the length of the water line.

End of service locations shall be the location at which the stub-out connection point is to be made. Section 14.2.7

ID, Type, Northing, Easting, Elevation, Invert, Material (all on first line of file)

Where:

ID – If the feature is a manhole then the number as shown on the as-built drawings (e.g. “MH1”). If feature is a clean out then a lot number or street address (e.g. “LOT10” or “123 Street Name”).

Type – The feature type, coded according to the following table:

5.6.1 Sanitary Sewer Features Descriptions

FEATURE DESCRIPTION	TYPE
CLEAN OUT	CLEANOUT
DRAIN	DRAIN
END OF SERVICE	SERV
FORCE MAIN VALVE	FMVALVE
FORCE MAIN TEE	FMTEE
FORCE MAIN BEND	FMBEND

FEATURE DESCRIPTION	TYPE
FORCE MAIN	FORCEMAIN
GREASE TRAP	GREASETRAP
MANHOLE	MANHOLE
SAND\OIL SEPERATOR	SOS
TRACER WIRE PORT	TWPORT

Northing – North coordinate value at the center of cover (+/- 0.1’).

Easting – East coordinate value at the center of cover (+/- 0.1’).

Elevation – Rim elevation at the center of cover (+/- 0.1’)

5.6.2 Sanitary Sewer Features Elevation Locations

Feature Type	Elevation Location
CLEANOUT	Surface adjacent to the cleanout.
DRAIN	Center of the drain grate.
FMVALVE	Center of the access structure.
FMTEE/FMBEND	Surface, at the mark that indicates the approximate location of the buried feature.

Feature Type	Elevation Location
FORCEMAIN	Surface, at the mark that indicates the approximate location of the buried main, at 25 foot stations *Only required if force main curves.*
GREASETRAP/OWS	Center of the structure.
MANHOLE	Center of the rim.

Invert Elevation– Invert elevation (+/- 0.1’, bottom of manholes)

Material – Construction material

Example File Format:

ID	TYPE	NORTHING	EASTING	ELEVATION	INVERT	MATERIAL
MH1	Manhole	751815.686	554237.51	1285.85	1277.61	CIP
CLEANOUT1	CLEANOUT	751827.313	553317.35	1290.13	1287.13	PVC

5.6.3 Sewer Pipes

The file shall be named “Sewer Pipes” and shall contain the following data. There is one line of data for each sewer pipe.

If the pipe is a force main, values for Size, Material, USId, and DSId only need to be provided.

ID, Size, Material, USId, DSId, USInv, DSInv, Slope, Length (all on first line of the file)

Where:

ID – A sequential pipe number as noted on the as-built drawings (e.g. “SSP1”).

Size – Inside pipe diameter (inches).

Material – Pipe material

USId – Upstream manhole number as shown on the as-built drawings (e.g. “MH1”).

DSId - Downstream manhole number as shown on the as-built drawings (e.g. “MH2”).

USInv – Invert elevation at the upstream end.

DSInv – Invert elevation at the downstream end. If downstream end is a drop connection, provide both elevations separated by a slash (e.g. 1100.05 / 1100.15).

Slope – The as-built grade of the pipe, expressed as a percentage and carried out to two decimal places.

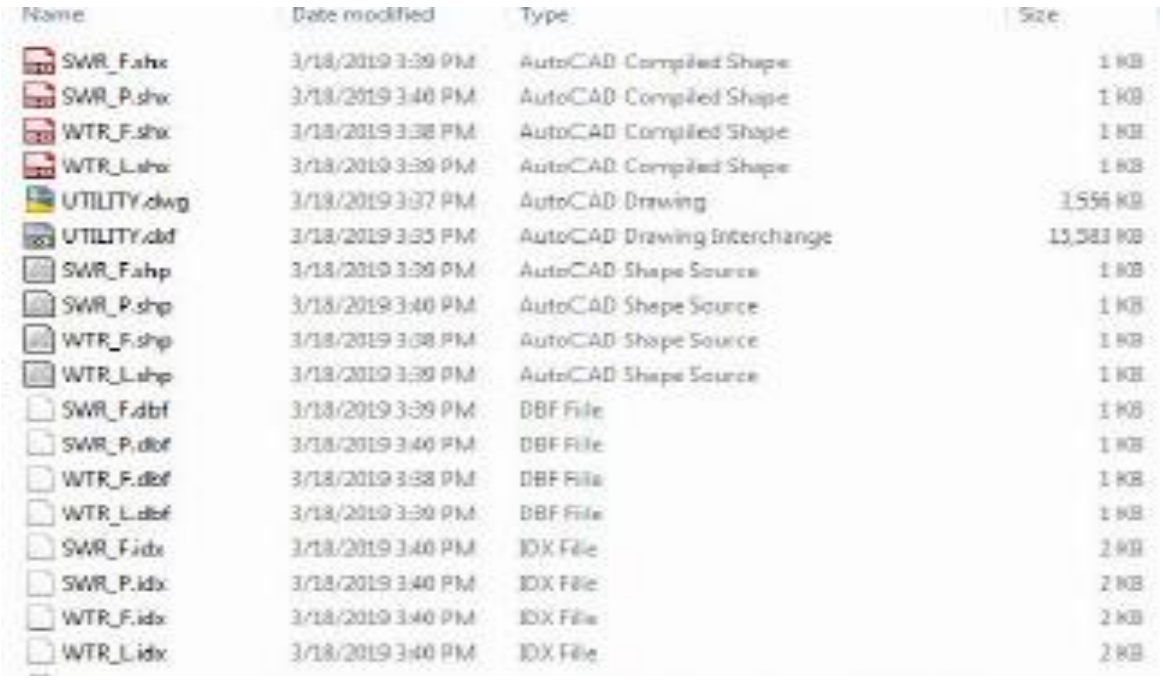
Length – The length (in linear feet) of the pipe as indicated on the as-built carried out two decimal places.

Example File Format:

ID	SIZE	MATERIAL	USID	DSID	USINV	DSINV	SLOPE	LENGTH
SSP1	8"	PVC	MH1	MH2	1233.15	1228.15	6.02%	78.76

5.7 Required data folder file format:

Example File Format:



5.8 Material Quantity Table

WATER SYSTEM IMPROVEMENTS	TYPE	QUANTITY
20" ENCASEMENT	LF	20
16" PVC WATER LINE	LF	1100
GATE VALVES (16")	EA	12
TAPPING SLEEVE & VALVE	EA	2
FIRE HYDRANTS	EA	6
45° BEND	EA	4
METER SETS	EA	30

SEWER SYSTEM IMPROVEMENTS	TYPE	QUANTITY
8" PVC	LF	800
8" DIP	LF	40
CIP SMH	EA	10
CLEANOUT	EA	2
4" FM	LF	150

SECTION 6 INSPECTION

6.1 This section covers the requirements of inspection for the construction of water and sewer facilities.

6.2 The responsible ENGINEER who prepared and submitted the construction plans and specifications shall be responsible for construction layout, general direction, resident inspection and final inspection as described in more detail in the following sections. Continuous project responsibility shall be an express condition of plan approval. The ENGINEERS responsibility shall extend through final inspection approval and submittal of "As-Built" drawings for acceptance of the project by the DEPARTMENT for maintenance.

6.3 All water and sewer facilities proposed shall be constructed by a licensed utility CONTRACTOR with the correct classification and inspected by the responsible ENGINEER as defined under definitions. Inspection 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 the DEPARTMENT. Any defects, deficiencies or irregularities in the work found by the ENGINEER or reported by the RESIDENT INSPECTOR shall be reported to the CITY INSPECTOR. Such action, as deemed appropriate, and as approved by the DEPARTMENT, shall be taken to correct such deficiencies. All work performed, shall at all times be subject to general inspection by the PRWU MANAGER or INSPECTOR.

6.4 If deemed necessary by the DEPARTMENT to insure conformance with the approved plans and specifications, full time resident inspection may be required during all or part of the project and shall be performed by qualified personnel under the direct supervision of the ENGINEER. The name(s) of the RESIDENT INSPECTOR shall be furnished to the DEPARTMENT, any changes shall be notified to the DEPARTMENT in writing with all contact information included. It shall be the responsibility of the RESIDENT INSPECTOR to safeguard the DEPARTMENT'S interest by checking the construction work for compliance with the approved plans, specifications and other standards. The responsible ENGINEER shall provide an inspector for each location within a project that would use more than one pipe laying crew (e.g. two pipe laying crews on two different sites, two inspectors, one for each site). The CITY INSPECTOR or DEPARTMENT representative and the RESIDENT INSPECTOR shall witness all test procedures. The RESIDENT INSPECTOR shall provide a documented report of results, conditions, and time of test to the DEPARTMENT for its use and approval. If the CONTRACTOR intends to work outside of the normal work schedule or on a holiday, the RESIDENT INSPECTOR shall be required to be on the job site at all times and shall notify the DEPARTMENT.

6.5 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 the DEPARTMENT upon request.

6.6 PRWU does require weekly reports to CITY INSPECTOR. If this is not followed or a request to alter requirement is not made, PRWU retains right to issue a 'Cease and Desist' or 'Halt Work' order until issue can be resolved.

SECTION 7 CONSTRUCTION LAYOUT

7.1 The layout and staking of the construction work shall be completed by trained and qualified survey personnel under the supervision of the ENGINEER. Construction layout shall consist of staking (physical monuments) necessary to determine alignment and elevations to properly construct the proposed facilities. All depths shall be approved by the DEPARTMENT during plan review.

SECTION 7A DESIGN REQUIREMENTS \ UTILITY CORRIDORS

7A.1 CONCEPT

7A.1.1 Please keep in mind that the DEPARTMENT provides water within three separate city boundaries (Pea Ridge, Rogers, and Bentonville) as well as County areas & sewer within the city limits of Pea Ridge, therefore, variations in specs may occur. The DEPARTMENT also has multiple pressure plains for water.

7A.1.2 Initial concept plans are helpful but not required. Many times we can help with decisions before too much money is spent designing, only to be changed after review. Our goal is to assist in the minimizing of the number of reviews for a development.

7A.1.3 Verify Water Mains are in the area and what size are the distribution lines.

A. Will a larger main line be required to serve development?

B. Where will the connection point(s) be?

C. Will 'off-site' improvements be required?

D. Will development 'link' pressure planes & required a Pressure Reducing Valve & Vault?

7A.1.4 Verify Sewer is in the area of development and what size are the collection lines.

A. To get sanitary sewer service, you must be within Pea Ridge City Limits.

B. Will a lift station be required? (See requirement information mentioned further within this document.)

7A.1.5 What electric service provider will serve this development? There are two (2) in our service area.

A. Carroll Electric

B. SWEPCO/AEP

7A.1.6 The DEPARTMENT only does water/sewer utilities and utility easements. We do not have anything to do with drainage, streets, lot layout, streetlights, etc. Please coordinate with street and planning departments on those items separately.

7A.1.7 All offsite mainline extensions must be in a private 20' Utility Easement (Sewer may require more based upon depth), signed over to the DEPARTMENT and it must be obtained prior to submittal to ADH.

7A.2 DESIGN

7A.2.1 All developments, unless otherwise approved through the city, have a 10' Right of Way along the road (which includes a 5' green space & a 5' sidewalk), then a 20' General Utility Easement, (which is to be dedicated during on the "Final Plat" or an official "Easement/Asset Dedication"). Then the structure setback is at 35' from back of curb. Each lot also will have a side setback of 7', which is important to observe as water/sewer/electric utilities are to be placed in that setback. No structures, including driveways, are to be placed in the 7' side setback.

7A.2.2 For the purpose of this document, we will be referring to Back-of-Curb for placement of utilities, and NOT from the Right-of-Way!

A. Water and Sewer Mains are to be placed in first 10' to 15' from back of curb.
   1. Water should be 11' from back of curb.
   2. Sewer should be 13' from back of curb (Should avoid placing manholes in sidewalks).

B. Meter Cans, Fire Hydrants, and Sewer Taps are to be placed as described below.
   1. From back of curb = Right of Way – First 10'.
   2. Side setback – 7' from property line.
   3. Meter cans (18" round BROOKS as per specs.) are to be placed, from center of can, 13' from back of curb and 6' from property line, within the side setback.
   4. Fire Hydrant Assembly, per the DEPARTMENT'S specs., shall consist of Valve, Swivel Anchor Coupler, and Fire Hydrant, and shall be placed on the side of main away from right of way. Fire Hydrant Assemblies shall be placed on the property line unless on a corner lot, then will need placed to keep any part of assembly out of the sidewalk.
   5. Sewer Service Connections (Taps) shall be placed 14' from back of curb at a finished elevation of 4' below finished grade and 6' from the property line, within side setback. The connection (tap) shall be capped and marked by a green 'T' post per the DEPARTMENT'S specifications.
   6. Electric corridor begins at 15' from back of curb. To maintain 5' of separation from Water/Sewer, conduit shall be placed a minimum of 16' from back of curb if following water main and 18' from back of curb if following sewer main. Electric providers should design transformers along with the meter loops centered on property lines within the side setbacks.
   7. Gas corridor begins at 20' from back of curb.
   8. Telecommunications (Cable, Phone, Internet) begins at 25from back of curb.

C. ***Flexibility needs to be maintained by the DEPARTMENT in this area due to the fact that water/sewer utility easements may need to be wider due to required depth of these utilities as may be needed based on designed flow and ADH requirements.***

D. Total Structure Setbacks are generally set at 35' from back of curb unless otherwise granted a variance by City of Pea Ridge Planning Commission and ALL utilities must remain 5' away from total setback, NO EXCEPTIONS.

E. **NOTE** – In the best interest of the City and the Water/Sewer Utilities, in order to loop water and link together an efficient collection system, additional easements may be requested by the DEPARTMENT in order to prevent isolated blocks of land/acreage/parcels, to precipitate growth.

7A.3 REVIEW

7A.3.1 All design work must follow City of Pea Ridge Specifications involving Building/Planning, Street, and Pea Ridge Water Utilities departments. The DEPARTMENT'S specifications are available at www.pearidgewater.com under the Information tab. Contact the afore mentioned departments for their respective specifications. After you have completed your design, following specifications and requirements within this document, the DEPARTMENT will do a cursory review of the plans (which may include submitting to PRWU's contracted engineering firm for more in-depth review) and will make any appropriate comments on what needs to be addressed. A Technical Review meeting will be scheduled with City Department representatives and planning commission members to discuss and review plans. A second technical meeting may be requested if required by planners to review any required changes from previous meeting.

7A.3.2 Before a second review can be submitted, developer/engineer should have worked with electric service provider for this development and have received their design back from them. This design is then to be overlayed on the plans showing locations in regards to other utilities. This is a required step to eliminate problems later in the process with conflicts involving electric transformer and meter loop placement.

7A.3.3 Is a sewer lift station required? If so, all lift stations taken into the DEPARTMENT'S system are to be designed by the consulting engineer and submitted to the DEPARTMENT for design consideration and review. Design must follow department specifications and will be reviewed by the DEPARTMENT and our contracted engineers. Back-up power generator will be required as per the DEPARTMENT'S specifications with auto-transfer panel and sized in conjunction with design engineers and pump supplier. Both pump and generator controls shall have an interface for connectivity to a SCADA monitoring system. Lift station shall have a SCADA transducer control of level and pump operation and alarm notifications. Piping system can be supplied by others but must interface with pump disconnects and valve connections.

7A.3.4 **NOTE** on Lift Station Power! All lift stations are to be three-phase power. However, if three-phase power is not available nor required for the development (Power Provider Must Advise!), three-phase power can be accomplished utilizing step-down transformers. If three-phase is required for development, then run three-phase to the lift station.

7A.3.5 *(You Must Keep The Following In Mind.)* The City requires all power within the development be buried without any overhead lines within the development. Certain voltages leading to the lift station cannot be buried. They are as follows: 120/240 cannot be buried (overhead only). 120/208, or combination thereof such as 208/230, and 277/480 can be buried. Generator voltage must match power being supplied.

7A.3.6 Once all requirements have been met and reviews completed with the DEPARTMENT, you may submit plans to the Arkansas Dept. of Health in Little Rock. In agreement with ADH, after their first review, and comment letter is received by our department, we will then issue a "Letter of Concurrence" to be submitted with second submission to ADH. Submission to ADH is allowed Technical Review, if all requests are addressed and before Planning Commission approval, but only if no further changes are to be made to the utility's layout.

7A.3.7 **NOTE** on Design Changes during construction: If any changes are made after being approved by Pea Ridge Planning Commission during construction that are substantial and major design changes, resubmittal to the Planning Commission may be required. Seek guidance from appropriate managing city department such as Planning, Street, and Water Utilities. Changes made to plans approved by ADH are required to be resubmitted to ADH for review.

7A.4 DEVELOPMENT

7A.4.1 Once all approvals have been obtained from planning, utilities, and ADH, you can request a pre-construction meeting with the planning department and all departments will typically be represented.

7A.4.2 Small changes, or 'field changes', are allowed with Pea Ridge Water Inspections approval in the field without having to do a Change Order. Any 'Major Changes' must go through the planning departments change order process if needed as determined by the DEPARTMENT. Changes made to plans approved by ADH are required to be resubmitted to ADH for review. Any changes must be reflected on the submitted as-built plans.

7A.4.3 The DEPARTMENT has its own "Inspections Department" which will make unscheduled visits to your project throughout construction looking for installation compliance as well as compliance with ADH and Dept. of Labor Safety guidelines. This department will take pictures, videos, and notes for our own construction record of you project. Engineer of Record is required by the DEPARTMENT'S specifications to provide on-site inspections. This inspector will be required to submit record of inspections to the DEPARTMENT on a weekly basis. This representative of the engineer of record will need to schedule all required testing of water/sewer through PRWU Inspections with a minimum of 24-hour advance notice. Our crew will work with you the best they can, time allowed, to keep your development moving and not held up.

7A.4.4 When it is time to 'load' the water mains with water to perform the appropriate pressure testing and chlorination of mains, coordinate with the DEPARTMENT'S inspection division for loading the lines. You are not allowed to do this on your own.

7A.4.5 When it is time to draw 'BACTI' samples, you must coordinate with the DEPARTMENT'S inspection division for the pulling of samples. The DEPARTMENT will, because of flow-metering of water usage, flush and pull samples as well as deliver them to the Benton County Health Unit for ADH Laboratory testing.

7A.4.6 After samples are approved and after 'Final Plat' or 'Asset Dedications' are approved by Planning Commission and/or City Council, the DEPARTMENT will be responsible for opening main valves and bringing development online.

7A.5 CLOSE-OUT

7A.5.1 Once the development is completed and ready for final inspection, schedule a "Final Walk-through" with the planning department. They will notify the DEPARTMENT and request a date and time that the inspection division can work it in. During this walk-through, any issues observed will be noted and must be reconciled before the DEPARTMENT will sign off on the project/development.

7A.5.2 "Final Plat" and "As-Built" plans must be submitted to planning department for all departments to make comments.

7A.5.3 At Final stage, the DEPARTMENT requires the following:

A. A cost breakdown of the installed infrastructure, including labor. (Submitted for review a minimum of 1 week prior to Final Plat meeting.)
B. Once that cost breakdown is approved, that amount will be used for the "*Maintenance Bond*" or an acceptable '*Irrevocable Letter of Credit*' which the developer will provide. This bond must be for ½ of the installed infrastructure cost. It is to be for a period of one (1) year from the acceptance date of the City Council. The bond 'must' be dated as of the City Council acceptance.
C. The developer must complete and submit an affidavit attesting to the accuracy of the prices and the proper installation of the infrastructure. (See Appendix #1)
D. Payment to PRWU for any and all Large Scale Development fees associated with development. (Contact the DEPARTMENT for fee schedule.)

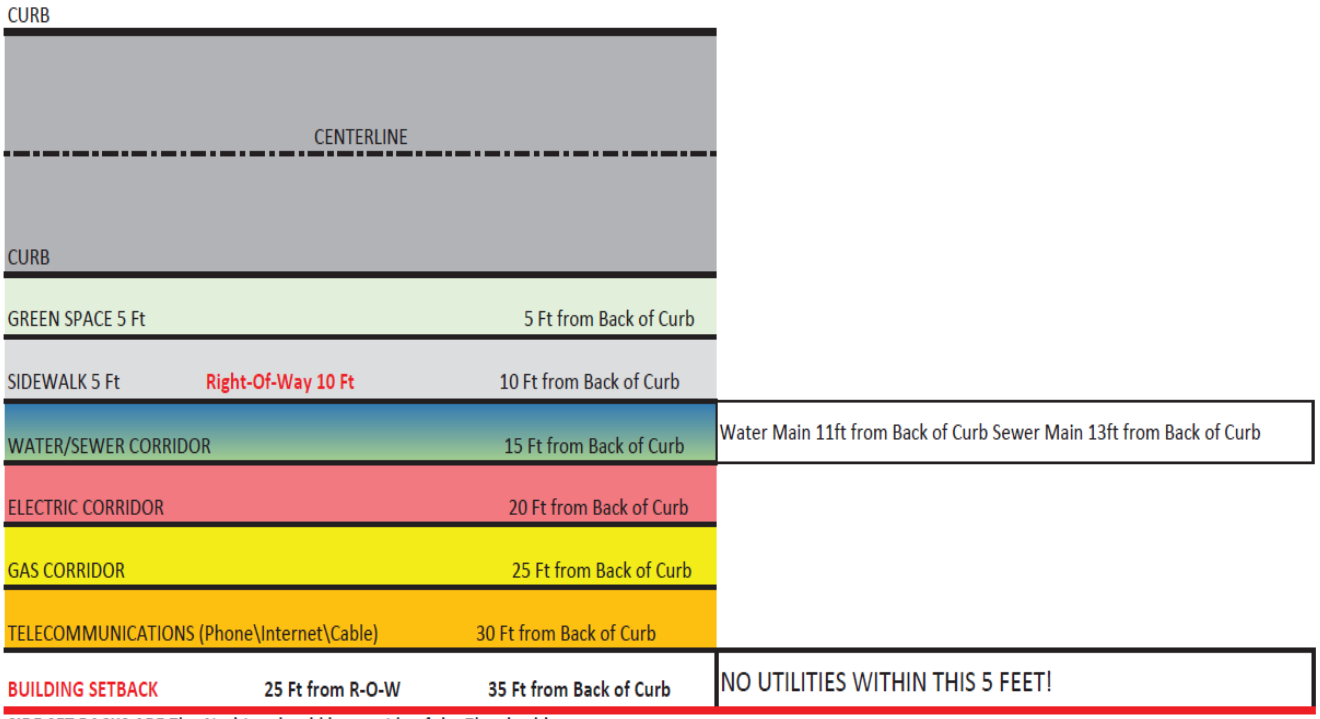
E. Electronic copy of As-built plans including GPS coordinates for all above ground appurtenances, i.e. meter cans, manholes, valves, fire hydrants, etc. Must receive these a minimum of one (1) week prior to Planning Commission approval meeting for the DEPARTMENT to review.

F. The DEPARTMENT must receive digital files of the correct as-builts in a digital format of the completed work. Digital files are to include a 'pdf' of the entire development which includes GPS coordinates, and a copy of the development in a geo-referenced AutoCAD/dwf format for incorporating into departments ESRI programs.

G. Without any one of the above, the DEPARTMENT reserves the right not to recommend passage to the City Planners or Council until missing item is submitted.

7A.6 UTILITY CORRIDORS (Exhibit)

City of Pea Ridge Subdivision Utility Placement Corridor



SIDE SET BACKS ARE 7' Nothing should be outside of the 7' setback!

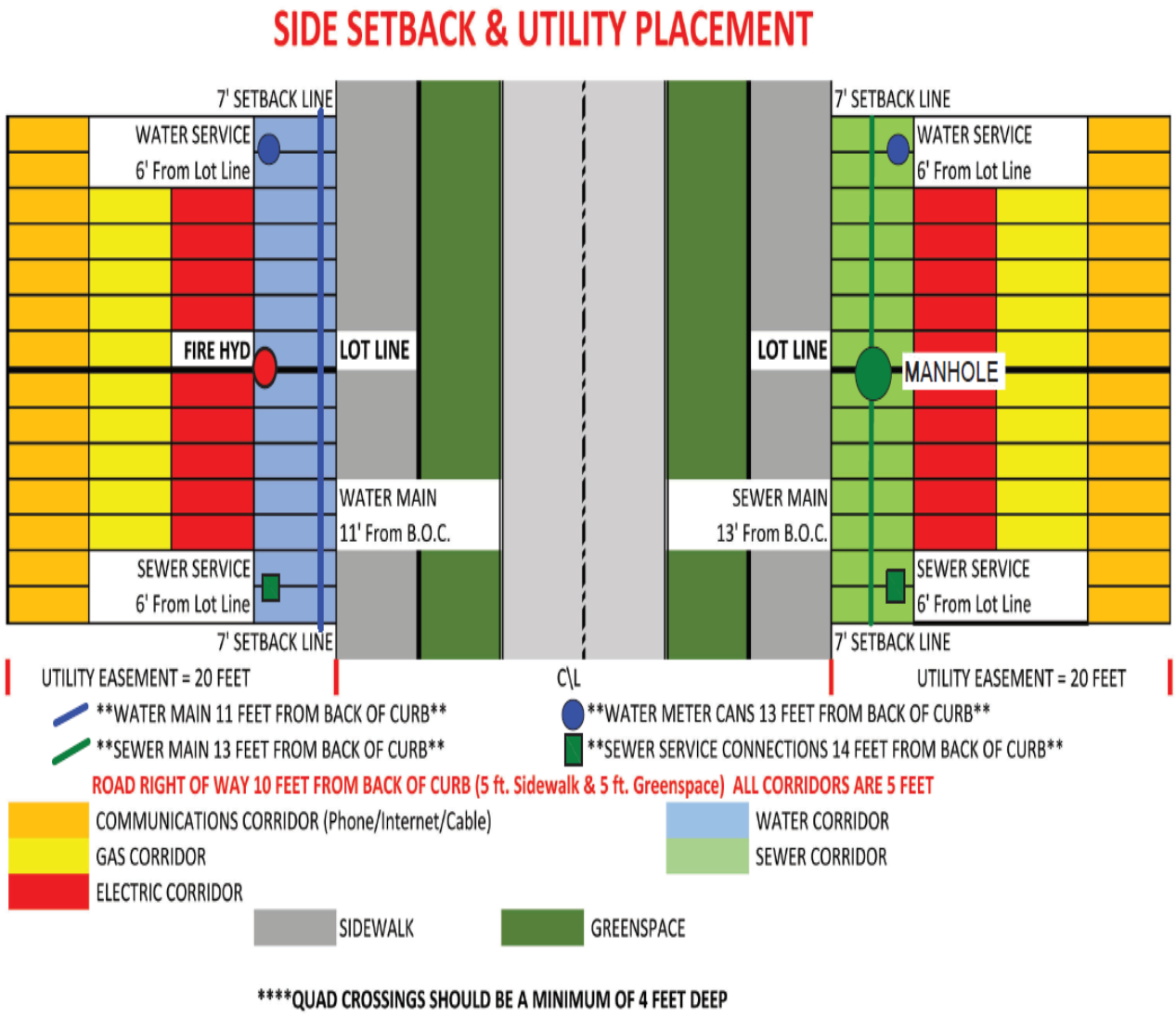
›››Meter cans are to be placed, from center of can, 13' from back of curb and 6' from property line, within the side setback.

›››Sewer Service Connections (Taps) shall be placed 14' from back of curb at a finished elevation of 4' below finished grade and 6' from the property line, within side setback.

›››Fire Hydrant Assembly, per Pea Ridge Water Utilities specs., shall consist of Valve, Swivel Anchor Coupler, and Fire Hydrant, and shall be placed on the side of main away from right of way. Fire Hydrant Assemblies shall be placed on the property line unless on a corner lot, then will need placed to keep any part of assembly out of the sidewalk.

General Utility Easements Are 20 ft in Width From Right of Way! All Utilities Are To Work Together And Try To Stay Within Assigned Corridor. Occasionally Conflicts May Occur But With Planning, Many May Be Avoided.

7A.7 SETBACKS (Exhibit)



SECTION 8 FINAL INSPECTION PROCEDURES

8.1 Before acceptance of new construction involving water lines or sewer main extensions, a physical site inspection will be scheduled by the DEPARTMENT referred to as a “Final Inspection”.

8.2 All lot corners shall be in place and witnessed by a survey marker. Said marker shall bear the number of the respective lot it represents. If lot lines do not coordinate with newly constructed utilities, it shall be the DEVELOPER’S responsibility to make the appropriate adjustments. If said situation exists at time of final inspection, approval shall be withheld until lot lines and utility locations coordinate. If these requirements have not been met, then final inspection shall be cancelled.

8.3 Water valve boxes will be to final ground elevation or paving grade centered directly over operator nut. Water valves and valve boxes shall be positioned in a manner to allow operability at all times. A continuous locator wire shall be present and operable in all valve boxes.

8.4 All water valve locations shall be verified by two reference measurements previously recorded by "As-Built" drawings. Water valve boxes shall be surrounded by a ground-level circular pre-fabricated concrete valve pad. Pre-fabricated circular valve pads shall be installed and grouted around valve box top section. All auxiliary fire hydrant valve boxes and valve pads shall have an 18" to 24" clearance from the top of the valve box to the fire hydrant cap and not interfere with cap removal when using a standard fire hydrant wrench.

8.5 Fire hydrants shall be set at bury line at finished grade. Hydrants shall be positioned as directed by the DEPARTMENT during plan review.

8.5.1 All fire hydrant assemblies shall have an auxiliary gate valve installed at the point of connection serving the hydrant. Hydrant lead lines in excess of 50' shall have an additional auxiliary gate valve installed at the fire hydrant or as designated by the DEPARTMENT during plan review.

8.6 Fire Department Connection (FDC) for each sprinkler or standpipe system shall be located not more than 100' from the nearest public fire hydrant connected to an approved public water supply. The FDC height shall be between 36" and 48" from the finished grade with a 30° bend and a 5" Storz connection. There shall be 12 gauge type TW (single strand) insulated copper locator wire installed above the initial backfill. Additional fire hydrants may need to be installed as required by the Fire Chief or his designated representative. With respect to hydrants, driveways, buildings and landscaping, fire department connections shall be so located that the fire apparatus and hose connected to supply the system will not obstruct access to the buildings for other fire apparatus. The location of the fire department connections and/or fire hydrants shall be approved by the Fire Chief or his designated representative. This fire hydrant will be solely used for the FDC. (*Or per newest Fire Department Ordinance*).

8.6.1 FDC's shall be located on address side of building and shall be approved by the Fire Department prior to installation.

8.6.2 Butterfly valves are not approved for use in fire suppression systems. Only approved Post Indicator gate valves (P.I.V.) or wall indicator valves shall be utilized and approved. P.I.V. needs to be 30" to 36" above final grade to the sight glass. There shall be 12 gauge type TW (single strand) insulated copper locator wire installed above the initial backfill. PIV shall be shown on construction plans.

8.7 Residential Meter boxes shall be set at 3" above proposed final grade or as directed by the DEPARTMENT during plan review. All meter setters inside the box shall not touch the sides of the box and shall be located where the turn-on and turn-off valves are easily accessible and operable by meter personnel. All meter sets shall have a minimum 3' stub-out service line for each service placed in such a manner to minimize disturbing meter box in the process of plumbing connection from pigtail to the customer's service line. All damage to meter boxes shall be the responsibility of the owner or builder after final acceptance has been completed. Meter personnel reserve the right to refuse placement of meters if setters or boxes are damaged, misaligned, or if finished grades have changed. If development has access to municipal sewer, a dual meter set (one for residential and one for agricultural) must be installed.

8.8 All meter vault plans and installations shall be approved by the DEPARTMENT during plan review. All meter vaults are to be installed by designated CONTRACTOR of the project in accordance with **Section 12.18.4** of the Specifications.

8.9 All pipe and fittings shall meet the DEPARTMENT'S specifications. All DI pipe shall be cement lined and tar coated, all fittings shall be epoxy coated. Meter by-pass material shall be rigid copper or DI pipe. Valves shall meet specifications herein. Vault depth shall not exceed 5' unless approved by the DEPARTMENT.

8.10 The vault cover shall be removable to allow full access to the vault. Four recessed lifting points shall be provided. An access door shall be installed in the center of the vault. Approved doors shall be similar or equal to Bilco or Halladay and shall be a minimum of 36" x 36".

8.11 Water meters shall not be installed within buildings without prior approval by the DEPARTMENT. If approved, meters inside buildings shall meet the criteria listed in **Section 8.12**, which shall be furnished and guaranteed by owner of future development prior to approval.

8.12 Meters must have capability via outside of building and accessible to meter personnel with no obstructions. Meters 4" and larger are to be purchased by OWNER with direction of the DEPARTMENT.

8.13 Sewer stub-outs installed for a domestic sewer connection shall be marked and made visible by installing a metal tee post painted green at the precise location above said sewer line end, at a height of 3' exposed above ground and buried a minimum of 3' below ground.

8.14 All trees planted in large scale projects and subdivisions shall be planted at a minimum of 5' from any water or sewer mains unless otherwise approved by the DEPARTMENT.

8.15 A full CCTV inspection and first tracer wire inspection shall be completed before final inspection. ENGINEER shall provide revised "as-built" drawing of utility sheet with sewer profile before testing will be scheduled. PRWU will do all CCTV inspections on sewer up for acceptance by PRWU at DEVELOPERS expense.

8.16 The Owner/Contractor/DEVELOPER shall pay any outstanding (3 or more months) invoice issued by the Water Utilities Office prior to final acceptance of the current project. This includes previous projects, water/sewer line repairs, fire hydrant contracts, discontinue services, replace meter tiles, re-inspection fees, survey fees, etc. – Does not include Utility Bills.

8.17 The DEPARTMENT reserves the right to charge for each re-inspection. *Refer to current fee ordinance*.

SECTION 9 GENERAL REGULATIONS For CONSTRUCTION PURPOSES

9.1 ***Refer also to the Pea Ridge Street Department Specifications.***

9.1.1 This section outlines minimum construction procedures and standards for the installation of water and sewer extensions.

9.1.2 Any Contractor/developer/CUSTOMER/RESIDENT that requests the use of a hydrant meter will be required to fill out a Contract and pay for a Fire Hydrant Meter at the Water Utilities Office. The Contractor/developer/CUSTOMER/RESIDENT will determine the location for the hydrant meter with the DEPARTMENTS approval.

9.2 Underground Utility Notification

9.2.1 It is the CONTRACTOR'S responsibility to notify "**Arkansas One-Call**" (**1-800-482-8998** or **811**) two days in advance of any excavation. Location of utility requests for surveying purposes will be charged to the requesting party. A notice of at least 2 working days (normal work schedule) should be expected before locates are performed by the DEPARTMENT. *Refer to current fee ordinance.*

9.3 Water Outages

9.3.1 In the event that the CONTRACTOR must have a water main out of service in order to connect to the water system, the CONTRACTOR shall notify the DEPARTMENT of impending loss of service at least 5 days in

advance. All shutdowns shall be coordinated with the DEPARTMENT, and the schedule shall be approved by the DEPARTMENT. Notifying customers will be accomplished by means of approved door hanger notices supplied by the DEPARTMENT, however it is the CONTRACTOR'S responsibility to notify the customers a minimum of 24 hours ahead of time.

9.4 Trench Dewatering

9.4.1 The CONTRACTOR shall install dewatering systems as necessary that will be required to construct the proposed utilities in a manner that will prevent groundwater contamination. Must meet current City of Pea Ridge Storm Water Regulations. For 12" and larger pipe sizes, ground water encountered shall be prevented from migrating along the trench with either clay or flowable fill mitigation dams and wrapping pipe bedding with filter fabric as approved by the DEPARTMENT, in accordance with geotechnical recommendations.

9.5 Location, Alignment and Grade

9.5.1 The pipe, fittings, valves, fire hydrants, meter boxes, manholes, and other appurtenances shall be constructed to conform to the location, line size and material, and grades specified or as shown on the Plans. Unless otherwise approved by the DEPARTMENT and must be shown on as-builts.

9.5.2 Valves and fire hydrants shall be set with operating stem and nut plumb.

9.5.3 Horizontal and vertical control points will be established along or adjacent to the construction area. It shall be the responsibility of the CONTRACTOR to make necessary measurements from these control points in order to maintain the proper alignment and grade of the structures. The CONTRACTOR shall preserve all stakes and markers established by the ENGINEER.

9.5.4 In a residential or commercial subdivision, the water mains will be placed at 11' back of curb or 1' behind master plan street right-of-way. Sewer mains will be placed at 13' back of curb or 3' behind master plan street right-of-way. The manholes and fire hydrants will be placed on the lot line and water and sewer services will be placed 6' off the lot line (*within the 7' setback*). Water services will be placed at 13' back of curb and sewer services shall be 14' from back of curb. The 1" tubing going to the meter set will be installed without excess tubing wrapping around the meter tile. The fire hydrants that are placed on the lot line need to stay within 5 ft. water corridor if at all possible, as shown in **Section 7A – Design Requirements**. The manholes that are street side need to have a final rim elevation that is 4" to 6" above final grade and any manholes that are at the back of lots or along drainage areas need to be 12" above final grade. Please keep in mind that the maximum vertical extension above the cone is 24". If the vertical extension is greater than 24" it will be necessary to take the cone off, extend the walls, re-pour the cone and do a vacuum test on the manhole. Any variation from the above described layout needs to be submitted to the DEPARTMENT for approval.

9.6 Public Travel

Traffic control shall be in accordance with the City of Pea Ridge Minimum Standard Specification for Streets. Contact City of Pea Ridge Street Department for guidance and recommendations.

9.7 Surface & Subsurface Structures Location and Protection

9.7.1 The DEPARTMENT does not guarantee the accuracy or correctness of locations of subsurface structures. It shall be the responsibility of the CONTRACTOR to satisfy himself as to the actual location and nature of subsurface structures.

9.7.2 The CONTRACTOR shall make necessary exploratory excavations to determine the location of underground structures such as pipes, drains, conduits, and other structures. The CONTRACTOR shall be

responsible for contacting the respective utility of such structures before excavating in the vicinity of these structures and shall be guided by their instructions.

9.7.3 The CONTRACTOR shall provide adequate protection and support for all surfaces and subsurface structures or other facilities encountered during the progress of the work. Whenever such structures or facilities are in the same location as the proposed pipeline or appurtenances thereto, the CONTRACTOR shall relocate or reconstruct or cause to be relocated or reconstructed, the structure or facility to the satisfaction of the DEPARTMENT and utility facility owner. Whenever requested by the DEPARTMENT or utility owner, the CONTRACTOR shall provide drawings and other plans for supporting or otherwise safeguarding surface and subsurface structures or other facilities which, in the opinion of the DEPARTMENT, or utility or facility owner, may be damaged, as a result of the CONTRACTOR'S work.

9.7.4 The CONTRACTOR shall not stop or impede the flow in any pipe, sewer, surface or subsurface drain without making provisions for diverting the flow to the satisfaction of the DEPARTMENT.

9.7.5 If any utility facility or structure is damaged during the progress of the work, the CONTRACTOR shall immediately notify the appropriate owner. Repairs shall not be made by the CONTRACTOR without the prior approval of the utility facility or structure owner. The CONTRACTOR shall pay utility owners for the cost of repairing, relocating or replacing any facilities damaged by the CONTRACTOR. In addition, the CONTRACTOR shall provide all assistance available to the utility involved in making repairs under emergency conditions.

9.7.6 The CONTRACTOR shall not operate any control valve or fire hydrant in the existing water distribution system without the approval or the direction of the DEPARTMENT.

9.7.7 All existing water mains, services, appurtenances and bends shall be properly restrained in such manner so as to prevent displacement before excavating behind these appurtenances.

9.8 Protection of Vegetation

9.8.1 The CONTRACTOR shall not remove or disturb any vegetation except that required for the execution of the work.

9.8.2 Unless otherwise specified in these specifications or in the plans, the CONTRACTOR shall replace all sod, shrubs, bushes, trees, and flowers disturbed or removed, that are located upon improved or landscaped public and private property. The CONTRACTOR shall replant vegetation and re-landscape or cause such to be performed throughout the work area as soon as possible after the water lines and appurtenances have been installed. All vegetation damaged during or after removal shall be replaced with healthy vegetation of the same kind or type. All plants shall be replanted in the original location. The CONTRACTOR shall maintain all such replanted vegetation by the application of water, fertilizers and topsoil. The vegetation shall be cultivated to prohibit the growth of foreign vegetation until a "well developed" root system has been established and transplanted vegetation has overcome the "shock" resulting from transplanting. If any vegetation dies or becomes unhealthy, it shall be replaced by the CONTRACTOR. The contour of the ground shall be left as near the original contour as possible.

9.8.3 The CONTRACTOR shall stabilize all areas where ground surface has been disturbed by water and sewer construction activities to as good or better condition.

9.9 Excavation and Preparation of Trench

9.9.1 The UTILITY INSPECTOR and "Arkansas One-Call System" shall be contacted before excavation shall begin. Also, excavations shall be in accordance with the Arkansas Department of Labor requirements.

9.9.2 All trench excavation side walls greater than 5’ in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by OSHA and ADL.

9.9.3 Before installation of pipe and appurtenances, the trench bottom shall be graded so uniform support of the pipe and appurtenances are provided. Shallow depressions shall be made in the trench bottom to accommodate bell ends. It is a requirement for bell or coupling holes to be excavated where no part of the load is supported by bells, couplings, or fittings.

9.9.4 All trenches shall be backfilled immediately after proper installation of the pipeline, tracer wire, embedment, and appurtenances, unless otherwise requested by INSPECTOR for viewing. It may be necessary to backfill only a portion of the trench in order to allow adequate curing of concrete thrust blocking.

9.9.5 The trench width may vary and depend upon the depth and the nature of the excavated material encountered. The trench shall be of ample width to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted properly. The minimum width of non-sheeted trench shall be at least 1’ greater than the nominal diameter of the pipe. Ledge rock, boulders, large stones, and other rock formation shall be removed to provide a clearance of at least 6” on each side of pipeline and appurtenances up to and including 24” in diameter.

9.9.6 The bottom of the trench shall be prepared so as to provide a uniform and continuous bearing and support for the pipe on solid undisturbed or compacted soil. The trench shall be excavated to at least the depth specified as follows beyond the specified grade when the following described conditions exist:

9.9.7 When the bottom of the trench is at sub-grade and is found to be unstable or includes ashes, cinders, refuse, other organic material, or large pieces of inorganic material, that, in the judgment of the DEPARTMENT, should be removed, the CONTRACTOR shall remove all such material to the extent required by the DEPARTMENT.

9.9.8 When the excavation is carried below or beyond that specified or required due to conditions described in **Section 9.9.7**, the CONTRACTOR shall backfill the trench to the proper grade with approved backfill material specified by the DEPARTMENT, unless permitted by the DEPARTMENT to install the lines and appurtenances at the undercut grade. The backfill shall be accomplished in accordance with that specified by the DEPARTMENT or elsewhere herein.

9.9.9 The use of trench-digging machinery will be permitted except in places where operations of same will cause damage to trees, buildings, or other existing structures above or below the ground; in which case hand methods shall be employed.

9.9.10 Blasting for excavation will be permitted only after the CONTRACTOR secures the approval of the Fire Department and DEPARTMENT and only when proper precautions are taken for the protection of persons and property. The Fire Department will approve the hours of blasting. Any damage caused by blasting shall be repaired by the CONTRACTOR at their expense. The method of transporting, handling, and storage of explosives and blasting procedure shall conform to Federal Regulations, local and state laws, municipal ordinances and be approved by the Fire Department in advance.

9.9.11 The CONTRACTOR shall comply with all federal, state and local laws or ordinances with respect to obtaining permits, the deposit of bonds and all other provisions of such laws and ordinances.

9.9.12 In order to prevent caving when excavating in sand, gravel, sandy soil, or other unstable material shall be adequately sheeted and braced. Where sheeting and bracing is used, the trench width may be increased

accordingly. Trench sheeting shall remain in place until the pipe has been laid and jointed. Where slides or cave-ins occur, the CONTRACTOR shall, at his expense, provide proper bedding and support for the pipe to maintain line and grade.

9.9.13 All excavated material stored on the job site shall be stockpiled in a manner to avoid blocking driveways, streets or sidewalks and will not endanger workers, pedestrians or travelers. Gutters shall be kept clear or other satisfactory provisions shall be made for street drainage. If local conditions permit their re-use, all surface materials suitable for re-use in restoring the surface shall be kept separate from the general excavation material. Excess material and debris shall be removed promptly.

9.9.14 The CONTRACTOR shall maintain all temporary surfaces in good condition until permanent repairs are complete.

9.10 Work Performed by Department

9.10.1 The intent of these specifications is for the CONTRACTOR to do all installation of new water and sewer infrastructure. All water service taps (*up to 2"*) and sewer taps (*4"*) to the existing Water Distribution or Wastewater Collection Systems shall be made by the DEPARTMENT. Taps larger than 'service' taps on existing infrastructure must be scheduled through DEPARTMENT and will be at the expense of the DEVELOPER/CONTRACTOR.

9.10.2 If damage occurs to the water or wastewater collection systems during construction, the DEPARTMENT, with its labor forces, will make all repairs to these systems. The CONTRACTOR may be requested to assist in the repairs to reduce charges for damages occurred.

9.10.3 If the DEPARTMENT assists the CONTRACTOR for any reason, the DEPARTMENT reserves the right to charge the CONTRACTOR for this assistance, based on the cost of labor, equipment, materials and overhead.

9.11 Confined Spaces

9.11.1 The CONTRACTOR'S attention is called to the requirements for entry into confined spaces as defined by the Current Edition of the OSHA Standard for Permit Required Confined Spaces which is specifically incorporated herein by reference.

9.11.2 CONTRACTOR'S responsibilities for entry into any Permit Required Confined Space are:

A. CONTRACTOR shall obtain from DEPARTMENT any available information regarding any hazards of entry operations for a Permit Required Confined Space.

B. When both DEPARTMENT and CONTRACTOR'S personnel are to work in or near a Permit Required Confined Space, CONTRACTOR shall coordinate such work with DEPARTMENT.

C. CONTRACTOR shall inform DEPARTMENT of type of Permit Required Confined Space Program used by his employees.

D. CONTRACTOR shall inform DEPARTMENT of any hazards confronted or created in a Permit Required Confined Space.

E. CONTRACTOR is responsible for having knowledge of and complying with all requirements of OSHA's Standard for Permit Required Confined Spaces.

9.12 Public Employees Right to Know Act

9.12.1 The CONTRACTOR'S attention is called to the requirements of the Hazard Communication Standard adopted by OSHA and State of Arkansas Act 556 of 1991: Public Employees Chemical Right to Know Act.

9.13 Clean-Up of Job Sites

9.13.1 The CONTRACTOR shall remove all materials, equipment, tools, temporary structures, barricades, trees and other vegetation that have been cut or have died as a result of the work from both public and private property along the job site.

SECTION 10 GENERAL INSTALLATION INFORMATION AND PROCEDURES

10.1 Handling Pipeline Materials

10.1.1 The CONTRACTOR shall handle the material with the utmost care and in a manner to prevent damage to the materials, material coating and lining during loading, hauling, unloading, and installation operations. Hooks, chains, or cables shall not come into contact with the exterior/interior of pipeline materials. It is recommended to use approved nylon straps or approved clamps to handle pipeline material. Material damaged shall be replaced at the CONTRACTOR'S expense.

10.1.2 Hooks shall not be in contact with the pipe interior and to the extent possible the interior of the pipeline materials shall be kept free from dirt and foreign matter.

10.1.3 Pipeline materials, especially valves, hydrants and fittings shall be drained and stored in a manner to protect them from damage by freezing. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

10.1.4 Proper implements, tools and facilities shall be provided and used by the CONTRACTOR for the safe and convenient execution of work.

10.1.5 All foreign matter or dirt shall be removed from the inside of the pipe and appurtenances before lowering into the trench and the pipe interior shall be kept clean during and after laying. A swab shall be kept in the water line as long as the pipe is being laid. Care shall be taken to prevent dirt from entering the joint space. When pipe laying is not in progress, the open ends of the pipe shall be closed by installing a plug or cap of sufficient design to prevent trench water, foreign matter, and dirt from entering the pipeline.

10.1.6 Cutting of the pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or pipe lining. Torch cutting is not permitted. All pipes shall be cut at an angle of 90° to the pipe centerline. Cutting at other angles to provide greater deflections at the joints shall not be permitted. Field welding or welding except by the pipe manufacturer shall not be permitted.

10.1.7 Unless otherwise approved or directed by the DEPARTMENT, all pipe shall be laid with bell ends facing the direction of laying; and for lines on an appreciable slope, bells shall face upgrade. Steep slope protection shall be provided in accordance with 10 States Standards.

10.1.8 No pipe shall be laid in water, or when the trench condition or the weather is unsuitable for such work, except by permission of the DEPARTMENT.

10.2 Pipe Embedment

10.2.1 This section covers materials used for embedment of water and sewer mains. Unless otherwise specified herein, approved by the DEPARTMENT, or shown on the plans, embedment materials shall be restricted to Class #67 type bedding as modified and described below with a maximum aggregate size of ¾". Installation of bedding shall be 6" under pipe and 6" over pipe. CONTRACTOR'S must provide proof of material to match required specifications.

- Crushed aggregate conforming to the ASTM C33, gradation 67 and as follows:
- Crushed aggregate sized from maximum ¾" to No. 8 sieves:
- 100% passing the ¾" sieve (maximum aggregate size ¾")
- 20 to 55% passing the 3/8" sieve
- 0 to 10% passing the No. 4 sieve
- 0 to 5% passing the No. 8 sieve

The required modification of the ASTM C33, gradation 67 is the clarification and potential additional requirement of 100% passing the ¾" sieve.

10.3 Compaction

10.3.1 All pipeline backfill shall be placed in layers of appropriate thickness and compacted using a mechanical, hydraulically-powered vibratory trench compactor or other equivalent equipment. All trench backfill (except under paved areas) shall be compacted to 95% (minimum) standard proctor density of that of the adjacent undisturbed soil Trench backfill is subject to density test as deemed necessary. In areas where the trench crosses a street, parking lot or driveway, the material shall be compacted as specified in **Section 10.3.2** to a minimum of 95% of that of the adjacent soils.

10.3.2 Class 7 crushed stone trench backfill where required shall be mechanically compacted in 8" lifts and compacted to 95% modified proctor density (ASTM D1557). PRWU reserves the right to request a density test.

10.3.3 Ditch line compaction shall follow immediately after trench backfill. Topsoil shall be placed and shaped leaving the ditch line slightly rounded above existing grade.

10.4 Jointing PVC & Ductile Iron Pipe and Fittings

10.4.1 Prior to jointing the pipe and/or fittings, the plain ends of the pipe and the bells of the pipe and fittings shall be thoroughly cleaned using a soapy water and cloth, removing all foreign materials from the bells, especially the gasket seats. Any burrs or imperfections in that part of the plain end or bell, which will be in contact with the gasket, shall be removed.

10.4.2 The clean rubber gasket shall be inserted in the bell and a thin film of lubricant shall be applied to the inside surface of the gasket. The cleaned plain end shall initially be entered in the bell straight.

10.4.3 The plain end shall be pushed inside the gasket and bell until it strikes the manufacturers mark on the pipe or the end of the interior of the bell, after which the end of the pipe shall be moved sideways or as specified by the manufacturer's requirements to move it slightly away from home to allow for expansion and to provide flexibility to the completed line.

10.4.4 Pipe lubricants specified by the pipe manufacturer shall be used. No substitutes shall be made.

10.4.5 When connecting the pipe or fittings according to manufacturer's requirements, care shall be exercised to avoid damage to where the pushing device or machine part contacts the pipe. A wood block or suitable pad shall be placed between the pipe and that part of the pushing device which contacts the pipe and/or fittings.

10.4.6 All plain ends that enter a push-on bell shall be beveled as specified by manufacturer requirements. All cut pieces or ends of pipe of other classifications shall be so beveled.

10.5 Jointing Flanged Pipe & Fittings

10.5.1 The faces of all flanges shall be thoroughly cleaned and all burrs or imperfections removed and brushed with a steel brush.

10.5.2 Gaskets between flanges shall be AWWA approved of 1/16" minimum thickness.

10.5.3 Care shall be taken to prevent strain of the flanges. All bolts and nuts shall be cleaned and lubricated prior to tightening. Bolts on opposite sides shall be tightened alternately to the torque listed in the table shown in **Section 10.6.4**.

10.6 Jointing Mechanical Joint Pipe & Fittings

10.6.1 Prior to jointing the pipe and/or fittings, the plain ends of the pipe and the bells of the pipe and fittings shall be thoroughly cleaned using a soapy water and cloth, removing all foreign materials from the bells, especially the gasket seats. When a pipe is being installed in a fitting, the factory bevels shall be removed.

10.6.2 The DI retainer glands shall be placed on the plain end of the pipe or fittings, followed by the rubber gasket, which has been thoroughly cleansed and lubricated with the soapy water.

10.6.3 The plain end of the pipe shall be placed in the bell, to which connection is to be made, and shouldered in back of the bell. The rubber gasket shall be advanced into the bell and seated in the gasket seat; the follower ring shall next be brought into contact with the rubber ring, and all bolts entered and nuts started.

10.6.4 Joints shall be made tight by advancing the nuts with a wrench 180° apart until a tight joint is made. The CONTRACTOR shall provide a "torque wrench" suitable for measuring tension on bolts for at least such a time as the workmen making the joints have gotten the "feel" of the required tension. At no time should handles longer than those supplied by the wrench manufacturer be permitted. The torque range shall be as follows or as directed by the manufacturer:

TORQUE SPECS.	
5/8" Bolts	45 - 60 ft. lbs
3/4" Bolts	75 - 90 ft. lbs
1" Bolts	85 -100 ft. lbs
1 1/4" Bolts	105 -120 ft. lbs

10.6.5 The rubber gasket and joint bolts of mechanical joint retainer glands shall be installed in accordance with above section. Set screws shall be tightened evenly to approximately 75-foot pounds or as directed by the manufacturer.

10.6.6 The entire follower, retainer gland and all bolts shall be encased in polyethylene material in accordance with **Section 13.11**.

10.7 Pipe Deflection

10.7.1 During the pipe laying operation, deflections at joints shall not exceed the amounts indicated by the manufacturer's recommendations.

10.8 Pipe Material

10.8.1 For 12" and larger water and sewer pipes with pipe cover exceeding 14', the DEPARTMENT reserves the right to request geotechnical and design calculations, in accordance with AWWA design manuals. The DEPARTMENT shall be immediately notified if field conditions differ from the design and geotechnical.

SECTION 11 WATER DISTRIBUTION SYSTEM GENERAL INFORMATION

11.1 No water main shall be less than 8" in diameter unless prior approval is obtained in writing from the DEPARTMENT. Variances will be considered, on a case-by-case basis for the reduction of water main sizes.

11.2 The minimum cover over water mains 8" and less shall be 3' minimum. Mains larger than 8" shall have a minimum cover of 4' or as approved by the DEPARTMENT. The minimum cover over water services shall be 30" or as approved by the DEPARTMENT. Sewer mains shall have a minimum cover of 3'. Minimum cover shall be measured from the ground surface or the surface of the permanent improvement to the top of the barrel of the pipe, whichever is greater. All depths of water and sewer mains shall be approved in advance by the DEPARTMENT.

11.3 In any case of signs, fencing or structures installed near a water line, at least 5' of separation between the water line and structure must be maintained. In any case of a permanent building installed near a water line, at least 10' of separation must be maintained. Any deviation in separation minimums must get the approval of the DEPARTMENT prior to installation.

11.4 Each component within a project, such as water valves, fire hydrants, and pipes, shall be homogenous throughout the project and by a single manufacturer. All materials shall be domestically made. All utility mains shall be extended to property lines on all stubbed out streets. Any water main within a project that is stubbed out shall terminate at a fire hydrant assembly with a restrained gate valve connected to the downstream side of the tee. The purpose for the stub-out is to allow for connection to the utility without disturbing the existing development. PRWU reserves the right to request water main be installed to extreme edge of development for future connectivity.

11.5 Water easements will be a minimum 20' in width or as directed by the DEPARTMENT. Easements shall be dedicated as utility easements unless required to dedicate for the exclusive use of the water mains. Water lines must be located within the center of the easement or as directed by the DEPARTMENT.

11.6 Fire hydrants shall be installed so that no distance shall be greater than 500' apart within residential areas and 300' apart in commercial or mixed developments or as directed by the Fire Department during plan review. Placement of fire hydrants in rural areas shall be installed so that no distance shall be greater than 1000' apart or as directed by the DEPARTMENT. Densely constructed or industrial sites may need to meet criteria set forth by Fire Department requirements. All considerations involving the physical locations of FDC connections shall be regulated by the Fire Department. New construction of buildings must have a working fire hydrant before structure construction begins. Subject to approval from the Fire Department. Fire hydrants placed in subdivisions need to be installed at the lot line to avoid conflicts with driveways. In a situation where a fire hydrant lead is over 50' an auxiliary gate valve shall be installed at the fire hydrant.

11.7 End of main fire hydrant locations for main extensions shall be approved by the DEPARTMENT during plan review.

11.8 The hydraulic analysis, design flows, residual pressures and static pressure of the proposed mains shall be provided as requested by the DEPARTMENT. Additional design data may be required if, in the opinion of the DEPARTMENT, it is necessary for review prior to approval of the plans.

11.9 Valves should be located not more than 500' intervals within residential areas and 300' intervals within commercial areas or as required by the DEPARTMENT. Valves shall be provided at each quadrant of intersecting mains so as to enable two directions of flow throughout the designed system during times of maintenance or emergencies. Valves shall be installed in a manner that connects them to all fittings with an anchor coupling.

11.10 All taps on existing mains, up to 2" shall be performed by the DEPARTMENT. Request for taps to be performed by the DEPARTMENT shall be made at least 24 hours in advance. CONTRACTOR shall provide material for all water taps greater than 2" as well as doing the tap or having it contracted out. CONTRACTOR shall be responsible for excavation, installation of valve and tapping sleeves, and shall provide a pressure test prior to the execution of tap. Pressure Test, as defined herein, at 150 psig, or 1.5 times static pressure of existing main, whichever is greater, with no loss for 15 minutes and shall be witnessed and recorded by the UTILITY INSPECTOR or DEPARTMENT representative. The pressure test shall be with the valve closed and without a test plug. Testing equipment shall be inspected by UTILITY INSPECTOR and shall be in proper working order at time of test. Tap locations on pipe sizes 6" to 12" will be no closer than 24" to the back end of the bell or collar of the pipeline and no closer than 24" from the insertion line on the spigot end of the pipeline. Water lines larger than 12" tap locations will be no closer than 36".

11.11 In no case shall a structure that is independently owned be allowed to connect to the same water service of another independently owned structure. Plumbing systems of two independently owned structures or properties shall not be served by the same water meter. Each individually owned plumbing system will have its own water meter to serve water for its domestic or commercial use. Each independently owned property or structure shall have a direct connection to public water and sewer. A private easement is not an acceptable means to access sewer for new structures or lots. Only when approved as part of the zoning for a planned development shall two properties be served from the same 1" service line suppling water to a double meter set installed on the property line of the adjoining properties. These double meter set installations will only be allowed in these approved developments in cases where no lawns exist and/or a community irrigation system is being provided. All water and sewer service lines shall be inspected by the Pea Ridge Building Inspection Department.

11.12 All water meter boxes and services shall terminate as indicated on the approved plans or as directed by the DEPARTMENT. The DEVELOPER will provide 1" water service piping to each lot with a minimum single meter set and box. All service lines shall be a minimum size of 1". All 1" service lines shall include 12 gauge type TW (single strand) insulated copper locator wire. All service lines installed shall be backfilled with class 67 bedding. Service tap locations on pipe sizes 6" to 12" will be no closer than 18" to the back end of the bell or collar of the pipeline. Water lines larger than 12" service line taps will be no closer than 24".

11.13 All water services shall include a 'lock-wing' meter yoke or setter, meter box, and lid. All meter sets shall have a minimum 3' service "pig-tail" on the customer's side of the meter connection for each water service. The "pig-tail" shall be placed in such a manner to minimize disturbing meter box in the process of plumber connection. Ensure fiber washers are installed in all meter yokes/setters. All 1" tubing installed for new water services will be one piece installation, no couplings or joining appurtenances permitted unless approved by the DEPARTMENT. In such cases that new 1" water services are to be installed across future streets, 2" conduit shall

be installed from 1’ back of curb to 1’ back of curb on the opposite side of the street. The 1” tubing and 12 gauge tracer wire shall be installed within the conduit. Only one service shall be installed in each conduit. Disclaimer: The “pig-tail” belongs to property owner and is not the responsibility of the CITY. Any residential lots that have access to city sewer will be required to install a double meter set for the lot. Any deviation will require approval from the DEPARTMENT.

11.14 ***For information related to cross-connection control and backflow prevention rules and regulations. Refer to Cross Connection Control Manual – Sections 20 - 27.***

11.15 PRWU reserves the right to request water main be installed to extreme edge of development for future connectivity. The utility main that is stubbed out shall terminate at a manhole for a sewer main or a fire hydrant assembly with a restrained gate valve connected to the downstream side of the tee for a water main. The purpose for the stub-out is to allow for connection to the utility without disturbing the existing development.

SECTION 12 WATER DISTRIBUTION SYSTEM MATERIALS

12.1 ALL MATERIALS SHALL BE DOMESTICALLY MADE

12.1.1 These material specifications are intended to set a standard of quality and design for all materials used in the construction of water mains and appurtenances. Materials shall be of types listed in these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless prior approval is obtained in writing from the DEPARTMENT prior to construction.

12.1.2 The DEPARTMENT must approve all material prior to installation. All materials shall meet AWWA specifications. The DEPARTMENT reserves the right to request detailed submittals for any material to be used in construction of facilities. It will be the responsibility of CONTRACTOR to provide material submittals.

12.2 Pipe

12.2.1 All pipe furnished shall be designed for the distribution of potable water. Lubricant furnished for lubricating 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 container shall be labeled with the manufacturer’s name. The DEPARTMENT will determine type and size of pipe to be installed within the water distribution system during plan review.

12.2.2 In areas where the static operating water pressure is 150psi or greater or installation of water mains are within 10’ of any permanent structure the DEPARTMENT reserves the right to require ductile iron water piping be installed. Request and approval will be made in the plan review process.

12.3 Polyvinyl Chloride (PVC) Water Pipe (4" – 12") (14" - 48")

12.3.1 PVC pipe in sizes 4” – 12” shall meet the requirements of AWWA C-900 DR-14 and comply with ASTM D1784 pressure classification rated class 305. DR-18 is allowable with pre-approval from the DEPARTMENT and depending upon which of the city’s pressure planes construction is occurring within. Pipe joints shall be integrally molded bell ends in accordance with ASTM 3034 with factory supplied elastomeric gaskets and lubricant. Pipe to bear NSF-61 seal of approval for potable water. The pipe shall be approved by the Underwriter’s Laboratories (UL) for use in underground fire protection service. The pipe shall be extruded from PVC meeting the requirements of cell classification 12454-B as defined in ASTM-D-1784, PVC compounds. The pipe shall be manufactured to cast iron size (C.I.) outside dimensions. Pipe shall bear identification markings

that will remain legible during normal handling, storage and installation. Marking on pipe shall include the following and shall be applied at intervals of not more than 5':

A. Nominal size and OD (DR-14)

B. PVC

C. Dimension ratio (DR-14)

D. AWWA pressure class (for example: PVC1120 or PC200)

E. AWWA designation numbers (AWWA C-900)

F. Manufacturer's name or trademark and production code

G. Seal (mark) of the testing agency that verified the suitability of the pipe

H. Material for potable water service. (for example: NSF-61 or ULFM)

12.3.2 PVC pipe in sizes 14" – 60" shall meet the requirements of AWWA C-900 DR-21 and comply with ASTM D 1784 pressure classification rated class 200.

12.4 Ductile Iron Pipe (DI)

12.4.1 The pipe shall have a cement mortar lining and seal coat in accordance with ANSI/AWWA C104 A21. The pipe and flanges shall conform to ANSI/AWWA C111/A21, Class 50 rated at 350 psi unless otherwise specified. Tapping DI pipe shall conform to ANSI/AWWA C600.

12.5 Ductile Iron Pipe 4" - 54"

DI pipe shall conform to ANSI/AWWA C104/A21 and shall have a cement mortar lining and seal coat conforming to ANSI/AWWA C104/A21. Joints shall conform to ANSI/AWWA C111/A21 and may be mechanical joint or push-on joint unless otherwise specified. The minimum thickness class shall be Class 50 rated at 350 psi unless otherwise specified.

12.6 Polyethylene Pipe (PE)

12.6.1 All Polyethylene pipe shall conform to ANSI/AWWA C901-17 with a MINIMUM pressure class rating of 200 psi and a DR rating of 9. All service line pipes will be 1" unless otherwise specified by the DEPARTMENT.

12.6.2 In no case shall stainless steel inserts be used with the installation of poly tubing service lines. If inserts are needed, the use of a plastic insert will be acceptable and approved at product submittal. In no case shall the insert extend passed the compression cap of the corporation stop when fully tightened.

12.7 Copper Pipe

12.7.1 Copper service pipe shall be 1" Type "K", soft tempered, seamless, for underground installation, in accordance with ASTM B88 and Federal Specifications WW-T-799.

12.8 Encasement Pipe

12.8.1 Smooth Wall Steel Encasement Pipe - Pipe shall conform to ASTM A-139, ASTM A-21.11 or AWWA C200. The metal thickness shall be as shown in the Proposal or Plans.

12.8.2 Casing spacer systems shall be manufactured in two pieces, made from heavy gauge T-304 stainless steel with Polymer Plastic Runners (Teflon). Spacers shall be a Cascade Casing Spacer manufactured by Cascade

Waterworks Manufacturing Company or equal conforming to ASTM ratings, approved by AWWA and the DEPARTMENT. Casing and utility pipes shall be sealed with synthetic rubber end seals.

12.8.3 Any bell located within an encasement pipe shall be restrained by an approved method.

12.9 Fittings

12.9.1 DI fittings shall be designed for working pressure of at least 350 psi, shall be DI and shall conform to ANSI/AWWA C153 A21. Joints shall be mechanical joint conforming to ANSI A21.11. All fittings shall be furnished with gaskets and mechanical joint fittings shall be furnished with bolts, nuts, and retainer glands. All fittings shall be ANSI/AWWA C550 AND C116 6-8 mil Nominal Thickness Fusion Bonded Epoxy Coated inside and out. Fittings shall be manufactured by U.S. Pipe "TRIM TYTE", Tyler, Star Pipe Products, or approved equal. Any alternate manufacturer shall require DEPARTMENT approval prior to installation.

12.9.2 Mechanical Joint Retainer Glands shall be installed on all water line valves bends and couplings. Mechanical Joint Retainer Glands for DI shall be made from DI and shall be designed for a working pressure of at least 200 psig. The set screws shall be extended through the outer most part of the gland. Glands shall be designed to standard mechanical joint fittings (AWWA C111). The minimum number and minimum size set screws shall be as follows or approved equal. Any alternate manufacturer shall require Department approval prior to installation:

D.I. PIPE

SIZE	SIZE SET SCREW	NUMBERS of SET SCREWS
4"	1/2"	4
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

D.I. PIPE

DESCRIPTION	SIZE	CATALOG NUMBER	MANUFACTURER
Gland Retainer (Series 1400)	18"	UFR1400-D18	Ford
Gland Retainer (Series 1100)	18"	1118	EBBA
Gland Retainer (Series 1400)	12"	UFR1400-D12	Ford
Gland Retainer (Series 1100)	12"	1112	EBBA
Gland Retainer (Series 1400)	8"	UFR1400-D8	Ford
Gland Retainer (Series 1100)	8"	1108	EBBA
Gland Retainer (Series 1400)	6"	UFR1400-D6	Ford
Gland Retainer (Series 1100)	6"	1106	EBBA
Gland Retainer (Series 1400)	4"	UFR1400-D4	Ford
Gland Retainer (Series 1100)	4"	1104	EBBA

12.9.3 Mechanical Joint Retainer Glands for PVC shall be made from DI and shall be designed for a working pressure of at least 200 psi. The set screws shall be extended through the outer most part of the gland. Glands shall be designed to standard mechanical joint fittings (AWWA C111).

PVC PIPE

DESCRIPTION	SIZE	CATALOG NUMBER	MANUFACTURER
Gland Retainer C900 Circle-Lock	18"	UFR1500-C-18	Ford
Gland Retainer (Series 2000 PV)	18"	2018	EBAA
Gland Retainer C900 Circle-Lock	16"	UFR1500-C-15	Ford
Gland Retainer (Series 2000 PV)	16"	2016	EBAA
Gland Retainer C900 Circle-Lock	12"	UFR1500-C-12	Ford
Gland Retainer (Series 2000 PV)	12"	2012	EBAA
Gland Retainer C900 Circle-Lock	8"	UFR1500-C-8	Ford
Gland Retainer (Series 2000 PV)	8"	2008	EBAA
Gland Retainer C900 Circle-Lock	6"	UFR1500-C-6	Ford
Gland Retainer (Series 2000 PV)	6"	2006	EBAA
Gland Retainer C900 Circle-Lock	4"	UFR1500-C-4	Ford
Gland Retainer (Series 2000 PV)	4"	2004	EBAA

12.10 Swivel hydrant adapters, anchor couplings, and Tees shall be designed for a working pressure of at least 250 psig and to fit standard mechanical joint fittings (ANSI/AWWA C111 A21). One end of the straight anchor coupling and the branch of the tee shall be provided with a gland that may be rotated 360° on the fitting. Lengths of swivel adapter shall be as specified on plans and conform to standard manufactured lengths.

12.10.1 Tapping Sleeves (4" Tap & Larger)

Tapping Sleeves shall be stainless steel. They shall be designed for a working pressure of at least 200 psig. Steel sleeves shall be stainless steel or coated with high build, Thermo-Set Epoxy. A test plug shall be furnished through the body for hydrostatic pressure testing. The outlets shall conform to ANSI B16.1, Class 125 flanges designed to accept tapping valves described herein. All bolts shall be of corrosion resistant alloy. Sleeves may be designed for a water tight seal by the use of mechanical followers or by the use of a gasket placed in a recess between the sleeve body and the pipe barrel. Only sleeves with mechanical followers or full circle gaskets may be used. If the known working pressure of the pipe to be tapped is greater than 200 psig the DEPARTMENT may require a MUELLER H-615 Series Tapping Sleeve.

DESCRIPTION	SIZE	CATALOG DESCRIPTION	MANUFACTURER
Tapping Sleeves: Stainless Steel w/Carbon Flange For AC			
Sleeve	8 X 8	FAST-945-8A	FORD METER
Sleeve	8 X 6	FAST-945-6A	FORD METER
Sleeve	6 X 6	FAST-750-6A	FORD METER
Tapping Sleeves: Stainless Steel w/Carbon Flange For CI/C900			
Sleeve	18 X 6	FAST-1992-6A	FORD METER
Sleeve	18 X 8	FAST-1992-8A	FORD METER

Sleeve	18 X 12	FAST-1992-12A	FORD METER
Sleeve	16 X 8	FAST-1780-8A	FORD METER
Sleeve	16 X 6	FAST-1780-6A	FORD METER
Sleeve	12 X 12	FAST-1350-12A	FORD METER
Sleeve	12 X 8	FAST-1350-8A	FORD METER
Sleeve	12 X 6	FAST-1350-6A	FORD METER
Sleeve	8 X 8	FAST-945-8A	FORD METER
Sleeve	8 X 6	FAST-945-6A	FORD METER
Sleeve	6 X 6	FAST-730-6A	FORD METER
Sleeve	4 X 4	FAST-620-4A	FORD METER
Tapping Sleeves: Stainless Steel			
Sleeve	4"	SST or SSTIII	ROMAC
Sleeve	6"	SST or SSTIII	ROMAC
Sleeve	8"	SST or SSTIII	ROMAC
Sleeve	10"	SST or SSTIII	ROMAC
Sleeve	12"	SST or SSTIII	ROMAC
Sleeve	16"	SST or SSTIII	ROMAC
Sleeve	18"	SST or SSTIII	ROMAC

12.11 Sleeves or Couplings

12.11.1 Sleeves shall be iron with mechanical joint followers. Couplings shall be steel or iron with gasketed ends. They shall be designed for a working pressure of at least 200 psig and sized to properly fit the type and class of pipe specified. All bolts shall be of corrosion resistance alloy. Steel couplings shall be coated internally and externally with high build, high strength, Thermo-Set epoxy coating. The Thermo-Set epoxy coating shall be 8 - 10 mils DFT and free of voids. Or approved equal, prior to construction.

12.12 Tapping Saddles\Sleeves shall be made from iron, bronze, steel or stainless steel and designed for a working pressure of at least 200 psig. The use of these strap saddle\sleeve is restricted to taps where the branch is at least one size smaller than the run.

DESCRIPTION	SIZE	CATALOG NUMBER	MANUFACTURER
Service Saddle, C.I., D.I., A.C.			
Saddle	18 X 2 IP Double Strap	FC202-2050xIP7	Ford Meter
Saddle	16 X 2 IP Double Strap (CI)	FC202-1840xIP7	Ford Meter
Saddle	16 X 2 IP Double Strap (AC)	FC202-1925xIP7	Ford Meter
Saddle	12 X 2 IP Double Strap	FC202-1438xIP7	Ford Meter
Saddle	12 X 2 PVC Only	FC202-1320-IP7 FOR C900	Ford Meter
Saddle	8 X 2 IP Double Strap	FC202-979xIP7	Ford Meter
Saddle	8 X 2 PVC Only	FC202-905-IP7 For C900	Ford Meter
Saddle	6 X 2 IP Double Strap	FC202-760xIP7	Ford Meter
Saddle	6 X 2 PVC Only	FC202-690-IP7 For C900	Ford Meter
Saddle	4 X 2 IP Double Strap	FC202-526x7	Ford Meter

Saddle	16 X 1 CC Double Strap (CI)	FC202-1840xCC4	Ford Meter
Saddle	12 X 1 CC Double Strap	FC202-1438xCC4	Ford Meter
Saddle	12 X 1 PVC Only	FC202-1320xCC4 For C900	Ford Meter
Saddle	8 X 1 CC Double Strap	FC202-979xCC4	Ford Meter
Saddle	8 X 1 PVC Only	FC202-905-CC4 For C900	Ford Meter
Saddle	6 X 1 CC Double Strap	FC202-760xCC4	Ford Meter
Saddle	6 X 1 PVC Only	FC202-690-CC4 For C900	Ford Meter
Saddle	4 X 1 CC Double Strap	FC202-526xCC4	Ford Meter
Saddle	3 X 1 CC Double Strap	FC202-425xCC4	Ford Meter
Saddle	2 X 1 CC Double Strap	FC202-250xCC4	Ford Meter
Service Saddle with Nyon Coating			
Saddle	4 X 2 CC Double Strap	202NS	ROMAC
Saddle	6 X 2 CC Double Strap	202NS	ROMAC
Saddle	8 X 2 CC Double Strap	202NS	ROMAC
Saddle	12 X 2 CC Double Strap	202NS	ROMAC
Saddle	16 X 2 CC Double Strap	202NS	ROMAC
Saddle	18 X 2 CC Double Strap	202NS	ROMAC
Saddle	4 X 1 CC Double Strap	202NS	ROMAC
Saddle	6 X 1 CC Double Strap	202NS	ROMAC
Saddle	8 X 1 CC Double Strap	202NS	ROMAC
Saddle	12 X 1 CC Double Strap	202NS	ROMAC
Saddle	16 X 1 CC Double Strap	202NS	ROMAC
Saddle	18 X 1 CC Double Strap	202NS	ROMAC

12.13 Service Fittings

12.13.1 Water service fittings shall be those manufactured by the following companies, listed below, or approved equal. The screws and/or nuts shall be of corrosion resistant alloy and shall be of Hex Head configuration. Any deviation must have approval from the DEPARTMENT prior to installation.

12.13.2 Corporation and curb stops shall conform to AWWA C800 (curb stops shall have 360° rotation of Tee Head) and shall be those manufactured by the company specified, or approved equal, as follows:

CORPORATION STOPS:

DESCRIPTION	SIZE	CATALOG NUMBER	MANUFACTURER
Valve Ball	1"	FB11-444NL	FORD
		76101-1 (NL)	A.Y. McDonald
Valve Ball	2"	B-11-777SWM-NL	FORD
		76101W-2 (NL)	A.Y. McDonald

12.13.3 PE and Copper pipe fittings shall conform to AWWA C800 and shall be those manufactured by Ford, A.Y. McDonald, or the Mueller Company, or approved equal by the DEPARTMENT.

12.13.4 Meter setters and meter connection fittings shall conform to AWWA C800 and be those manufactured by Ford, A.Y. McDonald, or the Mueller Company, or approved equal by the DEPARTMENT. A fiber washer must be set with each end connection if utilizing the 'Dual Purpose' connection.

12.14 Gate Valves

12.14.1 Gate Valves - 4" Through 18" with Resilient Seat

12.14.2 Resilient seat gate valves 4" through 18" shall be designed for a working pressure of 250 psig. Valves shall conform to AWWA C515 (Thin Wall or Lightweight Ductile Spec) with non-rising stem, O-ring stem seals and 2" square operating nut. Valves shall open when the operating nut is turned to the left (counterclockwise). 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. Gate valves larger than 18" need to be submitted to the DEPARTMENT for approval prior to installation.

12.14.3 Epoxy Coating shall be 8-mils DFT and free of voids.

12.14.4 Tapping valves shall have full size flow way accepting standard size shell cutter.

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

- American Flow Control Model #2500
- Clow Valve Company, Model 2638
- Mueller Company, Model A2361

12.15 Butterfly Valves

12.15.1 Butterfly valves shall conform to AWWA C504, having the following features and be approved by the DEPARTMENT prior to installation:

12.15.2 Class 150B

12.15.3 Suitable for complete buried service. Exterior of valve shall be epoxy coated.

12.15.4 Disc may be made from any of the materials as specified in AWWA C504. However, discs made from material other than bronze or stainless steel shall be coated with epoxy material in accordance with **Section 12.15.8.** All other interior surfaces which are not stainless steel or bronze shall also be coated with epoxy material.

12.15.5 Valve resilient seats shall be BUNA-N bonded into a self-retaining recess in the body or a natural rubber molded to an 18-8, Type 304 stainless steel retaining ring secured to the disc by self-setting screws. If the set is attached to the disc, the mating surface to the resilient seat shall be 304 or 316 stainless steel.

12.15.6 Stainless steel shafting. "O-Ring" or split-V shaft seals. Bronze, nylon or Teflon bearings and a "Manual Operator" totally enclosed for buried service shall include the following:

A. 2" x 2" operating nut

B. Open counter-clockwise

C. Operators of the traveling nut type shall not have u-joints on the rods.

D. On operators composed of worm gears; worm gears may be either bronze or DI and the worms shall be composed of hardened steel.

E. The operator shall satisfy the valve operating torque requirements for Class 150B valves and the operator input requirements of AWWA C504.

12.15.7 Valve ends shall be as specified. If flange ends are specified, they shall conform to Class 125, ANSI B16.1.

12.15.8 Epoxy Coating for Valve Disc. Before application of coating material, all surfaces of the disc shall be thoroughly cleaned to remove dirt, grease, oil and any other substances; all sharp angles, protrusions or irregularities which would interfere with proper coating coverage shall be removed; and the entire surface grit blasted to white metal in accordance with SSPC Specification SP5 resulting in an anchor pattern of at least 1 mil. Thermo-set epoxy material shall be applied to the sand-blasted surfaces before the white metal begins to oxidize (darken in color). The thermoset epoxy shall be approved for exposure to fluids for human consumption by the Federal Food and Drug Administration. The final DFT shall be at least 8 mils DFT and free of voids. The disc shall be post-cured for a sufficient period of time to assure full polymerization. Polymerization shall be checked by a direct impact test at 60-inch-lb. with no cracking or chipping of the coating. The DFT shall be checked using an accurate magnetic DFT gauge. The entire coated surface shall be checked for voids using a wet sponge type holiday detector. Any area where the DFT is found to be less than 8 mils or where voids were detected shall be re-coated and re-checked. Valves shall be packed for shipment in such manner that the disc coating is protected from damage.

12.16 Air Release Valves

12.16.1 Air Release Valves shall be APCO No. 200-A, or approved equal, or as specified.

12.17 Valve Boxes, Lids, and Extensions

12.17.1 Valve boxes shall be Tyler 6850 series or equal with 5 ¼" shafts. Length variable 10 ¼" OD bottom flange, 8" ID Bottom, 7 3/16" OD top, 6 ¾" ID top of 2 section valve box.

12.17.2 Valve box lids shall have a 7 5/16" outside diameter with 6 ½" inside diameter for 5 ¼" valve boxes. The lids shall be marked with "WATER" unless located at the tap for a fire line where a post indicator may not be installed. In this case the lid shall be marked "FIRE" and be painted safety red. The "FIRE" lid shall be locking and require only a wrench to open.

12.17.3 Extension shaft shall be required on any valve that exceeds 4' in depth. Valve stem extensions shall be adequate to transmit full torque required to open valve and shall be secured to the valve operating nut by set screws not clips. The top of the extension shaft shall be a 2" square AWWA nut. Extensions shall be provided to bring the operating nut to within 4' of grade and have disc attached to hold operating nut in the center of valve box and shall be firmly attached to the valve.

12.18 Meter Boxes, Vaults, and Lids

12.18.1 Water meters 5/8", 3/4", and 1" shall be installed in 18" Brook's type 22HFX1802KS round plastic meter boxes that are domestically manufactured or as approved by the DEPARTMENT.

12.18.2 Water meters 5/8", 3/4", and 1" that are installed in non-deliberate and incidental traffic shall be installed with a load bearing meter tile. Water meter installations that fit this criteria will use the DFW Plastics #DFW1800F-18-1ET load rated meter tile. Prior approval for water meters installed in potential traffic loaded areas shall be obtained from the DEPARTMENT during the plan review process.

12.18.3 2” meters are to be installed by the DEPARTMENT at OWNER/DEVELOPER’S expense. 2” meters shall be installed in 30”x 36” Mid-States MSP 30”X36” meter boxes or equivalent, as approved by PRWU.

12.18.4 All meter vault plans and installations shall be approved by the DEPARTMENT prior to the start of construction. Meter vaults shall not be subject to flooding and shall be water tight to prevent intrusion of water and dirt. The walls of the vault shall extend above the finished grade a minimum of 3” to prevent intrusion of water or dirt. Vault to be installed by CONTRACTOR at OWNER’S expense as shown on Detail W24 (for round meter vaults) or Detail W25 (for rectangular meter vaults).

12.19 Fire Hydrants

12.19.1 All fire hydrants furnished shall be dry barrel hydrants in conformance with AWWA C502, latest revision, for “Dry Barrel Fire Hydrants”, and shall be designed for a 250 psig maximum working pressure. All fire hydrants shall be equipped with a safety stem coupling and flange, which are intended to fail upon vehicle impact without damage to the stem or main valve. All fire hydrants shall conform to AWWA C502, the following specifications, and shall be the Traffic Model Fire Hydrant:

Standard Hydrant Requirements:

Maximum Working Pressure	250psig
Size of Valve Opening	Minimum 5"
Diameter of Inlet Connection	6"
Type of Inlet Connection	Mechanical Joint
Number & Size of Hose Connections	2 - 2 1/2" & 1 - 4 1/2"
Nozzle Thread ASA	Standard
Nozzle Cap Chains	Three (3)
Nozzle Cap Washers	Rubber
Barrel	Ductile Iron Pipe
Operating Threads	Oil or Grease Lubricated Seals
Lubrication Chamber	Oil or Grease Chamber
Seat Rings	Bronze to Bronze
Direction to Turn to Open	Left (Counter-Clockwise)
Shape & Size of Op-Nut & Cap Nut	5-sided, 1 1/2" frim Point to Flat
Operating Nut	Bronze
Hydrant Shoe	Epoxy Coated
Color Above Ground- Barrel & Dome	Industrial Safety Yellow or Standard Hydrant Red
Color Nozzle Caps & Top Nut, Including Shield	Industrial Safety Yellow or Standard Hydrant Red

12.19.2 Seat must be removable, using a short, lightweight wrench which will fit all depths of bury.

12.19.3 The hydrant shall have a 6” mechanical joint inlet in conformance to the dimensions shown in ANSI/AWWA C110 A21, latest revision. The lead pipe from the valve to the fire hydrant shall be an approved Mechanical Joint Swivel Anchor Coupling 6” x 13” Tyler 084150A CL 153 or approved equal for direct connections, or retainer glands as specified by type throughout these specifications. A fire hydrant anchor tee will be required for new main installation as indicated by the DEPARTMENT.

12.19.4 All fire hydrants shall be equipped with a two-piece barrel having a flange at the required elevation to meet the height requirement (18” to 24” from final grade) designated in Detail W15.

12.19.5 All fire hydrant installations shall have 6” gate valve with tracer wire, valve boxes and valve box pads meeting all provisions specified elsewhere in these specifications. Auxiliary gate valves are necessary for fire hydrant leads longer than 50’.

12.19.6 All concrete used for fire hydrant blocking shall be in conformance with the concrete Section 12.24 of these specifications.

12.19.7 Fire hydrants conforming to these specifications will be accepted from the following manufacturers:

- Mueller Super Centurion 250
- Clow Medallion
- American AVK

12.19.8 If a fire hydrant needs to be raised only 1 extension will be approved and all parts shall be manufactured by the same company as the fire hydrant. Generic extension parts shall not be used.

12.20 Polyethylene Tubing Material for Pipe Encasement

12.20.1 Polyethylene material for the encasement of cast IP (gray or ductile) shall conform to ANSI A21.5 (AWWA C105).

12.20.2 Tape for field application shall be Polyken #900, or Scotchwrap #50, or equal, at least 2” wide.

12.21 Locator Wire

12.21.1 All water mains and sewer force mains, including DI pipe, PE water services or other appurtenances installed shall have 12 gauge type TW (single strand) insulated copper locator wire installed on top of the initial backfill material.

12.21.2 Locator wire shall not be connected in any way to main or any other underground metal (except other tracer wires). In accordance with AWWA Standard C605, the tracer wire shall be placed immediately above the initial backfill material (between 6” and 12” above the top of the pipe) and directly over the pipe. Installation of locator wire shall be tested 1 time before the 1st acceptance inspection. Tracer wire shall be tested after curbs are installed and prior to asphalt. Please refer to **Section 8.15** for further information on tracer wire inspections and testing.

12.21.3 Wire shall be accessible at all valve boxes and meter boxes and shall extend a minimum of 6” above the valve or meter box, at the main or service, connect all locator wires together so that a continuous electrical path is ensured. Tracer wire shall be installed through the outside of the valve box bottom section then inserted through the inside of the top section of the valve box. A minimum of 6” to maximum of 12” of tracer wire is required to be extended beyond the top of the valve box.

12.21.4 To connect locator wires, the wires shall be spliced using a split bolt connector (Blackburn 9H or Kearney KS90) or equal, then covered with electrical plastic tape (Type 3M Scotch 33) so that a waterproof joint is made.

12.22 Concrete Material Specifications

12.22.1 Concrete shall have a 28-day compressive strength of at least 4,000-psi and shall contain not more than six (6) gallons of water per sack of cement, including the water in the aggregates, and not less than six (6) sacks of cement per cubic yard of concrete. A copy of all tickets from concrete company shall be presented to the DEPARTMENT.

12.22.2 Portland cement conforming to ASTM C150, Type 1, shall be used unless the DEPARTMENT approves the use of other types.

12.22.3 Water used shall be clean and free from injurious amounts of oil, acids, alkalis, salt, organic matter, or other deleterious substances.

12.22.4 Fine aggregate shall consist of clean, sound, properly graded sand conforming to ASTM Standard C33 uniformly graded from 100% passing the 3/8" sieve to not more than 8% passing the Number 100 sieve.

12.22.5 Coarse aggregate shall consist of crushed stone, gravel, or other inert material of similar characteristics, having clean, hard, strong, durable, uncoated particles with not more than 5% by weight of soft fragments, ¼ % by weight of clay lumps, and 1% by weight of material removed by decantation, except that when the material removed by decantation consists essentially of crushed dirt the maximum amount permitted may be increased to 1 ½ % by weight. Aggregate shall conform to ASTM Standard D289. Coarse aggregate may be either of two sizes, 1 ½" and smaller or ¾" and smaller, and shall be graded within the following requirements.

12.23 Percent Retained by Weight

Maximum Size Mesh Screen (sq. mesh)	0 - 3
Half-Maximum Size Mesh Screen (sq. mesh)	30 - 65
No. Sieve	94 - 100

12.23.1 In no case shall the maximum size aggregate exceed 1/3 of the design thickness of any part of a structure. Coarse aggregate for exposed aggregate surfaces shall be as follows:

Total Retained on 1 1/2" Sieve	0%
Total Retained on 3/4" Sieve	25 - 60%
Total Retained on 3/8" Sieve	70 - 90%
Total Retained on #4 Sieve	95 - 100%

12.24 Concrete Proportions and Consistency

12.24.1 The proportions of the concrete shall produce a mixture that will work readily, with the placement method most used, into the corners and angles of the forms and around reinforcement. Segregation of materials in the mixture shall not be permitted nor the collection of excess free water on the surface.

12.24.2 The slump of the concrete shall be the minimum that is practicable. When vibrators are used to consolidate the concrete, the slump shall not exceed 4"; otherwise, the slump shall not exceed 6".

12.24.3 The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked. Measurement of materials for ready-mixed concrete shall conform to Specifications for Ready-Mixed Concrete (ASTM C94).

12.24.4 Ready-mix concrete shall be required and shall conform to ASTM Standard C94 and to applicable portions of these specifications for on-site mixing. The concrete shall be delivered and placed within 1-hour after all materials, including mixing water, shall have been placed in the mixing drum. The CONTRACTOR shall obtain from the supplier of the ready-mixed concrete, the supplier's agreement to inspection by the DEPARTMENT, to the full extent deemed necessary by the DEPARTMENT.

12.25 Concrete Testing

12.25.1 As the placement of concrete progresses, the DEPARTMENT may take samples of the concrete for testing. The CONTRACTOR shall provide whatever assistance required by the DEPARTMENT in collecting and preparing samples for testing. Sampling shall be in accordance with ASTM Standard C172.

12.25.2 An independent laboratory in accordance with ASTM Standard C143 shall conduct slump tests.

12.25.3 Compression test specimen shall be prepared and cured in accordance with ASTM Standard C31. Specimens shall be tested in accordance with ASTM Standard C39.

12.25.4 All reinforcing bars shall be "Billet-Steel Concrete Reinforcement Bars" conforming to ASTM Designation A15 or "Rail-Steel Concrete Reinforcement Bars" conforming to ASTM Designation A16. Billet-Steel bars shall be intermediate grade with minimum yield point of 60,000 psi.

12.25.5 All reinforcing bars shall be deformed bars. Deformation shall comply with "Minimum Requirements of the Deformation of Deformed Steel Bars for Concrete Reinforcement - ASTM Designation A305".

12.25.6 When the volume of concrete required at the work site is less than 1/3 cubic yard, mixing may be accomplished by hand tool methods. The concrete shall be mixed in a clean, watertight vessel to the extent necessary to assure that the cement; aggregate and water are thoroughly integrated. The mix shall be at least 1 part Portland cement to 2 parts coarse aggregate, as specified in **Section 12.22.5** and 2 parts sand, as specified in **Section 12.22.4**. Only that amount of water required to provide a stiff, workable mix shall be used. The strength requirements specified in **Section 12.22.1** herein apply.

SECTION 13 INSTALLATION CRITERIA for WATER MAINS and APPURTENANCES

13.1 Connections to Water Distribution System

13.1.1 All connections to or any operations of appurtenances to the existing distribution system must be accomplished in the presence of the UTILITY INSPECTOR or DEPARTMENT representative.

13.1.2 In cases where completing the connection will disrupt service to customers, the CONTRACTOR shall notify the DEPARTMENT at least 5 days in advance of the work.

13.1.3 The customers whose service will be disrupted shall be notified by the CONTRACTOR a minimum of 24 hrs. prior to disruption of services in accordance with **Section 9.3.1**. The CONTRACTOR shall plan the work so that disruption of service is held to a minimum. The schedule shall be approved by the DEPARTMENT.

13.1.4 After connections have been completed, the valves shall be tightly closed. All valve operation shall be performed by the UTILITY INSPECTOR or DEPARTMENT personnel. At no time shall the CONTRACTOR operate valves or fire hydrants within the water distribution system.

13.1.5 A minimum horizontal distance of 10' should be maintained between water lines, and sewer lines, including edges of manholes or other sources of contamination. Water lines and sewer lines shall not be laid in the same trench except on the written approval of the ADH. Water mains necessarily in close proximity to sewers must be placed so that the bottom of the water line will be at least 18" above the top of the sewer line 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 10' either side of the crossing. Where

a water line must unavoidably pass beneath the sewer line, at least 18" 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 ADH.

13.2 Installation of Valves

13.2.1 Valves shall be joined in accordance with the methods of jointing pipe as specified elsewhere herein. Valve stems shall be plumb and there shall not be any obstructions which will prohibit the installation of valve boxes directly over the stem. For dead-end lines, concrete anchor collars shall be provided around an adjoining length of pipe for all valves. Mechanical joint retainer glands shall be installed on all valves with mechanical joint ends. Valves shall be installed and anchored on all sides of any Cross or Tee application. All valves shall be firmly supported on well compacted approved bedding and completely wrapped in polyethylene tubing material as specified in **Section 13.11**.

13.2.2 Valve boxes shall be installed over the operating nut of each valve and be of adequate length to reach the finished grade. The box cover shall be flush with the final grade. Tracer wire shall be installed through the outside of the valve box bottom section then inserted through the inside of the top section of the valve box. A minimum of 6" to maximum of 12" of tracer wire is required to be extended beyond the top of the valve box.

13.2.3 When the distance between the valve operating nut and the finished surface exceeds 4', a valve stem extension shall be provided. The stem shall be round steel bar stock or steel pipe with a 2" square bar steel operating nut (except 2" valve) attached to the upper end. The stem extension shall be of adequate length to reach from the valve operating nut to a point within 4' of the final grade. A box wrench, 2 1/8" ID square, made from high grade steel 3/16" thick shall be welded * to the lower end of the stem extension which will fit over the valve operating nut. A round center guide made from 3/16" or 1/4" steel plate shall be placed on the valve stem extension approximately 6" from the upper end. The diameter of the guide shall be slightly less than the ID of the valve box. The guide shall be affixed to the stem extension in such a way that it can rotate freely on the stem. A bituminous coating shall be applied to all stem extension pieces.

13.2.3.1 ***NOTE***: Welds on stem extensions (top and bottom nut) shall be 1/8" - 3/16" fillet weld around full circumference, small - large valve stem extension.

13.2.4 Valve stem extensions shall be manufactured by Clow, or equal. Shop drawings shall be submitted to the DEPARTMENT for approval prior to installing the stem extension pieces.

13.3 Installation of Tapping Sleeves & Tapping Saddles

13.3.1 The pipe shall be free of dirt and other debris before attaching tapping sleeve or tapping saddle. That part of the pipe barrel, which will be in contact with the gasket of tapping saddles, shall be smooth.

13.3.2 Tapping saddles or sleeves shall be bolted securely to the pipe. The face of the outlet shall be plumb. Mechanical joint glands for tapping sleeves shall be installed in accordance with **Section 12.9.3** herein. The strap bolts for tapping saddles shall be alternately tightened "snug" and then alternately tightened to a torque as required by manufacturer's requirements.

13.3.3 The tapping valve shall be bolted securely to the tapping sleeve or tapping saddle outlet flange. The tapping valve shall be supported by concrete cap blocks to remove weight from the valve and sleeve or saddle.

13.3.4 After installation of the tapping sleeve or saddle and the tapping valve, the assembly shall be hydrostatically tested at 150 psi for 15 minutes by introducing water through the sleeve or saddle test tap.

13.3.5 All tapping sleeves shall have poured-in-place concrete thrust blocking installed after pressure testing prior to tapping.

Polyethylene material shall be placed in accordance with **Section 13.11**.

13.4 Fire Hydrant Installation

13.4.1 All fire hydrants must have placement approval from the DEPARTMENT.

13.4.2 Hydrants shall be thoroughly cleaned before setting, removing all dirt and foreign matter from the barrel and bottom section up to the main valve. The main valve shall be in the "closed" position and the waste outlet shall be free of any obstructions.

13.4.3 Hydrants shall be located a safe distance from driveways, roadways and sidewalks and in a manner to provide complete accessibility. They shall stand plumb with nozzles at proper elevation and the steamer/pumper nozzle pointed perpendicular to traffic when hydrant is adjacent to a street, roadway or parking lot drive or toward the protected building unless otherwise directed by the DEPARTMENT.

13.4.4 The large diameter nozzle shall be at right angles to the street or fire lane, with the nozzle cap at a minimum of 5' from back of curb or edge of any driving surface (measured from the steamer cap nut) or as directed by the DEPARTMENT. ***Under no conditions will fire hydrants be allowed in the sidewalk or radius***, unless otherwise directed by the DEPARTMENT. Fire hydrants placed in subdivisions need to be installed at the lot line to avoid conflicts with driveways.

13.4.5 The CONTRACTOR shall, if necessary, rotate the hydrant barrel or nozzle section at the flanged joint to obtain the desired nozzle position as specified by the DEPARTMENT.

13.4.6 The fire hydrant shoe shall be supported firmly on the bottom and shall be well braced against unexcavated earth with formed and poured concrete blocking on the backside. If considered necessary by the DEPARTMENT, the fire hydrant shall be tied to the branch pipe with suitable rods or clamps. Rods or clamps are to be furnished by the CONTRACTOR without additional compensation.

13.4.7 All mechanical joint fittings shall be properly protected by polyethylene tubing as described in *Section 13.11*.

13.4.8 A drainage bed shall be provided under and around the base of the hydrant of at least 6 cubic feet in volume and extending at least 6" above the weep hole drain outlet and shall consist of Class #67 gravel. As defined in **Section 10.2.1**. Under no circumstances shall the waste outlet on the hydrant or the drainage bed be connected to sewer or storm drainage.

13.4.9 Backfilling and tamping around hydrant barrels shall be continuous in operation.

13.4.10 After installation, it is required that all fire hydrants shall be covered with a water resistant sack to indicate out-of-service. These may be removed after the CITY INSPECTOR or DEPARTMENT has placed the line in service.

13.5 Concrete Placement & Finishing

13.5.1 All placement of concrete must be in the presence of the DEPARTMENT or representative. The CONTRACTOR is cautioned that he may be required to remove, without compensation, any concrete placed in the absence of the DEPARTMENT or representative.

13.5.2 Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials. All concrete in reinforced walls and columns shall be poured through tremies unless otherwise permitted by the DEPARTMENT. The free fall of concrete shall be 5' maximum.

13.5.3 Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. The placing of concrete shall be carried on at such a rate that concrete is at all times plastic and flows readily into the spaces between the bars. Concrete that has been contaminated by foreign material shall not be used, nor shall re-tempered concrete be used.

13.5.4 When placing is once started, it shall be carried on as a continuous operation until placement of the panel or section is complete.

13.5.5 In placing concrete, care shall be taken that the freshly placed mass is so placed and vibrated that there is no tendency for the coarse aggregate to segregate from the mortar, that no rock pockets are left, that the concrete flows readily around the steel and into the extremities of the forms, and the whole freshly-placed mass becomes a plastic jelly-like mass but without free water in appreciable quantity on its surface. No concrete shall be poured without vibration with mechanical or magnetic internal vibrators.

13.5.6 Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the DEPARTMENT.

13.5.7 Concrete placed directly on the ground shall be placed in the forms on a compacted moist sub-grade and shall be vibrated until mortar covers the entire surface. Vibrating shall be given special attention in order to prevent voids in the concrete.

13.5.8 Concrete after placement and finishing shall be protected from damage while curing. Provisions shall be made for maintaining concrete in moist condition for a period of at least 72 hours after placement.

13.5.9 After removal of forms and finishing, as specified elsewhere herein, backfill shall be placed around the structure and thoroughly compacted.

13.5.10 Forms shall be constructed before placement of any concrete***** unless otherwise authorized by the DEPARTMENT.

13.5.10.1 ****NOTE***: Concrete utilized for thrust blocking to be poured against undisturbed earth.

13.5.11 Forms shall conform to shapes, lines, and dimensions of the members as specified on the Plans, or as required to conform to the original shape and dimensions in the case of replacement structures, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or joined together so as to maintain position and shape. They may be constructed of any material with sufficient strength, which will provide the finished work a satisfactory surface and alignment.

13.5.12 Forms shall be removed in such a manner as to insure the complete safety of the structure. When the structure is supported on shores, the removable floor forms, beams and girder sides, and column and similar vertical forms may be removed after 72 hours, providing the concrete will not be injured. In no case shall supporting forms or shoring be removed until members have acquired sufficient strength to support their weight and imposed loads safely.

13.5.13 Forms shall be coated with a form oil before placement of reinforcing steel or concrete. Excessive coating material shall not be allowed to form or stand in puddles in the forms nor allowed to come in contact with concrete against which fresh concrete or reinforcing bars will be placed.

13.6 Concrete Reinforcement

13.6.1 At the time concrete is placed, metal reinforcement shall be free from rust scale or other coatings that will destroy or reduce the bond. All bars shall be shop bent, unless otherwise permitted by the DEPARTMENT. No bars partially embedded in concrete shall be field bent except as shown on Plans or as specifically permitted by the DEPARTMENT. Field bonding of rail steel bars will not be permitted.

13.6.2 Metal reinforcement shall be accurately placed according to the Plans or as specified herein and adequately secured in position by concrete, metal, or other approved chairs, spacers or ties.

13.6.3 No splices of reinforcement shall be made except as shown on the Plans, or as specified, or as authorized by the DEPARTMENT. All welding shall conform to the American Welding Society's Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction (AWS D12.1), unless otherwise authorized by the DEPARTMENT. All laps and splices shall be in accordance with ACI 318, using f'c = 3,000 psig and fy = 60,000 psig unless otherwise shown on the Plans.

13.6.4 The reinforcement shall be protected by the thickness of concrete indicated in the Plans. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

A. Where concrete is deposited against the ground without the use of forms not less than 3", except wire mesh reinforcement for concrete slabs which may be within 1 ½" of the ground.

B. Where concrete is to be exposed to the weather or to the ground but placed in forms not less than 2" for bars larger than No. 5 and 1 ½" for No. 5 bars or smaller.

C. In slabs and walls not exposed to the ground or to the weather - not less than ¾".

D. In all cases - at least equal to the diameter of the bars.

13.7 Concrete Cold-Weather Requirements

13.7.1 Concrete shall not be placed when the ambient temperature is 40°F and falling, but can be placed if the temperature is 35°F and rising, or when the concrete is likely to be subjected to freezing temperatures before final set has occurred. Concrete footings or slabs shall not be placed over frozen ground. The temperatures of the concrete when placed shall not be less than 45°F. Heated materials shall be free of ice, snow and frozen lumps before entering the mixer. Methods and equipment for the heating of materials shall be subject to the DEPARTMENT'S approval. Suitable means shall be provided for maintaining the concrete at a temperature of at least 45°F for not less than 96 hours after placing.

13.7.2 Any and all concrete damaged by freezing shall be removed to the satisfaction of the DEPARTMENT, and replaced, all at the expense of the CONTRACTOR.

13.8 Concrete Hot-Weather Requirements

13.8.1 In hot weather, suitable precautions shall be taken to avoid drying of the concrete prior to finishing operations. Use of windbreaks, sunshades, fog sprays, or other devices shall be provided as directed by the DEPARTMENT.

13.8.2 Concrete deposited in hot weather shall not have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperatures shall be less than 90°F unless higher temperatures are permitted by the DEPARTMENT.

13.8.3 The use of additives shall be prohibited unless written approval of its use has been secured, in advance, from the DEPARTMENT.

13.9 Concrete Thrust Blocks & Anchor Collars

13.9.1 Concrete thrust blocks and anchors shall be provided along the pipeline in accordance with the construction details, plan sheets, or as directed by the DEPARTMENT. The concrete shall have a 28 day compressive strength of 4,000-psi.

13.9.2 Concrete for thrust blocks shall be placed against undisturbed soil. The excavation shall be hand shaped and free of loose material. Forms shall be used to confine the concrete in areas other than that part that is in contact with undisturbed soil in the direction of the thrust.

13.9.3 No concrete shall be placed around any part of a joint or placed so that it interferes with the removal of any joint accessories such as bolts, followers, threads, collars, couplings, etc. Fire hydrant weep hole drain outlets shall not be restricted.

13.9.4 The top of the concrete thrust block or anchor collar shall be struck off with a wood straight edge or float.

13.9.5 Admixtures are not to be used without the approval of the DEPARTMENT.

13.9.6 All placement of concrete must be in the presence of the UTILITY INSPECTOR or DEPARTMENT representative. The CONTRACTOR is cautioned that he may be required to remove, without compensation, any concrete placed in the absence of the UTILITY INSPECTOR or DEPARTMENT representative.

13.9.7 Backfill over concrete thrust blocks or anchor collars shall not be placed before the concrete has attained initial set.

13.9.8 No thrust blocks shall be less than 12” thick between the pipeline or appurtenances and undisturbed soil in the direction of thrust.

13.9.9 The excavation shall be free of water before concrete is placed. Steel reinforcement, as specified on the plans, shall be placed in accordance with **Section 13.6** herein.

13.9.10 The pipe or appurtenances shall be cleaned before placing concrete when the concrete is to be in direct contact with the pipe or appurtenance. Polyethylene plastic shall cover all pipes or appurtenances subject to direct contact with concrete.

13.9.11 The area of contact of the thrust blocks and anchor collars shall be sufficient to resist the thrust. This area will vary depending on the safe bearing value of the soil. Suggested safe soil bearing values are as follows:

TYPE Of SOIL	SUGGESTED SAFE BEARING VALUES (Tons\Sq.Ft.)
Solid Rock	25
Hard Slate	6
Medium Shale	4
Soft Shale	2
Dry Clay Gravel	4
Soft Clay	1.5
Dry Sand or Loam	2.5
Wet Clay	0.75

13.9.12 The above values are approximate and will vary considerably and are intended to be used only as a reference. The CONTRACTOR is responsible for determining the soil bearing value or taking other action to assure that the bearing area is adequate to restrain the pipe or appurtenances.

13.9.13 Where the soil is unstable or in the case of recent fill areas, the following procedures shall apply either individually or in a combination:

A. Thrust blocks shall be of adequate size to restrain pipe or appurtenances by mass alone without depending on horizontal bearing of the soil.

B. The excavation shall extend deep enough to contact firm soil and the block brought up to the pipe or appurtenances and constructed so that the block acts as abeam and will provide restraint required. Such block shall be reinforced with steel reinforcing bars.

C. Anchor blocks shall be constructed in a firm soil and tie rods extended to the pipe or appurtenances.

13.9.14 Thrust blocks for vertical bends shall be adequate to resist the thrust by mass alone when the thrust is upward.

13.9.15 Thrust blocks and anchor collars shall be adequate to restrain the pipeline and appurtenances at the specified test pressure. The table on Detail W10 provides the required blocking area for 2,000 lb/sf soil at a test pressure of 150 psi. To determine the thrust at the test pressure, these values are to be multiplied by a factor equal to the test pressure divided by 150.

13.9.16 Concrete thrust blocks or anchor collars that fail to restrain the pipe or appurtenances shall be replaced by the CONTRACTOR at his expense.

13.10 (Not Used)

13.11 Installation of Polyethylene Protection Material

13.11.1 Polyethylene material ANSI A21.5 (AWWA C105), shall be in tubing form or in the form of flat sheet or rolls, as specified herein, shall be placed around all mechanical joints of pipe and fittings; all valves and fire hydrants with mechanical joint ends and all saddles, sleeves, and couplings, tapping saddles and any other appurtenances with exposed bolts.

13.11.2 Pipe-shaped appurtenances - bends, reducers, offsets and other pipe-shaped appurtenances shall be covered with polyethylene in the same manner as the pipe.

13.11.3 Odd-shaped appurtenances - valves, tees, crosses, and other odd-shaped pieces which cannot practically be wrapped in a tube, shall be wrapped with a flat sheet or split length of polyethylene tube. The sheet shall be passed under the appurtenance and brought up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Tape polyethylene securely in place at valve stem and other penetrations.

13.11.4 Where specified in the Plans, DI pipe and appurtenances shall be completely encased in polyethylene tubing material. It is not the intent that the material form an enclosure that is absolutely air or water tight, but to prevent pipe to soil contact.

13.11.5 Polyethylene tubing, when required, shall be applied to water lines by one of the following methods:

A. ***Method "A"*** - Cut polyethylene tube to a length approximately 2' longer than the length of the pipe section. Slip the tube around the pipe centering it to provide a 1' overlap on each adjacent pipe section and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene tube. After assembling the pipe joint, take bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe and secure in place. Then slip the end of the polyethylene from the new pipe section of the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place. Take up the slack width to make snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points with tape.

B. ***Method "B"*** - Cut polyethylene tube to a length approximately 1' shorter than the length of the pipe section. Slip the tube around the pipe, centering it to provide 6" of bare pipe at each end. Make polyethylene snug, but not tight, secure ends. Before making up a joint, slip a 3' length of polyethylene tube over the end of the preceding pipe section, bunching it accordion fashion lengthwise. After completing the joint, pull the 3' length of polyethylene over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1'; make snug and secure each end.

13.11.6 Openings in Tubing Material - openings for branches, service taps, blow-offs, air valves, and similar appurtenances shall be made by making a x-shaped cut in the polyethylene and temporarily folding the film back. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut, as well as any other damaged areas in the polyethylene with tape.

13.11.7 Junctions between Wrapped and Unwrapped Pipe - Where polyethylene wrapped pipe joins a pipe, which is not wrapped, extend the polyethylene tube to cover the unwrapped pipe a distance of at least 2' and secure the end.

13.11.8 The polyethylene material shall be secured around the pipe and appurtenances by at least 3 circular wraps of tape. Tape for field application shall be Polyken #900, or Scotchrap #50, or equal, at least 2" wide.

13.11.9 All tongs, cables or chains that are used for lifting pipe and appurtenances that have been encased in polyethylene material shall be adequately padded to prevent damage to the material.

13.11.10 Repair any rips, punctures, or other damage to the polyethylene with tape or with a short length of polyethylene tube cut open, wrapped around the pipe and secured in place.

13.11.11 Polyethylene material shall be stored on the job site in such a manner that it is not exposed to direct sunlight. Exposure during installation shall not exceed 48 hours.

13.11.12 Backfill material shall be the same as specified for pipe without polyethylene wrapping. Special care shall be taken to prevent damage to the polyethylene wrapping when placing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, stones and/or other material that could damage polyethylene.

13.12 Meter Connections

13.12.1 All meter sets shall be provided with approved washers at both ground union connections.

13.12.2 All fittings shall be sealed using approved pipe sealant or Teflon tape.

13.13 Filling Water Lines

13.13.1 After the water lines and appurtenances have been installed, all concrete thrust blocking has cured adequately and upon approval of the UTILITY INSPECTOR or DEPARTMENT, the water lines shall be filled with water.

13.13.2 In order to prevent circulation of water through the new water lines back into the distribution system, only one valve shall be opened to allow water to flow into the new water lines. This valve will be tightly closed after the filling operation has been completed.

13.13.3 The valve operated to fill the water lines shall be operated slowly and shall not be fully opened. All water valve and fire hydrant operation shall be performed or under the supervision of the UTILITY INSPECTOR or DEPARTMENT representative.

13.13.4 All air shall be expelled from the pipeline by opening fire hydrants and/or other openings installed at the pipeline crests by the CONTRACTOR. The location and number of such openings shall be as shown on the Plans or as directed by the DEPARTMENT.

13.14 Hydrostatic Pressure and Leakage Tests

13.14.1 All water lines and appurtenances shall be tested by a hydrostatic pressure test after all trenching or boring has been completed in the area of the water main and/or water services. The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section. The test pressure shall not exceed the thrust restraint design pressures or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).

13.14.2 After the water lines or isolated sections of the pipeline have been filled with water, the pressure shall be increased to the test pressure by means of a pump. The leakage test shall be in accordance with the AWWA Manual of Water Supply Practice. The manual shall be chosen based on pipe material being tested. Concrete Pressure Pipe (M9), Steel Pipe (M11), PVC Pipe (M23), Ductile-Iron Pipe (M41), and PE Pipe (M55).

13.14.3 The CONTRACTOR shall furnish a pump with meter on discharge side of pump and a 4” gauge in 2 lb. increments, and all labor for conducting the tests.

13.14.4 The duration of the hydrostatic leakage test shall be 2 hours or as specified by the CITY INSPECTOR or DEPARTMENT representative.

13.14.5 The source of water for the pump suction shall be potable water from the DEPARTMENT’S distribution system. The vessel used must be approved by the UTILITY INSPECTOR or DEPARTMENT representative.

13.14.6 All interior valves including valves on fire hydrants and other appurtenances shall be open during all tests.

13.14.7 The maximum leakage per hour for DI and PVC shall be as calculated from the following formula (All rubber gasket or 0-ring joints):

Test Calculations:

$$L = \frac{SD\sqrt{(P)}}{148{,}000}$$

L = Allowable leakage (gallons per hour)

S = Length of pipe tested, in feet

D = Nominal diameter of pipe (inches)

P = Average test pressure during leakage test (psig)

* Loss = Length X Diameter X (Sq. Root of) Test Pressure
Divided by 148000 Equals Allowable Loss per hour.
Times 2 for a two (2) hour test.

13.14.8 After the specified test pressure has been applied the entire pipeline shall be checked in the presence of the UTILITY INSPECTOR or DEPARTMENT representative. After the CONTRACTOR has taken the necessary action to repair or replace any part of the pipeline or appurtenances where leaks were apparent or if no leaks were apparent, the water lines shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.

13.14.9 If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from above formula or table, the CONTRACTOR shall, at his expense, locate the leak or leaks and perform whatever work and/or replace whatever material that is required in order to remedy the defect and stop the leak. After corrective work has been completed, the section of line replaced or repaired shall be re-tested. All corrective work must be approved by the DEPARTMENT.

13.14.10 Prior to the pressure test, the ENGINEER shall present an allowable leakage report to the UTILITYINSPECTOR.

13.15 Disinfecting Water Lines and Appurtenances

13.15.1 Disinfection of water lines shall be performed in accordance with AWWA C651.

13.15.2 The CONTRACTOR shall construct blow-offs and sample points, as shown on the Plans or as directed by the UTILITY INSPECTOR or DEPARTMENT. Temporary blow-offs shall be utilized as sample points. Openings for sample points shall be 1” with polyethylene riser pipe that extends well above the surface. Water samples are only taken on Mondays, Tuesdays, Wednesdays, and Thursdays.

13.15.3 The continuous feed method is the only acceptable method for disinfection and sterilization. The DEPARTMENT shall approve any method other than the continuous feed method. The continuous feed method shall use either liquid chlorine or calcium hypochlorite in granulated form which contains approximately 65 percent (65%) available chlorine by weight. Liquid chlorine shall be used only when the CONTRACTOR has suitable equipment available, has employees who are familiar with the physiological, chemical, and physical properties of liquid chlorine and properly trained and equipped to handle any emergency that may arise, and when appropriate safety practices are observed to protect working personnel and the public. If, in the opinion

of the UTILITY INSPECTOR or DEPARTMENT, the equipment is inadequate, the personnel are not qualified, or appropriate safety measures are not utilized, this method shall not be used.

13.15.4 The pipelines and appurtenances shall be thoroughly flushed prior to disinfecting. The flushing plan shall be approved by the UTILITY INSPECTOR or DEPARTMENT. The DEPARTMENT may halt or reduce flushing when required.

13.15.5 The operation of valves or fire hydrants for this method shall be performed by or under the direction of the UTILITY INSPECTOR or DEPARTMENT Representative. Typically, DEPARTMENT personnel *will not* operate any valves or appurtenances until such time as they are dedicated to the DEPARTMENT.

13.15.6 The CONTRACTOR is reminded that chlorine is a powerful oxidant and reacts readily with foreign substances. All chlorine compounds shall be handled and stored in accordance with manufacturer's recommendations. Breathing of chlorine gas can be fatal. Hypochlorite solutions should not come into contact with skin or clothing. Containers used for mixing hypochlorite solution shall be clean and dry.

13.15.7 When the continuous flow method is used, the final concentration of chlorine inside the main shall be 50 parts per million and remain at this strength for a period not less than 24 hours. Calcium hypochlorite shall contain minimum 65% available chlorine by weight in granular form.

13.15.8 During application of any chlorine solution, The UTILITY INSPECTOR or DEPARTMENT Representative shall be present to operate or to oversee the operation of valves on the existing distribution system to ensure that the solution does not flow back into the distribution system.

13.15.9 The procedure for disinfecting by the continuous flow method shall be as follows:

A. The flow through the pipeline and the solution flow shall be regulated so that the required concentration of chlorine is attained. The flow through the main shall be measured by using a pitot gauge or meter.

B. The introduction of the solution shall be continuous until the desired concentration is attained throughout the pipeline system. The concentration shall be checked by the Drop Dilution Method.

C. After the required concentration has been attained all internal valves shall be operated so that the solution comes in contact with all appurtenances.

D. The solution shall remain in the pipeline system for 24 hours after which the pipelines shall be thoroughly flushed. The chlorine concentration shall be checked before flushing. If the concentration is less than 25 parts per million, the disinfecting procedure shall be repeated if directed by the UTILITY INSPECTOR or DEPARTMENT representative. Extreme caution shall be taken to ensure solution does not run into a stream or pond.

13.15.10 If any of the samples collected are positive of bacteria, the disinfecting procedures shall be repeated as directed by the DEPARTMENT until two sets of consecutive samples are collected and approved by the ADH.

13.15.11 Sections of water mains shall not be placed into service until two sets of consecutive samples have successfully passed bacteriological testing.

13.15.12 The cost of continuous sampling and flushing of water will be charged to the OWNER, DEVELOPER, or the CONTRACTOR.

13.16 Cleaning Large Pipelines

13.16.1 Before disinfection, hydrostatic pressure, and leakage testing - *Sections 13.14 & 13.15*, water lines 16" in diameter and larger or any other water line required by the DEPARTMENT may be required to be cleaned by forcing a resilient high density Polyurethane foam "cleaning pig" through each segment of the pipeline by water pressure to remove any dirt or other foreign matter from the pipeline. The "pig" shall be Style III, Type C (blue, plain criss-cross), manufactured by Knapp, Inc., Houston, Texas, or equal, in good condition and shall be at least 2% larger in diameter than the ID of the pipeline being cleaned.

13.16.2 The "pig" shall be inserted in the first length of pipe installed in each segment of pipeline. After installation of the pipeline segment to be cleaned, the pipeline shall be filled at a point downstream of the "pig". The "pig" shall be forced through the pipeline by applying water pressure to the rear of the "pig" and opening blow-off valves or fire hydrants downstream of the "pig". Valve at blow-off points shall be closed immediately prior to the "pig" passing.

13.16.3 Based on past experience, the "pig" will negotiate bends and tees in the pipeline and may also be forced through the pipeline backward after a pass forward. Openings in the pipeline, as shown on the Plans for removing the "pig", are based on this assumption. If the CONTRACTOR is unable to clean the pipeline, utilizing the openings provided, additional openings shall be provided by the CONTRACTOR, upon approval of the DEPARTMENT, at the expense of the CONTRACTOR.

13.16.4 If the need for more than one pass of the "pig" through the pipeline is indicated, the CONTRACTOR shall make additional passes as directed by the DEPARTMENT.

13.16.5 Drainage at blow-off points shall be provided so as not to create a nuisance and to avoid property damage.

SECTION 14 WASTEWATER COLLECTION SYSTEM GENERAL INFORMATION

14.1 SIZE No gravity sewer main conveying raw sewage shall be less than 8" in diameter unless prior approval is obtained from the DEPARTMENT and ADH.

14.1.1 There shall be a 5' minimum separation between the outside edge of a public sewer main to the outside edge of all other utilities within the utility easement. There shall be a 3' minimum separation from the outside edge of a manhole barrel to the outside edge of any other utility within the utility easement. Any deviation must have approval from the DEPARTMENT prior to installation. Sewer STEP systems are prohibited in the DEPARTMENT. There shall be no case that a property has an active septic tank directly or indirectly tied to the public sewer system.

14.1.2 A drop connection shall be provided for a sewer entering a manhole at an elevation of at least 24 inches above the manhole invert. Outside drop connections should be installed with inside drop connections only being allowed by the DEPARTMENT when necessary. The entire outside drop connection shall be encased in concrete. Larger diameters are required for manholes with inside drop connections, new manholes, and for manholes with pipes at least eight inches (8") in diameter, and may be necessary with larger diameter sewer mains or multiple sewer mains connecting at the manhole. External drop connections are not permitted for manholes greater than 13' deep.

14.1.3 The minimum earth cover for sanitary sewer mains shall not be less than 36" from final grade unless there is prior approval from the DEPARTMENT.

14.1.4 In any case of signs, fencing or structures installed near a public sewer main, at least 5’ of separation must be maintained. In any case of a permanent building built near a public sewer main at least a 10’ separation must be maintained. Any deviation in separation minimums must get approval from the DEPARTMENT prior to installation or construction.

14.1.5 Sewer pipe material shall be of the types listed in these specifications. Materials not specifically authorized in these specifications are forbidden for use in the system unless otherwise approved by the DEPARTMENT in writing.

14.1.6 For maintenance purposes, an access road shall be provided for all off-site sanitary sewer manholes. For the purpose of this section, off-site manhole refers to manholes which are not located within 25’ of a public street.

14.1.7 Access roads shall be a minimum of 12’ wide and located within a minimum 20’ wide utility and/or access easement. Street curb sections shall be modified to allow access for large vehicles including adequate turning radii. Turning radii shall also be provided to accommodate Department vehicles at any change of direction. Turn-arounds shall be provided at dead-end access roads which change direction and at any point where the slope of the road increases to 10% or steeper. Access roads with slopes up to 10% shall be minimum 6” of ARDOT Class 7 granular base compacted to 95% of standard proctor maximum dry density. Access roads steeper than 10% shall include a minimum 2” thick asphalt surface course in addition to the 6” of granular base mentioned above. Asphalt surface course shall meet the requirements of the current City of Pea Ridge’s Minimum Standards for Streets. A rigid pavement section with equivalent structural number will be allowed on sections steeper than 10%. Erosion and storm water controls shall be installed to prevent erosion and other road impairment.

14.1.8 The utility main that is stubbed out shall terminate at a manhole for a sewer main or a fire hydrant assembly with a restrained gate valve connected to the downstream side of the tee for a water main. The purpose for the stub-out is to allow for connection to the utility without disturbing the existing development.

14.2 Encasement Pipe

14.2.1 Smooth Wall Steel Encasement Pipe - Pipe shall conform to ASTM A-139, ASTM A-21.11. The metal thickness shall be as shown in the Proposal or Plans.

14.2.2 Casing spacer systems shall be manufactured in two pieces, made from heavy gauge T-304 stainless steel with Polymer Plastic Runners (Teflon). Spacers shall be a Cascade Casing Spacer manufactured by Cascade Waterworks Manufacturing Company or equal conforming to ASTM ratings, approved by AWWA and the DEPARTMENT. Encasement spacers shall be sized to eliminate the potential for the sewer main inside the encasement pipe to float. Casing and utility pipes shall be sealed with synthetic rubber end seals.

14.2.3 Location of main extensions to service parcels of property shall be planned so as to minimize the length of building sewer, which must be maintained by the property owner. If sewer stub-outs are provided for each lot in a new development, said stub-out shall be placed on the lowest elevation corner of property.

14.2.4 In no case shall a residential building be allowed to connect to the same sewer service or building sewer of another private residential building. Each building structure shall have a separate sewer line service from the point of the utility source and in no case be interconnected with the plumbing system of another privately owned property.

14.2.5 All gravity sewer main extensions without regard to length shall terminate in a standard manhole. Manholes are to be spaced no greater than 400’ and shall occur at all changes in direction or grade.

14.2.6 Sewer easements will be a minimum 20’ in width. Easements shall be dedicated as utility easements unless required to dedicate for the exclusive use of the sewer lines. Sewer lines must be located within the center of the easement or as directed by the DEPARTMENT. Recorded utility easement shall be provided to the DEPARTMENT. There shall be a 5’ minimum separation between the outside edge of a public sewer main to the outside edge of all other utilities within the utility easement. Any deviation must have approval from the DEPARTMENT prior to installation. Recorded utility easement shall be provided to the DEPARTMENT.

14.2.7 Sewer services shall terminate at the building setback or easement. Services shall be located from lot lines as directed by the DEPARTMENT in accordance with **Section 7A**. Placement of service stub-outs should be located on lowest elevation lot corner. Termination of all stub-outs shall be clearly marked 36” above ground with a single 6’ T-Post (painted green) driven in the ground at a minimum of 36”. GPS coordinates for the end of each service shall be provided in a chart on the final as-builts plans in accordance with **Section 5.**

14.2.8 All efforts shall be made to design sewer systems that are accessible for future maintenance. Manholes should be located on or near streets in order to minimize difficulty of routine maintenance and all efforts should be made to eliminate manholes in ditches or drainage areas. Prior approval to locate manholes in surface runoff areas, such as drainage ditches, shall be approved by the DEPARTMENT prior to construction. All manholes located in drainage areas shall be equipped with watertight manhole rings and covers.

14.2.9 Access to sewer easements shall be reviewed on a case by case basis during plan review. PRWU reserves the right to require additional easements for future expansion of collection system so as to avoid the blocking of other parcels access to system which may prohibit growth. PRWU also reserves the right to request changes in slope and\or depth of sewer to allow for future growth of the collection system.

14.2.10 Sewer service lines from buildings to sewer mains shall be placed so as not to cross driveways, walks and proposed permanent objects over them.

14.2.11 The DEPARTMENT shall perform all 4” taps on existing main lines. All 4” services tying into existing sewer infrastructure shall tie into sewer main lines and not manholes. Connection of any service into an existing manhole must be approved by the DEPARTMENT.

All services larger than 4” that are tying into the existing sewer infrastructure must tie into a manhole. All expenses for tying sewer services into existing manholes are at CONTRACTORS cost. Any tie to an existing manhole requires water stop and no shrink grout to repair intrusion. All manhole intrusions may be required to undergo vacuum testing at DEPARTMENT discretion and at CONTRACTOR’S cost.

14.3 Minimum Slope for Sewer Line Installation Table

Minimum Slope in Feet

Nominal Sewer Main Size	Minimum Slope Per 100 Feet	Nominal Sewer Main Size	Minimum Slope Per 100 Feet
8"	0.4	18"	0.12
10"	0.28	21"	0.1
12"	0.22	24"	0.08
14"	0.17	27"	0.067
15"	0.15	30"	0.058
16"	0.14	33"	0.052
36"	0.046	39"	0.041

SECTION 15 WASTEWATER COLLECTION SYSTEM MATERIALS

15.1 ALL MATERIALS TO BE DOMESTICALLY MADE.

15.1.1 All gravity or force sanitary sewer pipe shall be PVC. If it is deemed necessary to install DI pipe, the use of DI pipe shall be subject to approval by the DEPARTMENT prior to installation. The minimum acceptable size of all gravity sewer mains is 8" diameter unless prior approval is obtained from the DEPARTMENT and the ADH. All pipe installed shall be of the type, size, class, and thickness as indicated in these specifications and on the design plans. The design 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 DEPARTMENT.

15.2 Polyvinyl Chloride (PVC)

Pipe shall meet the requirement of SDR-26 Heavy Wall Sewer Pipe and comply with ASTM-3034 and Cell Classification 12454-B. Pipe joints shall be integrally molded bell ends per ASTM D-3034 Type PSM with factory supplied elastomeric gaskets and lubricant. Pipe shall be continually marked with the following:

A. Nominal OD

B. Dimension Ratio (SDR-26)

C. Notation "Heavy Wall Sewer Pipe"

D. Cell Classification: 12454-B

E. SDR Rating ASTM-D3034

F. Manufacturer's name or trademark and production code

G. Seal (mark) of the testing agency that verified the suitability of the pipe. (such as: "PSP")

15.2.2 The DEPARTMENT prohibits all A2000 type or any "profile pipe" use.

15.2.3 Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

15.3 Ductile Iron Pipe

15.3.1 Installation of DI pipe shall be installed under the direction of the DEPARTMENT. DI pipe that meets ASTM 4746, extra heavy type, inside nominal diameter as specified on plans, bell and spigot end shall be used. Jointing devices ASNI A21.11, rubber gasket joint devices.

15.3.2 All DI pipe and fittings for sewer service shall have an interior epoxy lining. The lining system shall be either Protecto 401 Ceramic Epoxy as manufactured by Vulcan Painters, Inc or Perma-Shield Series 431 manufactured by Tnemec. The lining applicator shall have a successful history of applying linings to the interior of DI pipe.

15.4 Pipe Accessories

15.4.1 If any pipe accessories are necessary the material being used shall be submitted to the DEPARTMENT for approval prior to installation. If approval has not been obtained in writing, the contractor is at risk of removing any accessory at the DEPARTMENTS discretion.

15.5 Fittings

15.5.1 All fittings shall be made of the same material as the sewer main whether it is Ductile Iron or Heavy Wall SDR-26. Fittings shall have a push-on gasket seal that will allow for a passing air test. All fittings shall be submitted to the DEPARTMENT for approval prior to installation.

15.6 Cleanouts

15.6.1 Cleanouts are strictly prohibited as a point of entry or maintenance for use in the municipal sewer system. Clean-outs shall be installed on private plumbing only. Entry into the sewer main shall be facilitated by the use of manholes only or as directed by the DEPARTMENT.

15.7 Force Mains

15.7.1 All force mains will have a 3' minimum cover of bedding material installed according to Detail WS01. The installation of the force main will include 12 gauge type TW (single strand) insulated copper locator wire installed above the initial backfill with locator ports. The pipe material that is to be used will need to withstand a 150 pound hydrostatic test. Warning tape will need to be installed above the initial backfill. The warning tape will have "Force Main" written on to identify the pipe. Pipe size shall be a minimum of 4".

15.7.2 Where force mains enter manholes the manholes shall be epoxy lined to a thickness of 125 mils after the installation of a ½" of cementitious lining has been applied. Manholes within 1000' downstream shall also be epoxy lined to prevent degradation of the manhole. In addition, any manhole upstream of the lift station wet well within 500' shall be epoxy lined.

15.7.3 Combination air and vacuum release valves shall be installed at high points in the sewer force mains. Manholes as per the Standard Details shall be furnished as part of the air/vacuum release valve installation. Valves shall be bedded in the same manner as the pipe bedding. Installation of the air/vacuum release valve and manhole shall be per Standard Sewer Detail S12.

15.8 Tracer Wire Ports for Force Mains

15.8.1 Tracer wire ports will be located no further apart than 500' and placed at every change in direction. The ports are to be laid out so that they are located by a manhole whenever possible for ease of locating in the event that they get buried. The tracer wire ports will consist of a 4" pipe resting on the bedding material and extending to the final grade elevation. The tracer wire port will include a cast iron lid and an 18" pre-cast or cast in place concrete pad. The tracer wire will be brought up through the 4" pipe and extend a minimum of 12" out of the top of the pipe. The tracer wire will be installed in a manner that will allow the force main to be located in both directions from the tracer wire port.

15.8.2 Valve boxes shall be Tyler 6850 series or equal with 5 ¼" shafts. screw type, 5 ¼" drop lid with "SEWER" on lid. All valve box material shall be domestically made.

SECTION 16 SEWER MANHOLE INFORMATION AND MATERIALS

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

16.2 Concrete Curing and Compounds

16.2.1 Concrete used in the construction of manholes shall conform to the requirements in **Section 12.22**. Curing compounds or covers must be approved by the DEPARTMENT. It is the responsibility of the CONTRACTOR to protect the concrete to prevent cracking during the curing process and to protect the manhole during freezing temperatures. The UTILITY INSPECTOR or DEPARTMENT representative shall, at their discretion, prohibit pouring concrete during periods of extreme cold or inclement weather.

16.3 Cast-In-Place-Manholes

16.3.1 Cast-in-place manholes shall be constructed of 4,000 psi concrete with the concrete base a minimum thickness of 8" below the invert and shall be poured on undisturbed earth. The base shall extend a minimum of 24" in all directions from the exterior of the manhole barrel. The DEPARTMENT prohibits the use of pre-cast manholes without prior approval.

16.3.2 Concrete shall be deposited evenly distributed in a continuous pour in maximum layers of 18", with each layer vibrated to bond it to the preceding layer.

16.4 Drop Type Manholes

16.4.1 Drop type manhole installations shall be approved during plan review.

16.4.2 Outside drop connections should be installed according to Detail S07.

16.4.3 Inside drop connections are only allowed by the DEPARTMENT when necessary. Point of intrusion shall be re-sealed with an approved water stop and grouted in place, the top section fitting shall be an all Hub SDR 26 double sanitary tee with direction of flow pointing downward. Vertical piping will be attached to concrete with 1 ¾" stainless steel bands by 5/8" X 3" stainless steel bolts with expansion anchors. Piping will terminate with a 90-degree long sweep bend resting on original invert base, fitting will be grouted in place on both sides to support assembly while forming new invert trough. Minimum pipe size for internal drop shall be 8".

16.5 Sanitary Sewer Manhole Abandonment

16.5.1 The DEPARTMENT requires the entire removal of the manhole if 5' deep or less. Upon removal of the manhole, all lines going into the manhole are to be cut and filled with 4,000 psi concrete until pipe is full, to not allow any infiltration.

16.5.2 Any manhole that is deeper than 5' is to be abandoned according to Detail S13.

16.6 Manhole Rings and Lids

16.6.1 All castings for manhole rings and lids 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 have a 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 casting without flaking the metal. Manhole rings and lids shall have a minimum access diameter of 24". The manhole lids shall be of solid construction without any openings other than 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 PEA RIDGE SANITARY SEWER" cast on the lid. Standard manhole rings and lids shall be East Jordan Iron Works 266# total weight or approved equal determined by PRWU, either model shall have a combined weight of ring and lid equaling 250 pounds or greater. All rings and lids shall be domestically made.

16.7 Private Manhole

16.7.1 The manholes along private sewer lines shall require the private manhole lids.

16.8 Watertight Manhole Rings and Lids

16.8.1 Watertight manhole rings and lids where required on the plans by DEPARTMENT, shall be East Jordan Iron Works, (260# or greater), or approved equal determined by the DEPARTMENT and be domestically made.

16.9 Manhole Steps

16.9.1 Manhole steps are strictly prohibited within the Pea Ridge Wastewater Collection System.

16.10 Water Stops

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

16.11 Manhole Configurations and Construction

16.11.1 Manholes shall be of such construction so that the finished manhole will have an ID of 4' 0" plus or minus ½". Concrete used to pour the manhole shall be 4,000 psi with a slump of approximately 3". Wall thickness shall be a minimum of 6".

16.11.2 Before the forms are set in place, any water that may have accumulated in the excavated area shall be pumped out.

16.11.3 All manholes shall be a monolithic pour. Pouring the base and walls with one continuous pour. The manhole shall not be backfilled less than 24 hours after the forms have been removed. Extra care shall be taken to compact all backfill to the top of the highest pipe entering the manhole. 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, DEPARTMENT or UTILITY INSPECTOR. If it is necessary due to the depth of the sewer main to pour the manhole in two sections, the joint shall have #4 rebar on 12" centers with a 3" X 3" construction joint (keyway). Manhole is to be inspected by UTILITY INSPECTOR or DEPARTMENT representative before additional pour is done.

16.12 Manhole Shape and Inside Dimensions

16.12.1 Manhole shapes shall be cylindrical and 48" diameter for sewer mains 12" and less; and 60" diameter for sewer mains larger than 12".

16.13 Manhole Design Depth, Height, and Placement

16.13.1 Manhole depth shall be as indicated on plans. The DEPARTMENT requires accessibility to all manholes, the responsible ENGINEER shall design the sanitary sewer system in a manner to eliminate backyard

placements between buildings, behind permanent structures, or other locations not accessible for normal street side maintenance.

16.13.2 Street side manhole rim elevations shall be 4" above the proposed final grade and offsite or non-street side manhole top rim elevations shall be 12" above proposed final grade. Manhole risers used in vertical adjustment must have ram-nek installed with the new riser. It must be heated in a manner that allows workability so it can be pressed into the receiving ring or inset of additional risers used to achieve proper rim elevation. Any risers added must be seated fully, "squeeze out" is proof of a watertight joint and a proper installation. All manhole rim elevations shall be shown as such on the sewer profile sheet and noted in the general construction notes. The DEPARTMENT, during final inspection, will address finished manhole elevations and may require additional height elevations. All manholes constructed in ravines, drainage or runoff areas will require the installation of a watertight ring and lid or rim shall be 12" above 100 year flood.

16.13.3 After sewer construction is complete, the vertical adjustment shall be no more than 24" plus the lid. Adjustments greater than 24" require the reconstruction of the manhole cone. A maximum of (2) risers may be utilized to achieve the 24" of adjustment.

16.14 Main and Service Pipes

16.14.1 All main and service pipes shall be neatly cut flush with inside of manhole or inlet where they enter structure walls, and correct irregularities and rough edges with non-shrinking grout.

16.15 Connections to Manholes

16.15.1 To ensure that pipe will not sag or break immediately adjacent to the manhole, care shall be taken that excavation for the manhole bottom is limited to the area to be filled with concrete. The CONTRACTOR shall support pipe entering the manhole all the way to solid bedding by placing approved backfill under the pipe and up to the mid spring-line with Class B concrete.

16.16 Inverts

16.16.1 The invert of the manhole shall be hand-placed and shaped using the same 4,000-psi concrete mixture used to pour the base and walls of the manhole. 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 that enter the manhole base. Inverts shall be shaped, formed and brushed smooth from the concrete poured for the base prior to the initial set of the base. In all cases the diameter of each pipe entering the manhole barrel shall be cut smooth with the inside edge of the manhole barrel and the invert shaped throughout from all inlet pipes to the outside pipe. Shape inverts for smooth flow across structure floor as shown on drawings.

SECTION 17 SEWER SYSTEM GENERAL TESTING INFORMATION

17.1 All Materials Shall Be Domestically Made

17.2 Field Quality Control

17.2.1 Compaction testing will be performed in accordance with ANSI/ASTM D698, ASTM D2922, ASTM D3017 or ASTM D1557.

17.2.2 The DEPARTMENT reserves the right to request that sewer testing *not take place* until electric and\or gas and\or communication utilities has been put in place.

17.2.3 Test sanitary sewer pipe system installed below grade and outside building in accordance with the following procedures:

A. The CONTRACTOR shall perform the testing of manhole construction, pipe materials and/or other materials incorporated into the construction of the sanitary sewer system to determine leakage and water tightness. Testing to be supervised by design ENGINEER or representative thereof and inspected by the UTILITY INSPECTOR.

17.3 Air Testing of Gravity Sewer Lines

All gravity sewer lines shall be tested in accordance with the following procedures after all trenching and boring in area of sewer mains and sewer services:

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

B. 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 workmen entering the manhole.

C. Add air slowly to the portion of pipe under test until the internal pressure of the line is raised to approximately 4 psig but less than 5 psig.

D. Shut the air supply off and allow at least 2 minutes for the air pressure to stabilize.

E. When the pressure has been bled down to 3 1/2 psig and stabilized, start the test.

F. If the pipe section does not decrease from 3.5 psi to 2.5 psi in less time than is allotted the section passes the test.

17.4 Gravity Sewer Air Testing Time Requirements

Table 1 - Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q=0.0015

Pipe Diameter, inches	Minimum Time, min,sec	Length for Minimum Time,ft	Time for Longer Length,s	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	11:20	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51.16	57:41
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:.50	124:38	142:26	160:15
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 1 - Minimum Specified Time Required for a 0.5 psig Pressure Drop for Size and Length of Pipe Indicated for Q=0.0015

Pipe Diameter, inches	Minimum Time, min,sec	Length for Minimum Time,ft	Time for Longer Length,s	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	43:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	86:32	50:30	57:42	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

17.5 Hydrostatic Pressure and Leakage Test of Force Mains

17.5.1 All sewer force mains and appurtenances shall be tested by a hydrostatic pressure test after all trenching or boring has been completed in the area of the sewer force main and appurtenances. The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section. The test pressure shall not exceed the thrust restraint design pressures or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).

17.5.2 After the sewer force mains have been filled with water, the pressure shall be increased to the test pressure by means of a pump. The leakage test shall be in accordance with AWWA M23.

17.5.3 The CONTRACTOR shall furnish a pump, and all labor for conducting the test.

17.5.4 The duration of the hydrostatic leakage test shall be 2 hours or as specified by the UTILITY INSPECTOR or DEPARTMENT representative.

17.5.5 The source of water for the pump suction shall be potable water from the DEPARTMENT'S distribution system. The vessel used must be approved by the UTILITY INSPECTOR or DEPARTMENT representative.

17.5.6 The maximum leakage per hour for DI and PVC shall be as calculated from the following formula (All rubber gasket or 0-ring joints):

Test Calculations:

$$L = \frac{SD\sqrt{(P)}}{148{,}000}$$

L = Allowable leakage (gallons per hour)

S = Length of pipe tested, in feet

D = Nominal diameter of pipe (inches)

P = Average test pressure during leakage test (psig)

* Loss = Length X Diameter X (Sq. Root of) Test Pressure
Divided by 148000 Equals Allowable Loss per hour.
Times 2 for a two (2) hour test.

17.5.7 After the specified test pressure has been applied the entire pipeline shall be checked in the presence of the UTILITY INSPECTOR representative giving particular attention to that part of the pipeline and those appurtenances that are exposed. After the CONTRACTOR has taken the necessary action to repair or replace any part of the pipeline or appurtenances where leaks were apparent or if no leaks were apparent, the sewer force mains shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.

17.5.8 If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from above formula or table, the CONTRACTOR shall, at his expense, locate the leak or leaks and perform whatever work and/or replace whatever material that is required to remedy the defect and stop the leak and re-test the line. All corrective work must be approved by the DEPARTMENT.

17.5.9 Prior to the pressure test, the ENGINEER shall present an allowable leakage report to the UTILITY INSPECTOR.

17.6 Testing Safety Precautions

17.6.1 The low-pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is overpressurized 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” plug by an internal pressure of 5 psi. Observe the following safety precautions:

A. No person shall be allowed in the manholes during the test or when a plugged pipe is under pressure.

B. Gauges, air piping manifolds and valves shall be located at the top of the ground. Install and brace all plugs securely.

17.7 Ground Water Elevation

17.7.1 If the pipeline to be tested is below the ground water level, the starting test pressure shall be increased by 0.433 psi for each foot the groundwater level is above the invert of the sewer pipe. In no case shall the starting test pressure exceed 9.0 psig.

17.8 Test Equipment

17.8.1 All necessary equipment to perform the air test in accordance with this specification shall be provided by the CONTRACTOR. The test gauge shall be 4” and have incremental division of 0.10 psig and have an accuracy of at least +0.04 psig. In no case shall a test gauge be used which has incremental divisions of greater than 0.25 psig. The gauge shall be of sufficient size to determine this accuracy.

17.8.2 The ENGINEER shall furnish one copy of gravity sewer and manhole test results to the DEPARTMENT upon completion of gravity sewer system approval by the UTILITY INSPECTOR.

17.9 Mandrel Test

17.9.1 A deflection test shall be required after the pipe has been laid and backfilled. The test shall consist of pulling a mandrel through the pipe. The maximum deflection allowable shall not exceed 5% of the pipe's internal diameter.

17.9.2 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 ID of the sewer to be inspected. Critical mandrel dimensions shall carry a tolerance of + 0.01". The mandrel and all necessary equipment for the mandrel test shall be provided by the CONTRACTOR. No handmade mandrel devices shall be used for testing unless prior permission is given by the DEPARTMENT or the UTILITY INSPECTOR.

17.9.3 The mandrel shall be hand-pulled by the CONTRACTOR through all flexible pipe sewer lines no earlier than 30 days after the trench has been completely backfilled. Any sections 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 DEPARTMENT. Any repaired section shall be re-tested.

17.9.4 The outer diameter of the mandrel shall be set according to ASTM standards.

17.10 Manhole Vacuum Testing

17.10.1 The manhole vacuum test shall be performed with suitable apparatus made for such purpose and shall draw a vacuum of 10" of mercury (Hg). The test shall pass if the vacuum remains at 10" of mercury (Hg) or drops to not less than 9" of mercury (Hg) in one minute. Vacuum test will be performed by construction CONTRACTOR. Test shall be witnessed and documented by UTILITY INSPECTOR. Responsible ENGINEER shall furnish test result information to the DEPARTMENT. If, after 2 attempts to perform a satisfactory vacuum test have failed, the DEPARTMENT may require that the manhole be removed and re-poured. All sewer services entering the manhole shall be vacuum tested with the manhole.

17.10.2 If existing manhole is to be adjusted – either lowered or raised – and cone is removed – manhole *may* require a passing vacuum test at the discretion of the DEPARTMENT.

17.11 Closed Circuit Television Inspection – (CCTV)

17.11.1 All sewer mains that are installed as part of a new subdivision or large scale development and for the purpose of becoming part of a public sewer system, maintained by the DEPARTMENT will require a Close Circuit Television Inspection (CCTV). The inspection will be performed by City personnel after all other required sewer main line testing has been completed. The inspection consists of hydro-jet cleaning the sewer main line and allowing it to drain for a period of not less than one hour. After the sewer main line has been allowed to drain the CCTV inspection will begin. Defects that will be documented are: Pipe bell ends facing downstream, narrow or rough manhole inverts, misaligned or backward service wyes, loose or missing pipe joint gaskets, pipe joints not fully seated, crushed, or out-of-round pipe and the pooling of water in the pipe and at service wyes, joints and manhole inverts. Any pooling of water that is deeper than ¾" will require the sewer main line to be adjusted to eliminate the problem. The only personnel allowed in the CCTV vehicle during the inspection are the DEPARTMENT'S employees.

17.11.2 A pass or fail decision is not made in the field. The camera inspection is recorded on video recording software and then reviewed at the DEPARTMENT. After review of the recording, the comments will be made available to the responsible ENGINEER for the project indicating approval of the sanitary sewer mains or a list of defects that require repair.

17.11.3 All CCTV inspections or re-inspections that are necessary are to be requested in written form by email to the DEPARTMENT by the responsible ENGINEER for the development project. The responsible ENGINEER shall provide accurate record drawing of sewer system, with profiles, at time of CCTV request.

17.11.4 One attempt will be made by City staff to adequately clean new sewer mains for proper CCTV inspection. If during construction sufficient care is not taken to keep rocks, dirt or debris from entering new sewer mains and extra cleaning is necessary, CCTV staff will not complete the inspection. Department personnel will then advise the ENGINEER of record of the condition of the pipe. The contractor shall be responsible for the additional cleaning needs. It will be the ENGINEER of record's responsibility to communicate to the contractor why the inspection was stopped and why they are now responsible for cleaning and removing obstructions in the sewer main. After the contractor has completed the necessary cleanings, the ENGINEER of record will contact the DEPARTMENT and request continuation of the CCTV inspection.

17.11.5 After the completion of the required repairs by the CONTRACTOR, a re-inspection must be performed using the same procedures as for the initial inspection. All inspections, including re-inspections, if required, will be billed to the OWNER/DEVELOPER according to current fee ordinance.

17.11.6 Full CCTV inspection and the first tracer wire inspection shall be completed before final inspection.

17.12 Acceptance of Installation

17.12.1 No gravity sewer or manhole will be accepted that does not comply with the minimum requirements of tests described within these specifications.

17.13 Warranty

17.13.1 The DEPARTMENT reserves the right to inspect by mandrel test or camera inspection any sewer line before acceptance, and also prior to expiration of the first year of operation. If a previously accepted line fails an inspection during the first year of operation, the defects must be corrected at the CONTRACTOR/DEVELOPER'S expense.

SECTION 18 SEWER LIFT STATIONS

18.1 General Requirements

18.1.1 This specification governs the construction of publicly operated wastewater lift stations and provides a set of design and construction criteria to ensure a level of quality and standardization for wastewater lift station construction within the City of Pea Ridge.

18.1.2 The construction of sanitary sewer lift stations shall only be considered if no feasible gravity flow alternative exists. Prior to beginning detailed design work, the engineer shall obtain written approval of the DEAPRTMENT for a lift station to serve the subject development.

18.1.3 The DEPARTMENT must approve all plans.

18.1.4 The DEPARTMENT lift station details contained in this specifications book are to be used as a guide only. These details are *not* to be used as construction plans.

18.1.5 Lift station design and construction shall conform with the latest edition of the "Recommended Standards for Wastewater Facilities" as reported by the Wastewater Committee of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (10 States Standards).

18.1.6 Lift stations shall be designed to accommodate sanitary sewage flows from all proposed upstream drainage basins.

18.1.7 Buoyancy of the wastewater pumping station structures shall be considered and, if necessary, adequate provisions shall be made for protection.

18.1.8 Lift station site and access drive shall be deeded to the City of Pea Ridge.

18.1.9 All sanitary sewer lift stations shall consist of a circular wet well, duplex submersible pumps, and above-ground electrical controls housed in a climate- controlled environment. Any alternative configuration requires prior approval from the DEPARTMENT.

18.1.10 Multiple pumps shall be provided. Where only two units are provided, they shall be of the same size. Units shall have capacity such that, with any unit out of service, the remaining units will have capacity to handle the design peak hourly flow. All pumps should be warranted by the manufacturer.

18.1.11 Electrical service to the lift station shall be 277/480 Volt, 3 phase, 4-wire WYE. Confirmation of service availability shall be required prior to construction.

18.1.12 Emergency backup power shall be provided for all lift stations. Backup power generation shall be capable of operating (2) pumps for a period not less than 12 hours.

18.1.13 Communications and SCADA control system shall be provided for all lift stations.

18.2 Hydraulic Capacity

18.2.1 A hydraulic study shall be provided for the basis of design of wastewater lift stations. At a minimum, the report shall include:

A. Narrative of the methodology used in determination of wastewater flows

B. Maps showing the extent of drainage basins including topographic contour data, existing land use, potential areas of redevelopment, and comprehensive growth zones.

C. Population projections of the proposed service area assuming 2.5 persons per living unit.

D. Design average flow of the sewer collection system

E. Peaking Factor shall be calculated by the following equation, where P is the total population served:

$$PF = \frac{Q\ peak\ hourly}{Q\ design\ average} = \frac{18+\sqrt{P}}{4+\sqrt{P}} \quad \text{or 1.5, whichever is greater}$$

F. The design fill time and minimum pump cycle time shall be considered in sizing the wet well. The effective volume of the wet well shall be based on the design average flow with a filling time not to exceed 30 minutes. The pump manufacturer's duty cycle recommendations shall be utilized in selecting the minimum cycle time.

G. Hydraulic calculations showing all head loss in the discharge pipe, fittings, and force main.

H. Pump Curves for all proposed pumps

18.2.2 The sizing of wastewater facilities receiving flows from new wastewater collection systems shall be based an average daily flow of 100 gallons per capita plus wastewater flow from industrial plants and major

institutional and commercial facilities unless water use data, wastewater flow monitoring data, or other justification upon which to better estimate flow is provided.

18.2.3 The 100 gallons/capita/day value shall be used in conjunction with a peaking factor to cover normal infiltration for systems built with modern construction techniques. However, an additional allowance should be made where conditions are unfavorable.

18.2.4 If the new collection system is to serve existing development, then the likelihood of inflow and infiltration (I/I) contributions from existing service lines and non-wastewater connections to those service lines shall be evaluated and wastewater facilities designed accordingly.

18.2.5 Projections shall be made from actual flow data to the extent possible.

18.2.6 The probable degree of accuracy of data and projections for all critical design flow conditions shall be evaluated. This reliability estimation should include an evaluation of the accuracy of existing data, and an evaluation of the reliability of estimates of flow anticipated due to I/I, or flow due to elimination of sewer bypasses and backups or hydraulic restrictions.

18.2.7 Critical data and methodology used shall be included in all reports.

18.3 Wet Well Requirements

18.3.1 Wet wells shall be circular with a minimum diameter of eight (8) feet and a minimum depth of ten (10) feet. The wet well shall be of all concrete construction incorporating a double aluminum access lid to allow access to the pumps. The wet well hatch shall open toward the control panel. Alternate Storage (i.e. equalization basin) may be required at certain locations, which will be determined by the DEPARTMENT. EQ shall be the same size as the wet well.

18.3.2 The lift station will be constructed of min. 3,500psi concrete with reinforcement material per ACI 350 and ACI 315 (Latest Edition).

18.3.3 The wet well shall be constructed on a minimum of 6” of Class 7 base material.

18.3.4 Wet wells shall be 4” above the asphalt.

18.3.5 Wet well walls shall be a minimum of 8” thick with #4 rebar on 12” centers. The base of the wet well shall be designed to resist the buoyance/floating with the wet well empty.

18.3.6 Wet well bottom rebar spacing - #4 bar on 6” centers.

18.3.7 Wet well top shall be a minimum of 6” thick with # 4 rebar on 6” centers.

18.3.8 Wet well access shall be cast-in-place. No precast structures nor grout will not be accepted.

18.3.9 All interior concrete walls of new lift station wet wells will be epoxy coated prior to lift station approval and being brought into service. Epoxy coating will be 100% epoxy at a minimum application thickness of 125 mils after the installation of a ½” of cementitious lining has been applied. Epoxy is added to extend the service life of the concrete wet well walls.

18.3.10 All plumbing entering or leaving the wet well shall have a water stop and grouted to prevent infiltration.

18.3.11 All lift station wet wells shall be vented by a 4” stainless steel pipe with bird screen.

18.3.12 Access covers and safety grates shall be of aluminum construction and designed for access to submersible pumps. Covers shall be equipped with a guide bar bracket, safety chain hook, electric cable support, and a hasp for a padlock. Covers shall be of a size compatible with the pumps. Wet well hatch shall open toward the control panel and safety hatch towards the sides of the wet well and hold a live-load of at minimum 300 pounds per square foot. Door shall open to 90-degrees, lock automatically in position; have closed position lock hasp and retractable grip for opening and closing with one hand.

18.3.13 All lift station mounting rails, guide rails, support brackets, cables, chains, cross bracing, anchors, bolts, nuts, washers and other hardware shall be stainless steel type 304 or 316 and of domestic manufacture.

18.3.14 Stainless steel chains, hooks and cord grip shall be provided for all pump cables in wet well.

18.3.15 Each pump shall have an individual intake. Wet well and intake design should be such as to avoid turbulence near the intake and to prevent vortex formation.

18.3.16 Pumps weighing greater than 500 lbs. or wet wells with more than 2 pumps will require a monorail type overhead hoist system.

18.3.17 Lift station shall have a pump around port/connection, sized appropriately, in case of pump failure.

18.4 Valve Vault Requirements

18.4.1 Valves shall be located in a vault separate from the wet well.

18.4.2 The valve vault shall be of all concrete construction incorporating a double aluminum access lid to allow access to the valves.

18.4.3 Valve vault walls and base shall be a minimum of 6” thick.

18.4.4 Valve vault top shall be a minimum of 6” thick with # 4 rebar on 6” centers.

18.4.5 The valve vault shall be constructed on a minimum of 6” of Class 7 base material.

18.4.6 All lift station mounting rails, guide rails, support brackets, cables, chains, cross bracing, anchors, bolts, nuts, washers and other hardware shall be stainless steel type 304 or 316 and of domestic manufacture.

18.4.7 Provisions shall be made to drain accumulated water from the valve chamber to the wet well through a 2” stainless steel drain line with a 2” stainless steel check valve.

18.4.8 Access shall be provided for the valve vault. Access covers shall be aluminum construction, designed for access to valves. Covers shall be of a size compatible with the valves, and shall be located such that valve nuts can be operated from the surface without the need for personnel to enter the vault. The valve vault hatch shall be rated for a live-load of at minimum 300 pounds per square foot. Door shall open to 90-degrees, lock automatically in position; and have a closed position lock hasp and retractable grip for opening and closing with one hand.

18.4.9 The base of all piping shall be mounted a minimum of 24” above the floor of the vault with steel support stands.

18.4.10 A quick disconnect fitting shall be located inside the valve vault on the discharge piping to serve as a connection to an emergency pump in cases of pump or electrical failure at the lift station.

18.5 Lift Station Site Requirements

18.5.1 The lift station site and access road shall be deeded to the City of Pea Ridge.

18.5.2 All lift station site work shall conform to the City of Pea Ridge Code of Ordinances regarding the development of lands.

18.5.3 The minimum lot size for the lift station shall be 50’ X 50’.

18.5.4 Lift station lot shall be 2’ above surrounding project area. Wet wells shall be a minimum of 6” above the surrounding pavement and a minimum of 2 feet above the 100-year flood hazard elevation.

18.5.5 Lift station lot shall be asphalt. A minimum of 6” of compacted base material is required. Base material and compaction shall be in accordance with the latest edition of the ARDOT Standard Specification (Division 300). A minimum of 4” of asphalt is required. Paving materials and construction methods shall be in accordance with the latest edition of the ARDOT Standard Specifications (Division 400).

18.5.6 A paved access drive shall be provided to service the lift station. The paved access road shall extend from the curb to the lift station. The road leading to the lift station shall be asphalt, have a minimum width of 12 feet, maximum cross slope of no more than 3%, maximum longitudinal slope of no more than 10%. An unobstructed access to the lift station shall be provided and maintained. Base material, compaction, and pavement recommendations shall be provided by a qualified geotechnical engineer.

18.5.7 A 6’ high chain link fence (or alternate materials as approved by the DEPARTMENT) with posts set 1’ inside the asphalt with a 14’ roll back gate or swing type gate is required. The roll back gate shall have solid rubber tires. All areas inside of the fence shall be paved or otherwise maintenance-free. If a wooden fence is provided, the HOA or other controlling entity will be required to execute a maintenance agreement assuming full responsibility for the repair and maintenance of the fence. Any deviation from this specification will require the approval of the DEPARTMENT.

18.5.8 The site shall be designed with ample maneuvering room for a vacuum excavation truck to service the lift station and turn around so as not to back out of the site or onto an adjacent street. Pavement grades in maneuvering areas shall be a minimum of 1% and a maximum of 5%.

18.5.9 A pole mounted LED photocell light that conforms to the Subdivision Code for outdoor lighting shall be install to adequately illuminate the control panel and lift station site.

18.5.10 Steel pipe bollards shall be provided for protection of the building, generator, vault, transformer, and other above-ground features in or adjacent to traffic areas.

18.5.11 A potable water supply shall be provided for wash down. Each lift station shall have a potable water supply service line consisting of a 1” service line with an approved RPZ type backflow preventer and terminating at the lift station site with a frost free, 2’ min bury water hydrant.

18.5.12 A weatherproof, insulated and air-conditioned building shall be provided for the station control panel. The building shall consist of traditional stud wall framing or masonry. The inside of stud wall framed buildings shall be covered with plywood. Floor sills and roof overhangs shall be weatherproof. Doors shall be of sufficient size to provide ample room for installation and removal of all electrical cabinets and components. The Building shall be of sufficient size to such that workspace dimensions comply with NEC 110.26 and OSHA 29 CFR 1910.333. The building shall have a light and switch with 120 volt spare receptacle.

18.6 Pump Requirements

18.6.1 All lift stations require rail mounted submersible pumps as manufactured by Flygt (N-Series) or Fairbanks and interchangeable without alteration to the piping or electrical system. Any pump other that those manufactured by Flygt or Fairbanks will require pre-approval by the DEPARTMENT.

18.6.2 All pumps will meet or exceed the requirements to pump the anticipated flow for the known number of houses, units, or number of persons. The pumps will meet or exceed required head values based on ENGINEERS design. At a minimum, all lift stations shall be duplex, two pumps of the same size that alternate pumping.

18.6.3 All pumps shall have a minimum horsepower rating of 5hp and rated for a 277/480V, 3 phase, 4-wire WYE service. Pumps not meeting this criteria shall require prior approval from the DEPARTMENT.

18.6.4 Submersible pumps and motors shall be designed specifically for raw wastewater use, including totally submerged operation during a portion of each pumping cycle, and shall meet the requirements of the National Electrical Code for such units.

18.6.5 Submersible pumps shall be readily removable and replaceable without the necessity of personnel entering or dewatering the wet well or disconnecting any piping in the wet well.

18.6.6 Proposed lift station pumps must have capability of passing 3" solids. Grinder pumps are *not accepted* without pre-approval by the DEPARTMENT.

18.6.7 Any time it is determined through an analysis that a development or subdivision impacts or exceeds the capacity or the flow of an existing lift station, the existing lift station shall be upgraded. The existing lift station shall be upgraded with equipment including pumps, piping and control panel components that are consistent with the existing equipment.

18.6.8 The DEPARTMENT reserves the right to request an *upgrade or 'over-design'* of new lift stations based on potential growth or overall sewer system analysis and collection plans.

18.6.9 An effective method to detect shaft seal failure or potential seal failure shall be provided.

18.6.10 A stainless steel chain shall be hooked to each pump for removal.

18.6.11 Pump motor power cords shall be designed for flexibility and serviceability under conditions of hard usage and shall meet the requirements of the National Electrical Code standards for flexible cords in wastewater pump stations. Ground fault interruption protection shall be used to de-energize the circuit in the event of any failure in the electrical integrity of the cable. Power cord terminal fittings shall be corrosion-resistant and constructed in a manner to prevent the entry of moisture into the cable, shall be provided with strain relief appurtenances, and shall be designed to facilitate field connecting.

18.7 Discharge Piping Requirements

18.7.1 The Discharge Pipe is defined as all pipe and fittings required from the pump discharge to the check valve connection at the valve vault.

18.7.2 Discharge pipes shall be sized to meet all flow needs. The discharge pipe shall be designed and constructed such that normal velocities are between 2 feet per second and 8 feet per second.

18.7.3 Head loss shall be calculated using Hazen-Williams with C=100 for stainless steel and C=120 for DIP, epoxy-lined sewer pipe, as well as appropriate "K" factors for minor losses in fittings.

18.7.4 Plug Valves and Check Valves are required on all discharging lines.

18.7.5 Check valves sized 3-inches and larger shall be swing type with iron body and flanged ends mounted in the horizontal position only and shall be located in a valve vault not exposed to wastewater.

18.7.6 Discharge pipes smaller than 3" shall be equipped with a stainless steel swing check valve and stainless steel plug valve.

18.7.7 Plug valves 4" and larger shall be of the resilient seat type and meet the requirements of AWWA C515 latest revision. Valves shall have non-rising stems and close right (clockwise). Valves shall have flanged ends. Acceptable manufacturers for all sizes include American Darling, Clow, Kennedy, Mueller or approved equal. Plug valves shall be mounted horizontally in valve vault with no exposure to wastewater.

18.7.8 A plug valve located downstream of the check valve. Plug valves are an acceptable means for isolation and shall be flanged Dezurik, Pratt, or approved equal.

18.7.9 All lift station piping 3" diameter or less shall be stainless steel. All piping 4" diameter or greater shall be DIP, epoxy lined pressure sewer pipe.

18.7.10 All valves must be provided with 2" operating nuts so that valves can be operated without entering the valve vault.

18.7.11 Pumps shall be mounted on stainless steel slide rails and use watertight pump connector as recommended by the pump manufacturer.

18.8 Level Controls

18.8.1 All lift stations being dedicated to the DEPARTMENT must have level control monitored and operated by a SCADA system compatible transducer.

18.8.2 The level control system sensor must be submersible transducer.

18.8.3 Provide a float control back-up system incorporating a hermetically sealed liquid level indictor as a level sensing and signal control device for automatic control of lift station. The system shall monitor and control wet well level at each station as follows:

SWITCH 1 – All Stop

SWITCH 2 – Energize Lead Pump

SWITCH 3 – Energize Lag Pump

SWITCH 4 – High Level Alarm

18.8.4 Contingent upon wet well level, transducer\float system shall cause indicator/controller to energize appropriate control contacts.

18.9 ELECTRICAL

18.9.1 All electrical services and components shall be installed by a licensed electrician and comply with all City, State, and applicable building and electrical codes. All equipment shall be UL listed.

18.9.2 Electrical systems shall comply with Arc Flash requirements per NEC 240.87 and NFPA 70E.

18.9.3 Electrical systems and components (e.g., motors, lights, cables, conduits, switch boxes, control circuits, etc.) in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, shall comply with the National Electrical Code requirements for Class I, Division 1, Group D locations.

No electrical equipment or electrical connections shall be located inside the wet well with the exception of pump cable and level sensing equipment. Each flexible cable shall be provided with a watertight seal and separate strain relief. A breaker type disconnect located above ground shall be provided for the main power feed for all pumping stations. When such equipment is exposed to weather, it shall meet the requirements of weatherproof equipment NEMA 3R or 4, at a minimum.

18.9.4 Lightning and surge protection systems should be incorporated in the electrical design on all wiring entering or leaving the panels, including incoming power and Ethernet. Surge protection shall be installed between the modem and the PLC to protect from lightning.

18.9.5 Ground Fault Circuit Interruption (GFCI) protection shall be provided for any outdoor outlets.

18.9.6 An automatic transfer switch shall be incorporated for any backup power source.

18.9.7 All conduit entries and exits shall be galvanized to 5' outside structure. All conduit elbows shall be long sweep elbows. Conduits and conductors between transformers and main disconnect to be sized in accordance with NEC standards. Conduits to be minimum 18" depth. All conduits inside wet well shall be type 304 or 316 stainless steel.

18.9.8 Electrical supply, control, and alarm circuits shall be designed to provide strain relief and to allow disconnection from outside the wet well. Terminals and connectors shall be protected from corrosion by location outside the wet well and through use of watertight seals.

18.9.9 Control Panel (277/480V 3-phase)

A. All pumps rated at 7.5 HP and smaller shall be installed with one "across the line" magnetic contactor or "soft start" per pump sized to HP and NEMA standards shall be provided and installed with overload protection sized to motor specifications.

B. Lift stations requiring greater than 7.5-HP pumps shall be operated by variable frequency drives as manufactured by Schneider or approved equal. VFDs shall be sized in accordance with pump motor specifications.

C. All operator controls, overload resets, toggle switches, circuit breakers, etc., shall be accessible without removing the dead-front panel.

D. A disconnect for the High Voltage panel shall be provided to disconnect power before the panel can be opened.

E. One combination circuit breaker/overload disconnect unit with magnetic trip elements sized for individual protection shall be provided for each pump.

F. Each pump will have separate Terminals (Busman or equivalent) provided and mounted a minimum of 4" above the bottom of the control panel.

18.9.10 3-phase power monitor must be installed to protect pump from low voltage, single phasing and phase reversal. (Motor Saver Model 460)

18.9.11 A 120 Volt Surge arrester (Mission Critical Guard MA035) shall be used for control circuit protection.

18.9.12 A backup float system shall operate a timer that allows both pumps to run without the need of a PLC. The float cord shall be of sufficient length to reach the lowest inlet.

18.9.13 480/120VAC control transformer protected by combination circuit breaker/overload shall provide protection on both the primary and secondary control circuit. Neutral and ground wires shall be bonded inside the transformer.

18.9.14 All terminals coming from the wet well shall be manufactured by Busman or equivalent and must be mounted a minimum of 4” above the bottom of the control panel.

18.9.15 All terminal connections must be a minimum of 4” above the bottom of the control panel.

18.9.16 All pumps shall be protected by seal fail and hi temp relays.

18.9.17 Building air conditioning shall be relay-controlled by the PLC.

18.9.18 One 120 volt receptacle will be provided for the modem. The modem shall be powered by a relay that will sense power fail and switch to battery power.

18.9.19 Station service panel shall operate on 220 Volts AC with a minimum of eight breakers.

18.9.20 A lightning arrester shall be installed for pumps protection and mounted below and outside of the control panel.

18.9.21 A fuse shall be added for the phase monitor with 1/16 amp fuses on each leg.

18.9.22 High level alarms are required. A red warning light with flasher and audible alarm shall be installed at a height visible from the adjacent roadway.

18.9.23 The power company shall be contacted prior to design to determine type of electrical service and transformer requirements. Three-phase 277/480V power must be used. No single phase power will be accepted on duplex stations.

18.10 COMMUNICATIONS / SCADA

18.10.1 Control panel shall be NEMA 3R or 4X stainless steel mounted on a 6” X 6” stainless steel pedestal on the wet well and shall be sealed to prevent fumes from rising into control panel. Control panel and pedestal door shall open away from wet well hatch. The stainless steel enclosure shall:

A. have a hinged, removable dead-front panel,

B. have a draw pull catch,

C. have provisions for padlocking

D. provide terminals for the connection of the level sensors, and

D. be suitable for indoor or outdoor mounting.

18.10.2 The SCADA panel shall have an Ingram (Anti-Condensate Heater AHC-50W) or equivalent.

18.10.3 The SCADA Control panel shall incorporate the following features as a minimum:

A. Individual selector switches to provide "hand-off-auto" control of each pump.

1. HAND POSITION - In this position, the pump controlled by the (HOA) switch will run regardless of the regardless of the wet well level. The pumps will continue to run until the switch is turned “off” or in “auto” position

2. AUTO POSITION – Of the (HOA) switch shall operate the pumps and will be controlled automatically by the PLC and level sensors in the wet well. The control center will be designed to provide automatic operation, while maintaining motor protection.

B. Pump HI TEMP pilot lights (red)

C. Pump SEAL FAIL pilot lights (amber)

D. Pump running pilot lights (green)

E. Hour meters (totalizers) will be provided for each pump

F. HMI (Scadapack Vision-60 or approved equal)

18.10.4 A portable generator connector is required on lift station control panels. It must be an Appleton 200 Amp 4-W, 4-P style -1 type connector Cat # ADR20044 for 3Ø stations only.

18.10.5 The generator shall have an automatic transfer switch and be connected to the station SCADA system and generator alarms transmitted to the office Wonder Ware program.

18.10.6 Communication between the generator and the PLC is to be fiber optic only. This reduces transient potential voltage.

18.10.7 The Chase way coming through the wet well will be 6" PVC with a 6" PVC cap with cord grips.

18.10.8 The developer / contactor will provide spare parts and software for any controls not commonly used by the DEPARTMENT.

18.10.9 Alternator shall be provided in the PLC for duplex units.

18.10.10 The level control system sensors shall be a Transducer 4 to 20 milliamps. (Chase Control Model 03271988-03042005) or equivalent. ***All Lift Stations must have transducer control of pumps and level.*** Floats are only acceptable as a back-up control.

18.10.11 All duplex pump stations shall be controlled with a (SCADAPACK 32 PN/P4-100-01-1-1) and have circuit protection for disconnect. The PLC shall be powered by a SCADAPack 5103 power supply. The power supply and PLC shall have a battery as a backup (12 volt 26 amp hour battery). Inline fuse shall be installed between the battery and the SCADAPack 5103 power supply. Battery to be placed in bottom of SCADA panel.

18.11 Final Acceptance

18.11.1 At the DEVELOPER's expense, a SCADA (Supervisory Control And Data Acquisition) package compatible with the PRWU current system must be purchased, installed per specifications, and included in the facility's manual before any approval and/or acceptance by the DEPARTMENT is given.

18.11.2 A spare pump, lifting chain, and mountain flange must be furnished, at the DEVELOPER's expense, with each sewer lift station and delivered to the DEPARTMENT prior to lift station final inspection and acceptance.

18.11.3 The developer / contractor will provide 3 copies of operation & maintenance manuals, as well as one PDF digital copy. This manual shall include identification and contact information for all suppliers, installers, and programmers, hydraulic report, force main plans, station component cut sheets, valve vault components, electrical schematics, and electrical catalog, pump serial numbers, and pump curves. The books shall be submitted to the DEPARTMENT prior to final inspection.

18.11.4 The electric and water meters shall be installed before a final inspection is requested.

18.11.5 All panels, disconnects and breakers will be labeled. The correct voltage shall be displayed on all panels. All disconnects shall be Lock Out/Tag Out compatible and locked in "ON" position.

18.11.6 An on-site generator must be provided at DEVELOPER's expense and must be in place and operational prior to any approval\acceptance is given by the DEPARTMENT.

18.11.7 The auxiliary generator, if required, must be test run and load bank tested to ensure proper operation, and to insure the correct rotation of the pumps.

18.11.8 A final lift station inspection shall be conducted at the DEVELOPER'S request once lift station construction has been completed and pump startup has been performed. DEPARTMENT maintenance personnel must be present at the pump start up session.

18.11.9 A lift station startup report must be given to the DEPARTMENT'S Field Operations personnel.

18.11.10 The Contractor shall provide a basic parts list to the DEPARTMENT for the Electrical and Communications Panel.

18.11.11 The lift station final inspection and development final inspections are separate inspections and will take place at separate appointments.

18.11.12 Before final acceptance, 1 paper and 1 pdf copy of as-built drawing must be supplied to the DEPARTMENT.

18.11.13 A 12-month warranty period will be provided to DEPARTMENT after final acceptance.

18.11.14 The electric account shall be setup with Power Company by the contractor and after the final inspection shall be transferred to the DEPARTMENT upon acceptance of the overall development and lift station.

SECTION 19 SEWER LIFT STATIONS (RESIDENTIAL\UNDER MAINTENANCE PLAN)

19.1 APPROVAL - ***Plans for any lift stations for residential and private use must be pre-approved by the DEPARTMENT.***

19.1.2 The DEPARTMENT ***will not accept any private\residential lift stations without pre-approval. Those that are accepted such as those in a 'low-pressure sewer system' are required to install E-One Grinder pumps.*** Once required pumps are installed, customer will be required to pay a monthly 'pump maintenance fee' to the DEPARTMENT and PRWU will assume responsibility.

SECTION 20 CROSS-CONNECTION CONTROL PROGRAM MANUAL (C.C.C.P.)

20.1 General

This document sets forth the DEPARTMENT'S Cross-Connection Control Program, and is adopted within the water and sewer specifications for the purpose of regulating cross-connection hazards by the operating staff and management of the DEPARTMENT.

20.2 Introduction

This program prohibits uncontrolled cross-connections within the water distribution system of the Bentonville Water Utilities, authorizes the DEPARTMENT to conduct inspections of the consumers' property, requires that cross-connection hazards be corrected or controlled and provides for enforcement.

20.3 Purpose

The purpose of this program is to:

20.3.1 Protect the public potable water supply of the City of Pea Ridge service area from the possibility of contamination or pollution from backflow into the Water System.

20.3.2 Promote the elimination or control of existing cross-connections, actual or potential, between the customer's potable water system(s) and non-potable water systems, plumbing fixtures, and industrial piping systems.

20.3.3 Provide for a continuing program of cross-connection control that will systematically and effectively prevent the contamination or pollution of potable water systems.

20.4 Definitions

The following terms shall have the stated meanings:

20.4.1 APPROVING AUTHORITY: the DEPARTMENT (i.e. PRWU) or its designated agent(s).

20.4.2 AUXILIARY WATER SUPPLY: any water supply, on or available to the property other than the Water System.

20.4.3 BACKFLOW: flow of water or other liquids, mixtures or substances, under positive or reduced pressure in the distribution pipes of a potable water supply from any source other than its intended source.

20.4.4 BACKFLOW PREVENTION ASSEMBLY ("BACKFLOW PREVENTION ASSEMBLY" OR "ASSEMBLY"): a mechanical backflow preventer assembly constructed with shut-off valves, and provided as a complete assembly by a single manufacturer, used to prevent the flow of contaminants or pollutants into the Water System. The assembly must have the approval of the FCCCHR, ADH, and the DEPARTMENT.

20.4.5 BACKFLOW PREVENTION DEVICE: a mechanical back-flow preventer without shut-off valves on any side of the backflow prevention mechanism.

20.4.6 BYPASS: any arrangement of pipes, plumbing, or hoses designed to divert the flow around an installed device or assembly through which the flow normally passes.

20.4.7 CERTIFIED ASSEMBLY TESTING TECHNICIAN: a person certified by the ADH as an Assembly Testing Technician.

20.4.8 CERTIFIED ASSEMBLY REPAIR TECHNICIAN: a person certified by the ADH as an Assembly Repair Technician.

20.4.9 CITY: the City of Pea Ridge, Arkansas.

20.4.10 CONSUMER: a "person" or facility receiving service from a potable water system.

20.4.11 CONTAMINANT: a biological agent or chemical compound, which can cause disease or threat to health.

20.4.12 CROSS CONNECTION: any actual or potential connection between the Water System and a source of contamination or pollution.

20.4.13 CROSS CONNECTION CONTROL: the use of backflow prevention assemblies, methods and procedures to prevent contamination or pollution of a potable water supply through cross connections.

20.4.14 DIRECT CROSS-CONNECTION: a cross-connection which is subject to both back-siphonage and backpressure.

20.4.15 DOMESTIC WATER SERVICE: refers to plumbing as defined by the State of Arkansas Plumbing Code that is not associated with designated fire protection water service lines and systems.

20.4.16 DOUBLE CHECK VALVE ASSEMBLY (DCVA): a backflow prevention assembly meeting the latest version of the USC Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) and ADH standards and consisting of two (2) independently operating check valves, four (4) test cocks, and two (2) shut-off valves. DCVA's are only appropriate for use against non-health hazards.

20.4.17 DETECTOR DOUBLE CHECK VALVE ASSEMBLY (DDCVA): a DCVA with an additional smaller DCVA with a flow detector meter in parallel, used to detect system leaks and unauthorized use.

20.4.18 DETECTOR REDUCED PRESSURE ZONE ASSEMBLY (DRPZA): an RPZA with an additional smaller RPZA with a flow detector meter in parallel, used to detect system leaks and unauthorized use.

20.4.19 FCCCHR: The University of Southern California (USC) Foundation for Cross-Connection Control and Hydraulic Research

20.4.19 FIRE PROTECTION SYSTEM: a fire protection system consisting of one or more of the following: pipes, sprinklers, valves, fixtures, fittings, ponds, tanks, water storage vessels and fire hydrants that are intended and used exclusively for fire protection.

20.4.20 HAZARD: any contaminant or pollutant which if it enters the potable water system causes a risk to public health or has an adverse effect on the public potable water system.

20.4.21 INDIRECT CROSS-CONNECTION: a cross-connection which is subject to back-siphonage only.

20.4.22 INSPECTOR: a person authorized by the APPROVING AUTHORITY to perform inspections of consumer's facilities to determine compliance with the Program.

20.4.23 MULTIPLE SERVICES: two or more water service connections. When two or more water suppliers are involved, the multiple service connections constitute an "auxiliary source" of water on the property.

20.4.24 NEW CONSTRUCTION: construction of a new facility, alteration of or addition to an existing facility, or modification of or addition to existing plumbing and fire protection systems.

20.4.25 PERMIT: a document issued by BUILDING OFFICIAL\DEPARTMENT that allows the use of a backflow prevention assembly at the Consumer's service connection.

20.4.26 PERSON: any individual, partnership, company, public or private corporation, political subdivision or agency of the United States or any other legal entity.

20.4.27 POLLUTANT: a biological or chemical substance which do not pose a health hazard, but reduces the aesthetic quality of water.

20.4.28 POTABLE WATER: any water which, according to recognized standards, is safe for human consumption.

20.4.29 PROGRAM: the Pea Ridge Water Utilities Cross-Connection Control Program.

20.4.30 RESPONSIBLE MANAGING EMPLOYEE (RME): an individual or individuals who shall be designated by each company that plans, sells, installs, maintains, or services a fire protection sprinkler system on a full time

basis to assure that each fire protection sprinkler system as installed, maintained, or serviced, meets the standards as provided by state law.

20.4.31 REDUCED PRESSURE ZONE ASSEMBLY (RPZA): a backflow prevention assembly meeting the latest version of the USC Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) and ADH standards and consisting of four (4) test cocks, two (2) shutoff valves, two (2) independently operating, spring-loaded check valves with a reduced pressure zone between the check valves. The zone contains a relief port, which will open to atmosphere if the pressure in the zone falls within two (2) psi of the supply pressure. The assembly provides protection against both backpressure and back-siphonage.

20.4.32 RETROFIT: replacement of an existing device or backflow prevention assembly when the specifications or condition of the device or assembly are not adequate for the degree of hazard found on the property as defined by this program.

20.4.33 SERVICE CONNECTION: a piping connection between the water main of the Water Utilities and a consumer's system.

SECTION 21 C.C.C.P. ADMINISTRATION

21.1 Authority of Approving Authority

21.1.1 APPROVING AUTHORITY is hereby authorized to:

21.1.2 Protect the public water distribution system from contamination or pollution due to the backflow or back-siphonage through the water service connection.

21.1.3 Conduct a program, which includes routine survey of commercial, institutional and industrial establishments for possible contamination or pollution.

21.1.4 Review construction plans and determine requirements for backflow prevention assemblies. This shall apply to new construction, alteration or additions, as well as, modification of existing fire protection systems.

21.1.5 Provide installation criteria for backflow prevention assemblies and issuance of permits prior to construction.

21.1.6 Conduct a final inspection of backflow prevention assembly installations to verify conformance with approved installation plans.

21.1.7 Ensure that RPZA's used for fire hydrants are performance tested and have a backflow prevention assembly permit.

21.1.8 Maintain RPZA's and meters for issue to water users needing temporary water service from fire hydrants.

21.1.9 Ensure RPZA's used by customers are tested annually and before issue/use. (Within ten (10) days of installation)

21.1.10 Verify collection of fees for permits.

21.1.11 Verify fire hydrant RPZA's and meters are set and removed by DEPARTMENT Personnel.

21.1.12 Submit all required reports, maintain a database, coordinate with other agencies to accomplish the goals of the Program and maintain the following records:

A. Master files on customer Cross-Connection Tests.

B. Master files on Cross-Connection Permits.

C. Copies of permits and permit applications.

D. Copies of lists and summaries supplied to the ADH.

E. Number of annual tests conducted on backflow prevention assemblies.

F. Number of cross-connection control surveys performed.

G. Total number of each type of backflow prevention assemblies installed.

H. The following information is required per assembly: DDCVA and DRPZA are made up of two (2) assemblies, each requiring record data.

1. Organization or Customer's name, mailing address, phone #, contact name, assembly address, permit # and account number.

2. Type installation, problem history, location on property, installed by, phone # and type of service.

3. Name of the manufacturer, model number and serial number of assembly.

4. Type of assembly, date of installation and installation specifications.

5. Number of the DEPARTMENT meter, if any.

6. Date of initial cross-connection survey, survey results and type of actual or potential hazard.

7. Date of initial permit and current permit number.

8. Test results before and after repair or maintenance and date of latest retest.

9. Maintenance performed, repairs made, replacement parts, part numbers and date repairs were made.

10. Information on backflow through the assembly.

21.1.13 Maintain an inventory of all commercial, institutional and industrial locations with complete information on cross connection devices or assemblies installed.

21.1.14 Ensure meters on fire protection assemblies are read and consumer advised of water usage.

21.1.15 Coordinate repairs on any damage resulting from vandalism or flooding of backflow prevention assemblies.

21.1.16 Ensure a Certified Assembly Repair Technician is responsible for all repairs performed on an assembly. A Journeyman or Master Plumber's License shall be required when installing backflow prevention assemblies within the scope of the plumbing system.

21.1.17 Verify only Certified Assembly Testing Technicians perform testing on backflow prevention assemblies.

21.2 Powers and Authorities Of Inspectors

21.2.1 The APPROVING AUTHORITY or duly authorized employees of the DEPARTMENT or the City bearing proper credentials and identification shall be permitted to enter all properties for the purposes of inspection, observation and testing to verify adherence to the provisions of this program. Authorized personnel shall have authority to inspect and copy records pertaining to the threat of a hazard to the Water System.

21.2.2 The consumer's property shall be available for inspection at all reasonable times to authorized representatives of the APPROVING AUTHORITY to determine whether cross connections or other structural or sanitary hazards, including violations of the Program, exist.

21.2.3 On request by the APPROVING AUTHORITY, the consumer shall furnish information on water use practices within the consumer's premises.

21.3 Cross-Connection Surveys

21.3.1 Personnel authorized by the APPROVING AUTHORITY will survey the property of consumers considered likely to have cross-connections to determine if backflow can occur. Routine surveys will be made periodically to determine if backflow prevention measures are maintained, are functioning properly and new cross-connections have not been created.

21.4 Scheduling Surveys, Priorities

21.4.1 The selection of existing property for cross-connection surveys will be made on the basis of suspected hazard. Those customers suspected of having the most hazardous cross-connections will be surveyed first. Surveys shall continue until all property considered likely to have cross-connection problems have been surveyed. Information for the review process will be obtained from questionnaires sent to industrial, commercial and institutional establishments.

21.5 Other Surveys

21.5.1 Cross-connection surveys will continue with the aim being to survey all industrial, commercial or institutional type customers and agricultural operations that may pose a hazard. Prompt attention will be given to identifying residential type customers that may have significant cross-connection problems.

21.5.2 Follow-Up Surveys

21.5.3 Follow up surveys shall be made on a frequency established by the Minimum Standards for a Cross-Connection Control Program from the ADH – Division of Engineering.

21.6 Enforcement Action

21.6.1 Where backflow prevention is required, the APPROVING AUTHORITY shall require the problem to be eliminated or controlled by a properly installed, approved backflow prevention assembly. Such protective measures may include but not be limited to a backflow prevention assembly on the consumer's water service line. Every effort will be made to secure the voluntary cooperation in correcting cross-connection hazards. If voluntary corrective action cannot be obtained within a reasonable period of time, the water service shall be terminated.

SECTION 22 PUBLIC WATER SYSTEMS (C.C.C.P.)

22.1 Auxiliary Public Water Systems

22.1.1 The Water System shall be protected as outlined in the **Arkansas publication, "Policies and Procedures for Backflow Prevention Devices Location and Department of Health Installation"** by an approved method of backflow prevention at the point of connection to the Water System if a public water supply other than the Water System is available to the premises. Backflow prevention is required regardless of actual development or cross-connection between the Water System and the other public water system.

22.1.2 RPZA Containment is required if the auxiliary water supply is not operating under the authority of the ADH.

22.1.3 Backflow prevention is not required if the auxiliary water supply is being operated under the authority of the ADH, and has properly conducted sanitary control and cross-connection control programs, and provides potable water to the Water System.

SECTION 23 DOMESTIC WATER SERVICE LINES (C.C.C.P.)

23.1 General

23.1.1 The information on backflow preventers described in this section is extracted from the ADH publication, "Policies and Procedures for Backflow Prevention Devices Location and Installation".

23.2 Costs

23.2.1 The consumer of a property shall bear the expense and burden of protecting the Water System from the potential hazard through approved backflow prevention methods and procedures.

23.3 RPZA Containment

23.3.1 Any building strictly consisting of commercial use or mixed-use shall be protected from cross-connection backflow by an approved RPZA containment assembly.

23.3.2 Any multi-story building, hotel, apartment house or private structure when a booster pump is used that furnishes water to all or part of the property, or where there is the potential for a cross-connection; it shall be protected from cross-connection backflow by an approved RPZA containment assembly.

23.3.3 Any Establishment's use such as, but not limited to the following that contain a risk to cross-connection on the premises:

*Aircraft Plants (with Industrial Water)		*Hospitals
*Asphalt Plants		*Laboratories
*Automotive Plants		*Landfills
*Autopsy Facilities		*Laundries (excluding Laundromats)
*Baking Facilities		*Liquid Gas Handling Facilities
*Battery Manufacturer		*Livestock Operations (Excluding small non-commercial operations without industrial fluids.)
*Breweries		

*Beverage Bottling Plants	*Lumber Processing Plants
*Blood Banks	*Medical Facilities (Health, Chiropractic, Veterinary)
*Bottled Water Manufacturing	*Metal Plating, Etching, Passivation, Pickling Plants
*Broiler Houses	*Mines & Quarries
*Missile Plants (with Industrial Water)	*Car Wash Facilities
*Cleaners (Processing Plant)	*Cold Storage Plants
*Morgues or Mortuaries	*Motion Picture Studios (with Industrial Water)
*Chemical Plants	*Colleges (with Laboratories)
*Compressed Gas Handling Facilities	*Natural Gas Handling Facilities
*Concrete Mixing Plants	*Nursery, Shrubbery & Gardening Centers
*Crime Laboratories	*Nursing Homes or Convalescent Homes
*Dairies & Milk Distributors	*Oil Handling Facilities
*Dental Facilities	*Dye Works
*Film Laboratories	*Packing Houses (except small plants without industrial fluids
*Food Processing Plants	*Pesticide Procesors & Applicators
*Funeral Homes	*Paper & Paper Product Plants (with Industrial Water)
*Golf Courses	*Poultry Operations (excluding small non-commercial operations without industrial fluids)
*Gravel Processing Plants	*Hazardous Waste Processing
*Health Clinics	*Health Clubs & Fitness Centers
*Power Plants (excluding small heating or compressing systems)	*Pressure Vessel Repair, Testing and Maintenance Facilities
*Steel Manufacturers (using Indrustrial Fluids)	*Propane & butane Gas Handling Facilities
*Swimming Pools	*Radioactive Material Plants\Handling Facilities

*Tank Repair, Cleaning, Testing & Maintenance Facilities	*Railroads
*Taxidermist	*Recycling Facilities
*Reduction Plants	*Wastewater Plants & Pump Stations
*Restricted, Classified or Other Closed Facilities	*Rubber Manufacturing Plants (excluding small plants)
*Sand Processing Plants	*Sanitariums
*Schools (with Laboratories)	*Sod Farms
*Water Treatment Plants & Pump Stations	*Zoos
*Water Front Facilities and Industries (excluding premises without docks-cafes, comfort stations, concessions, office buildings or private residences.)	

23.3.4 Multiple Water Services: If there is a potential for two or more water service lines being interconnected; and there is a potential high hazard on the premises, or the water is used for other than domestic purposes.

23.3.5 Private Water System: If there is an auxiliary water supply on or available to the premises that is a potential high hazard, including a fire protection system.

23.3.6 Used Water and Industrial Fluids: If there is a used water or industrial fluid system on the premises that is a potential high hazard.

23.3.7 Solar Heating Systems: If there is a solar heating system on the premises, and chemicals are added to the solar heating system or the solar heating system is not used exclusively for once through heating (i.e. domestic hot water.)

23.3.8 Chemically Contaminated Water Systems: If chemicals are used as an additive to the water, or the water is subjected to additional treatment, or water is used on the premises to transport chemicals or chemicals are used with water on the premises in compounding or processing.

23.3.9 Sewers and Storm Drains: Any premises used for handling sewage or storm water (e.g. treatment and processing facilities, pumping plants, gauging stations, lift stations, ejector plants.)

23.3.10 Public Fire Hydrants as Temporary Water Services: The Water System shall be protected by an approved RPZA on the outlet of any fire hydrant when it is used as a water supply, except when used to extinguish a fire.

23.3.11 Irrigation System: If there is an irrigation system on the premises.

23.3.12 All RPZA backflow devices used for domestic water service will need to be a low lead device to meet the current Safe Water Drinking Act section 1417.

23.3.13 All new structures in a mixed use zoning based on the City of Pea Ridge zoning map that allows for a mix of uses including but not limited to commercial and industrial uses accompanied with a residential use, shall be required to have a backflow permit and an RPZA backflow assembly.

23.3.14 At the time of construction all structures within the mixed use zone may utilize a spool or like method and floor drain in lieu of installation of the backflow device if all current uses are strictly residential. In the event of a shared meter the spool or like method must be removed and an appropriate backflow assembly be installed at the first change of use within the structure.

23.3.15 All new structures shall depict the location and type of backflow assembly on the construction plans. In the event of a spool or like method, the construction plans shall depict the location. The construction plans shall be reviewed and approved by the City of Pea Ridge Water Utilities Department prior to construction.

23.3.16 All current buildings that change their use and are allowed commercial uses doing a remodel or renovation that requires a building or plumbing permit that does not have a current RPZA will be required to bring the existing building (or suite if metered separately) up to meet current specifications.

23.3.17 All Code Compliance applications for a current commercial building or suite not currently protected by an RPZA will be required to have a permit and bring the existing building (or suite if metered separately) up to meet current specifications.

23.4 Containment Not Required

23.4.1 **Residential Systems**: Used exclusively for domestic purposes (without irrigation).

23.4.2 **Solar Heating Systems**: Used exclusively for once through heating (i.e. domestic hot water), and no chemical additives are used in the system.

23.5 Retrofit

23.5.1 All presently installed backflow prevention assemblies and devices that do not meet the requirements of this program but were approved assemblies for the purposes described herein at the time of installation and have been properly maintained, shall, except for the inspection, testing and maintenance requirements, be excluded from the requirements of these rules so long as the APPROVING AUTHORITY is assured that they will satisfactorily protect the Water System.

23.5.2 If the existing assembly is moved or requires more than the minimum maintenance or, the APPROVING AUTHORITY determines that the operation or maintenance of this assembly constitutes a hazard, the assembly shall be replaced by an approved backflow prevention assembly.

SECTION 24 FIRE PROTECTION LINES (C.C.C.P.)

24.1 Classes of Fire Protection Systems

24.1.1 **Class 1** - A fire protection system directly connected to the Water System as the only water supply - no pumps, tanks or reservoirs; no physical connection to auxiliary water supplies; no antifreeze or other additives of any kind; all fire protection system drains discharging to atmosphere, dry wells or other safe outlets.

24.1.2 Class 2 - A fire protection system that is the same as a Class 1 system; except that a booster pump is installed in the fire protection system, and no outlet is located between the booster pump and the Water System. (Note - Booster pumps alone do not affect the potability of the system. In Class 2 fire protection system, it is necessary to avoid low or negative pressures that can occur by excessive flow through the booster pump. A minimum pressure of 20 psig on the inlet side of the booster pump shall be maintained through proper design, construction, operation and maintenance in addition to the use of a low pressure cutoff switch, pump modulating valve, or other automatic device.)

24.1.3 Class 3 – Direct connection from public water supply mains, plus one or more of the following: elevated storage tank, fire pump taking suction from above ground covered reservoir, tank, or pressure tank. Such storage facilities are filled or connected to public water only and the water in the tank is to be maintained in a potable condition. (Note: Unless the storage tank is owned and operated by the public water system, the assumption will be made that the water in the tank is non-potable, making it a Class 4 installation).

24.1.4 Class 4 - A fire protection system that is the same as a Class 1 or Class 2 system; except that an auxiliary water supply is on or available to the properties, or there is an auxiliary water supply designated by the DEPARTMENT within a radius of 1,700-feet from a pumper connection to the fire protection system. (Note - Connection to an auxiliary water supply cannot exist in a Class 4 fire protection system.)

24.1.5 Class 5 - A fire protection system that is connected to an auxiliary water supply which could be exposed to a high hazard (e.g. non-potable reservoirs, rivers, ponds, wells, industrial water), or that uses additives (e.g. antifreeze, wetting agents, “Foamite”), or that does not maintain a minimum pressure of 20 psig on the inlet side of a booster pump as defined for a Class 2 fire protection system.

24.15.6 Class 6 - A fire protection system that is connected to a water service line from the Water System if the water service line is not used exclusively for fire protection.

24.2 Backflow Prevention on Fire Protection Systems

24.2.1 The Water System shall be protected by an approved method of backflow prevention in water service lines to fire protection systems, regardless of backflow prevention requirements in other water services on the premises.

24.2.2 Classes 1, 2 & 3: An approved DDCVA is required as the minimum backflow prevention in the water service line to a Class 1, 2 or 3 fire protection system. An approved DRPZA shall be required on any system with hose drops or standpipe outlet.

24.2.3 Classes 4, 5 & 6: An approved DRPZA is required in the water service line to a Class 4, 5 or 6 fire protection system.

24.2.4 Strainers are not required to be installed on fire protection systems.

24.3 Retrofit of Existing Systems

24.3.1 This applies to an existing fire protection system, which is modified, extended, or enlarged. Such systems include a modification or extension to an existing network (distribution piping, sprinkler heads control valves, etc. are added to or replaced in an existing system), or where an additional fire protection system (new feed line, riser, control valve, distribution piping, sprinkler heads, etc.) will connect to a fire main which has an existing cross-connection control device.

24.3.2 If the existing assembly is moved, or requires more than the minimum maintenance or the APPROVING AUTHORITY determines that the operation or maintenance of this assembly constitutes a hazard, the assembly shall be replaced by an approved backflow prevention assembly.

24.3.3 The minimum protection for cross-connection control for existing systems is the same as listed for new systems, except as noted for Class 1 and 2 systems only.

24.3.4 The installation of a properly sized assembly may cause an excessive pressure loss in some altered Class 1 and 2 systems. Such loss could make the system non-compliant with NFPA Pamphlets 13 and 14 as adopted.

24.3.5 The RME shall document to the APPROVING AUTHORITY that reasonable modifications will not compensate for the additional loss.

24.3.6 The documentation shall contain a listing of the minimum flow and pressure, headloss summary, desired and calculated sprinkler head output and a summary of the options examined to reduce headloss.

24.3.7 For these installations, if not already installed, the existing cross-connection control device will be replaced with two check valves in series (one of which can be the alarm valve), each valve meeting AWWA C510, UL 312-88, or UL 193-88, or the latest versions thereof, and equipped with a resilient seating surface. Valves on assemblies for fire protection services shall meet the appropriate recognized standard of UL and FM Global listed or approved for use in Fire Protection Systems. The valves or adjacent piping shall be equipped with a sufficient number of resilient seated test cocks (minimum diameter of one quarter to one-half inch) to determine the effectiveness of each valve (there shall be no leakage past any check valve). Sufficient isolation valves-one valve upstream of the valves and one valve downstream of the valves - shall be present or added to the system to permit this testing.

24.3.8 Existing fire protection systems which are not being modified, enlarged, or expanded are not required to upgrade to comply with this policy unless a hazard is found within the fire protection system.

24.3.9 For Class 1 and 2 systems, if the hydraulic analysis for the modified, extended, or enlarged system demonstrates that the installation of a properly sized cross-connection control device will increase the pressure loss so as to make the system noncompliant with the Rules and Regulations for Sprinkler Systems of the Arkansas Fire Protection Licensing Board (less than the minimum flow required by state fire sprinkler regulations), and that reasonable modifications to the system cannot compensate for the additional losses, the Responsible Managing Employee (RME) of the fire protection firm will document 1 that as part of the submittal to the ADH. (Refer to Section 24.7.2)

24.4 Assembly Installation

24.4.1 The following conditions apply to Class I through Class 6 systems:

24.4.2 Backflow preventers must be tested within 10 days of placing the fire sprinkler system “on stream” and annually thereafter by a state certified Assembly Test Technician. A copy of the test report must be sent to the local water utility.

24.4.3 Reduced pressure type backflow prevention assemblies shall not be installed in pits or vaults. Double check valve assemblies must be installed above ground, if possible. However, if review and approval by the ADH permits below grade installation of a double check valve assembly because of unique conditions at the job site then the below grade unit must be placed in a vault which is located in a well drained area.

24.4.4 Installers of fire protection equipment must be licensed by the Fire Protection Licensing Board.

24.5 Plan Approval

24.5.1 All plans submitted to the ADH for approval shall indicate the name and license number of the RME. *Section 5*

24.5.2 There shall be no deviation from backflow prevention assembly installation plans and specifications once approved by the ADH and the DEPARTMENT unless revised plans and specifications have been first re-submitted for review and re-approval and written consent given by said authorities.

24.5.3 Plans for connection to fire protection systems must be submitted to the ADH and the local water utility for review and approval prior to beginning installation work. Submittals must include the following elements (include the elements appropriate to the project):

A. A utility plan showing location of the fire main, property lines, and easements.

B. Material of construction of the fire main.

C. Pressure class of the fire main.

D. Fire sprinkler connection details; including the following:

E. Test flow information at the job site; including flow rate, static and residual pressures.

F. Location of the backflow preventer.

G. Make, model number, size, and type DC, RPZA, DCDA, or RPDA.

H. Show where the FDC line takes off from the riser or verbally describe the location.

I. Show flow calculations or certify that the flow through the backflow preventer will not exceed the maximum rated flow for the unit as indicated in the table show below.

24.5.4 Reduced pressure type backflow prevention assemblies shall not be installed in the vertical position unless approved by the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR), University of Southern California, Los Angeles, CA.

24.6 Flow/Pressure Loss Table

24.6.1 DCVA's and RPZA's are to be sized according to the following table:

Maximum Flow Rate	Minimum DCA/RPZA Size - Inches	Maximum DCA Pressure Loss - psi	Maximum RPZA Pressure Loss - psi
50	1	10	18
75	1.25	10	18
100	1.5	10	16
160	2	10	16
225	2.5	10	15
320	3	10	14
500	4	10	14
1000	6	10	14
1600	8	10	14
2300	10	10	14

3000	12	10	14

24.6.2 **NOTE:** 1 The sprinkler flow and pressure on which the calculation is based is to be the minimum required by NFPA as defined in the latest regulation of the Arkansas Fire Protection Licensing Board. Documentation to the ADH is to include a listing of that minimum flow and pressure, a headloss summary, the desired and calculated sprinkler head output, and a summary of the options examined to reduce headloss. As required per *Section 24.3.9*

SECTION 25 CONSUMER RESPONSIBILITIES (C.C.C.P.)

25.1 General

The consumer shall:

25.1.1 Eliminate all cross connections or install an approved backflow prevention assembly on the water service line.

25.1.2 Immediately correct any malfunction of the backflow prevention assembly.

25.1.3 Inform the APPROVING AUTHORITY of any proposed or modified cross connections and of any existing cross connections of which the consumer is aware.

25.1.4 Prior to start of construction have plans approved and permit obtained for any domestic plumbing or fire service installation requiring an approved backflow prevention assembly. Failure, refusal, or inability on the part of the customer to install, maintain, and have tested, any backflow prevention assembly on the consumer's property shall constitute grounds for discontinuing water service until such requirements have been satisfactorily met.

25.1.5 Have the type of backflow prevention assembly and manner of installation approved by the APPROVING AUTHORITY.

25.1.6 Install a backflow prevention assembly if a private water source is operational even if it is not cross-connected to the Water System.

25.1.7 Install two (2) backflow prevention assemblies in parallel if uninterrupted water service is desired during testing or repair.

25.1.8 Not install a by-pass around any backflow prevention assembly unless there is a backflow prevention assembly of the same type in the bypass.

25.1.9 Have a certified operational test within ten (10) days of installation and at intervals not to exceed one year thereafter. In those instances where the APPROVING AUTHORITY deems the degree of hazard to be great, an operational test may be required at more frequent intervals.

25.1.10 Have only personnel authorized by the ADH perform repairs, installation, maintenance and testing of domestic backflow prevention assemblies.

25.1.11 Have only personnel authorized by the ADH perform repairs, maintenance, and testing of designated fire protection service line backflow prevention assemblies.

25.1.12 Make repairs immediately upon notification by the tester that repairs are needed. Overhaul shall be performed at intervals not to exceed five (5) years.

SECTION 26 ASSEMBLY INSTRUCTIONS (C.C.C.P.)

26.1 General

26.1.1 Specifications for backflow prevention assemblies are essential, since no two assemblies are always reliable under every condition.

26.2 Backflow Prevention Assemblies

26.2.1 NOTE: Only those assemblies that are approved by the DEPARTMENT shall be used for backflow prevention in water service lines:

26.2.2 Approved Assembly: Assemblies that have been tested and approved by the FCCCHR and certified by the ADH are approved by the DEPARTMENT.

26.2.3 The following information shall be distinctly marked on every RPZA, DCVA, DDCVA and DRPZA by cast in the metal, stamped in the metal, or stamped on a brass or stainless steel nameplate permanently affixed to the assembly:

A. Name or trademark

B. Type (RPZA, DCVA, etc.)

C. Size

D. Model number

E. Direction of flow (indicated by an arrow)

F. Serial number

G. Maximum working water pressure

H. Maximum water temperature for which designed (designate degree F or degree C).

26.2.4 Every RPZA, DCVA, DDCVA and DRPZA shall be shipped completely assembled.

26.2.5 All frost free bury hydrants shall have the minimum of a ***hose bib atmospheric vacuum breaker with set screw*** installed prior to meter being installed. A hose bib freeze proof atmospheric vacuum breaker with set screw is also recommended for the customers protection. All parts must be American Made.

26.2.6 HOSE BIB ASTMOSPHERIC VACUUM BREAKER with set screw



26.2.7 HOSE BIB FREEZE PROOF ATMOSPHERIC VACUUM BREAKER with set screw



SECTION 27 ASSEMBLY INSTALLATION, RECORDS and REPORTS (C.C.C.P.)

27.1 General

27.1.1 Proper installation of backflow prevention assemblies is necessary to adequately protect the Water System from backflow.

27.2 Authorized Installers & Testers

27.2.1 Installation of backflow prevention assemblies on domestic water service lines shall be provided by personnel licensed or certified by the ADH.

27.2.2 Installation of backflow prevention assemblies on fire protection services shall be provided by personnel licensed or certified by the Arkansas Fire Protection Licensing Board.

27.2.3 Testing of backflow prevention assemblies on domestic and fire protection services shall be provided by personnel licensed or certified by the ADH.

27.3 Permits

27.3.1 Consumers shall possess a permit from the APPROVING AUTHORITY prior to beginning installation of an assembly. All permits shall be obtained by Licensed Plumber installing the device.

27.3.2 A permit authorizes the use of the backflow prevention assembly and is necessary for continuing water service. Permits are non-transferable and may be revoked if the consumer fails to adhere to the conditions of the permit. Adequate records and documentation are required for continued permit usage. Consumer shall secure and hold one backflow prevention assembly "use" permit per address. Water meter shall not be set until permit is purchased and recorded at the Building Officials Office (at Pea Ridge City Hall) and the inspection completed.

27.4 Installation Detail

27.4.1 Assembly Installation

27.4.2 A backflow prevention assembly shall be installed in accordance with the manufacturer's instructions.

27.4.3 An assembly shall be installed on the owner's side of the water meter prior to first outlet.

27.4.4 Piping connected to the assembly shall not be used for electrical grounding.

27.4.5 Piping for risers on irrigation BFP assemblies shall be hard copper (per plumbing code) with two ground unions, one on the upstream riser and one on the downstream riser, for repair and replacement. No plastic allowed.

27.4.6 Piping connected to the assembly shall be thoroughly flushed before installing the assembly.

27.4.7 An adequate and permanent method of test water disposal shall be provided.

27.4.8 A pressure relief valve and a thermal expansion tank shall be properly installed and maintained on all water heating apparatus served by the assembly.

27.4.9 Examples of approved enclosures:






With Regulator Standard

27.4.9.1 IMPORTANT! Thermal Expansion Notice-Water expands as it heats up and is ordinarily not a problem in an open water system. However, the installation of a backflow preventer into the water system creates a closed system. This can create a potentially dangerous and/or costly situation in the water system if a provision is not allowed for the safe expansion of the heated water.

27.4.9.2 The installation of Thermal Expansion Tanks or other approved methods or devices are recommended in domestic water systems requiring backflow prevention assemblies.

27.4.9.3 Please refer to current Arkansas State Plumbing Codes or call the Pea Ridge Water Utilities office at 479-451-1109 if you have any questions.

27.4.10 The assembly installation shall be protected from vandalism and freezing. Heating and electrical wiring shall meet ASSE 1060 Standards.

27.4.11 Backflow prevention assemblies installed outdoors and subject to freezing shall be protected by an 'enclosure' which complies with the standards and specifications set forth by the American Society of Sanitary Engineering (ASSE), Code 1060.

27.4.12 Adequate support, excluding water lines, shall be provided for assemblies that are 3" or larger.

27.4.13 If not part of the approved assembly, an approved strainer shall be installed on the inlet side of the assembly prior to the assembly isolation valve, so that all water must pass through the strainer immediately before entering the assembly.

27.4.13.1 **NOTE**: On backflow prevention assemblies 2" and smaller, utilizing outdoor enclosures, width of enclosure and location of Y-strainer must be taken into account to allow for proper fit of enclosure. Strainers are not required on Fire Protection Systems.

27.4.14 An approved blow-off shall be installed in the water line immediately after the assembly, to allow for flushing the assembly and to allow for usage of water that is not charged a sewer fee.

27.4.14.1 **NOTE**: On backflow prevention assemblies 2" and smaller utilizing outdoor enclosures, the Blow-off shall be installed on the downstream riser, keeping width of assembly to a minimum to allow for proper fit of enclosure. 2" through 10" assemblies shall have a blow-off not less than 2" in diameter. Assemblies larger than 10" shall have a minimum 4" blow-off. Blow-offs installed in vaults shall have piping into the existing vault drain to prevent splashing.

27.4.15 Blow-offs in vaults may also be routed above grade and away from the vault, however, a self draining feature must be incorporated to prevent freezing damage to the blow-off piping.

27.4.16 If the assembly cannot be installed in the prescribed manner for any reason, the proposed deviations shall be submitted to the DEPARTMENT for review and approval before installation.

27.4.17 No backflow preventer assembly shall be installed above or inside a ceiling or over head in any manner, between a ceiling and sub floor or within a wall structure (between wall boards), without the express authorization of the Cross-Connection Control Program manager/agent.

27.5 RPZA & DRPZA Installation

27.5.1 The assembly shall not be buried or shall not be installed in a vertical position unless the assembly is approved for use in that position by the FCCCHR.

27.5.2 The assembly may be contained in an approved enclosure. If a shelter is desirable, plans will be reviewed on a case by case basis.

27.5.3 An adequate and permanent method of handling relief vent discharge and test water discharge shall be provided.

27.5.4 Clear unobstructed space for the relief vent shall be provided to prevent the vent from becoming blocked or flooded.

27.5.5 This discharge and drainage method shall meet all applicable codes and regulations per the ADH and the Pea Ridge Cross-Connection Control Program.

27.6 DDCVA & DCVA Installation

27.6.1 The assembly shall not be installed below grade, unless the following criteria can be met and accepted by the APPROVING AUTHORITY:

A. The vault and its installation shall be approved by the DEPARTMENT before the start of construction.

B. The vault shall not be subject to flooding.

C. The walls of the vault shall extend above the finished grade a minimum of 3" to prevent intrusion of water or dirt.

D. The vault shall be water-tight to prevent intrusion of water or dirt.

E. The vault shall drain to daylight through an adequate and permanent gravity drain with a slope of at least 1º. Installation plans shall show the elevation of the vault floor and the area the water will drain to. Plans shall show drainage pipe depth and location. Drainage pipe size shall be 2" larger than the blow-off. Protection on the drainage outlet shall be provided to prevent undesirable creatures from entering.

F. The vault cover shall be removable to allow full access to the vault. A minimum of two lifting points shall be provided.

G. An access door will be installed in the vault cover on the testable side of the assembly. Approved doors shall be similar or equal to Bilco or Halladay and shall be a minimum of 24" x 24".

H. Directly below the access door, steps shall be provided in the vault wall similar or equal to ICM Plastic Manhole Steps. Steps are ½" steel reinforced rod encapsulated in special polypropylene plastic.

I. Minimum installation clearance dimensions shall be 30" between the assembly and corresponding wall and 12" on the opposite side, 8" on each end, 6" above the highest point and 12" under the assembly. Top of assembly shall not exceed 72" above finished grade.

J. Manufactured enclosures shall be equal to or the equivalent of a "Hot Box". Enclosures shall be placed on a wire reinforced concrete pad a minimum of 4" thick and shall be removable.

27.7 Temporary Use Assemblies

27.7.1 A public fire hydrant used as a temporary water source shall be protected by a check valve or air gap and metered by a flow meter which shall be obtained from and installed by the APPROVING AUTHORITY.

27.8 Reporting Requirements

27.8.1 The consumer shall be responsible for properly filing reports with the APPROVING AUTHORITY for each required backflow prevention assembly. DDCVA's and DRPZA's are composed of two (2) unique assemblies, each requiring report submission. In addition to the administrative reports, any failure, removal, modification or replacement of an assembly or suspected backflow shall be reported immediately to the APPROVING AUTHORITY. Performance tests, replacement, repair and maintenance reports shall be filed within 14 calendar days.

27.9 Records

27.9.1 The consumer shall keep records for each assembly. Installation drawings, installer, test reports, manufacturer, model, serial number, date installed, copy of current permit, schedule of preventive maintenance, test reports and technical data are the minimum record requirements. These records shall be maintained for a period not less than five years.

27.10 Protection Of Assemblies

27.10.1 No person shall maliciously, willfully, or negligently break, damage, destroy, deface or tamper with any structure, appurtenance or equipment which is a part of the backflow prevention assembly.

27.10.2 No person shall cover a backflow prevention assembly vault with earth or pavement, or otherwise render it inaccessible.

27.11 Penalties

27.11.1 The DEPARTMENT shall, within an approximate period of forty five (45) days prior to the annual test date, mail a notification letter to customers operating a backflow prevention assembly (BFP) on that customer's premises, informing them of the annual test due date of said assembly. Included in the notification letter shall be identifying information connected with the BFP assembly, i.e.; brand, model, serial number and approximate location of the BFP assembly(s). The City may also include with the notification a test form and a list of Licensed Assembly Tester Technicians that the customer may use to have the BFP assembly tested. The Licensed Assembly Tester Technician list is also available on the City of Bentonville website. The period of approximately forty five (45) days allows adequate time to secure a satisfactory test report of the BFP assembly(s) and to have a copy of the report sent to the DEPARTMENT.

27.11.2 In the event the DEPARTMENT has not received a copy of a satisfactory test report approximately fifteen (15) days prior to the due date, a second notice letter will be mailed to the customer. This letter is a reminder to the customer of the approaching due date.

27.11.3 The second notice shall also contain the same BFP assembly information.

27.11.4 If the DEPARTMENT has not received a satisfactory test result within five (5) days after the due date, the customer shall be notified by mail, hand delivery or in some cases certified mail that they are in violation of current ordinance and have 15 days to complete a satisfactory test and deliver a copy of the test report to the DEPARTMENT, or water service to this address shall be discontinued until such time a copy of said test report shall be delivered to the DEPARTMENT office.

27.11.5 Any consumer found in violation of any of the provisions of the Program, shall be served by the APPROVING AUTHORITY with written notice stating the nature of the violation, describing the penalty applicable to the violation and providing a reasonable time limit for the satisfactory correction thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations. The consumer may deliver by certified mail to the APPROVING AUTHORITY, within 5 days of receipt of such notice a written request for a "just cause" meeting with the APPROVING AUTHORITY. At this meeting the consumer shall be given the opportunity to show "just cause" for the notice to be rescinded or modified.

27.11.6 Any notice issued pursuant to this sub-section may provide one or more of the following penalties:

A. A compliance directive mandating procedures to bring the consumer into compliance with the Program within the designated time; failure to comply with the compliance directive shall result in termination of water service.

B. A withdrawal of the Consumers backflow prevention assembly permit and termination of water service to the consumer.

27.11.7 No action to withdraw a consumer's permit shall be final until the APPROVING AUTHORITY has given notice described herein held a "just cause" meeting, if requested.

27.11.8 However, if the APPROVING AUTHORITY determines that to continue to provide water service will endanger the public health, due to possible contamination of the Water System, water service to the property shall be immediately terminated.

27.11.9 Any person violating the provisions of this Program shall become liable to the DEPARTMENT for any expense, loss or damage occurred to the DEPARTMENT by reason of such violation.

27.11.10 The listing of penalties in this Section shall not preclude other appropriate judicial remedies available to the DEPARTMENT for any violation of the Program. The DEPARTMENT may petition any Court of competent jurisdiction to grant injunctive or other legal or equitable relief by reason of a violation.

(THIS AREA INTENTIONALLY LEFT BLANK TO CONCLUDE THE CROSS CONNECTION CONTROL PROGRAM SECTION)

SECTION 28 PROJECT CLEANUP

28.1 GENERAL:

28.2 Classification - 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.

28.2.1 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.

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

28.2.3 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.

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

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

28.3.1 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 0.15 pounds per 100 square feet, using the following seed mixture (percent expressed in terms of weight).

SEED	MIXTURE % of Weight
Lawn Fescue	50%
RYE Grass (Annual)	40%
White Clover (Common)	5%
Red Clover (Common)	5%

28.3.1.1 During or after seeding is complete, 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.

28.3.1.2 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.

28.3.1.3 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.

28.3.1.4 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. If 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.

28.3.1.5 Photographs "before and after" as specified elsewhere in these Specifications shall be provided of lawns, gardens, etc. as directed by the Engineer.

28.3.2 Class II Cleanup - Fields, Meadows, Etc.

28.3.2.1 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 posts, trees, mailboxes, etc. All areas which have been disturbed, such as that caused by equipment tracks, shall be carefully backfilled and repaired as though 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).

SEED	MIXTURE % of Weight
Lawn Fescue	50%
RYE Grass (Annual)	40%
White Clover (Common)	3%
Red Clover (Common)	7%

28.3.2.2 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 complete, 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 of grass so that an equivalent ground cover will be provided.

28.3.2.3 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 to provide a thickness of approximately 2 inches when first spread.

28.3.2.4 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.

28.3.3 Class III Cleanup - Steep, Wooded or Rocky Areas

28.3.3.1 The trench shall be backfilled in accordance with the Pipe Specifications. After the trench backfill is complete, all damaged 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.

28.3.3.2 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.

28.3.3.3 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 to provide a thickness of approximately 2 inches when first spread.

28.3.3.4 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.

28.3.4 Special Cleanup:

28.3.4.1 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.

28.3.5 All Areas:

28.3.5.1 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.

28.3.5.2 During construction, the Contractor shall always 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.

28.3.5.3 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.

28.4 Restoration of Damaged Surfaces and Property:

28.4.1 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.

28.5 Access after Construction:

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

28.6 Erosion Control:

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

28.7 Sodding:

28.7.1 Materials. 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 surface removal.

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

28.7.2.1 Sod: Sod shall consist of a densely rooted growth of Bermuda grass, Zoysia, etc. substantially free from noxious weeds and undesirable grasses. The sod shall be Cut in uniform strips with a minimum of 2 inches of root depth approximately 12 inches in width and not less than 12 inches in length but not longer than can be conveniently handled and transported.

28.7.2.2 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-phosphorus-potash). Fertilizer shall be applied to areas seeded at a rate of 290 pounds per acre or 0.15 pounds per 100 square feet.

28.7.2.3 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.

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

28.8 Execution:

28.8.1 Sodding shall be installed by the Contractor as required on the plans.

28.8.2 The area 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.

28.8.3 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.

28.8.4 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 laid to produce tight joints.

28.8.5 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.

28.8.6 The sod shall be compacted and watered as directed by the Engineer, and recompacted 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.

SECTION 29 CROSSINGS AND MISCELLANEOUS

29.1 ARKANSAS STATE HIGHWAY CROSSINGS

29.1.1 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 Highway(s).

29.1.2 Material:

29.1.2.1 Carrier Pipe: The carrier pipe shall be in conformance to that section of the Specifications governing ductile iron sewer lines and/or ductile iron force mains.

29.1.2.2 Casing Pipe: Unless otherwise shown on the Plans, casing pipe shall be welded or seamless steel pipe having a wall thickness as shown on the Plans and a minimum yield strength of 35,000 pounds per square inch.

29.1.3 Construction: The Plans show the location of highway crossings to be made. The crossings shall be accomplished by boring and inserting a casing pipe of the type and thickness, diameter and length as specified or shown on the Plans.

29.1.4 Permit Application: The Engineer is responsible to prepare any application by the City of Pea Ridge with the Arkansas State Highway and Transportation Department for permits which includes all crossings and construction on ASHTD right of way as shown on the Plans. A copy of the permit issued by the ASHTD will be furnished by the Contractor to the Owner. A copy of the license or permit issued by the ASHTD shall always be kept on the job site.

29.1.5 Bond Posted: The Pea Ridge Water Utilities maintains an acceptable bond with the Arkansas State Highway and Transportation Department.

29.1.6 Location of Utilities: The Contractor shall be responsible for the location of all utility lines located within the area of construction.

29.1.7 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.

29.1.7.1 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.

29.1.8 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 2.5 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 making the crossings by boring or tunneling have been exhausted, the Pea Ridge Water Utilities will make application to the Arkansas State Highway and Transportation Department to make the installation by the open cut method.

29.1.9 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 additional cost of deposits or bonds for open cutting shall be borne by the Contractor. Since the return of the deposit required by the ASHTD depends upon returning the roadbed to

original or better condition, the Contractor will be required to complete this item of construction to the satisfaction of the Highway Department.

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

29.2 STREET AND COUNTY ROAD CROSSINGS

29.2.1 General: This item shall consist of obtaining permits and posting bonds and/or deposits which may be required by the City of Pea Ridge and Benton County, and providing all labor, equipment, tools, supplies and incidentals necessary for the crossing, 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.

29.2.2 Materials:

29.2.2.1. Pipe Bedding Material: Pipe bedding material shall be as specified elsewhere in these Specifications.

29.2.2.2. Crushed Stone Backfill: Backfill under streets and county roads shall be crushed stone (AHTD Class 7).

29.2.2.3. Prime Coat: Prime coat material shall be Grade MC-30 as set forth in *Section 403.03, Table II,* on page 230 of the 1996 Edition of the *Arkansas State Highway and Transportation Commission Standard Specifications*.

29.2.2.4. Course: Asphaltic Concrete Hot-Mixed Surface: The asphaltic concrete hot-mixed surface course shall be Type II as set forth in Section 407, page 249, of the 1996 Edition of the Arkansas State Highway and Transportation Commission Standard Specifications.

29.2.3. Referenced Materials and Construction: The following specifications are hereby referenced and made a part of these Specifications. These specifications are contained in the "*Standard Specifications for Highway Construction*," published by the Arkansas State Highway and Transportation Commission. These specifications are available for inspection in the Engineer's office or may be obtained from the Arkansas State Highway and Transportation Department, Little Rock, Arkansas.

Refer To the Arkansas State Highway Standard Specifications for Highway Construction'
Bituminous Pavement Prime and Tack Coats
Materials and Equipment for Bituminous Surface Courses
Asphaltic Concrete Hot-Mix Surface Courses
Materials and Equipment for Hot-Mix Bituminous Binder and Surface Courses
Construction Methods for Hot-Mix Bituminous Binder and Surface Courses

29.2.4. Execution: The Contractor shall obtain required permits and post required bonds and/or deposits with the permitting entity. Street crossings in the City of Pea Ridge shall be performed in accord with City of Pea Ridge Code of Ordinances and in full accordance with Pea Ridge Street Department Specifications.

29.2.4.1 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 piles, 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.

29.2.4.2 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.

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

29.2.4.4 All areas excavated for the construction of sewer lines force mains, 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.

29.2.4.5 Crushed stone base (Class 7) shall be placed and compacted to 95 percent of modified Proctor density (ASTM D1557-78), as shown on the Plans detail.

29.2.4.6 All asphaltic surfaces shall be replaced with asphaltic concrete hot-mixed surface course. Asphaltic concrete hot-mixed surface course, Type II, shall be constructed as specified herein.

29.2.4.7 All Portland cement surfaces shall be replaced with Portland cement concrete. Portland cement concrete surfacing shall be constructed as specified elsewhere in these Specifications.

29.2.4.8 All unpaved driving surfaces shall be replaced with crushed stone base Class 7 as specified elsewhere in these Specifications, as shown on the Plans detail.

29.2.4.9 All street and county road rights-of-way disturbed by construction of these wastewater and water facilities shall be restored to its original or equivalent condition as required by the permitting entity.

29.3 CREEK CROSSINGS

29.3.1 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 of sewers, force mains and water lines crossing creeks.

29.3.2 Permit Application: Applications for a Corps of Engineers Section 404 permit may be 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.

29.3.3 Materials:

29.3.3.1. Restrained Joint Pipe: Restrained joint pipe shall be as specified by the Engineer.

29.3.4. Construction: Creek crossings shall be made in conformance to these Specifications.

29.3.4.1 General: The creek crossings shall generally consist of excavating the trench to a depth of 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.

29.3.4.2. Excavation: The pipe shall be laid with 5 feet of 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.

29.3.4.3. Placement of the Pipe: Mechanical Restrained 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 eves as required.

29.4 MISCELLANEOUS PAVED SURFACE REPAIR

29.4.1 General: The work to be include 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*.

29.4.2 Materials:

29.4.2.1. Prime Coat: Prime coat material shall be Grade MC-30 as set forth in Section 403, on page 229 of the 1996 Edition of the Arkansas State Highway Department Standard Specifications.

29.4.2.2. Tack Coat: Tack coat material shall be Grade SS-l, as set in the *Arkansas State Highway Department Standard Specifications*.

29.4.2.3. 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 State Highway Department Standard Specifications*, using asphalt cement viscosity grade AC-30.

29.4.2.4. Concrete: Concrete shall be as specified elsewhere in these Specifications.

29.4.2.5. 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.

29.4.2.6. Curb and Gutter Joint Sealer: Curb and gutter joint sealer shall be either Type 1, Type 2, or Type 3 in accordance with the *Arkansas State Highway Department Standard Specifications*.

29.4.3 Materials and Construction: The specifications referenced and made a part of these specifications. These specifications are contained in the "*Standard Specifications for Highway Construction"*, published by the Arkansas State Highway and Transportation Commission. These Specifications are available for inspection in the Engineers office, or may be obtained from the Arkansas State Highway Department, Little Rock, Arkansas.

Refer to the Arkansas State Highway Standard Specifications for Highway Construction'
Bituminous Pavement
Prime and Tack Coats

Materials and Equipment for Bituminous Surface Courses
Asphaltic Concrete Hot-Mix Surface Courses
Materials and Equipment for Hot-Mix Bituminous Binder and Surface Courses
Construction Methods for Hot-Mix Bituminous Binder and Surface Courses

29.4.4 Construction:

29.4.4.1. 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.

29.4.4.2. Asphaltic Pavement Repair: After the trench has been backfilled and compacted, as specified elsewhere in these Specification, 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 gallons/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.

A. One nuclear density meter test per asphaltic patch or repair shall be performed.

B. The cost of determining the compacted density shall he at the expanse of the Contractor.

C. Any unacceptable patch or repair shall be recompacted and re-tested at the Contractor's expense.

29.4.4.3. 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 Class 7 crushed stone base.

29.4.4.4. 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.

29.4.4.5. 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.

29.4.4.6. 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.

29.4.4.7. 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.

29.4.4.8 Cleanup: Cleanup of areas behind the curb and gutter and around sidewalks shall be as specified elsewhere in these Specifications.

29.5 DUMPED STONE RIPRAP

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

29.5.2. Materials:

29.5.2.1. 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 (1) 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.

29.5.2.2. Filter Blanket: Filter blanket shall be class 7 crush stone base as specified elsewhere in these specifications.

29.5.3. Execution:

29.5.3.1. Subgrade: The pipe backfill shall be constructed as specified elsewhere in these Specifications. The toe trenches shall be excavated directed by the engineer. The subgrade shall be stripped of vegetation and smoothed to conform to the general shape of the stream bank prior to construction activities.

29.5.3.2. 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 subgrade 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.

29.5.3.3. Dumped Stone Riprap: This item 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 surfaced 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. The area shall be cleaned up and seeded as specified elsewhere in these Specifications for pipeline cleanup and seeding.

29.5.3.4. 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.

29.6 FARM TYPE FENCE

29.6.1 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 of farm type fence. The work shall include every item of construction necessary for a complete and acceptable installation as shown on the Plans and hereinafter specified.

29.6.2 Materials and Construction: Unless otherwise required by these Specifications, all farm type fence shall be five strand barbed wire, steel °T" post and treated wood corner and brace posts.

29.6.2.1. Posts: All corner and brace post assemblies shall be 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 posts shall be metal T posts.

A. End, Corner, Brace Assembly and Gate Posts. Posts shall be 6 inches minimum diameter, 7 feet in length, creosoted or penta treated Grade A southern yellow pine, Cross brace post shall be 4 inches minimum diameter.

B. Line Posts. 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 by the same manufacturer.

29.6.2.2. Wire: Barbed wire shall be used in all locations unless specific requirements call for other types.

A. 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 RR-F-221, Type A.

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

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

29.6.2.3. 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 be 3/4 inch diameter, Schedule 40 black pipe with vertical braces of 3/15 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 as selected by the Pea Ridge Water Utilities or his 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 the Pea Ridge Water Utilities.

29.6.2.4. Concrete: Where specified or shown on the Plans, all concrete shall conform to requirements as set out elsewhere in these Specifications.

SECTION 30 GREASE, SAND, SOIL, AND OIL INTERCEPTORS

30.1 APPLICABILITY -***NOTE-**While the following specifications make mention mostly about 'food service' and 'grease traps', same policies shall be applied to Sand, Soil, & Oil Separators, ad-nauseum.

30.1.1 Grease Traps

30.1.1.1 Grease Traps are looked at on a case by case basis by the UTILITY. What may be required is not based on what others have been required to do.

30.1.1.2 The following food service types shall be required to have properly sized and functioning grease interceptors or grease removal devices: restaurants, cafeterias, hotels, motels, cafes, schools, hospitals, nursing homes, grocery stores, bakeries, churches, caterers, and any other facility that discharges applicable waste as determined by the UTILITY. Unless otherwise given approval by the DEPARTMENT.

30.1.1.3 The following facility types shall be required to have properly sized and functioning sand, soil, and oil interceptors; oil/water separators; and/or oil separators: car washes, truck washes, garages, service stations, car and truck maintenance facilities, automotive dealerships, utility equipment shops, fabricators, and other facilities, as determined by the UTILITY, that have sources of sand, soil, and oil**.**

30.2 General Criteria

30.2.1 All car washes, truck washes, garages, service stations, car & truck maintenance facilities, fabricators, utility equipment shops, and other facilities, as determined by the UTILITY, that have sources of sand, soil, and oil shall install effective sand, soil, and oil interceptors, oil\water separators, and/or oil interceptors.

30.2.2 Sand, soil, and oil interceptors shall be sized to effectively remove sand, soil, and oil at the expected flow rates. Oil\water separators and oil interceptors shall be sized to effectively remove oil at the expected flow rates.

30.2.3 Users whose systems are deemed to be ineffective by the UTILITY shall be required to change the cleaning frequency and/or to increase the size of the system. In addition, owners or operators of washing facilities shall be required to use non-phosphate detergents and prevent rainwater from entering the collection system (*POTW*).

30.2.4 ***Failure to install, upgrade, maintain, operate, and follow specifications, as set forth in this manual, as deemed by the UTILITY, may result in user being denied water service or having water service discontinued until issue is resolved in a satisfactory manner approved by the DEPARTMENT.***

30.3 Installation Requirements

30.3.1 All existing, proposed, or newly remodeled food service facilities within the City's Wastewater Collection service area shall be required to install, at the user's expense, an approved, properly sized and properly operated and maintained grease interceptor.

30.3.2 Food services and other locations subject to this specification which were in operation prior to the effective date of the ordinance from which this specification is accepted and derived and do not have grease interceptors are required to install a grease interceptor within one year of the effective date of ordinance accepting this specification, unless otherwise approved by UTILITY.

30.3.3 Existing businesses with an existing grease interceptor that does not meet the requirements of this specification shall be required to upgrade the system. The UTILITY shall determine the allowable time frame for this work to be completed.

30.4 Sanitary Sewer Flows

30.4.1 Sanitary sewer flows from toilets, urinals, lavatories, etc., shall not be discharged into the grease interceptor. These flows shall be conveyed separately to the sanitary sewer service lateral.

30.5 Floor Drains/Sinks/Trenches

30.5.1 Only floor drains/sinks/trenches which discharge or have the potential to discharge grease shall be connected to a grease interceptor.

30.6 Use of Disposal/Grinder

30.6.1 It is recommended that solid food waste products be disposed of through normal solid waste/garbage disposal means. If a disposal/grinder is utilized, it must be connected to a solids interceptor prior to be connected to the grease interceptor. The use of disposals/grinders are discouraged since it decreases the operational capacity of the grease interceptor and will require an increased pumping frequency to ensure continuous and effective operation. The use of a garbage disposal/grinder will also require routine cleaning of the solids interceptor.

30.7 Dishwashers

30.7.1 Dishwashers used in commercial operations shall be connected to the grease interceptor. Dishwashers discharge soap and hot water, which can melt grease and allow it to pass through an undersized grease interceptor. Interceptors must be sized accordingly to allow enough detention time to allow water to cool and grease to solidify and float to the top of the interceptor.

30.8 Kitchen Sinks

30.8.1 All sinks (i.e., prep sinks, single compartment sinks, two-compartment sinks, three-compartment sinks, mop sinks, hand wash sinks, rinse sinks, etc.) located within or adjacent to the kitchen area shall be connected to the grease interceptor.

30.9 Location

30.9.1 Grease interceptors are normally installed outside the building upstream from the sanitary sewer service lateral connection. This allows easy access for inspection, cleaning, and removal of the intercepted grease at any time. The UTILITY and the county health department may allow the installation of a grease interceptor or grease removal device inside a building with pre-approval.

30.10 Discharge Limits

30.10.1 No user shall allow wastewater discharges containing fats, wax, grease or oils, whether emulsified or not, in excess of 100mg/l (milligrams per liter) or containing substances which may solidify or become viscous at temperatures between 32 degrees and 150 degrees Fahrenheit (0 to 65 degrees Celsius).

30.11 Residential Dwellings

30.11.1 Grease interceptors shall not be required for single family residences, duplexes, triplexes, quadplexes, or apartment complexes unless the UTILITY first determines there are discharges from the property that will

cause problems in the collection system (POTW). Upon a determination that the discharge will create problems in the POTW, the UTILITY may require the owner of the property to install a sufficiently sized grease interceptor to treat the discharges.

30.12 Pumping/Cleaning

30.12.1 The user, at the user's expense, shall clean/pump all grease interceptors to assure proper operation and efficiently to maintain compliance with the discharge limits. Pumping of a grease interceptor shall include the removal of floating materials, wastewater, and bottom sludge and solids. A qualified and approved pumper shall perform this work. Decanting or discharging of removed waste back into the interceptor from which it was removed or any other grease interceptor, for the purpose of reducing the volume to be disposed. Is prohibited.

30.13 Frequency

30.13.1 The grease interceptor must be pumped frequently enough to prevent grease from entering the sanitary sewer lines. The schedule for cleaning is to be determined by the user and the approved pumper contract for the job (a minimum of twice per year is required). However, if the UTILITY determines through inspections or analyses that the schedule established is deemed to be ineffective, the user shall be required to change the cleaning/pumping frequency and/or to increase the size of the grease interceptor.

30.14 Cleaning Record Log

30.14.1 Each food service facility shall maintain a grease interceptor cleaning log at the facility indicating each pumping for the previous twelve (12) months. This log must be filled out each time the grease interceptor is pumped and made immediately available to the UTILITY during inspections. Completed logs must be retained on file at the facility for a minimum of three (3) years.

30.14.2 The grease interceptor cleaning log shall include the following information:

A. Business name, and address, and phone number

B. Size of grease interceptor in gallons

C. Date pumping was performed

D. Initials of business employee inspecting and overseeing the cleaning

E. Name of the approved pumping service

F. Initials of the pumper service employee conducting the cleaning

G. Amount of waste grease pumped (in gallons)

H. Any additional comments pumper deems appropriate

I. upon completion of the log, printed name, title and signature of the responsible person for the business as well as the date completed.

30.15 Disposal

30.15.1 All waste removed from each grease interceptor must be disposed of at a facility approved to receive such waste. In no way shall the waste be returned to any private or public portion of the UTILITY collection system.

30.16 User Responsible for Maintenance

30.16.1 The user, at the user's expense, shall be responsible for maintaining grease interceptors in continuous proper working condition. Further, users are responsible for inspecting, repairing, replacing, or installing apparatus and equipment as necessary to always ensure proper operation and function of grease interceptors and compliance with discharge limitations.

30.16.2 All users shall maintain a written record of maintenance performed on the grease interceptor. Records shall be retained on file at the facility for a minimum of three (3) years.

30.17 Utility Inspections

30.17.1 The UTILITY being the '*Control Authority*' will perform periodic inspections of food service facilities and shall notify the user of any required change to the pumping frequency and/or any maintenance or repairs required. Upon written notification by the UTILITY, the user shall be required to perform the requested maintenance within fourteen (14) days or by a date specified by the UTILITY.

30.18 Additives

30.18.1 Any biological additives placed into grease interceptor or building discharge line including, but not limited to, enzymes, commercially available bacteria or other additives designed to absorb, purge, consume, treat or otherwise eliminate fats, oil, or grease are prohibited.

30.19 Chemicals

30.19.1 Chemical treatments such as drain cleaners, acid, or other chemical solvents designed to dissolve or remove grease shall not be allowed to enter the grease interceptor.

30.20 Petroleum Products

30.20.1 Petroleum products shall not be allowed to be introduced into the UTILITY collection system (POTW) in any manner.

SECTION 31 SUPERVISORY CONTROL AND DATA ACQUISTION SYSTEM (SCADA)

31.1 GENERAL

31.1.1 WORK INCLUDED

31.1.1.1 This section covers work necessary for the design, documentation, test, installation, field testing and startup and final documentation for a modification to the Telemetry System hereafter referred to as a Supervisory Control and Data Acquisition (SCADA) system for the City of Pea Ridge, AR as described herein.

31.1.1.2 Components will include pressure sensor monitoring, existing SCADA Software Host upgrades, data logging and trending system upgrades, historical data base manager upgrades, alarm notification system upgrades, and the installation of these items as shown on the plans and described below. The hardware, software, and integration of the system changes to the SCADA system will be furnished by Instrument & Supply, Inc. of Hot Springs, AR 501-262-3282. All loose equipment is to be furnished by the Supplier and installed by the General Contractor.

31.1.2 PRODUCTS

31.1.2.1 Major components of this system shall include the specified materials, equipment and installation required to implement a complete and operational SCADA system along with associated instrumentation.

31.1.2.3 In order to achieve standardization for appearance, operation, maintenance, spare parts and manufacturer's service to the greatest extent possible, like items of equipment provided hereunder shall be the end products of one (1) manufacturer.

31.1.3 RESPONSIBILITY FOR COMPLETE SYSTEM

31.1.3.1 The Supplier shall be responsible for and shall provide for the design, supply, delivery, certification, calibration and adjustment, software configuration, testing and startup, of a complete, coordinated system which shall perform the specified functions contained herein and as indicated on the plans. The Contractor shall provide the installation of the furnished equipment.

31.1.3.2 The Owner and the Engineer will review system technical information as submitted by the Supplier for software operating system, database, control logic and the graphical user interface (report and log formats, graphics, trends and alarming) for complete compliance with these specifications.

31.1.4 PRE-BID SUBMITTAL REQUIREMENTS

31.1.4.1 Any Supplier other than that specified herein and wishing to provide equipment on this project must comply with the pre-bid submittal requirements as specified herein.

31.1.4.2 Pre-bid submittals for substitute equipment must be provided to the engineer for review at least 21 days prior to bid. Pre-bid submittals must be provided in triplicate and may remain the property of the review engineer. A reviewed copy of the pre-bid submittal may be returned to the submitting party, at the option of the engineer, and only if the proposed substitute equipment is deemed acceptable, in the professional opinion of the engineer. The utilization of approved substitute equipment on this project is conditional upon strict compliance with the engineer's review comments.

31.1.4.3 If, in the professional opinion of the engineer, a substitute item is deemed acceptable, that substitute item will be named in an addendum as approved for use in the project no later than two (2) days prior to bid. Approval of a pre-bid submittal in no way waives a supplier of the responsibility of providing full equipment submittals post bid, nor are any requirements of these specifications mitigated in any way.

31.1.4.4 Pre-bid submittals must be bound into a concise all-inclusive document. The document must contain a cover identifying the project, engineer, owner, submitting party, submittal date, date of bid, and proposed substitute equipment. The pre-bid submittal will contain an index or table of contents. Attachments must be bound to or attached to the document.

31.1.4.5 Pre-bid submittals must include the following submittal material, as a minimum, for all relevant equipment, and may not be limited to the following:

A. Controls – wiring schematics, component cut sheets, panel ratings, panel dimensions, UL508A listing, NEMA compliance, and materials of construction.

B. Measuring equipment – Accuracy statement, dimensions, range, size, electronics box ratings, voltage and signal requirements and materials of construction.

C. Analytical Measurement Equipment – Consumable items, sensor description, electronics description, performance, accuracy, calibration methods, weight, dimensions, materials of construction, and power and signal requirements.

D. SCADA & Telemetry Equipment – Description, bill of materials, component cut sheets, software description, accessory equipment, I/O diagram, company resume, 25 project references, and path studies.

31.1.5 SUBMITTALS

31.1.5.1 Hardware Submittals: Before any components are fabricated, and/or integrated into assemblies or shipped to the job site, furnish to the Engineer for his review three (3) hard copies of submittal documents. Submittals shall include full details, shop drawings, catalog cuts and such other descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these specifications. Specifically, the Supplier shall submit the following materials:

A. Block diagram and operational description of the system showing all major components and their interconnections and interrelationships. Label each diagram and specify all external power and communications interfaces. All diagrams shall be in an 11 by 17 format.

B. Drawings of equipment to be supplied shall include, as a minimum: overall dimension details for each panel, console, etc., including internal and external arrangements and door mounted operator devices with nameplate designations. Wiring diagrams of equipment including field device connections shall be included and specific installation/wiring requirements identified. Provide AutoCAD DVD-Rom or flash drive.

C. Operational Description shall include the principal functions/capabilities of the personal computer, MTU and the RTUs, as provided and configured/programmed. Included shall be a description of system communications.

D. Provide a detailed Bill of Materials along with descriptive literature identifying component name, manufacturer, model number, and quantity supplied.

E. Provide system hydraulic layout(s) where applicable.

31.1.5.2 Spares and Expendables Recommendations: The Supplier shall provide a list of recommended spares and expendable items. The list shall be exclusive of any spares furnished under this Contract. A total purchase cost for the recommended list shall be provided in addition to the unit cost for each item.

31.1.6 TESTING AND START-UP

31.1.6.1 All elements of the SCADA system shall be tested to demonstrate that the total system satisfies all of the requirements of this Specification. The Supplier shall provide all special testing materials and equipment. The Supplier shall coordinate and schedule all of his testing and startups work with the Owner. As a minimum, the testing shall include both a factory test and a field test. Testing requirements are as follows:

A. Factory Tests - All equipment shall be factory tested prior to shipment.

B. Field Tests - All system components shall be checked to verify that they have been installed properly and that all terminations have been made correctly. Witnessed field tests shall be performed on the complete system. Each function shall be demonstrated to the satisfaction of the Owner and Engineer. The Supplier shall notify the Owner at least two (2) weeks prior to the commencement date of the field tests.

31.1.7 TRAINING

31.1.7.1 The training program shall educate operators, maintenance, engineering, and management personnel with the required levels of system familiarity to provide a common working knowledge concerning all significant aspects of the system being supplied. The training program shall consist of up to one (1) 8-hour day. Both classroom-type and field site sessions shall be provided. At least two weeks prior to the requested start of the program, the proposed dates of training shall be submitted to the Owner and the Engineer for approval.

31.1.7.2 The Supplier shall provide all instructional course material, equipment, and manuals to conduct the training program. Owner shall provide facilities for the training.

31.1.7.3 The training program shall be conducted as follows:

A. Training shall be conducted by a qualified instructor. Initial training shall familiarize the student with the fundamental operation of any microprocessors, operating systems, and software programs.

B. Operator training shall be conducted utilizing the actual system.

C. Maintenance training shall address each item of equipment being supplied (operator interface equipment, computer equipment, instrumentation, modems, etc.) down to the individual module, board or card level.

D. A minimum of 50 percent of training time shall be dedicated to actual operation and use of the SCADA System as encountered in day-to-day operations.

31.1.8 OPERATION AND MAINTENANCE MANUALS

31.1.8.1 The Supplier shall provide (3) complete sets of hard-covered ring bound loose-leaf O&M manuals and one (1) digital copy on DVDRom or flash drive. In addition to "as-built" system drawings, the manuals shall include internal wiring diagrams and operating and maintenance literature for all components provided under this section. The submitted literature shall be in sufficient detail to facilitate the operation, removal, installation, configuration, adjustment, testing and maintenance of each component and/or instrument.

31.1.9 DEFINITION OF ACCEPTANCE

31.1.9.1 System acceptance shall be defined as that point in time when the following requirements have been fulfilled:

A. All O&M documentation has been submitted, reviewed, and approved.

B. The complete SCADA system and instrumentation have successfully completed all acceptance testing requirements specified herein and have successfully been started up, tested, and accepted by the Engineer.

C. All Owners' staff personnel training programs have been completed.

D. Owner/Engineer sign a document indicating SCADA system has formally been accepted.

31.2 PRODUCTS

31.2.1 GENERAL

31.2.1.1 The functions and features specified hereunder are the minimum acceptable requirements for the SCADA system. The provided system shall equal or exceed each requirement.

31.2.1.2 In some cases, the specifications may allow the accomplishing of certain functions by means of more than one hardware/firmware/software approach. Any approach that is proposed shall equal or exceed all functional, operational, convenience and maintenance aspects of the one described. Whether a proposed approach is equal to or exceeds specification requirements shall be in the sole desecration of the Engineer.

31.2.1.3 Major equipment, component and software items are specified; however, the Supplier shall, at no additional cost, provide all appurtenant items, whether specifically referenced herein or not, but which may be required for system operation as hereinafter specified.

31.2.2 FUNCTIONAL REQUIREMENTS

31.2.2.1 General

A. The SCADA system shall monitor and control the equipment functions stated herein and as indicated on the plans. The master control station at the Pea Ridge Wastewater Treatment Facility shall be configured to monitor all of the parameters of the new RTUs. New equipment signals shall be hardwired to the New Telemetry Unit by the Contractor.

B. The plant SCADA operating system shall be programmed to present screen displays of each item, each area of activity, equipment status and other functions indicated elsewhere in the plans and specifications and shall allow the operator to select each screen display from a menu and to allow operator to control specific equipment and instruments remotely via keyboard entries or mouse clicks on the screen.

C. The SCADA system shall provide visual and/or audible alarms for abnormal and out of tolerance conditions and shall annunciate the alarms through the existing ClearSCADA HMI at the Pea Ridge Wastewater Treatment Facility in addition to permanently recording on the system computer hard-disk. Monitoring points for will be:

a. Upstream Pressure

b. Downstream Pressure

c. Power Status

d. Valve Manual Override

D. The RTU will be furnished with inputs and outputs to monitor continuously. The SCADA system will allow the owner to set an over-ride setpoint and emergency hi-low alarm setpoints in the HMI software at the plant.

E. The HMI software will be required to log all data points with accurate time and date stamps, continuous readings, alarm reporting to operator. Ad-Hoc reports will be available for all logged data with no special programming required, and will be made available for export to Microsoft Excel.

F. Under this contract, the Contractor is to interconnect all listed systems, while the Supplier will setup graphics for all systems and, in general, provide a complete unified operating SCADA System.

31.3 EXECUTION

31.3.1 GENERAL

31.3.1.1 Coordinate all work with the engineer/owner to avoid conflicts, errors, delays and unnecessary interference with operation of the existing system during installation, testing, cutover and startup.

31.3.1.2 Install all new equipment in accordance with the manufacturer's instructions and approved submittals.

31.3.1.3 Provide one (1) year warranty against defects in materials and workmanship.

SECTION 32 MULTIPLE UNIT RESIDENTIAL AND COMMERCIAL

32.1 WATER SERVICE

32.1.1 Residential

32.1.1.1 All purposed living units are to be metered individually (except for nursing homes, institutional care facilities, assisted living facilities, etc.) unless pre-approved by the UTILITY. The UTILITY *shall not* be bound by what has been approved in the past or on another property. Each multi-family dwelling presents unique challenges and will be reviewed on a case-by-case basis.

32.1.1.2 Multi-level or residential building of six (6) or more living units will be reviewed on a case-by-case basis. This may require, but not be limited to, a larger tap, or taps, a larger meter(s), larger service line(s), and/or the installation of 'lockable' valves on individual service lines.

32.1.2 Commercial

32.1.2.1 All commercial, multi-unit buildings (i.e. strip malls, flex-space units, office complex, etc.) shall have each individual unit metered (except hotels, motels, etc., where individual metering is deemed impracticable) unless specifically approved by the UTILITY. Commercial buildings will be reviewed on a case-by-case basis. The UTILITY *shall not* be bound on what has been approved in the past or on another property.

32.1.3 Backflow\Back-siphonage Protection

32.1.3.1 All commercial property being served by PRWU is required to have installed and maintained, by yearly testing, a backflow protection device. Refer to the Cross Connection Section of this specification manual.

32.2 SEWER SERVICES

32.2.1 Residential

32.2.1.1 All proposed living units shall have an individual sewer service connection to the sewer main (except institutional care facilities, long term care facilities, nursing homes, etc.) unless specifically approved by the UTILITY. The UTILITY *shall not* be bound by what has been approved in the past or on another property. Each multi-family dwelling presents unique challenges and will be reviewed on a case-by-case basis.

32.2.2 Commercial

32.2.2.1 All commercial multi-unit building shall have a dedicated sewer service connecting to a sewer main for each unit (except for motels, inns, etc.). Each individual unit may also be required to have a grease trap installed. Each building with individual units presents unique challenges and will be reviewed on a case-by-case basis. The UTILITY *shall not* be bound by what has been done in the past or on other properties.

32.2.3 Grease Traps

32.2.3.1 Pursuant to Arkansas Plumbing Code 1003.1, a grease trap or interceptor shall be required to receive the drainage from fixtures and equipment with grease-laden waste located in food preparation areas, such as in restaurants, hotel kitchens, hospitals, school kitchens, bars, cafeterias or clubs.

32.2.3.2 The UTILITY reserves the right to require a grease trap be installed in any commercial space if deemed to be a via candidate in the future for use as a food preparation location or any other location as described in the Grease, Oil, Sand and Soil Separator section of this specifications manual.

SECTION 33 CONSTRUCTION PERMISSION REVOCATION/CEASE AND DESIST

33.1 Once the UTILITY and the ADH have issued plan approvals, expectation is that the plans are to be followed during construction. Any change in plans must come from the RESPONIBLE ENGINEER and be approved by the UTILITY and the ADH. Field changes may be approved by UTILITY INSPECTOR or DEPARTMENT REPRESENTATIVE at the UTILITY's discretion. Major changes must go through the UTILITY and ADH and may even require another approval from the CITY PLANNERS.

33.2 The UTILITY reserves the right to issue a ***'Cease and Desist'*** declaration, effectively stopping construction of utilities for reasons such as, but not limited to, failure to follow approved plans, improper materials or construction methods being utilized, failure to maintain inspection reports as required, etc. This declaration will be in the form of a signed letter from the UTILITY, and will be sent to the OWNER\DEVELOPER and the ENGINEER of RECORD. Communication of the '***Cease and Desist'*** declaration or retraction may be sent electronically or via U.S. Mail. The declaration may only be lifted by a letter, signed by the UTILITY, and sent to OWNER\DEVELOPER and the ENGINEER of RECORD. Declaration shall only be lifted once the issue(s) declared in the letter has been corrected and\or resolved.

33.3 The UTILITY also reserves the right to revoke plan approval at any time for reasons such as, but not limited to, approved plans not be followed or altered without consent from the approving authorities, improper materials or construction methods are being utilized, etc.

33.4 The UTILITY also reserves to right to refuse acceptance of any utility service\extension for reason such as, but not limited to, construction that has not been properly installed or not by the approved plans, improper materials or workmanship, failure to pass any required tests, etc.

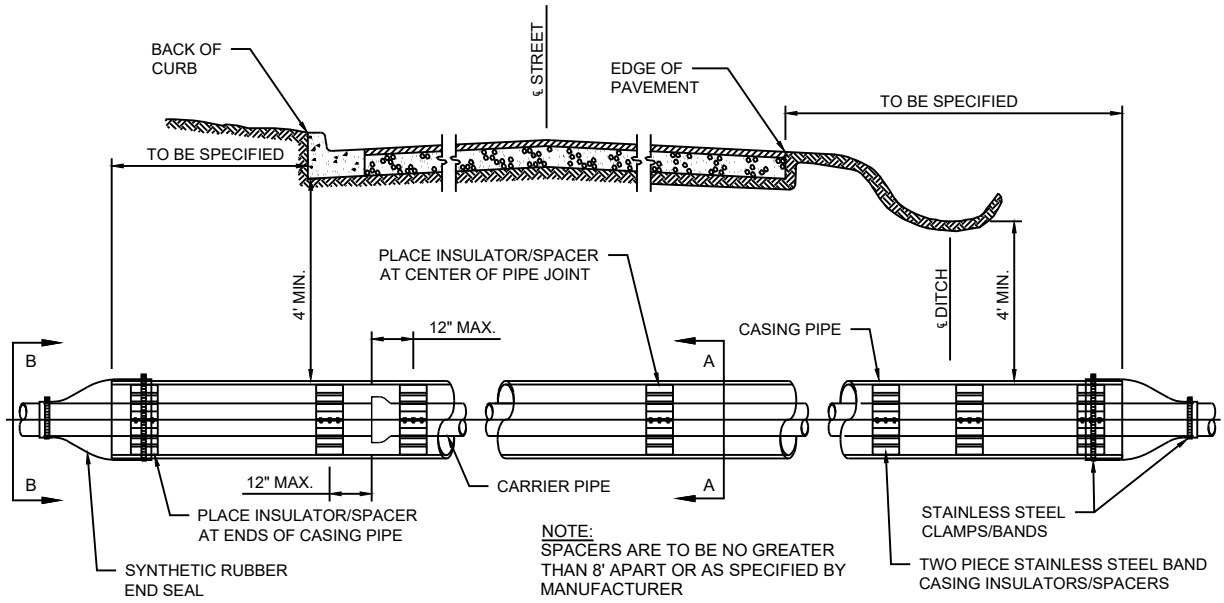
SECTION 34 FIRE FLOW PAINT SCHEMES PER NFPA 1

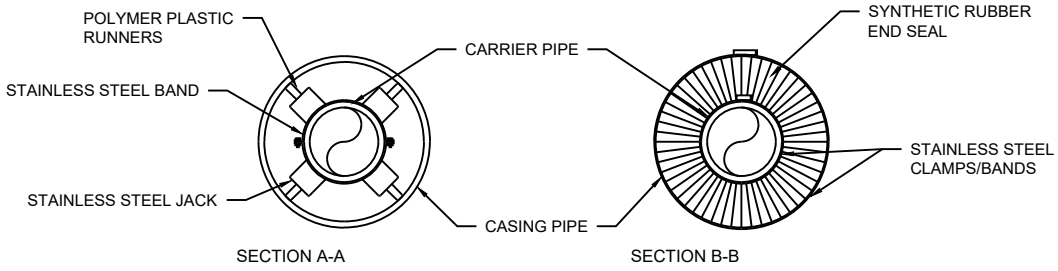
34.1 Fire Flow Paint Scheme (Exhibit)

FIRE FLOW PAINT SCHEMES FOR FIRE HYDRANTS

FIRE FLOWS (GPM)	COLOR	PAINTED ON:
0 - 499	RED	BONNET
500 - 999	ORANGE	BONNET
1000 - 1499	GREEN	BONNET
1500 - 3000	BLUE	BONNET
ABOVE 3000	BLUE	BONNET and STEAMER CAP

ENCASEMENT DETAIL





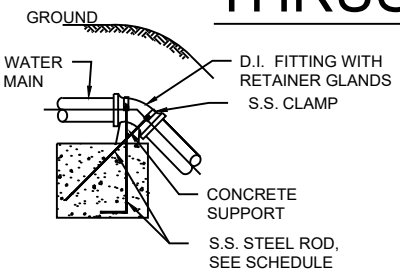
CARRIER & CASING SIZES									
CARRIER	4"	6"	8"	10"	12"	14"	16"	18"	20"
CASING	16"	16"	16"	18"	20"	24"	30"	30"	36"
CASING/WALL THICKNESS	REFER TO ASTM A-139 STANDARDS								

* ALL BELLS SHALL BE RESTRAINED INSIDE ENCASEMENT BY APPROVED METHOD

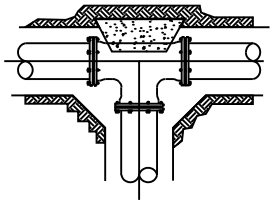
NOTE:
DUCTILE IRON, OR PVC PIPE REQUIRED FOR WATER, OR SEWER

CITY OF PEA RIDGE		WATER DETAIL - W01	
		REVISION DATE:	
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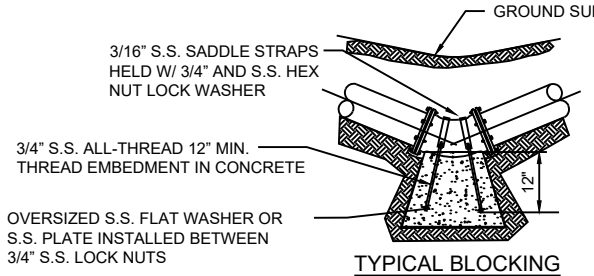
THRUST BLOCKING



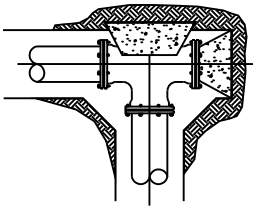
BLOCKING FOR VERTICAL TIE DOWN



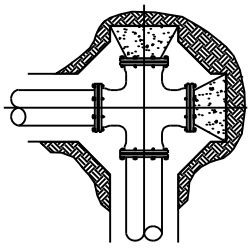
BLOCKING FOR TEE



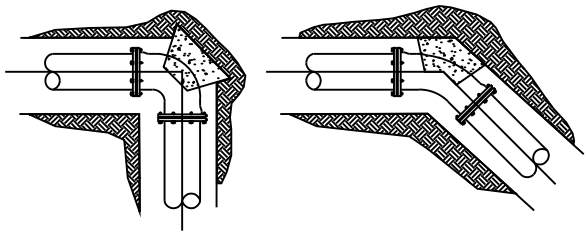
TYPICAL BLOCKING
FOR VERTICAL BENDS



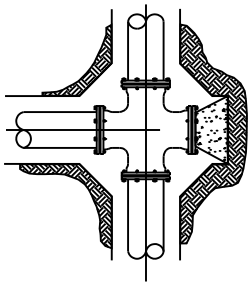
SPECIAL BLOCKING OF TEE & PLUG



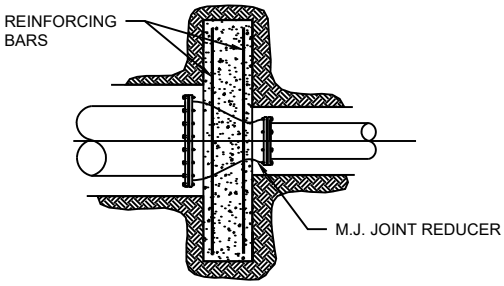
TYPICAL SECTION OF CROSS & 2 PLUG BLOCKING



TYPICAL BLOCKING
FOR HORIZONTAL BENDS



TYPICAL SECTION OF CROSS & PLUG BLOCKING



THRUST SUPPORT FOR REDUCER
(SIZE TO BE DETERMINED BY WATER DEPT.)

NOTES ON THRUST BLOCKING:

I. ALL BLOCKING SHALL BE AGAINST UNDISTURBED SOIL, USING 4,000 PSI CONCRETE.
2. WHERE SOIL CONDITIONS MAKE IT NECESSARY TO POUR CONCRETE OVER JOINTS, THE ENDS OF THE ADJACENT PIPES MUST HAVE A THRUST BLOCK TO RESIST MOVEMENT OF THESE JOINTS.
3. WEIGHT CALCULATIONS TO BE BASED ON REACTION BACKING TABLE (SEE W10).
4. WHEN BLOCKING AGAINST FITTINGS, FITTINGS SHALL BE COVERED WITH POLYETHYLENE TUBING TO PREVENT BONDING OF CONCRETE.
5. WHERE SHEAR BECOMES A PROBLEM, PROPER REINFORCING MUST BE INSTALLED INTO THE BLOCKING.
6. CLEARANCE SHALL BE A MINIMUM OF 6" BETWEEN PIPE AND OBSTRUCTIONS.
7. CLEARANCE ON PIPES BELONGING TO OIL/GAS COMPANIES SHALL BE 18" UNLESS SPECIAL PERMISSION IS GIVEN BY THESE COMPANIES.
8. MINIMUM 5/8" ALL THREAD FOR SECTIONS 10 FEET OR UNDER.

CITY OF PEA RIDGE		WATER DETAIL - W02	
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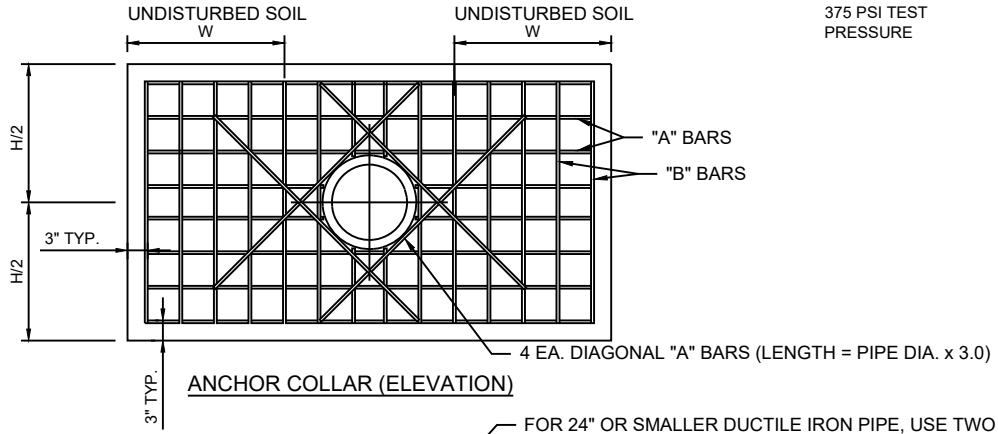
ANCHOR COLLAR SPECIFICATIONS

ANCHOR COLLAR SCHEDULE						
PIPE SIZE	*MINIMUM DIMENSIONS*				REINFORCING BARS	
	W	H	T	THRUST COLLAR	"A" BARS	"B" BARS
6"	1.5'	2.0'	2.0'	M.L. RETAINER GLAND	#6 @ 6"	#6 @ 6"
8"	1.5'	2.5'	2.0'	M.L. RETAINER GLAND	#6 @ 6"	#6 @ 6"
12"	2.0'	4.0'	2.0'	M.L. RETAINER GLAND	#6 @ 6"	#6 @ 6"
16"	3.0'	4.5'	2.0'	M.L. RETAINER GLAND	#6 @ 6"	#6 @ 6"
20"	3.5'	5.0'	2.0'	M.L. RETAINER GLAND	#6 @ 6"	#6 @ 6"
24"	4.5'	5.5'	2.0'	M.L RETAINER GLAND	#7 @ 6"	#7 @ 10"
30"	6.5'	6.0'	2.5'	4.5" X 1.0" WELD-ON	#8 @ 6"	#8 @ 10"
36"	7.5'	7.0'	2.5'	4.7" X 1.0" WELD-ON	#8 @ 6"	#8 @ 10"
42"	8.5'	8.0'	3.0'	5.0" X 1.25" WELD-ON	#8 @ 6"	#8 @ 10"

ALL RETAINER GLANDS SHALL BE MEGA-LUG

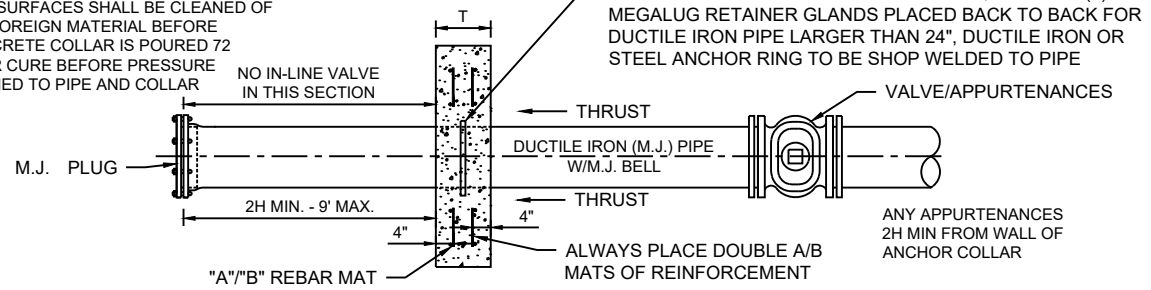
WELD-ON THRUST RING SHALL BE DUCTILE IRON OR STEEL

WELD ON THRUST RING SHALL BE DESIGNED FOR 250 PSI WORKING PRESSURE AND 375 PSI TEST PRESSURE

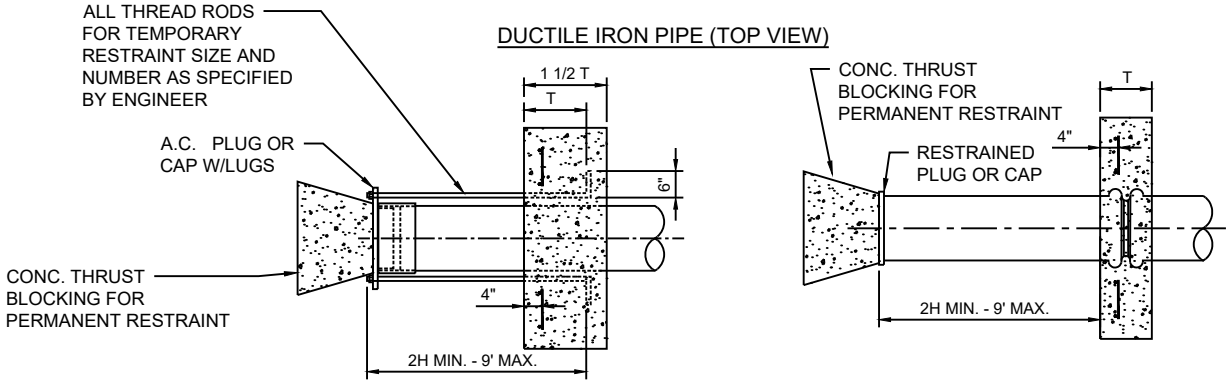


ANCHOR COLLAR (ELEVATION)

NOTE:
PIPE SURFACES SHALL BE CLEANED OF ALL FOREIGN MATERIAL BEFORE CONCRETE COLLAR IS POURED 72 HOUR CURE BEFORE PRESSURE APPLIED TO PIPE AND COLLAR



DUCTILE IRON PIPE (TOP VIEW)



ROD REQUIREMENTS	
MAIN SIZE	NO. OF RODS
6"	2
8"	4
12"	4
16"	6
24"	6
30"	8
36"	8
42"	8

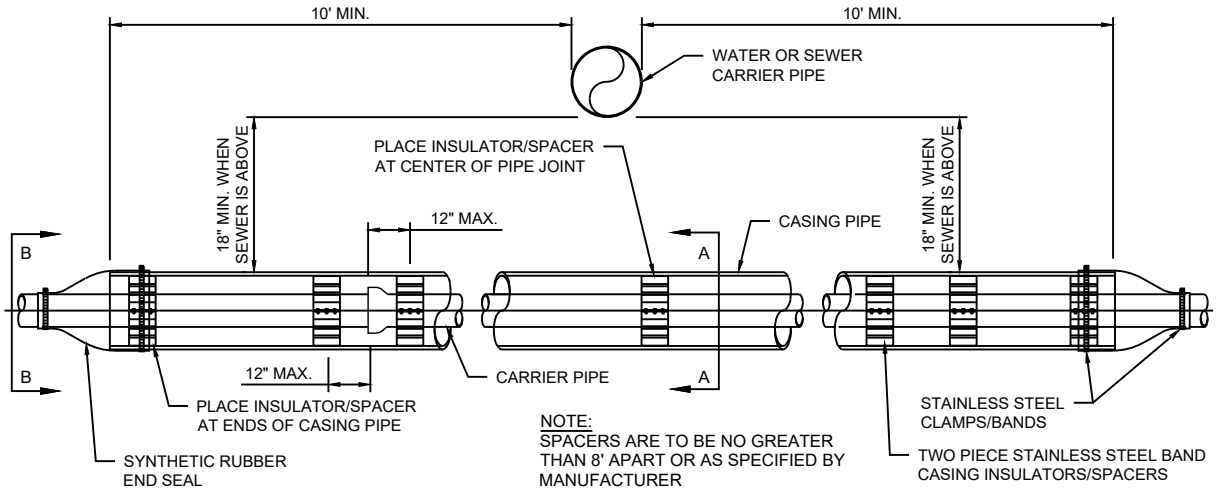
NOTE:
ALL-THREAD STEEL RODS SHALL BE 5/8" STAINLESS STEEL WITH STAINLESS STEEL HARDWARE

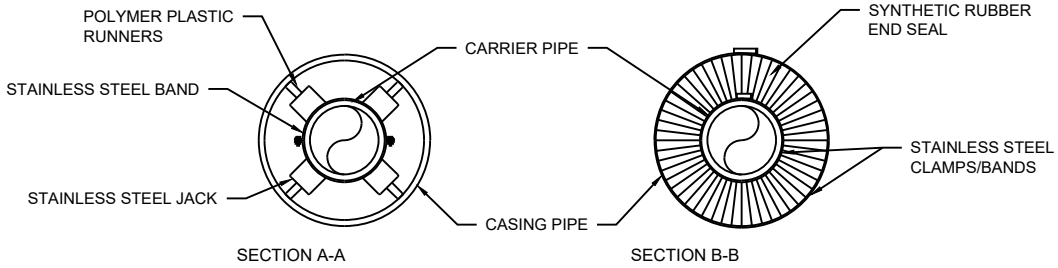
ASBESTOS CEMENT PIPE ANCHOR COLLAR DETAIL

CONCRETE PIPE- PRECAST KEY

CITY OF PEA RIDGE		WATER DETAIL - W03	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

ENCASEMENT CROSSING DETAIL





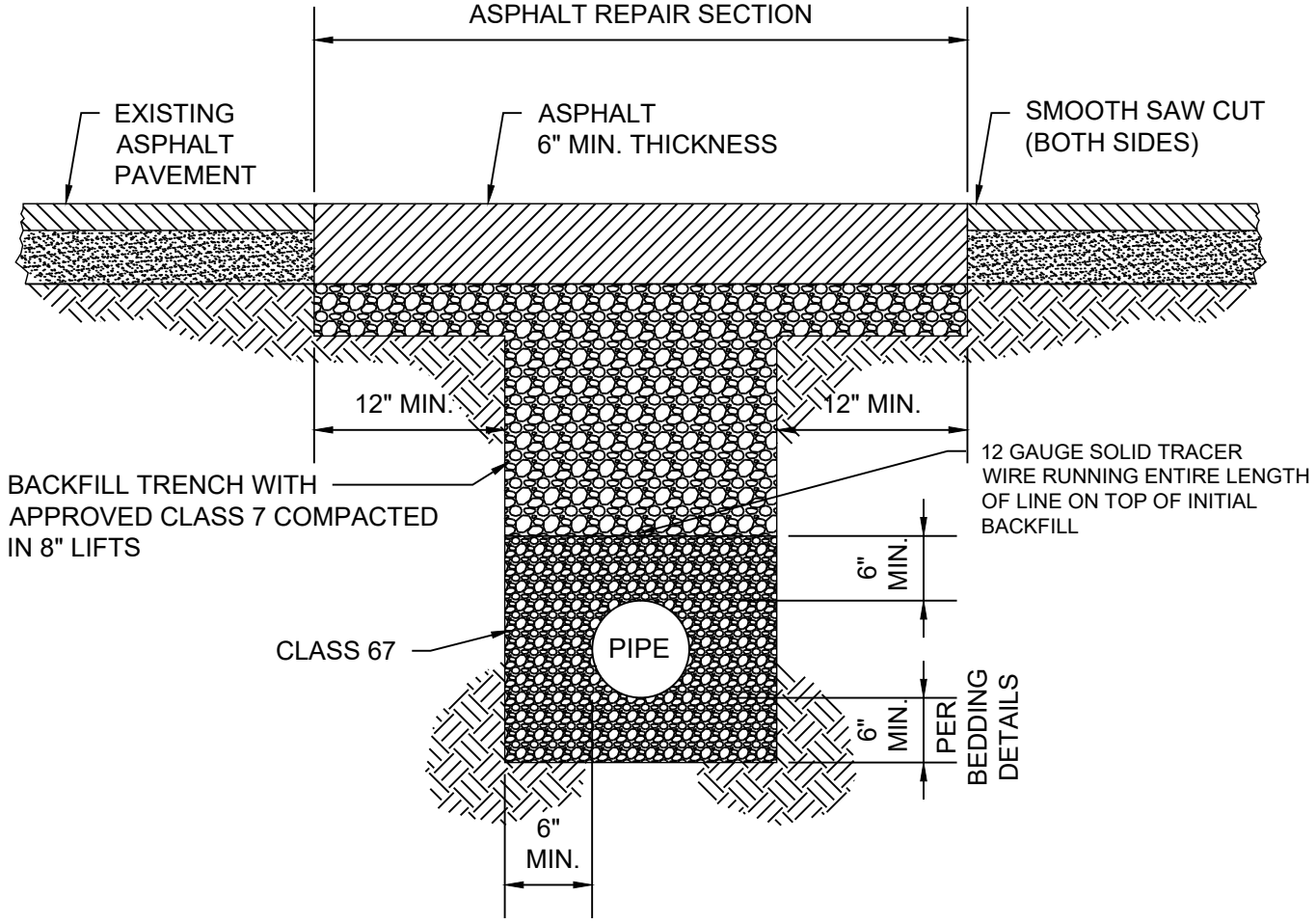
CARRIER & CASING SIZES									
CARRIER	4"	6"	8"	10"	12"	14"	16"	18"	20"
CASING	16"	16"	16"	18"	20"	24"	30"	30"	36"
CASING/WALL THICKNESS	REFER TO ASTM A-139 STANDARDS								

NOTE:
DUCTILE IRON, OR PVC PIPE REQUIRED FOR WATER, OR SEWER

* ALL BELLS SHALL BE RESTRAINED INSIDE ENCASEMENT BY APPROVED METHOD

CITY OF PEA RIDGE		WATER DETAIL -W04	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

ASPHALT OR DRIVEWAY REPAIR

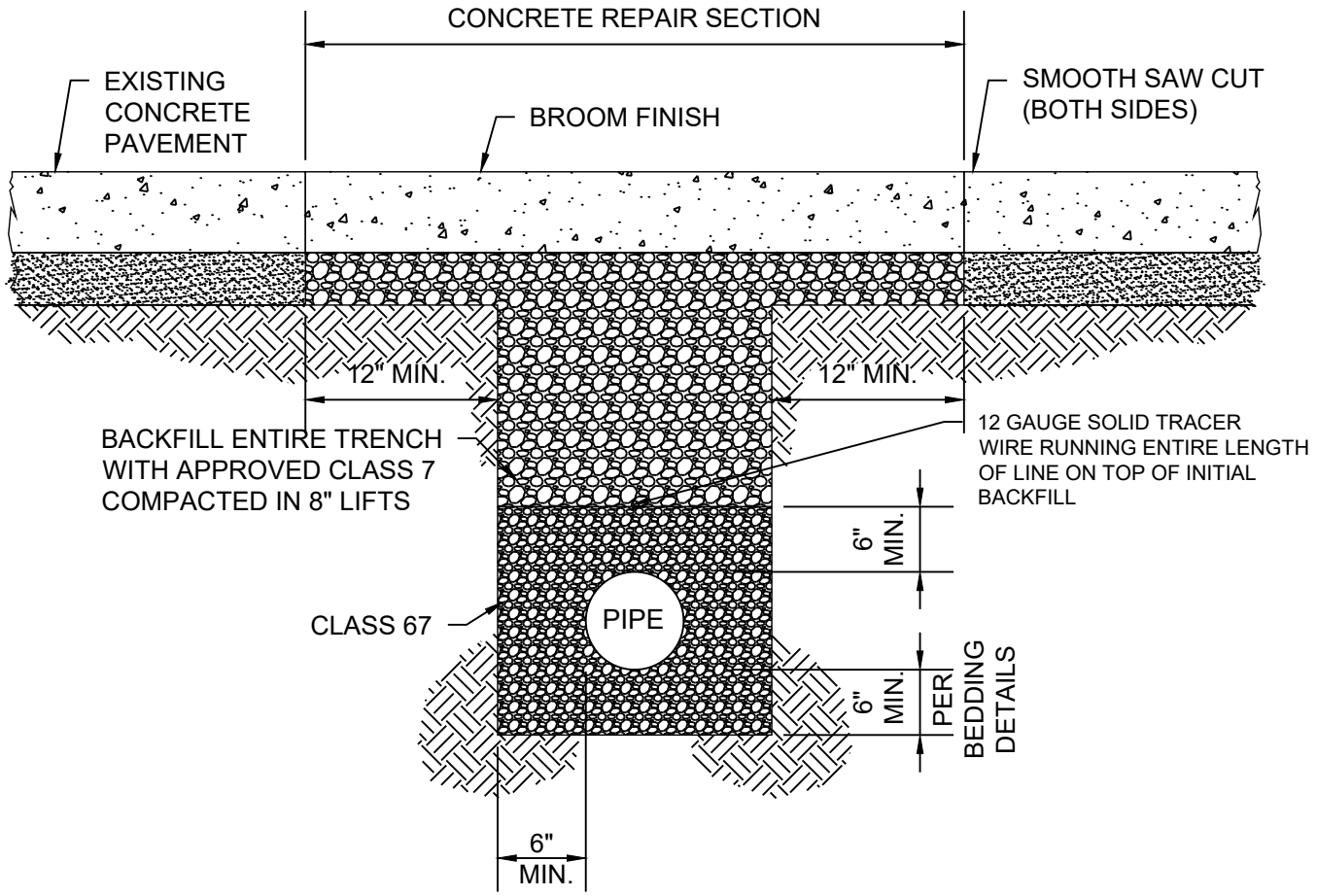


NOTES:

1. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND)
2. THIS DETAIL IS TO BE USED FOR WATER LINES AND SANITARY SEWER MAINS.

CITY OF PEA RIDGE		WATER DETAIL -W05	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

CONCRETE STREET OR DRIVE CUT REPAIR

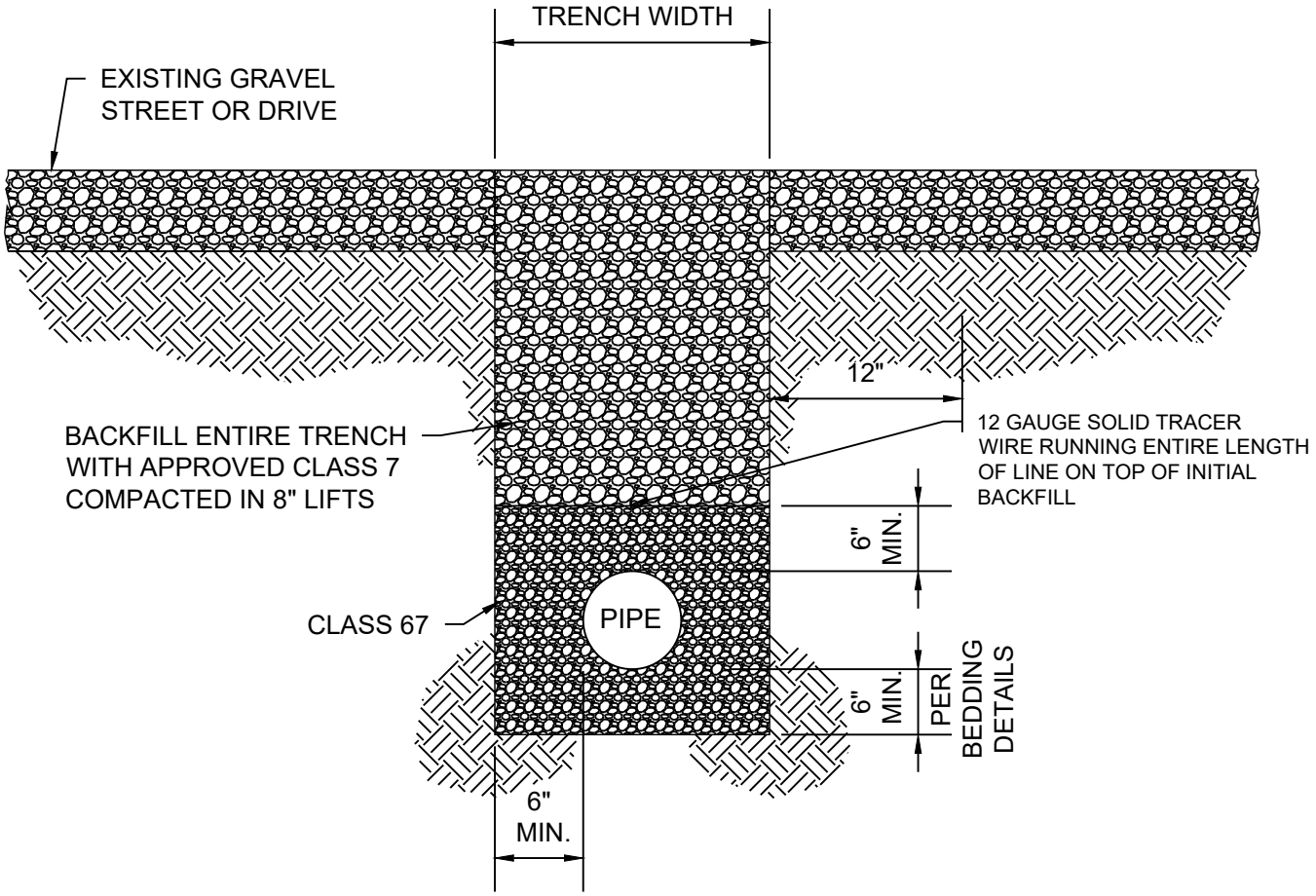


NOTES:

1. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND).
2. THIS DETAIL IS TO BE USED FOR WATER LINES AND SANITARY SEWER MAINS.

CITY OF PEA RIDGE		WATER DETAIL - W06	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

GRAVEL STREET CUT/REPAIR

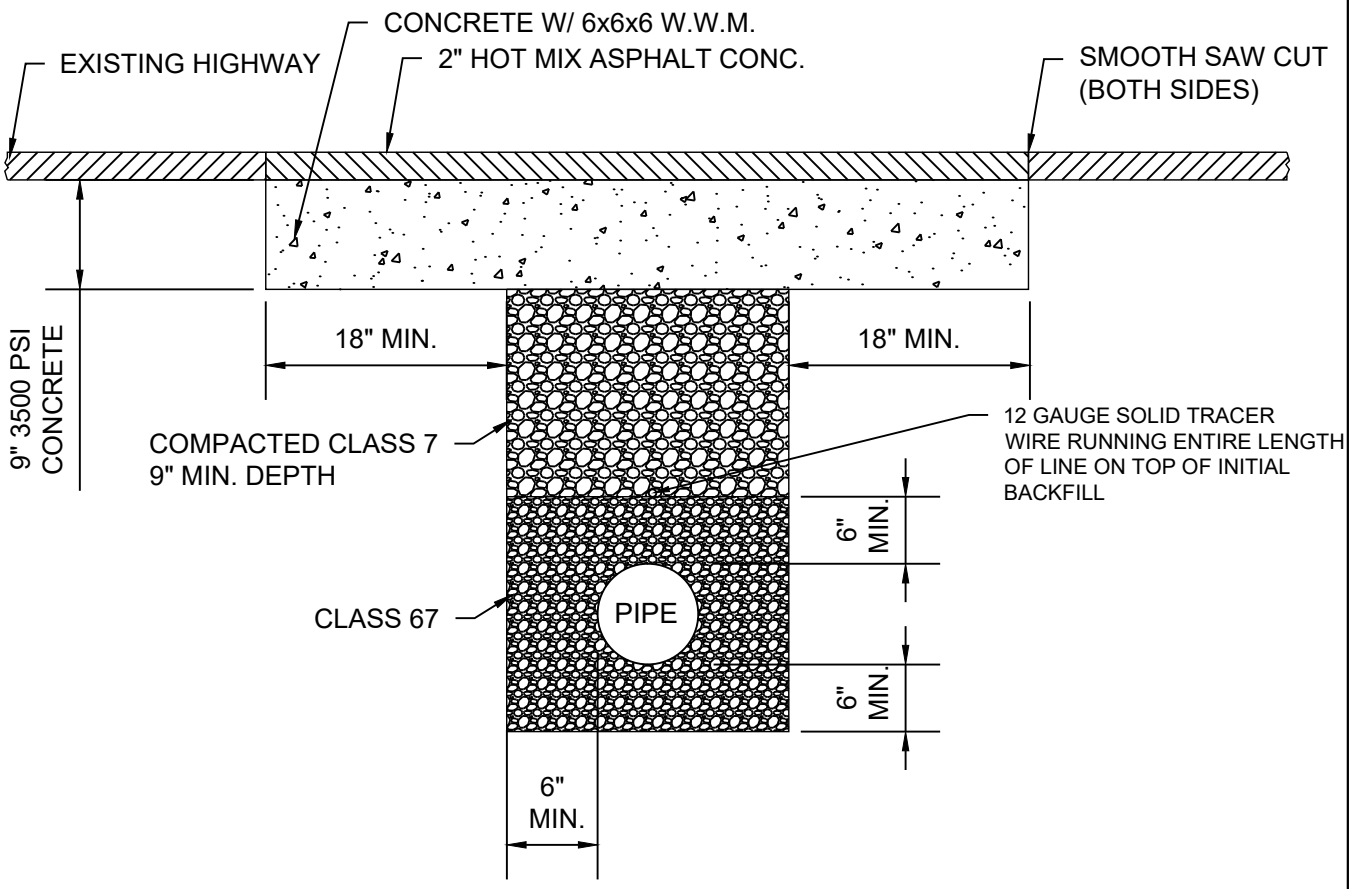


NOTES:

1. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF ¾" (NO SAND).
2. THIS DETAIL IS TO BE USED FOR WATER LINES AND SANITARY SEWER MAINS.

CITY OF PEA RIDGE		WATER DETAIL - W07	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

HIGHWAY STREET REPAIR

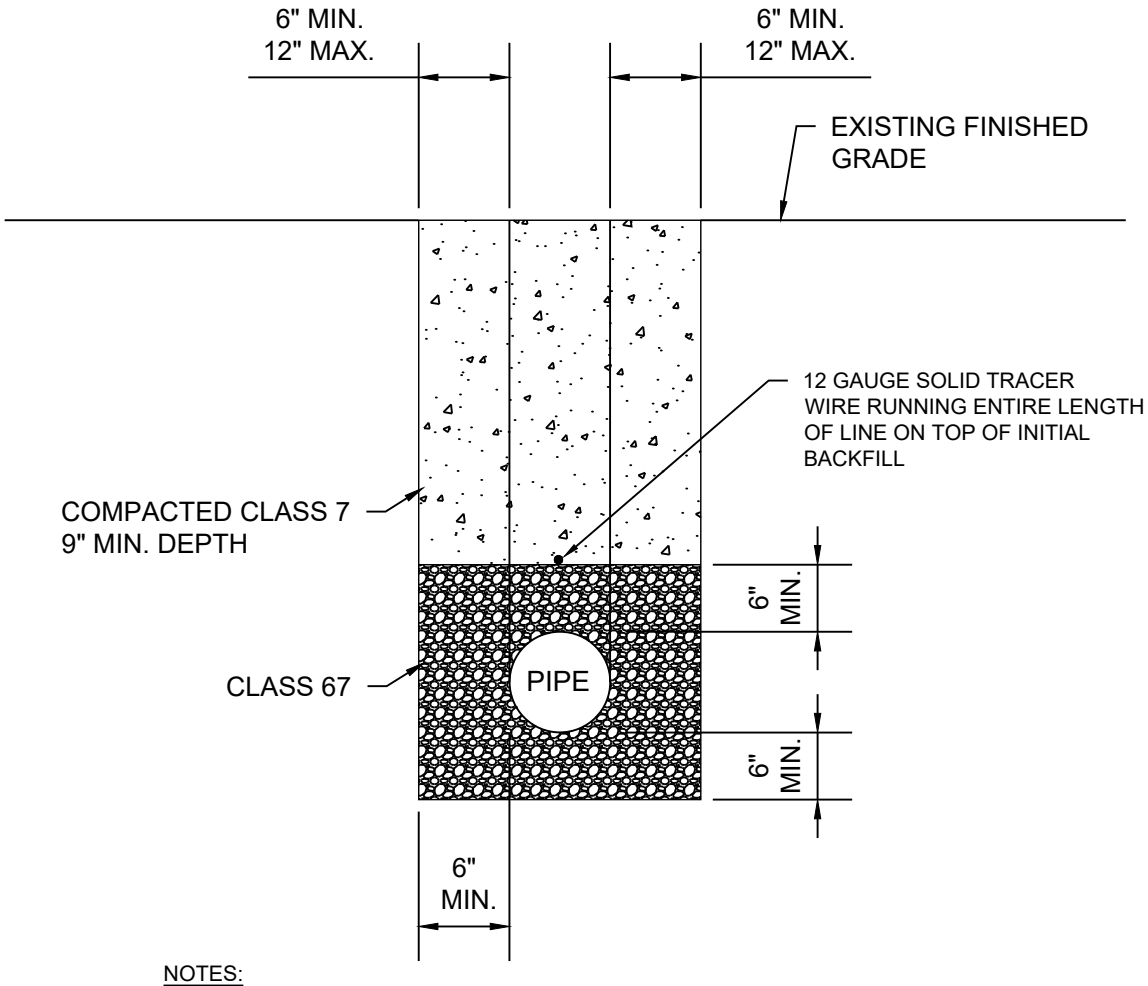


NOTES:

1. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND).
2. THIS DETAIL IS TO BE USED FOR WATER LINES AND SANITARY SEWER MAINS.

CITY OF PEA RIDGE		WATER DETAIL - W08	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

UNIMPROVED ROADS & DRIVEWAYS-
PRIVATE DRIVEWAYS & PARKING AREAS



NOTES:

* IMPROVED PRIVATE DRIVEWAYS AND PARKING AREAS BACKFILLED AS SHOWN ABOVE. SUBSURFACE MATERIAL TO EQUAL OR EXCEED EXISTING SURFACE.
* THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND).
* THIS DETAIL IS TO BE USED FOR WATER LINES AND SANITARY SEWER MAINS.

CITY OF PEA RIDGE		WATER DETAIL - W09	
		REVISION DATE:	
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REACTION BACKING TABLE

REQUIRED SQUARE FEET OF UNDISTURBED EARTHWORK FOR REACTION BACKING

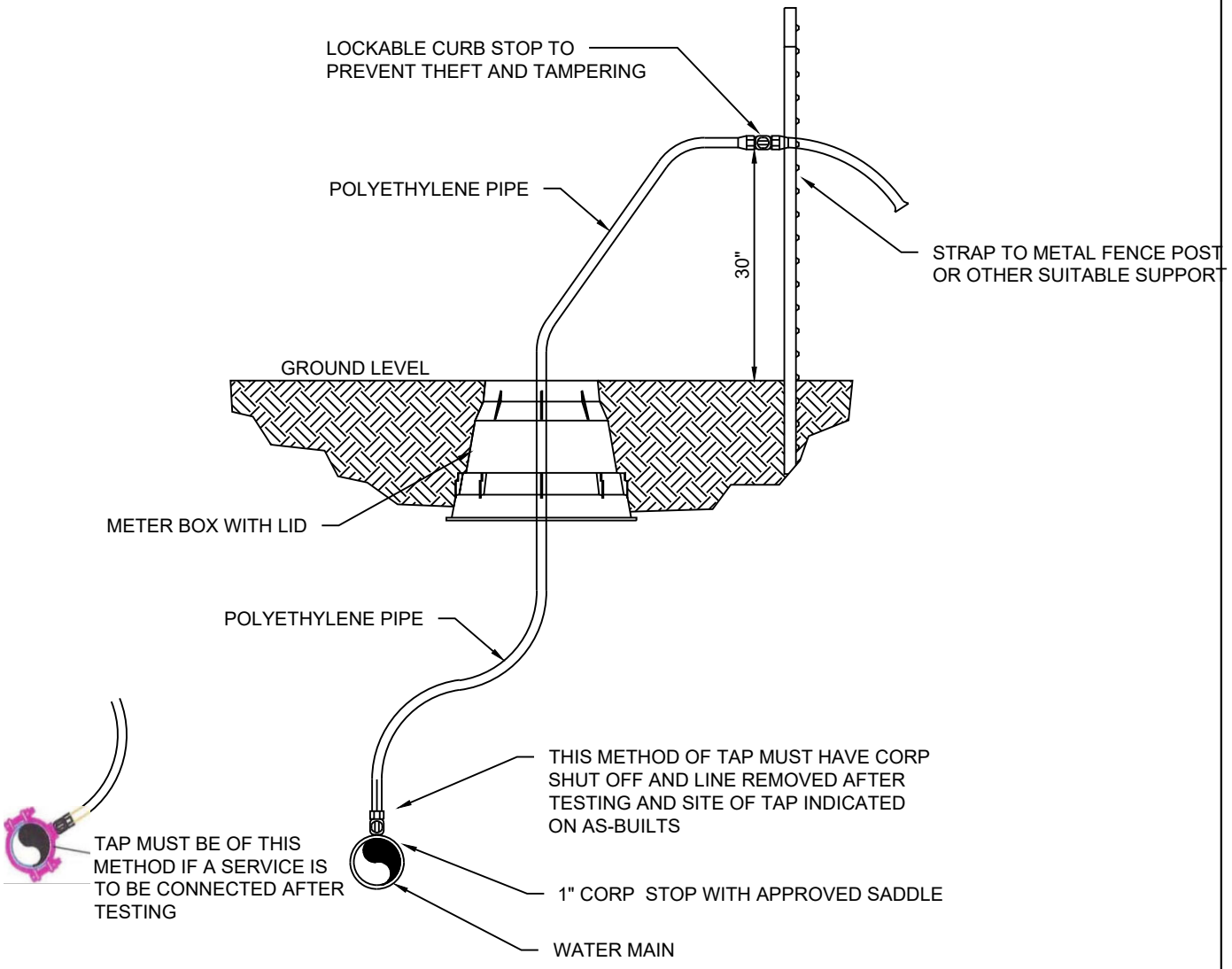
PIPE SIZE	TYPE OF FITTINGS					
	TEE	90°	45°	22 1/2°	11 1/4°	PLUG
2"	1	1	1	1	1	1
3"	1	1	1	1	1	1
4"	1	2	1	1	1	2
6"	3	3	2	1	1	3
8"	4	6	3	2	1	4
10"	6	8	5	3	1	6
12"	8	12	6	3	2	8
14"	11	16	9	4	2	11
16"	14	20	11	6	3	14
18"	18	25	14	7	4	18
20"	22	31	17	9	4	22
24"	32	45	24	12	6	32
30"	48	68	37	19	10	48
36"	69	98	53	27	14	69

NOTES:

1. ALL FITTINGS SHALL BE MECHANICAL JOINTS.
2. DO NOT COVER BELLS OR FLANGES WITH CONCRETE.
3. WRAP ALL FITTINGS WITH POLY WRAP.
4. BACK ALL TEES ACCORDING TO SIZE OF BRANCH.
5. BACKING FUTURE LINE EXTENSIONS SHALL BE SUCH THAT LATER REMOVAL IS POSSIBLE.
6. ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL OR VERTICAL, SHALL BE BACKED.
7. REACTION BACKING TABLE IS BASED ON 150 PSI AND SOIL BEARING PRESSURE OF 2,000 LB/SQ. FT. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS REQUIRED BY CITY WATER DEPARTMENT.

CITY OF PEA RIDGE		WATER DETAIL - W10	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

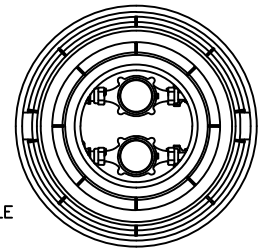
TEMPORARY 1" BLOW OFF ASSEMBLY
SAMPLE POINTS



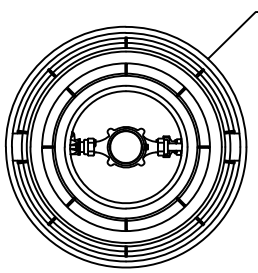
CITY OF PEA RIDGE		WATER DETAIL - W11	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

WATER SERVICE DETAIL 5/8", 3/4", & 1"

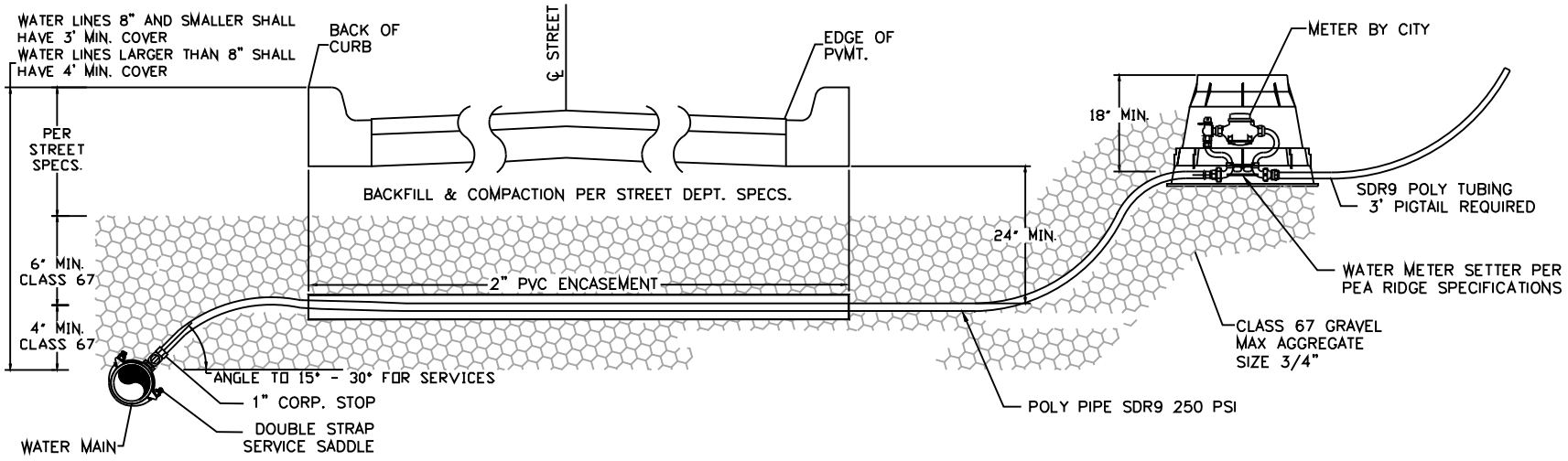
NOTE:
1" TUBING WILL
SUPPLY WATER TO A SINGLE
5/8" METER SERVICE OR A DOUBLE
5/8" METER SERVICE.



DOUBLE SET



SINGLE SET



NOTE:
LONG SERVICES UNDER
ROADWAY WILL HAVE 2" PVC
CARRIER PIPE AS SLEEVING.

CITY OF
PEA RIDGE

WATER DETAIL - W12

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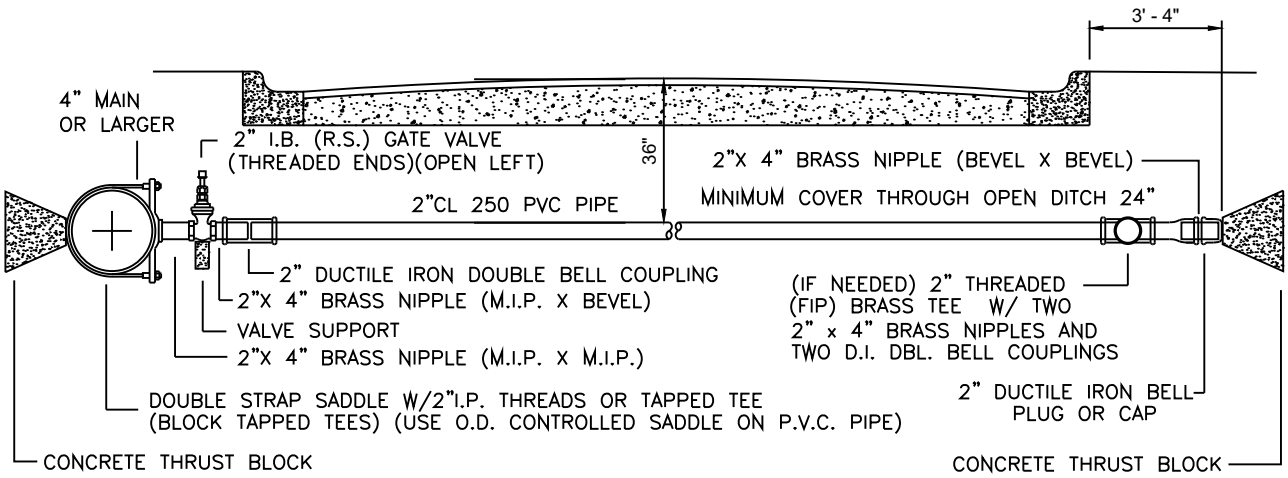
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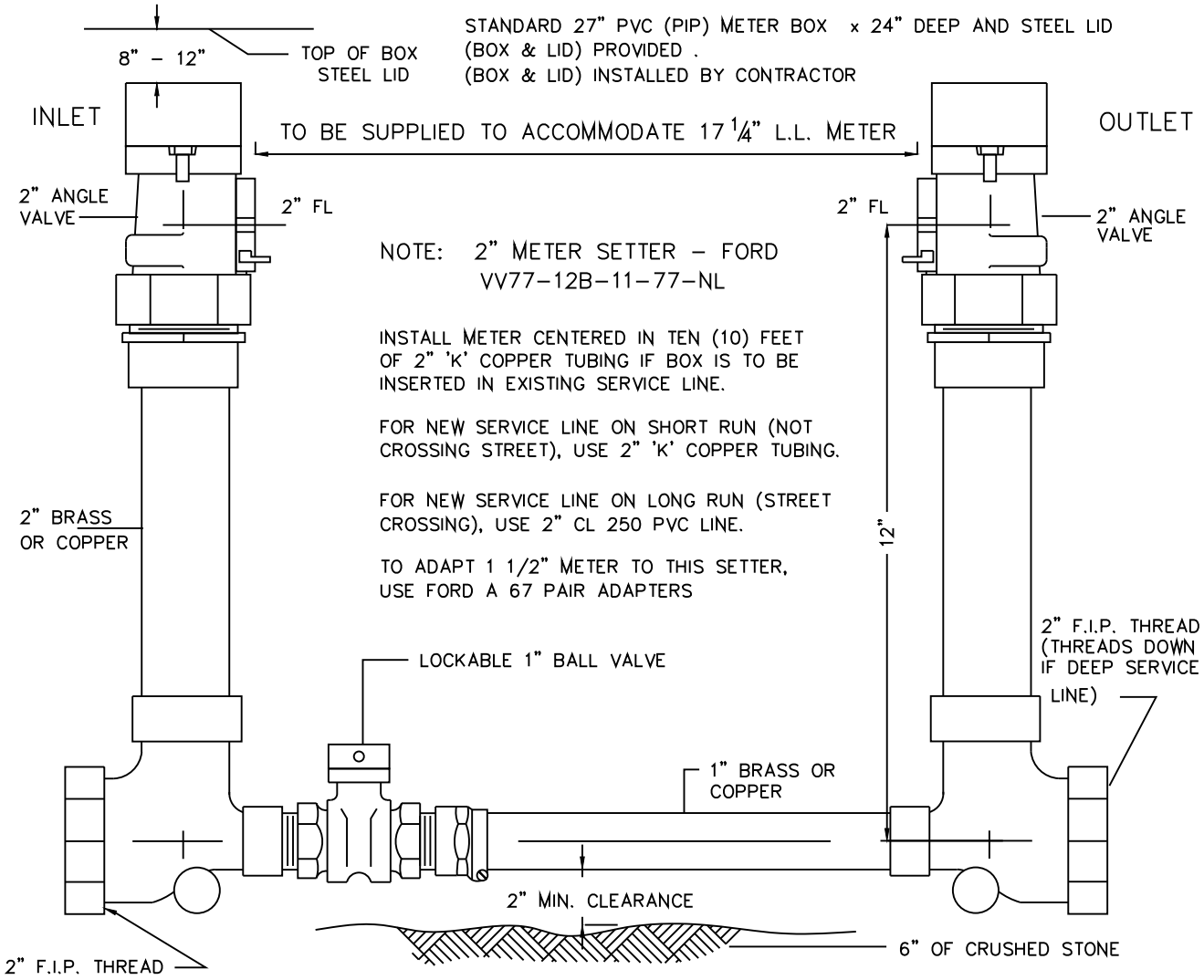
REVISION DATE:

2" SERVICE CONNECTION
MAINS 4" AND LARGER



CITY OF PEA RIDGE		WATER DETAIL - W13	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

METER SETTING FOR
1 1/2" & 2" METERS

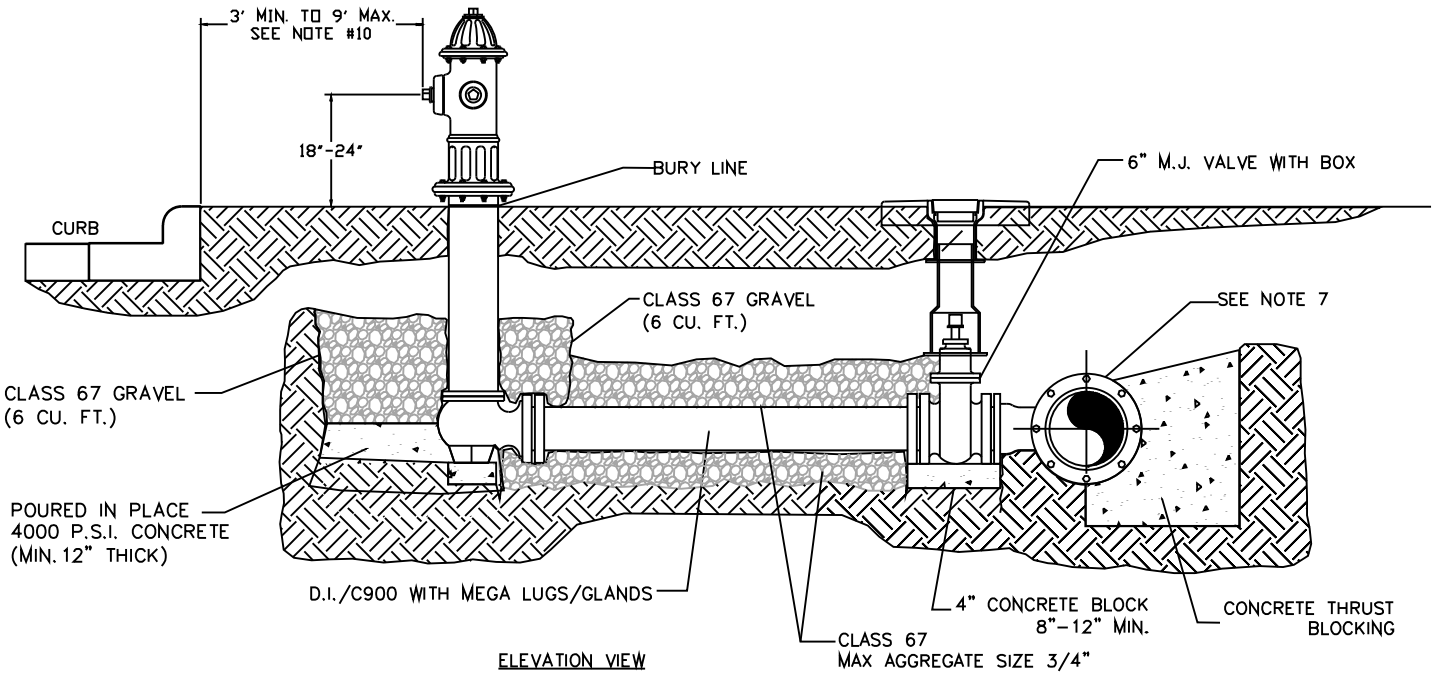


NOTES:

1. 2" IPS/CTS POLYETHYLENE TUBING CAN BE USED IN PLACE OF "K" COPPER TUBING OR CL250 PVC LINE.
2. THE LOCKABLE 1" BALL VALVE IS REQUIRED ONLY FOR FACILITIES WHERE WATER SERVICE SHOULD NOT BE INTERRUPTED DURING METER MAINTENANCE.

CITY OF PEA RIDGE		WATER DETAIL - W14	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

FIRE HYDRANT DETAIL W/DI/C900 PIPE AND RETAINER GLANDS



ELEVATION VIEW

NOTES:

1. DRAINAGE BED SHALL CONSIST OF 6 CU. FT. OF CLASS 67 GRAVEL. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF ¾" (NO SAND)
2. USE 6" D.I./C900 WITH MEGA LUGS/GLANDS IF DISTANCE BETWEEN VALVE AND HYDRANT MUST BE GREATER THAN 17" SWIVEL ADAPTER.
3. FIRE HYDRANT TO BE BLOCKED AGAINST FIRM SOIL AS SHOWN.
4. ALL HYDRANTS SHALL BE INSTALLED PLUMB.
5. LARGE NOZZLE SHALL FACE CURB UNLESS OTHERWISE NOTED. ROTATE BARREL AS REQUIRED.
6. HYDRANT SHOULD NOT BE SET CLOSER THAN 4'-0" TO OBSTRUCTIONS THAT ARE IN LINE WITH NOZZLE.
7. M.J. ANCHOR TEE, TAPPING SLEEVE OR TAPPING SADDLE MAY BE USED (SEE MATERIAL SPECIFICATIONS).
8. HYDRANTS TO BE SET AT DEPTHS GREATER THAN 60' SHALL BE SET WITH A MODIFIED FIRE HYDRANT SETTING.(CONTACT PEA RIDGE WATER DEPARTMENT FOR DETAILED DRAWING FOR DEEP DEPTH FIRE HYDRANT SETTINGS).
9. POLYWRAP ENTIRE HYDRANT ASSEMBLY DO NOT COVER WEEP HOLE DRAIN.
10. REFER TO UTILITY CORRIDOR AND DESIGN REQUIREMENTS.

CITY OF PEA RIDGE

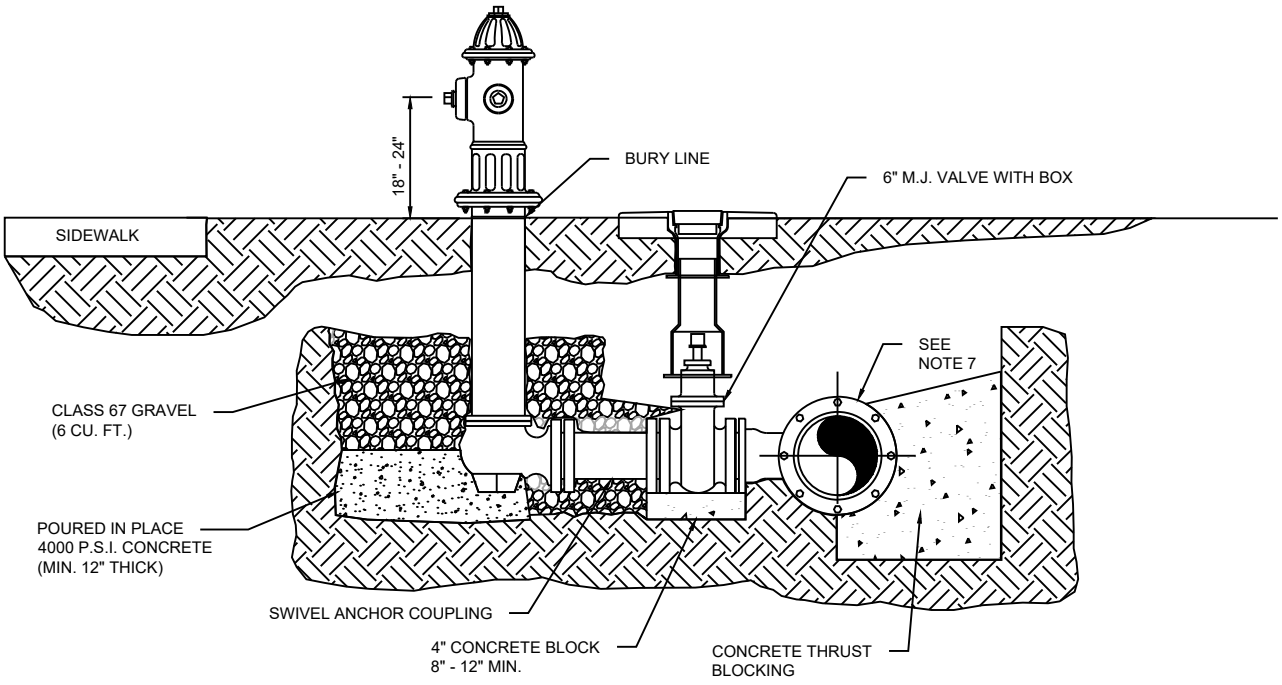
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REVISION DATE:

WATER DETAIL - W15

FIRE HYDRANT DETAIL
WITH SWIVEL ANCHOR COUPLING



ELEVATION VIEW

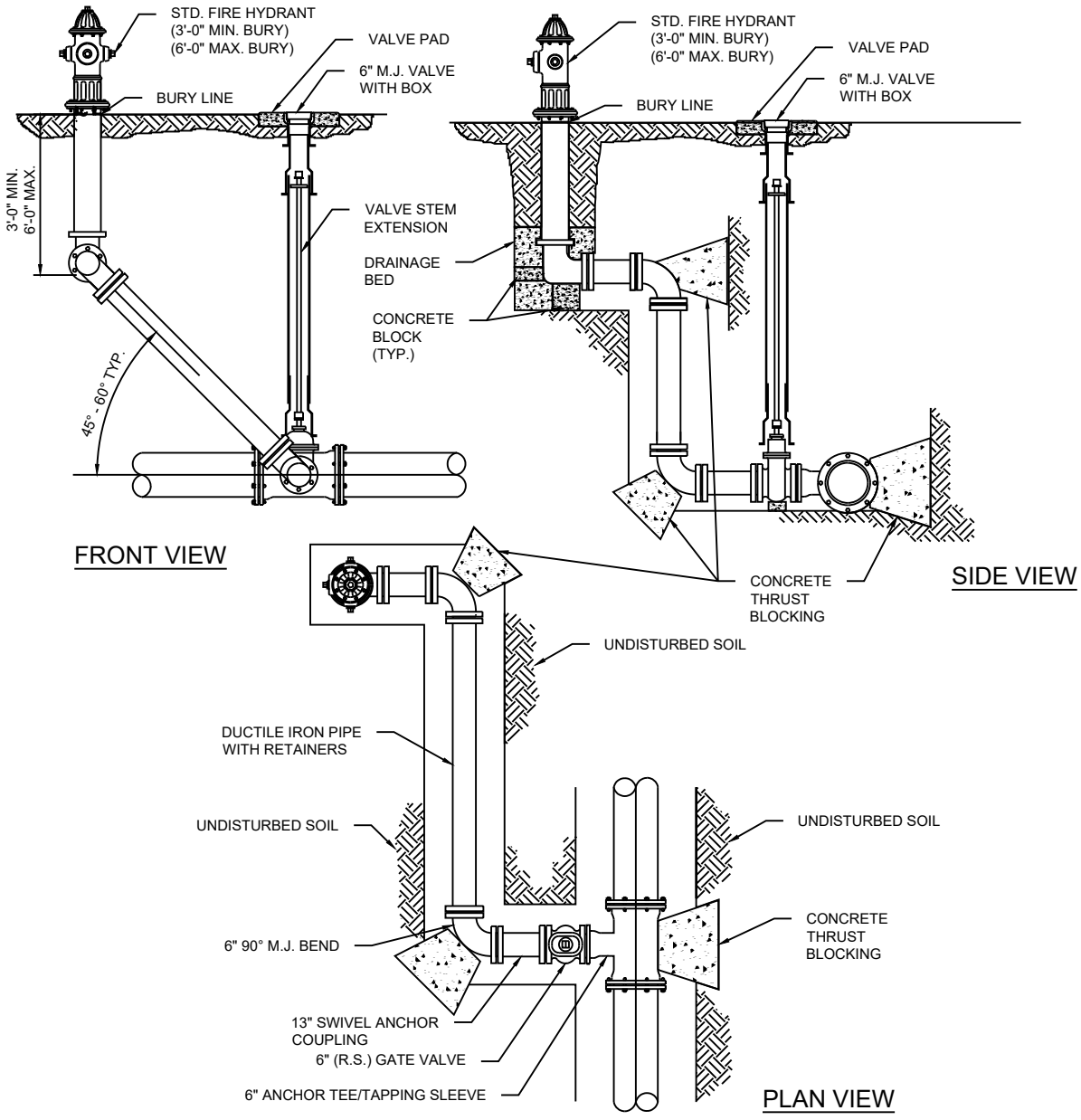
NOTES:

1. DRAINAGE BED SHALL CONSIST OF 6 CU. FT. OF CLASS 67 GRAVEL. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND)
2. USE 6" D.I. WITH MEGA LUGS/GLANDS IF DISTANCE BETWEEN VALVE AND HYDRANT MUST BE GREATER THAN 13" SWIVEL ADAPTER.
3. FIRE HYDRANT TO BE BLOCKED AGAINST FIRM SOIL AS SHOWN.
4. ALL HYDRANTS SHALL BE INSTALLED PLUMB.
5. LARGE NOZZLE SHALL FACE CURB UNLESS OTHERWISE NOTED. ROTATE BARREL AS REQUIRED.
6. HYDRANT SHOULD NOT BE SET CLOSER THAN 4'-0" TO OBSTRUCTIONS THAT ARE IN LINE WITH NOZZLE.
7. M.J. ANCHOR TEE, TAPPING SLEEVE OR TAPPING SADDLE MAY BE USED (SEE MATERIAL SPECIFICATIONS).
8. HYDRANTS TO BE SET AT DEPTHS GREATER THAN 60' SHALL BE SET WITH A MODIFIED FIRE HYDRANT SETTING.(CONTACT PEA RIDGE WATER DEPARTMENT FOR DETAILED DRAWING FOR DEEP DEPTH FIRE HYDRANT SETTINGS).
9. POLYWRAP ENTIRE HYDRANT ASSEMBLY DO NOT COVER WEEP HOLE DRAIN.
10. REFER TO UTILITY CORRIDOR AND DESIGN REQUIREMENTS.

CITY OF PEA RIDGE	WATER DETAIL - W16
	REVISION DATE:
DRAWN BY: CHECKED BY:	APPROVED BY: DATE:

DEEP BURY FIRE HYDRANTS

(BURY DEEPER THAN 6'-0")

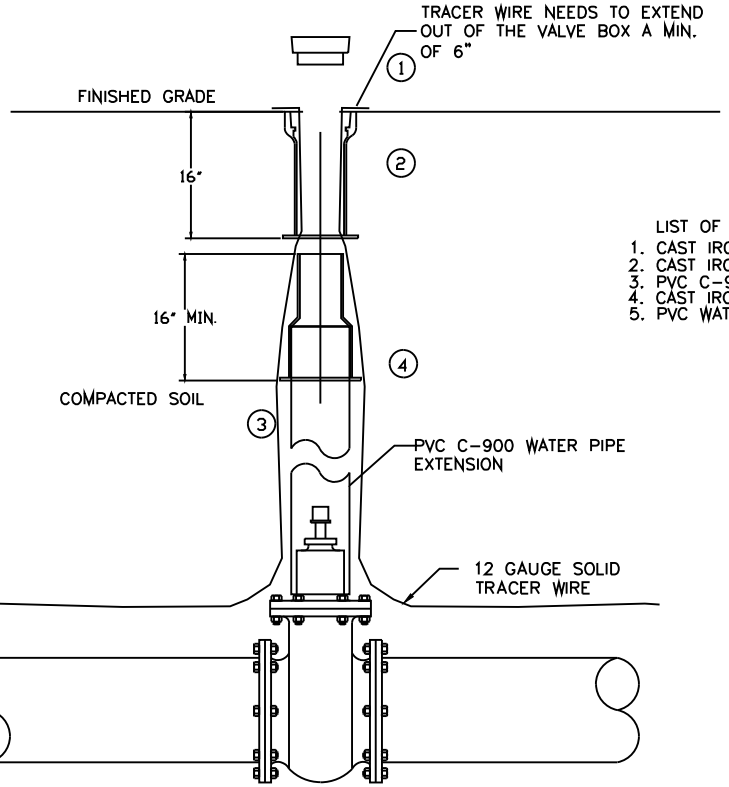


NOTES:

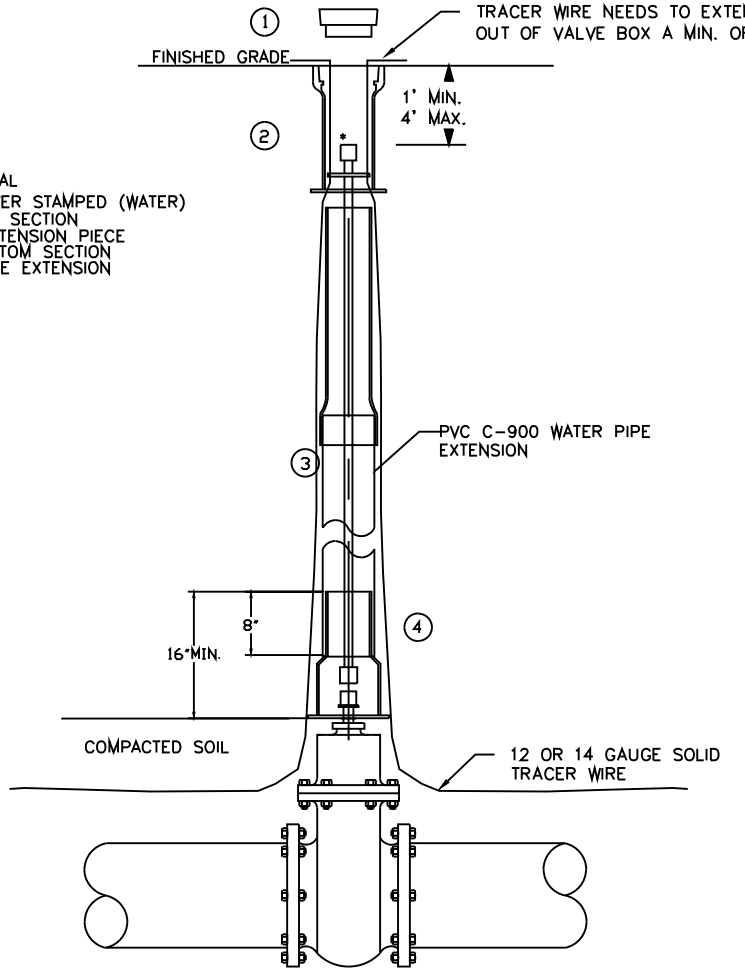
1. DRAINAGE BED SHALL CONSIST OF CRUSH STONE OR COURSE GRAVEL WITH COURSE SAND MINIMUM VOLUME OF 6 CU. FT. DRAIN BED SHALL EXTEND A MINIMUM OF 6" ABOVE DRAIN OUTLET.
2. USE 6" D.I. NIPPLE WITH M.J. RETAINER GLANDS IF DISTANCE BETWEEN VALVE AND HYDRANT MUST BE GREATER THAN 17" SWIVEL ADAPTER.
3. FIRE HYDRANT TO BE BLOCKED AGAINST FIRM SOIL AS SHOWN.
4. ALL HYDRANTS SHALL BE INSTALLED PLUMB.
5. LARGE NOZZLE SHALL FACE CURB UNLESS OTHERWISE NOTED ROTATE BARREL AS REQUIRED.
6. HYDRANT SHOULD NOT BE SET CLOSER THAN 4'-0" TO OBSTRUCTIONS THAT ARE IN LINE WITH NOZZLE.
7. M.J. ANCHOR TEE OR TAPPING SLEEVE MAY BE USED (SEE MATERIAL SPECIFICATIONS) WHEN USING REGULAR M.J. TEE USE 13" SWIVEL ADAPTER NIPPLE BETWEEN TEE AND VALVE.
8. POLY WRAP ALL PIPE, FITTINGS, BOLTS AND NUTS.
9. FOR HYDRANTS NOT SET IN CONCRETE, PAVEMENT OR SIDEWALKS, A CONCRETE PAD SHALL BE CONSTRUCTED AROUND THE HYDRANT BARREL. CONCRETE PAD SHALL BE 2'X2'X1' DEEP, REINFORCED WITH ONE #5 REBAR ALL AROUND HYDRANT.

CITY OF PEA RIDGE	WATER DETAIL - W17
	REVISION DATE:
DRAWN BY: CHECKED BY:	APPROVED BY: DATE:

VALVE BOX VALVE STEM & TRACER WIRE INSTALLATION



LIST OF MATERIAL
1. CAST IRON COVER STAMPED (WATER)
2. CAST IRON TOP SECTION
3. PVC C-900 EXTENSION PIECE
4. CAST IRON BOTTOM SECTION
5. PVC WATER PIPE EXTENSION



NOTES:

1. IF EXTENSION PIECE IS NEEDED, PVC C-900 WATER PIPE MAY BE USED.
2. EXTENSION PIECE CAN BE CUT TO LENGTH REQUIRED.
3. TRACER WIRE NEEDS TO EXTEND OUT OF THE VALVE BOX A MINIMUM OF 6"

**PROVIDE VALVE STEM EXTENSION WITH CENTERING DEVICE IF GREATER THAN 4.0' DEEP.*

CITY OF PEA RIDGE

WATER DETAIL - W18

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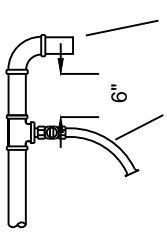
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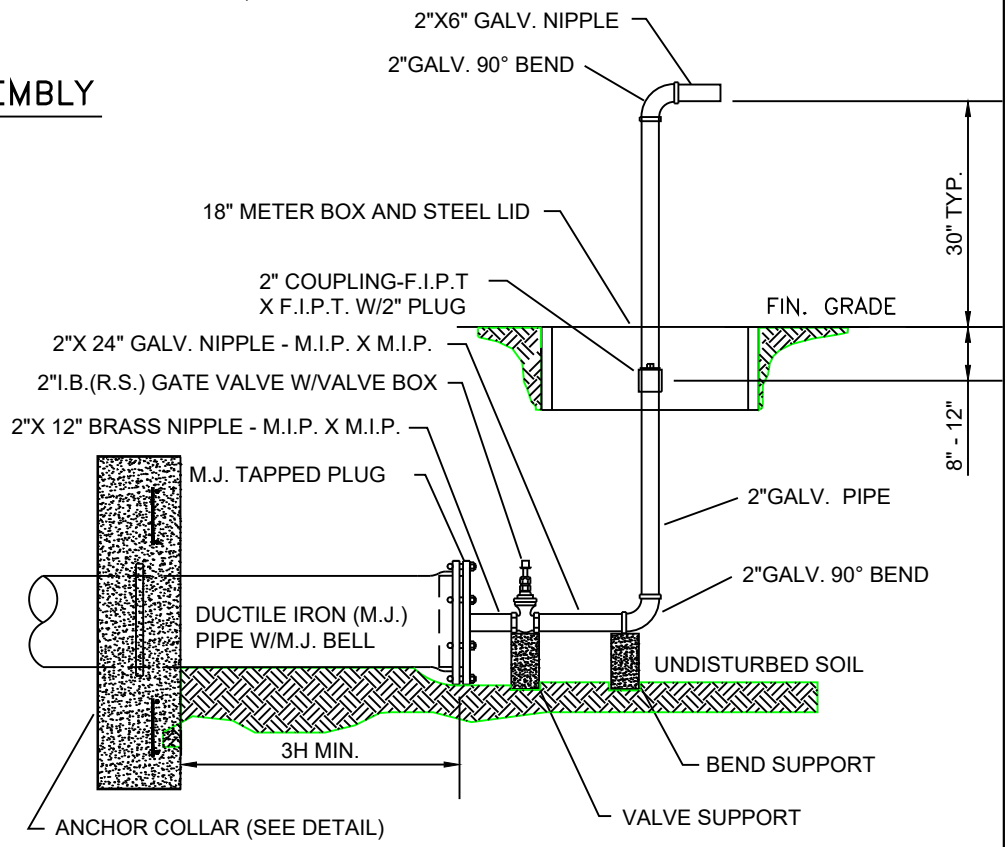
DATE:

REVISION DATE:

RESTRAINED GATE VALVE W/ 2" BLOWOFF



2" SAMPLE POINT ASSEMBLY

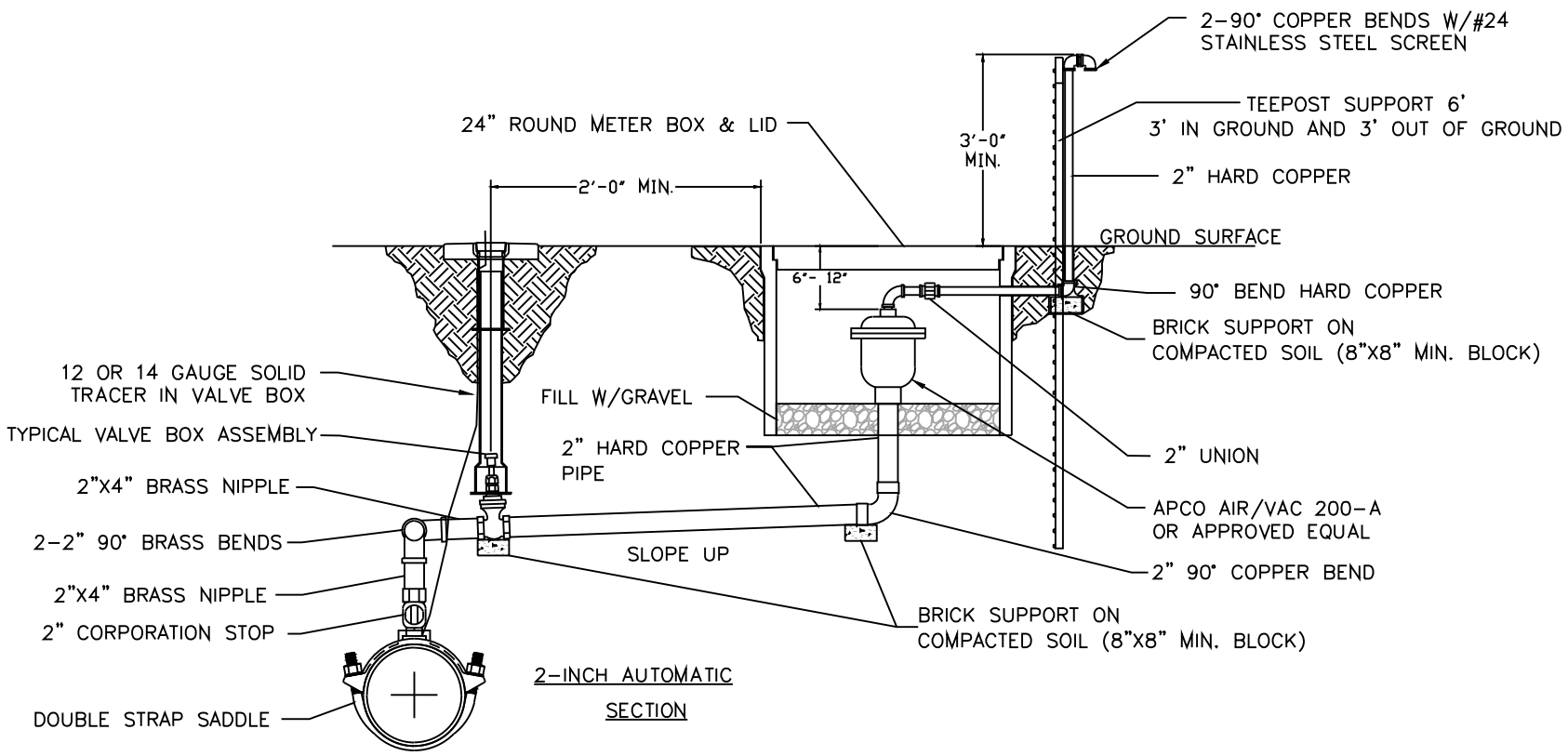


NOTES:
1. 2" END BLOW OFF'S TO BE INSTALLED AT THE END OF MAINS 6" AND LARGER
2. A 1" COPPER BLOW OFF SHALL BE INSTALLED AT ON NEAR THE END OF EVERY MAIN NOT REQUIRING A 2" BLOW OFF.
3. ALL THREADED OUTLETS SHALL HAVE A DOUBLE WRAP OF TEFLON TAPE, TEFLON PASTE OR RECTORSEAL ON THREADS.
4. VALVE BOXES SHALL BE INSTALLED ON ALL BLOW OFF VALVES.
5. RISER PIPE SHALL BE PIPED INTO METER BOX AS SHOWN.

2" END BLOW OFF ASSEMBLY

CITY OF PEA RIDGE	WATER DETAIL - W19
	REVISION DATE:
DRAWN BY: CHECKED BY:	APPROVED BY: DATE:

2" COMBINATION AIR/VACUUM VALVE DETAIL



NOTES:
1. ALL THREADED CONNECTIONS SHALL HAVE A DOUBLE WRAP OF TEFLON TAPE ON THREADS.
2. DRILL HOLE IN SIDE OF METER BOX FOR OUTLET PIPING.
3. VALVES WILL BE PIPED TO POINT BEYOND PAVEMENT AND SHOULDER.

CITY OF PEA RIDGE

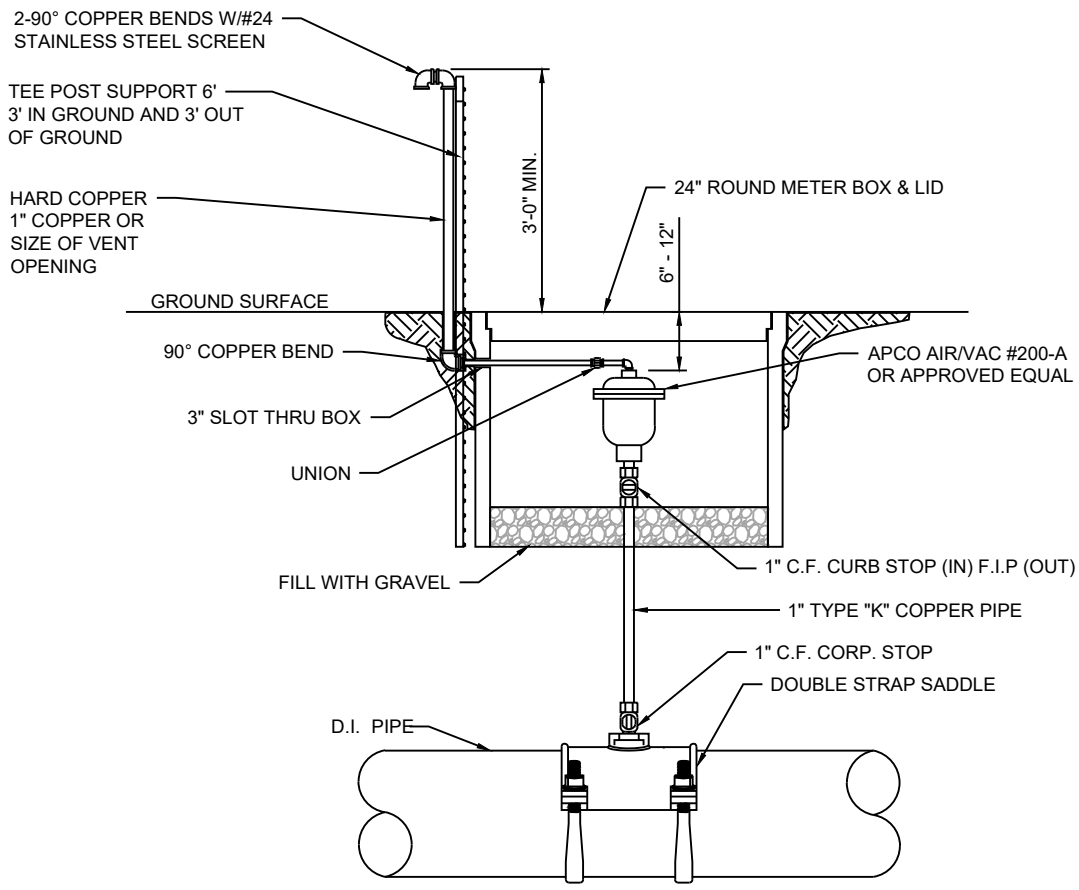
WATER DETAIL - W20

DRAWN BY: CHECKED BY:

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REVISION DATE:

1" COMBINATION AIR/VACUUM VALVE DETAIL



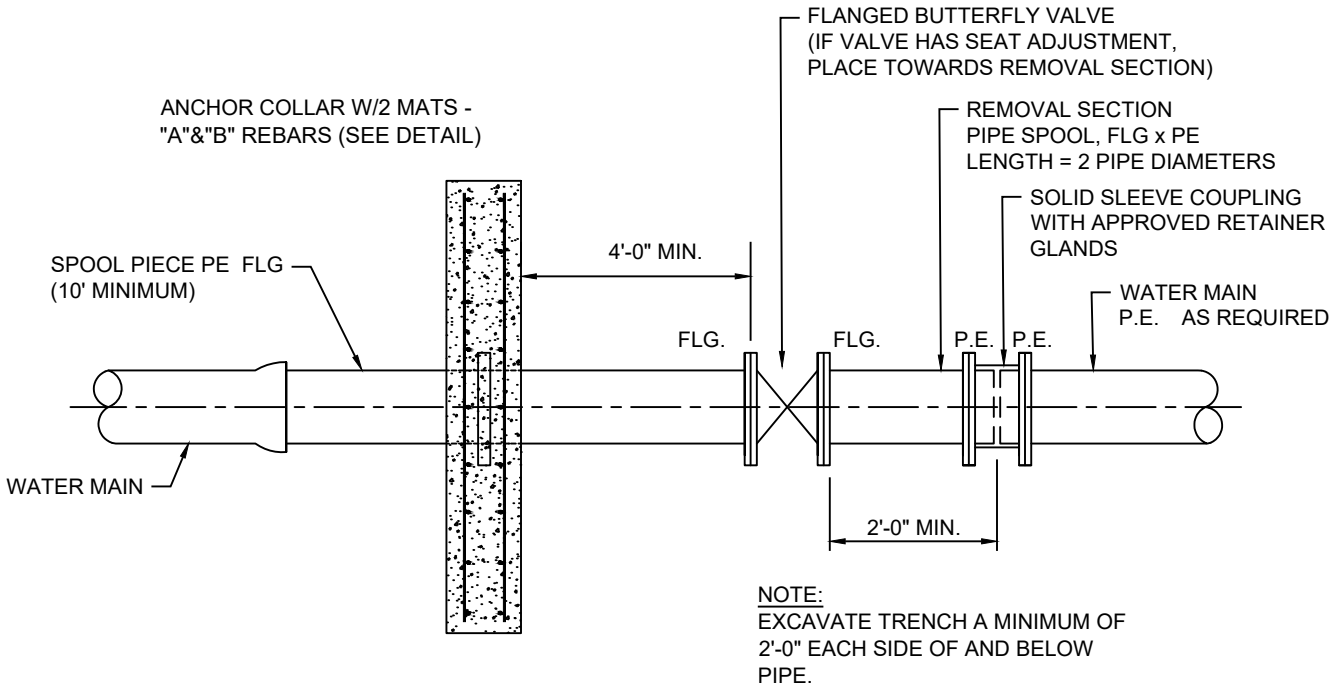
NOTES:

1. ALL THREADED CONNECTIONS SHALL HAVE A DOUBLE WRAP OF TEFLON TAPE ON THREADS.
2. DRILL HOLE IN SIDE OF METER BOX FOR OUTLET PIPING.
3. VALVES WILL BE PIPED TO POINT BEYOND PAVEMENT AND SHOULDER.

CITY OF PEA RIDGE		WATER DETAIL - W21	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

TYPICAL BUTTERFLY VALVE INSTALLATION

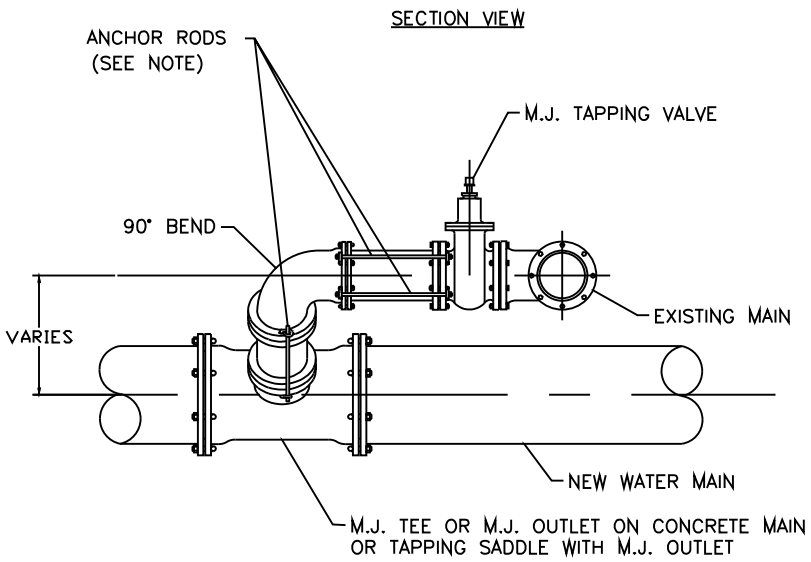
(16" AND LARGER PIPE)

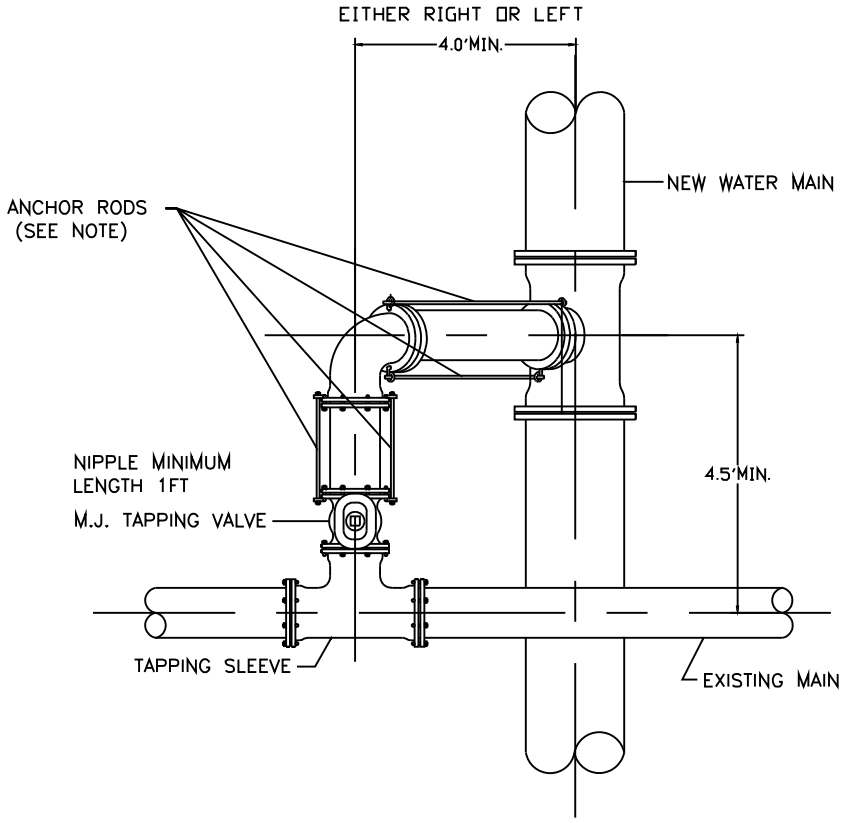


NOTE:
EXCAVATE TRENCH A MINIMUM OF
2'-0" EACH SIDE OF AND BELOW
PIPE.

CITY OF PEA RIDGE		WATER DETAIL - W22	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

SWING CONNECTION - NEW MAIN TO EXISTING MAIN





THRUST BLOCKING REQUIRED AT TEES AND ELBOWS.

PIPE SIZE	6"	8"	12"
RODS PER NIPPLE	2	2	4

NOTES:
1. CONTRACTOR SHALL LOCATE EXISTING MAIN IN ADVANCE OF LAYING NEW LINE IN ORDER TO ASSURE ADEQUATE LENGTH TO ADJUST DEPTH OF NEW MAIN.
2. DIMENSIONS SHOWN ARE RECOMENDED MINIMUMS TO PROVIDE ADEQUATE ROOM FOR TIGHTENING BOLTS ON JOINTS (OTHER DIMENSIONS MAY BE USED).
3. PROVIDE STAINLESS STEEL "ALL THREAD (MIN 5/8" DIA.)" TIE RODS WITH EYE BOLTS FOR ANCHORING ALL JOINTS.
4. RODS SHALL BE FIELD CUT TO FIT & SHALL BE PROTECTED WITH POLYWRAP.
5. ROTATE TEE UP & ELBOW DOWN AS REQUIRED TO MATCH.
6. USE TYPICAL CONCRETE BLOCKING REQUIRED.

CITY OF
PEA RIDGE

WATER DETAIL - W23

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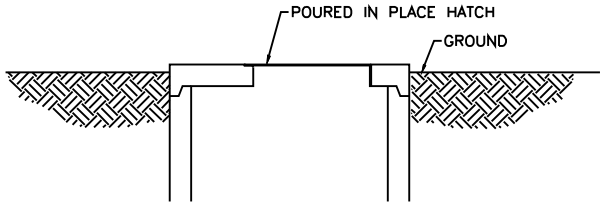
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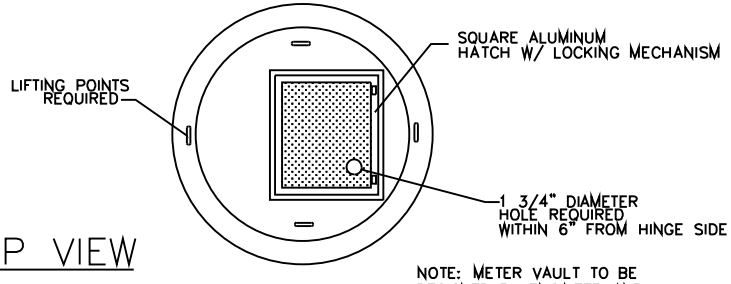
REVISION DATE:

METER VAULT DETAIL 4" - 8" METERS (ROUND)

(DIMENSIONS MAY VARY FOR METER SIZES)

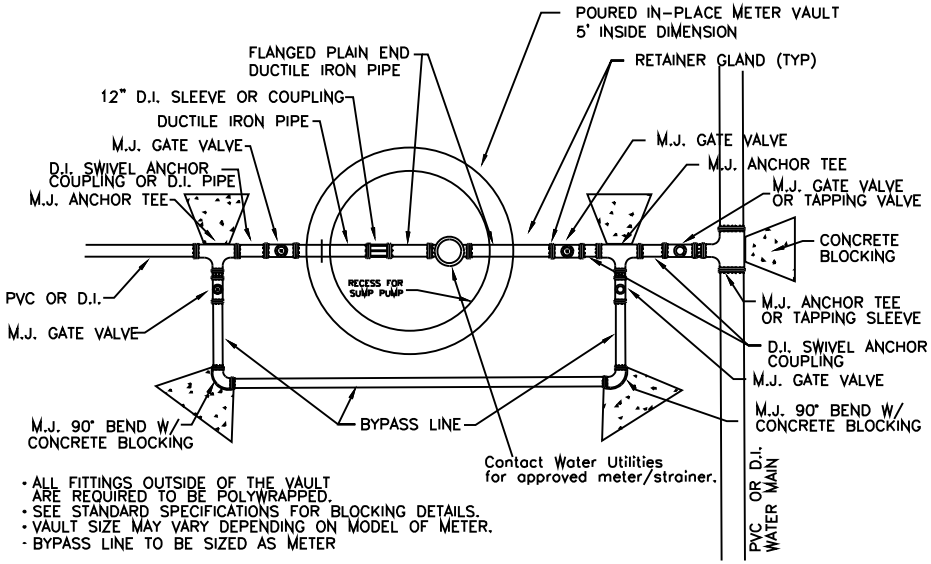


SIDE VIEW



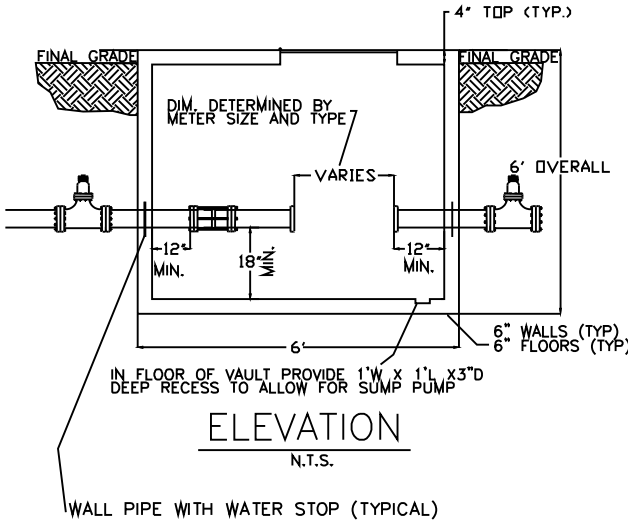
TOP VIEW

NOTE: METER VAULT TO BE DESIGNED BY ENGINEER AND APPROVED BY UTILITY



PLAN VIEW

N.T.S.



ELEVATION

N.T.S.

CITY OF PEA RIDGE

WATER DETAIL - W24

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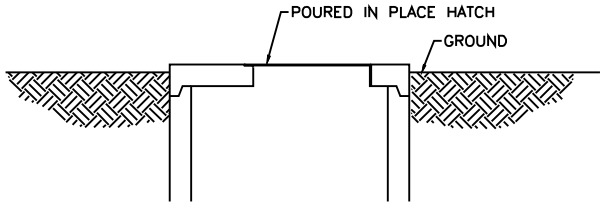
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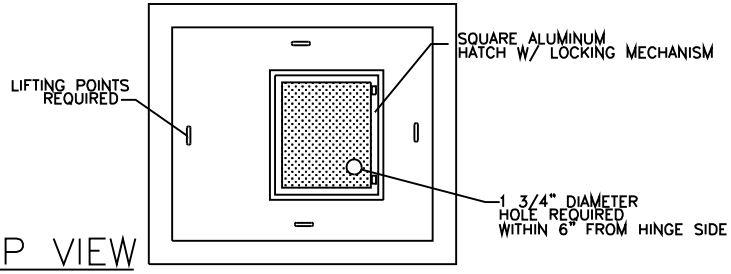
REVISION DATE:

METER VAULT DETAIL 4" - 8" METERS (RECTANGULAR)

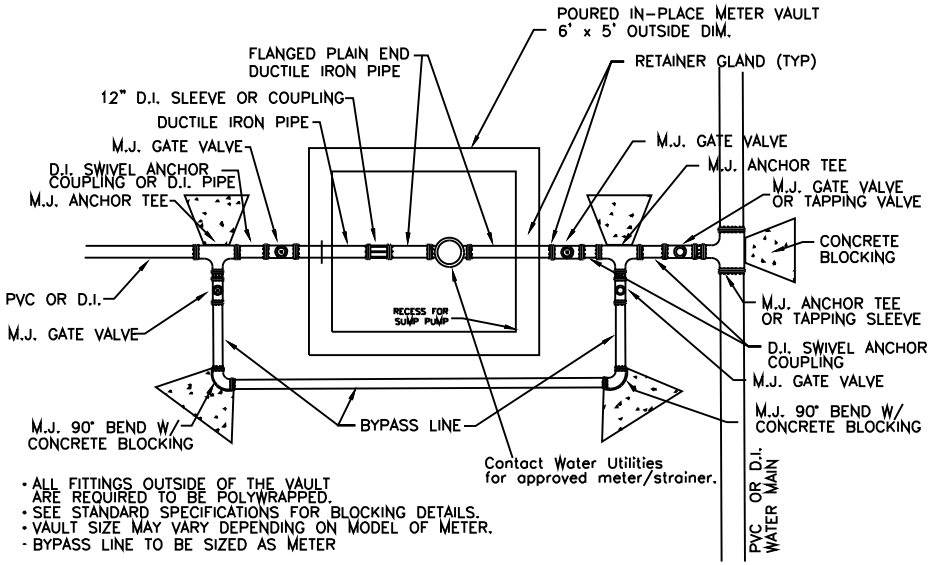
(DIMENSIONS MAY VARY FOR METER SIZES)



SIDE VIEW



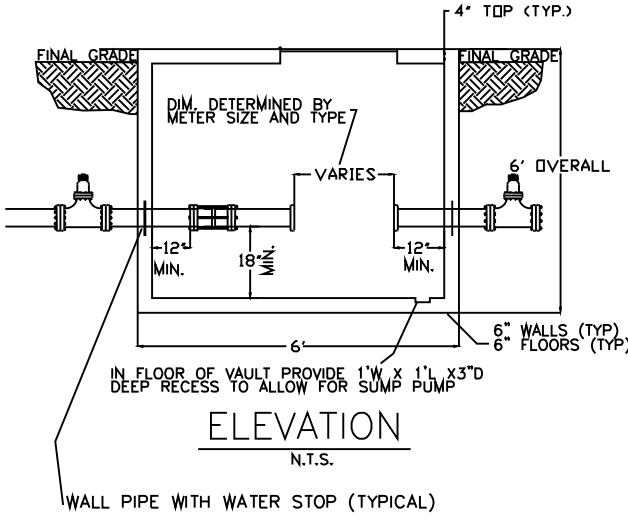
TOP VIEW



PLAN VIEW

N.T.S.

NOTE: METER VAULT TO BE DESIGNED BY ENGINEER AND APPROVED BY UTILITY



ELEVATION

N.T.S.

CITY OF PEA RIDGE

WATER DETAIL - W25

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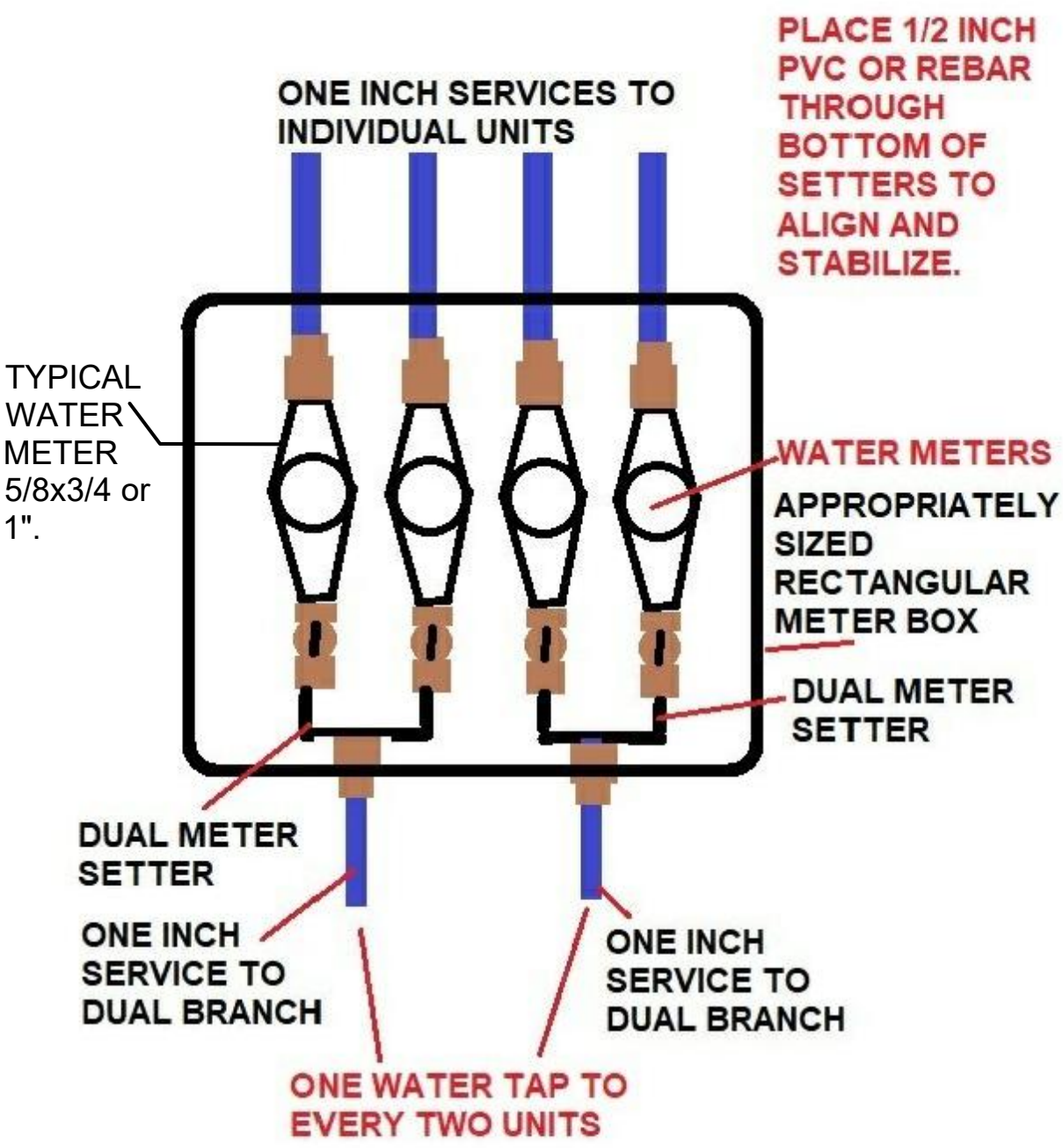
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REVISION DATE:

MULTI-UNIT WATER METER OPTION

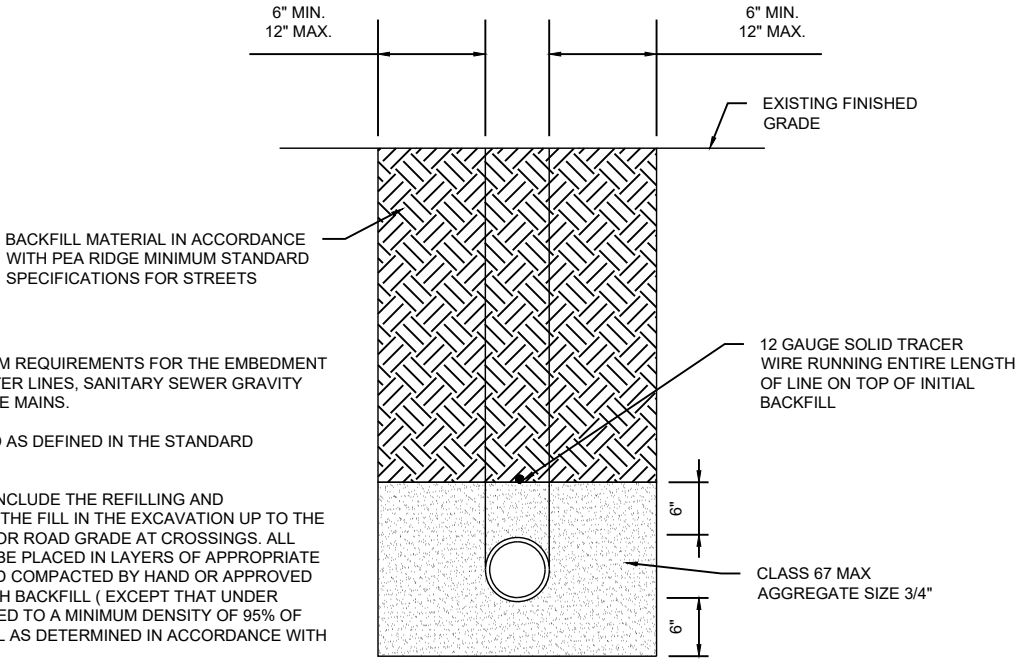


METER GANG BOX EXAMPLE

MULTI-UNIT SERVICES MUST BE PRE-APPROVED BY UTILITY DURING PLANNING .

CITY OF PEA RIDGE		MULTI-UNIT WATER METER OPTIONAL - W26	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

TYPICAL BEDDING DETAIL



REFER TO STREET SPECIFICATIONS FOR STREET REPAIR INFORMATION

GENERAL:

THIS SECTION COVERS THE MINIMUM REQUIREMENTS FOR THE EMBEDMENT AND BACKFILLING OF POTABLE WATER LINES, SANITARY SEWER GRAVITY LINES, AND SANITARY SEWER FORCE MAINS.

ALL PIPELINES SHALL BE INSTALLED AS DEFINED IN THE STANDARD SPECIFICATIONS.

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 8"; AND COMPACTED BY HAND OR APPROVED MECHANICAL METHODS. ALL TRENCH BACKFILL (EXCEPT THAT UNDER PAVED AREAS) SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% OF THAT ADJACENT UNDISTURBED SOIL AS DETERMINED IN ACCORDANCE WITH ASTM D2922.

WHERE TRENCHES ARE UNDER EXISTING OR PROPOSED PAVED AREA, THE ENTIRE TRENCH UP TO A POINT (2) FEET BELOW EXISTING OR PROPOSED SUBGRADE SHALL BE BACKFILLED WITH AHTD CLASS 7 AND COMPACTED TO 90 PERCENT MODIFIED PROC TOR DENSITY AS DETERMINED BY AASHTO T-1 80. THE REMAINING 2 FEET SHALL BE BACKFILLED WITH AHTD CLASS 7 PLACED IN 6 IN. LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY AS DETERMINED BY AASHTO T-99. 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.

WHERE TRENCHES ARE UNDER EXISTING OR PROPOSED PUBLIC STREETS OF THE CITY OF PEA RIDGE, THE ENTIRE TRENCH SHALL BE BACKFILLED UP TO THE SUBGRADE WITH AHTD CLASS 7 MATERIAL PLACED IN 4-6 INCH LIFTS AND COMPACTED BY APPROVED MECHANICAL METHODS TO 95% STANDARD PROCTOR DENSITY AS DETERMINED BY AASHTO T-99. DESIGN SHALL BE FIELD VERIFIED AS ABOVE.

BACKFILL MATERIAL:

ALL, BACKFILL MATERIAL SHALL BE FREE FROM CINDERS, ASHES, REFUSE, VEGETABLE, OR ORGANIC MATERIAL, BOULDERS, ROCKS, OR STONES, FROZEN SOIL, OR OTHER MATERIAL THAT IN THE OPINION OF THE ENGINEER OR THE PEA RIDGE WATER UTILITY IS UNSUITABLE.

INITIAL BACKFILL:

AFTER EMBEDMENT AND CRUSHED STONE HAS BEEN PLACED TO THE REQUIRED DEPTH AND COMPACTION AS REQUIRED ABOVE, THE INITIAL BACKFILL (AS DEFINED IN SECTION 10.2.1 OF THE STANDARD SPECIFICATIONS) SHALL BE PLACED TO A DEPTH OF 6 INCHES ABOVE THE PIPE. ALL PIPELINES, REGARDLESS OF MATERIAL, SHALL HAVE AT LEAST 6 INCHES OF INITIAL BACKFILL ABOVE THE PIPE. THE CLASS 67 BEDDING SHALL COMPLY WITH THE MODIFICATIONS LISTED IN STANDARD SPECIFICATIONS SECTION 10.2.1. MAXIMUM AGGREGATE SIZE OF $\frac{3}{4}$" (NO SAND)

BACKFILLING OF DUCTILE IRON PIPE:

AFTER THE INITIAL BACKFILL HAS BEEN PLACED, THE TRENCH, EXCAVATED AREAS AROUND MANHOLES, VALVES, FITTINGS, FIRE HYDRANTS, AND OTHER APPURTENANCES SHALL BE BACKFILLED WITH EXCAVATED MATERIAL FREE FROM ROCK LARGER THAN 8 INCHES.

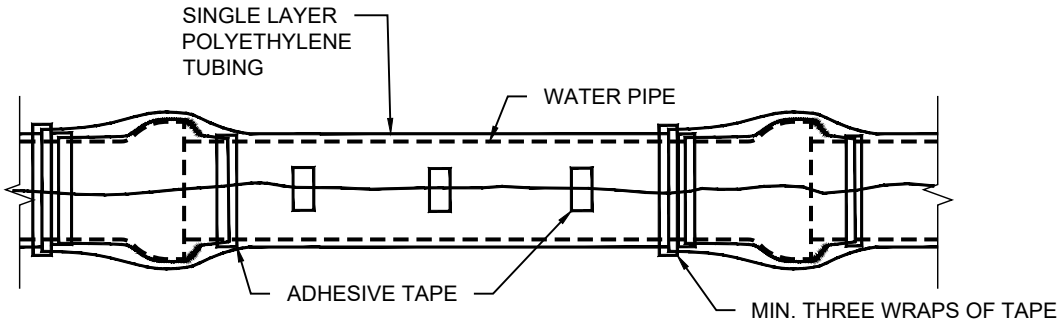
BACKFILLING OF POLYVINYL CHLORIDE (PVC) PIPE:

AFTER THE INITIAL BACKFILL HAS BEEN PLACED, THE TRENCH, EXCAVATED AREAS AROUND MANHOLES, FITTINGS, AND OTHER APPURTENANCES SHALL BE BACKFILLED WITH EXCAVATED MATERIAL FREE FROM ROCK LARGER THAN THREE INCHES; HOWEVER, PLACE NO ROCK OR STONES HAVING A DIMENSION LARGER THAN 6 INCHES WITHIN (3) FEET OF THE TOP OF THE PIPE.

MARKER TAPE INSTALLATION FOR SEWER FORCE MAINS:

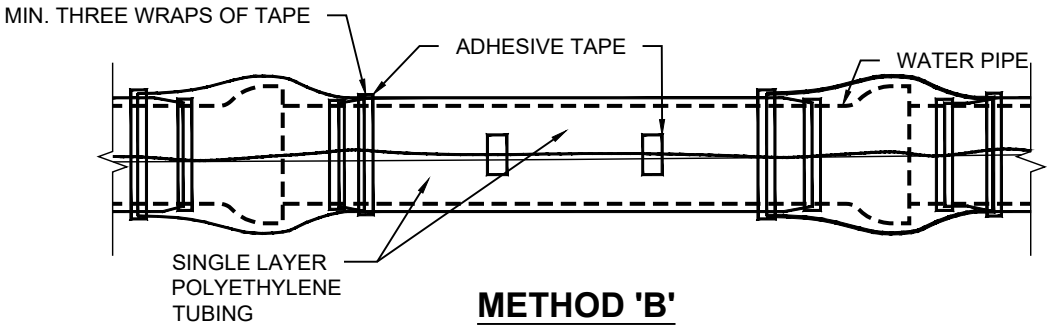
MARKER TAPE SHALL BE INSTALLED 12" TO 18" ABOVE THE SEWER FORCE MAIN.

CITY OF PEA RIDGE	WATER & SEWER BEDDING DETAIL -WS01	
	REVISION DATE:	
DRAWN BY: CHECKED BY:	APPROVED BY:	DATE:



METHOD 'A'

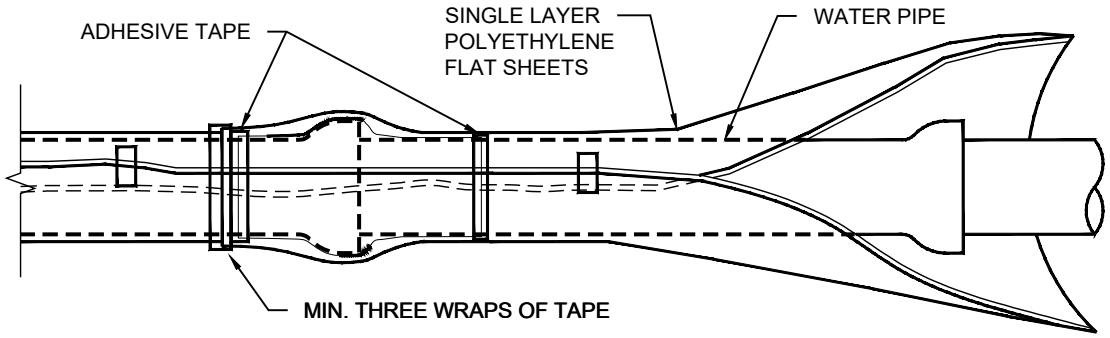
METHOD 'A' USES ONE LENGTH OF POLYETHYLENE TUBE, OVERLAPPED AT THE JOINTS A MINIMUM OF 2 FEET.



METHOD 'B'

METHOD 'B' USES SEPARATE PIECES OF POLYETHYLENE TUBE FOR THE BARREL OF THE PIPE AND THE JOINTS. SHORT PIECES SHALL BE APPROXIMATELY 6' LONG AND OVERLAP BARREL SECTION BY A MINIMUM OF 2 FEET.

POLYETHYLENE FLAT SHEETS



METHOD 'C'

METHOD 'C' - USED FOR PIPE-SHAPED AND ODD- SHAPED APPURTENANCES SUCH AS BENDS, REDUCERS, OFFSETS, VALVES, TEES, ETC.

ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE POLY WRAPPED.

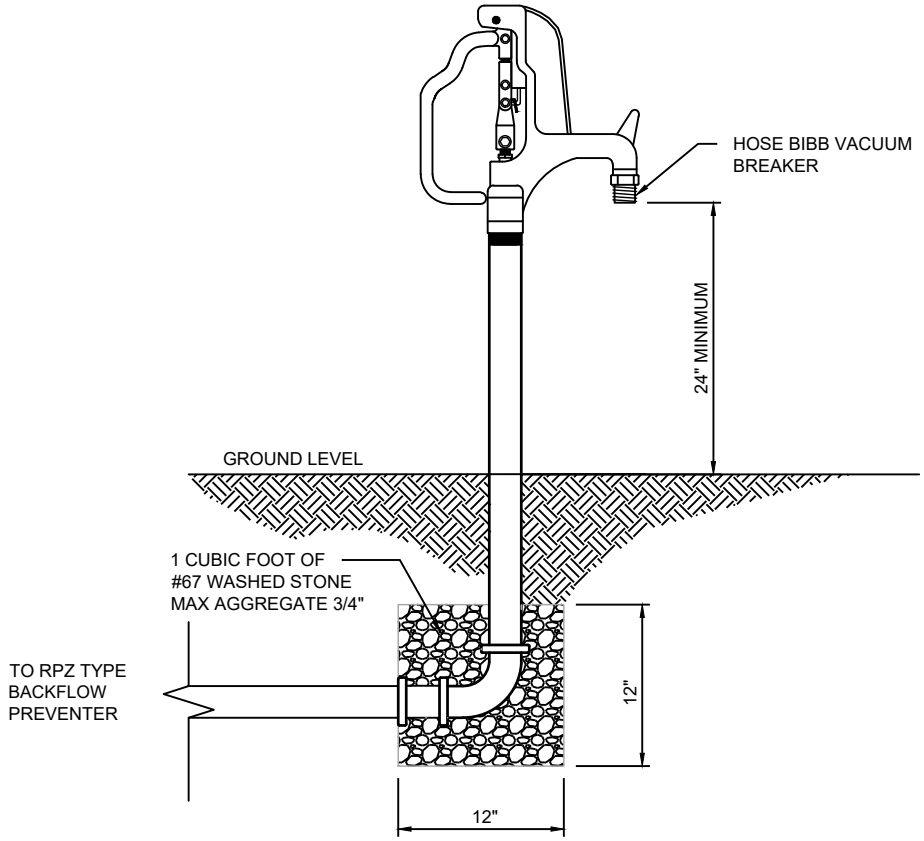
THE ANSI/AWWA C105/A21.5 STANDARD OUTLINES THREE METHODS OF INSTALLING POLYETHYLENE ENCASEMENT/ SLEEVING.

POLY WRAP DETAIL

N.T.S.

CITY OF PEA RIDGE		POLYWRAP DETAIL - WS02	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

FROST FREE HOSE BIBB WITH VACUUM BREAKER (FOR LIFT STATIONS ONLY)



ELEVATION

N.T.S.

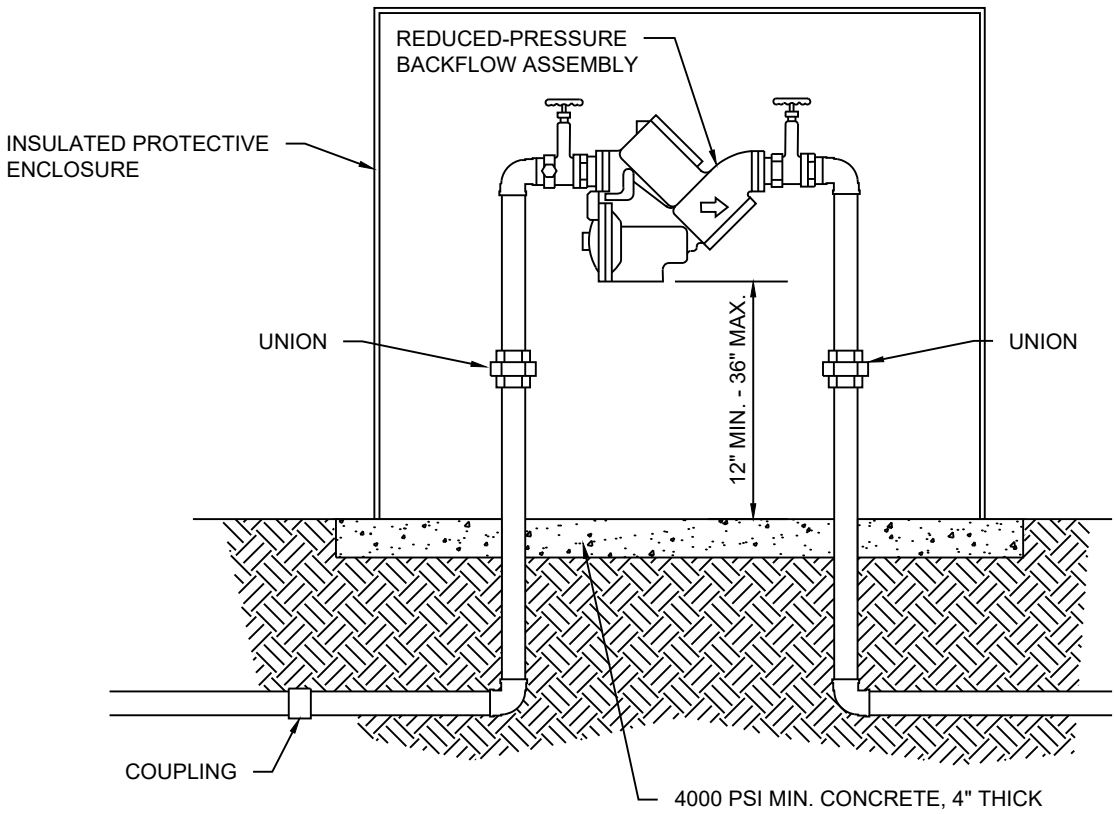
CITY OF PEA RIDGE		FROST FREE HOSE BIBB DETAIL - WS03	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

REDUCED PRESSURE (RPZ) BACKFLOW ASSEMBLY (FOR LIFT STATIONS ONLY)

COMMON REDUCED-PRESSURE BACKFLOW DEVICES (MUST BE CERTIFIED LEAD FREE):

FEBCO-LF825Y
WATTS-LF009 SERIES
WILKINS-975XL-2

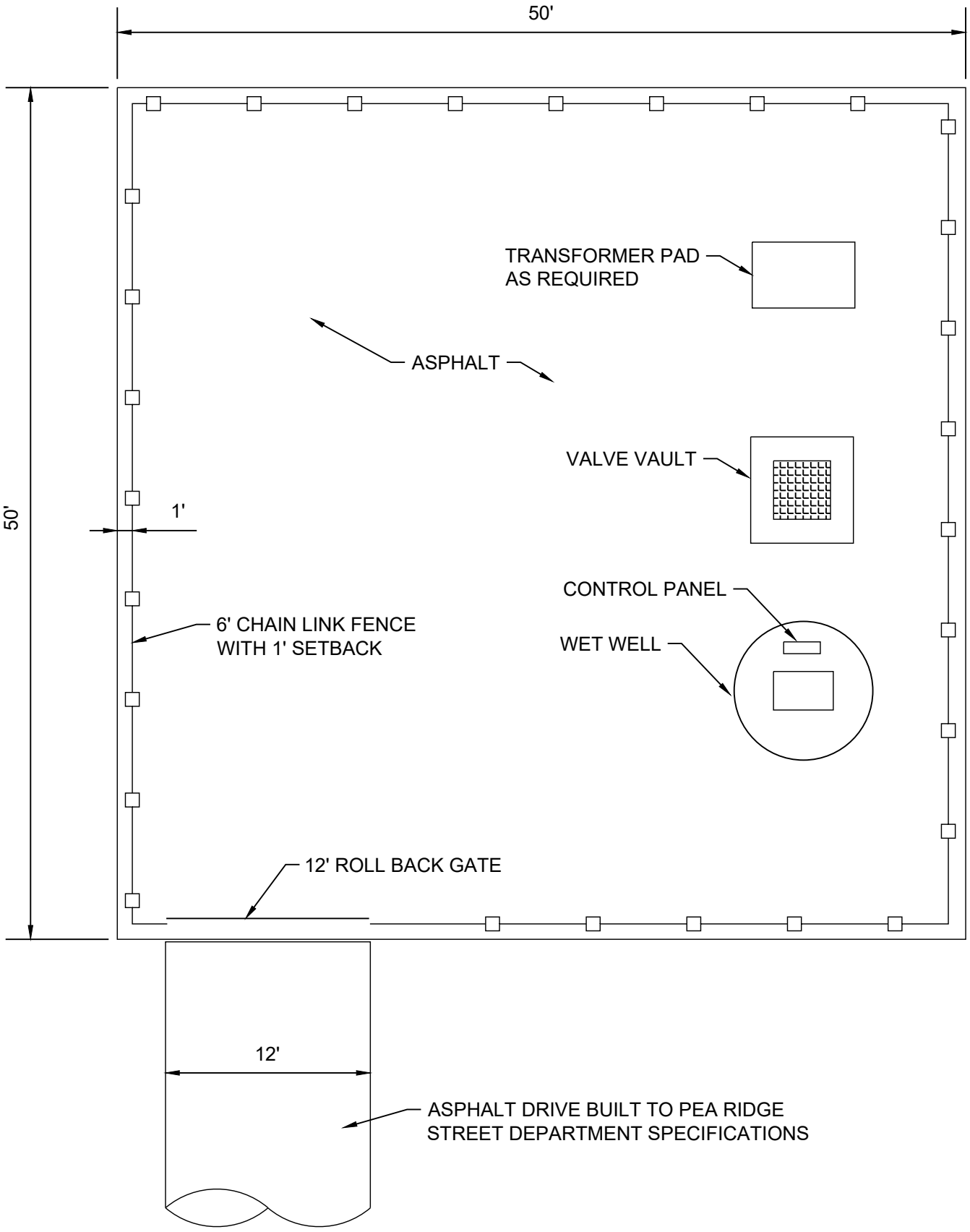
REDUCED PRESSURE ZONE BACKFLOW ASSEMBLY



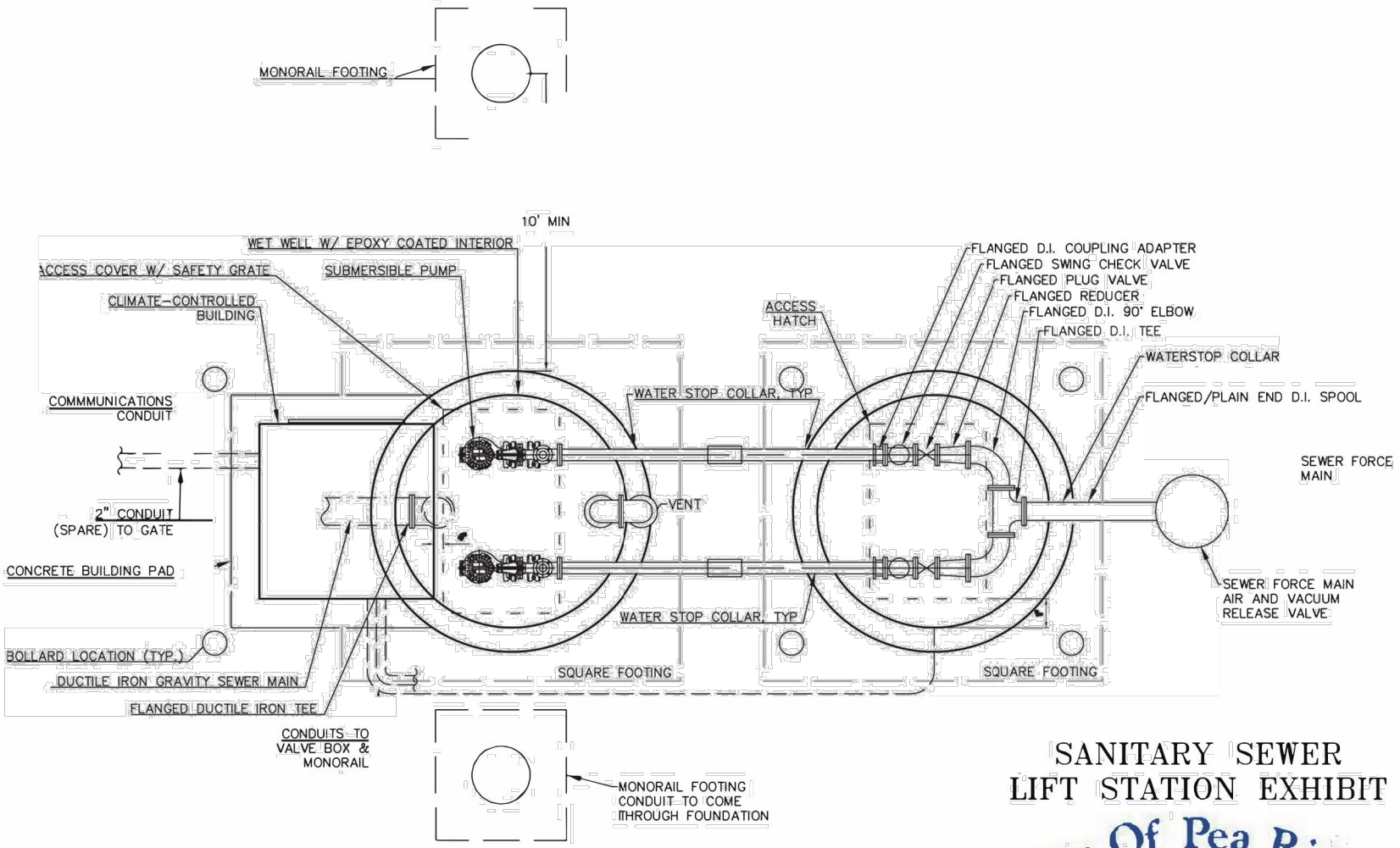
NOTES:

A. REDUCED PRESSURE-BACKFLOW DEVICE SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE WATER METER WITH NO TEES OR CONNECTIONS BETWEEN THEM.
B. FITTINGS, JOINTS, BOLTS AND NUTS ARE TO BE COVERED WITH PLASTIC SHEETING (4 MIL THICK MIN) OR 10 MIL TAPE PRIOR TO PLACEMENT OF CONCRETE. NO CONCRETE TO BE ALLOWED ON BOLTS OR PIPE.
C. WRAP ALL UNDERGROUND PIPE WITH 10 MIL TAPE.
D. IF SOLID ENCLOSURE IS USED, MAINTAIN 12" MIN CLEARANCE AROUND TEST-COCKS.

CITY OF PEA RIDGE		BACKFLOW ASSEMBLY DETAIL - WS04	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:



CITY OF PEA RIDGE	LIFT STATION SITE DETAIL - S01	
	REVISION DATE:	
DRAWN BY: CHECKED BY:	APPROVED BY:	DATE:



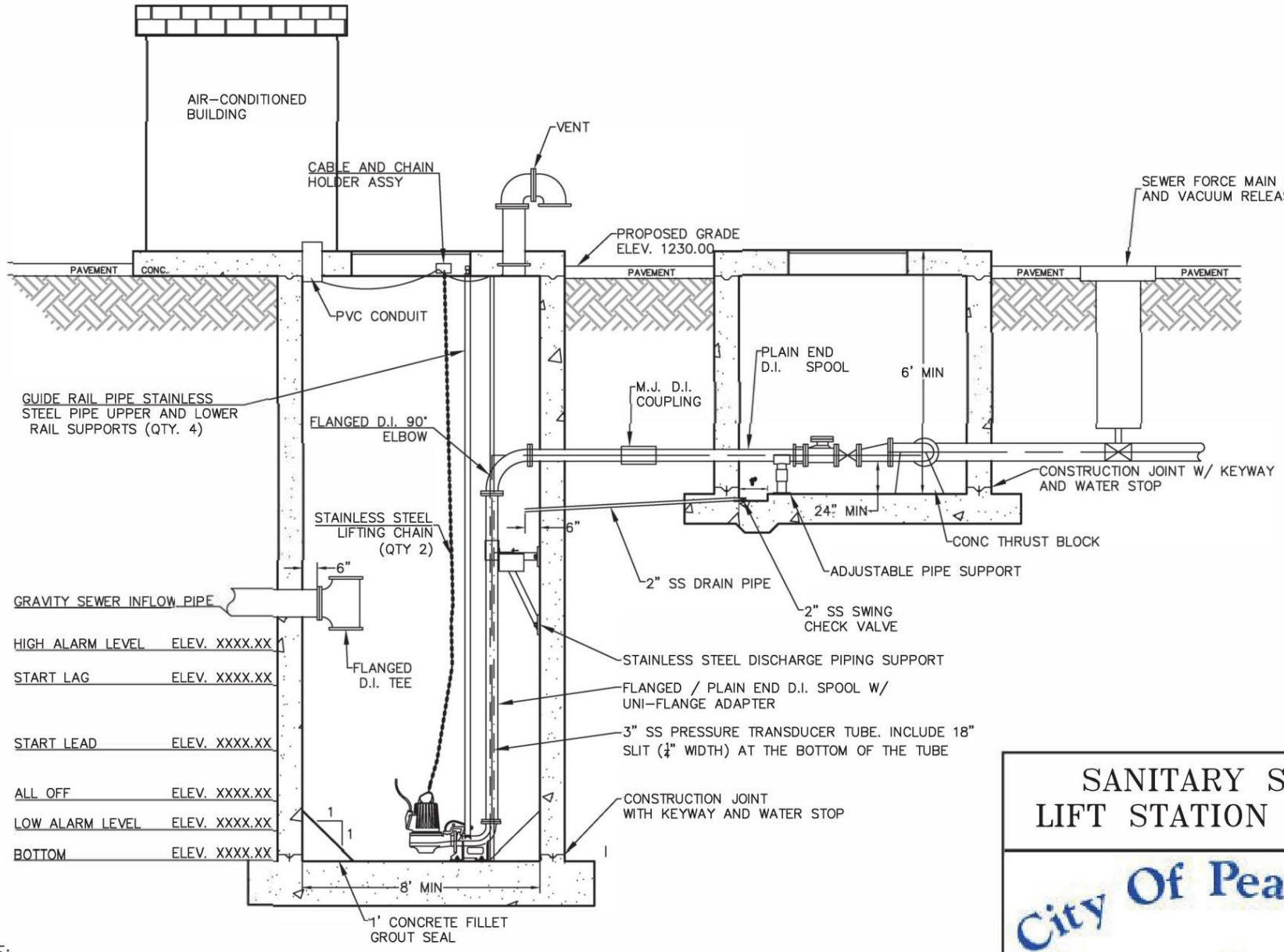
PLAN VIEW
SCALE: 1"=5'

NOTE:

LIFT STATION EXHIBITS ARE TO BE USED AS A DESIGN GUIDE AND TO SUPPLEMENT TO STANDARD SPECIFICATIONS. EXHIBITS ARE INTENDED TO SHOW THE DESIRED GENERAL LAYOUT OF FACILITIES AND ARE NOT TO BE USED AS CONSTRUCTION PLANS.

SANITARY SEWER LIFT STATION EXHIBIT

City Of Pea Ridge
Water Utilities
PO Box 29 Pea Ridge AR 72751
479-451-1109
WWW.PEARIDGEWATER.COM



NOTE:

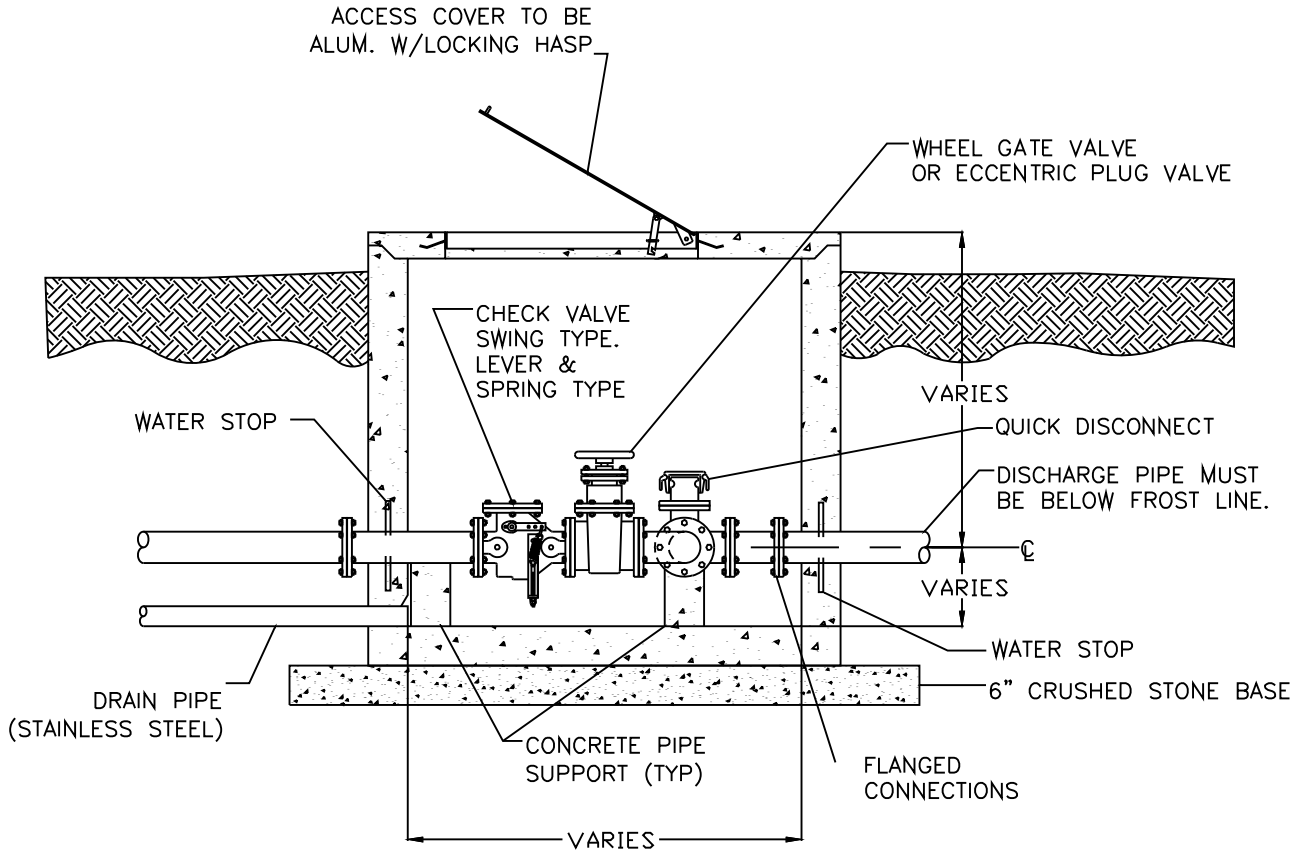
LIFT STATION EXHIBITS ARE TO BE USED AS A DESIGN GUIDE AND TO SUPPLEMENT TO STANDARD SPECIFICATIONS. EXHIBITS ARE INTENDED TO SHOW THE DESIRED GENERAL LAYOUT OF FACILITIES AND ARE NOT TO BE USED AS CONSTRUCTION PLANS.

PROFILE VIEW
SCALE: 1"=5'

SANITARY SEWER LIFT STATION EXHIBIT

City Of Pea Ridge Water Utilities
PO Box 29 Pea Ridge AR 72751
479-451-1109
WWW.PEARIDGEWATER.COM

LIFT STATION VALVE VAULT EXHIBIT



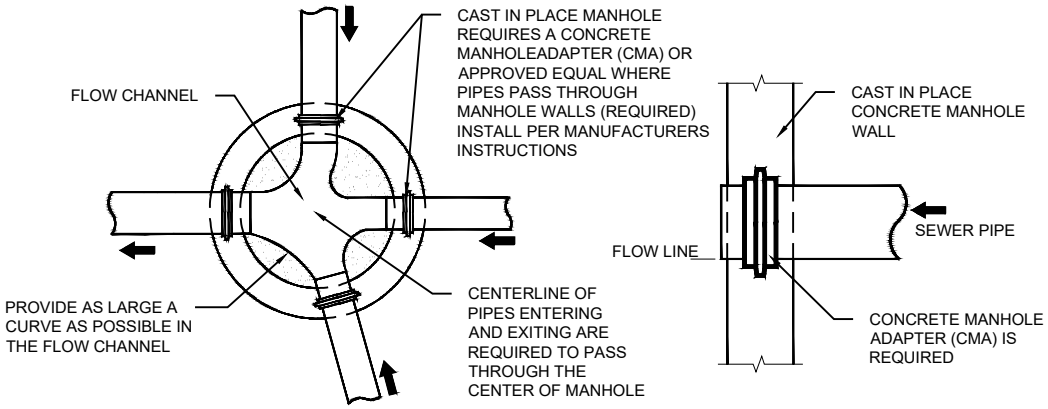
NOTE: REBAR IS REQUIRED SITE SPECIFIC PER ENGINEERING.

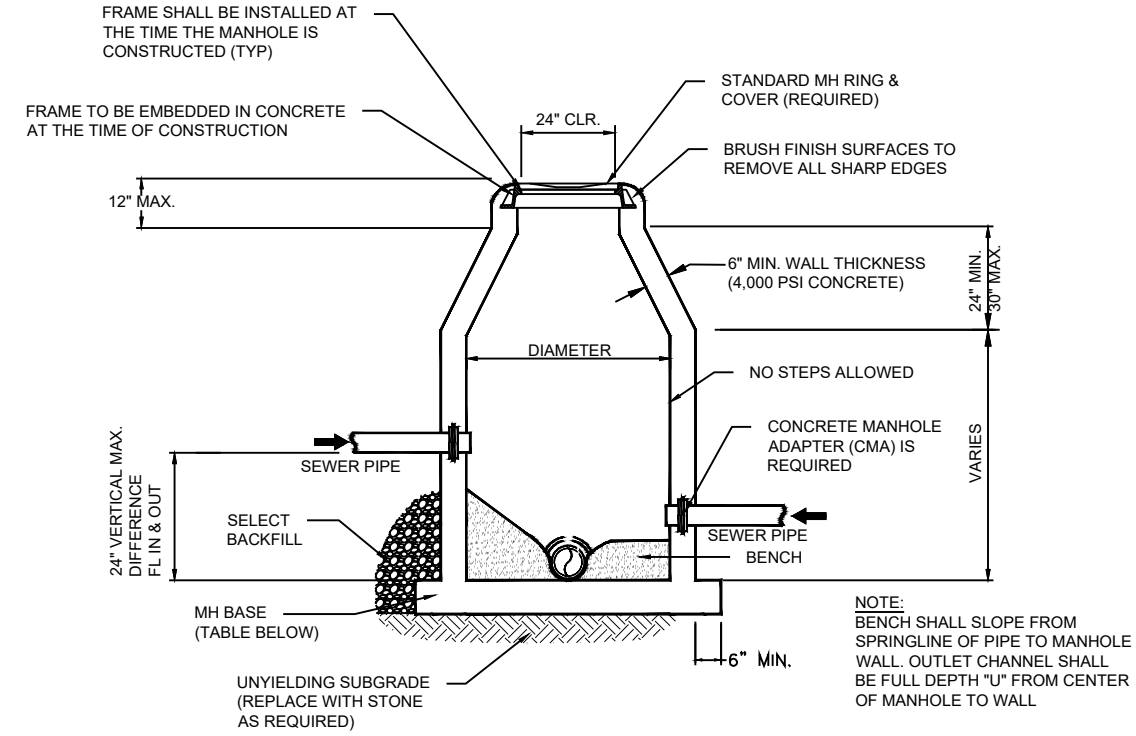
NOTE: A QUICK DISCONNECT FITTING SHALL BE LOCATED INSIDE THE VALVE VAULT ON THE DISCHARGE PIPING TO SERVE AS A CONNECTION TO AN EMERGENCY PUMP IN CASES OF PUMP OR ELECTRICAL FAILURE AT THE LIFT STATION.

CITY OF PEA RIDGE		LIFT STATION DETAIL - S04	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

SANITARY SEWER MANHOLE
CAST-IN-PLACE

4,000 PSI CONCRETE





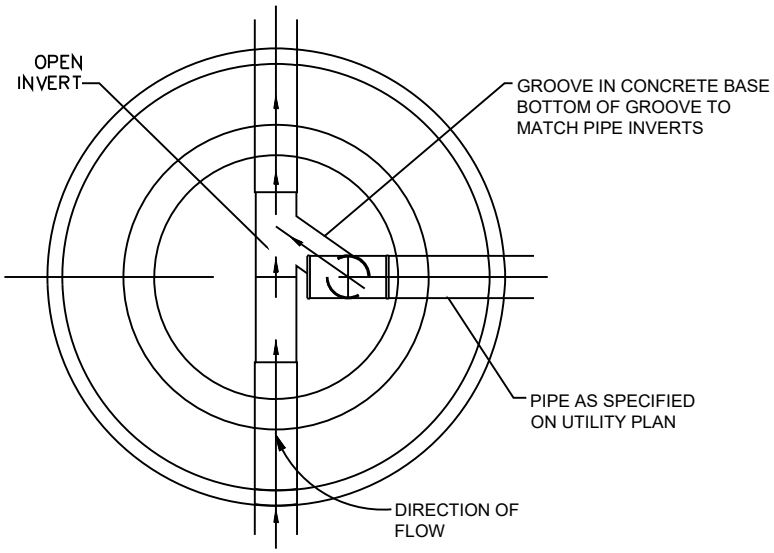
NOTE:
BENCH SHALL SLOPE FROM SPRINGLINE OF PIPE TO MANHOLE WALL. OUTLET CHANNEL SHALL BE FULL DEPTH "U" FROM CENTER OF MANHOLE TO WALL

INSIDE DIAMETER OF MANHOLE	MINIMUM WALL THICKNESS	BASE THICKNESS	MINIMUM RING & COVER SIZE
4' DIA.	6"	8"	24" (< OR EQUAL TO 24" PIPES) 36" (> 24" PIPES)
5' DIA.	8"	10"	
6' DIA.	8"	12"	

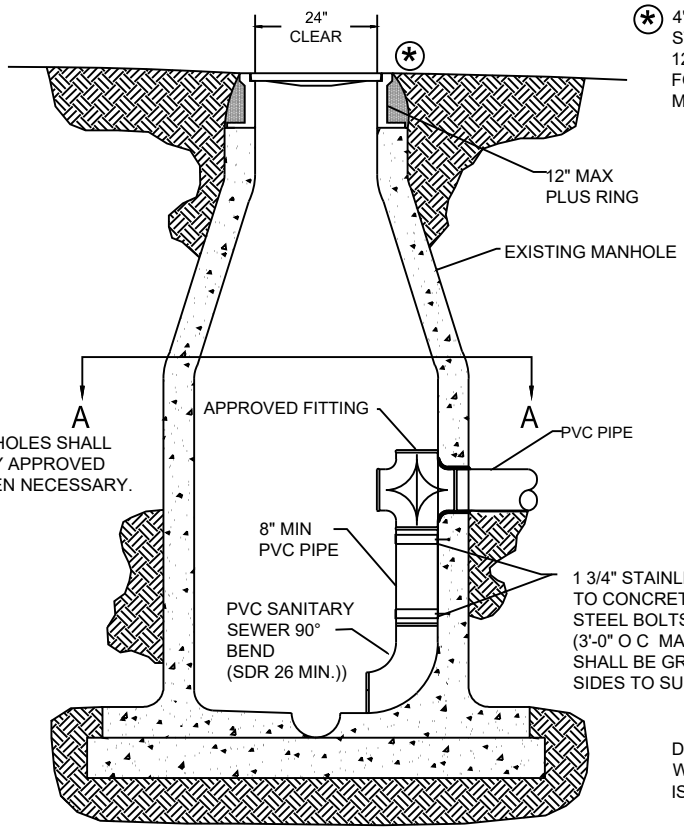
NOTE: DROP MANHOLE IS REQUIRED WHEN DIFFERENCE IN ELEVATION IS 24" OR MORE

CITY OF PEA RIDGE	SANITARY SEWER DETAIL - S05	
	REVISION DATE:	
DRAWN BY: CHECKED BY:	APPROVED BY:	DATE:

SANITARY SEWER
INTERIOR DROP MANHOLE



SECTION A-A



(*) 4" MINIMUM ABOVE FINISHED GRADE FOR STREET SIDE MANHOLES.
12" MINIMUM ABOVE FINISHED GRADE FOR OFFSITE OR NON-STREET SIDE MANHOLES.

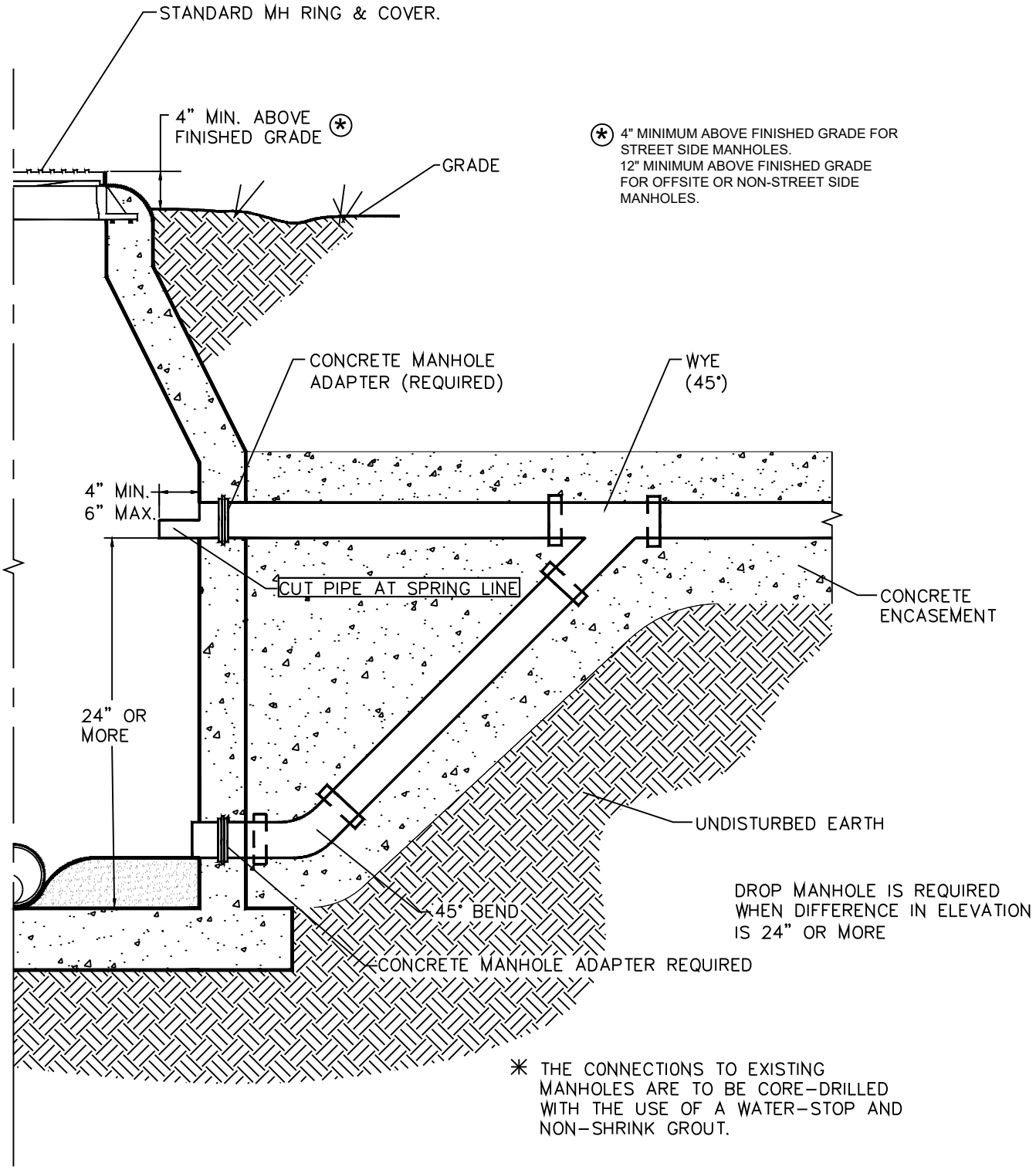
NOTE:
INSIDE DROP MANHOLES SHALL ONLY ALLOWED BY APPROVED DEPARTMENT WHEN NECESSARY.

1 3/4" STAINLESS STEEL BANDS ATTACHED TO CONCRETE WITH 5/8" X 3" STAINLESS STEEL BOLTS WITH EXPANSION ANCHORS (3'-0" O C MAXIMUM SPACING). FITTING SHALL BE GROUTED IN PLACE ON BOTH SIDES TO SUPPORT ASSEMBLY.

DROP MANHOLE IS REQUIRED WHEN DIFFERENCE IN ELEVATION IS 24" OR MORE

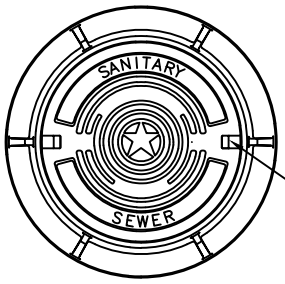
CITY OF PEA RIDGE	SANITARY SEWER DETAIL - S06	
	REVISION DATE:	
DRAWN BY: CHECKED BY:	APPROVED BY:	DATE:

SANITARY SEWER
EXTERIOR DROP MANHOLE



CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S07	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

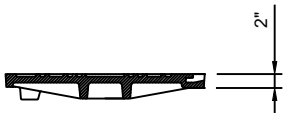
HEAVY DUTY MANHOLE
LID & COVER



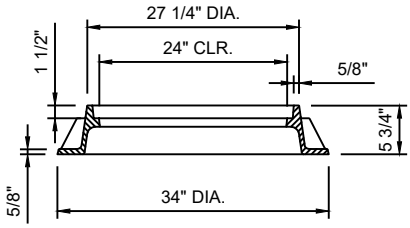
MINIMUM 260LB IN STREETS

(2) CLOSED PICKHOLES

PLAN VIEW



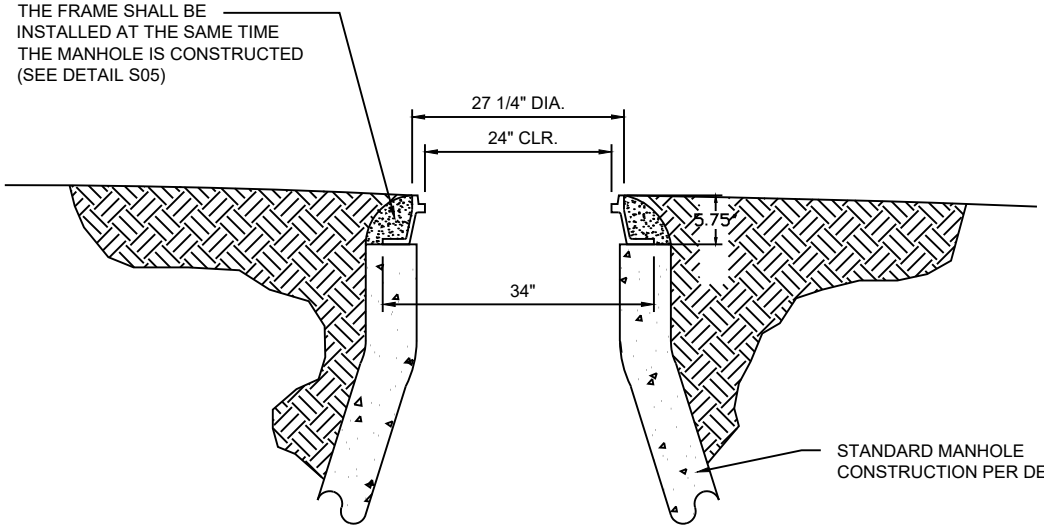
COVER SECTION



USA MANUFACTURED RING AND LID ASSEMBLY REQUIRED

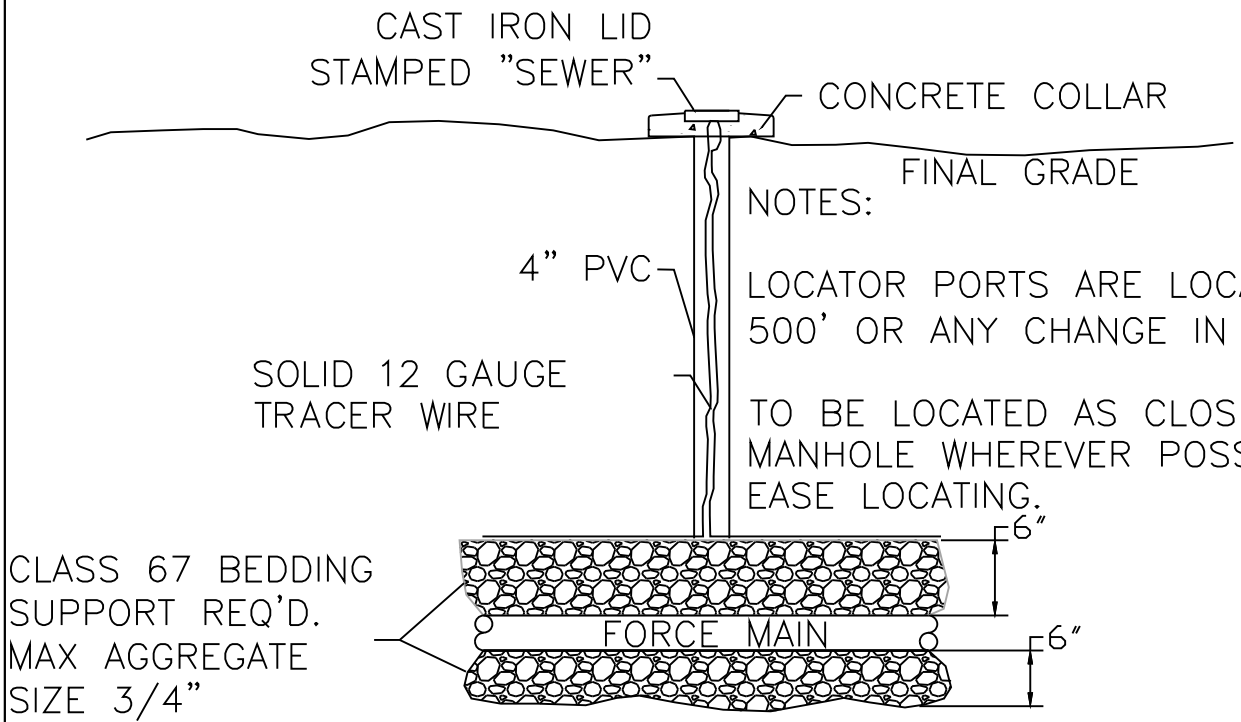
* SEE PLANS FOR PROPER MANHOLE ELEVATION

FRAME SECTION



CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S08	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

TRACER WIRE PORT



NOTES:

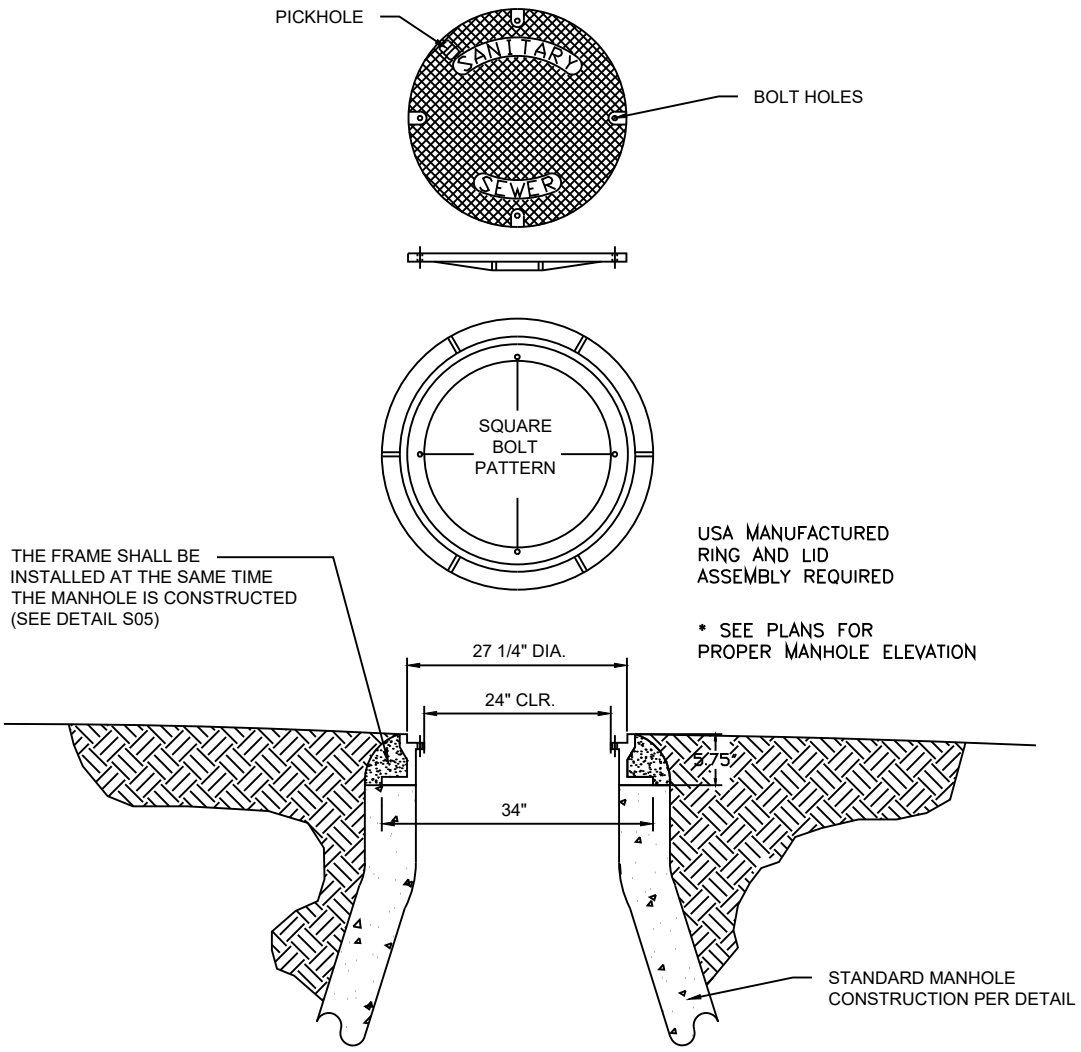
LOCATOR PORTS ARE LOCATED EVERY 500' OR ANY CHANGE IN DIRECTION.

TO BE LOCATED AS CLOSE TO A MANHOLE WHEREVER POSSIBLE TO EASE LOCATING.

NOTE:
TRACER WIRE BROUGHT UP AND EXTEND AT LEAST 12" MINIMUM OUT OF THE TOP OF THE PIPE.

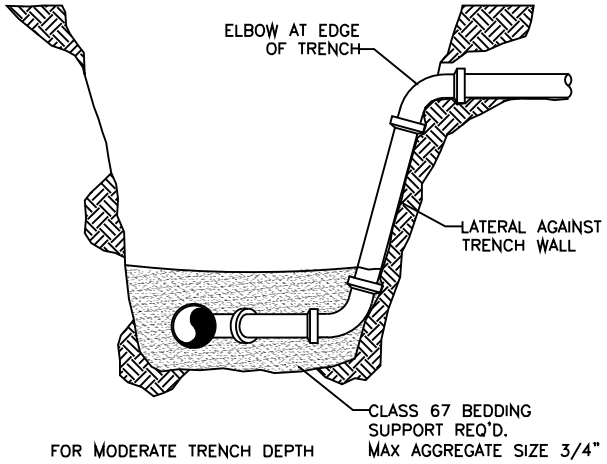
CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S09	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

WATER TIGHT BOLTED MANHOLE LID & COVER

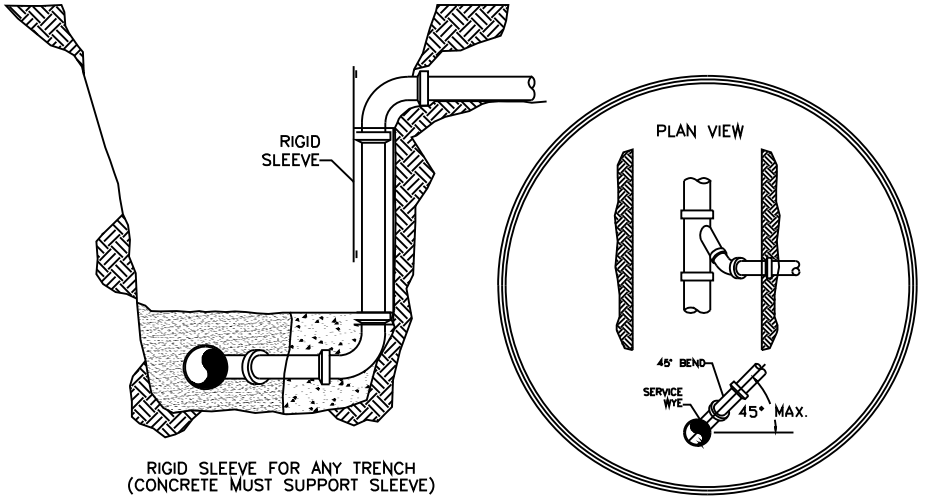


CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S10	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

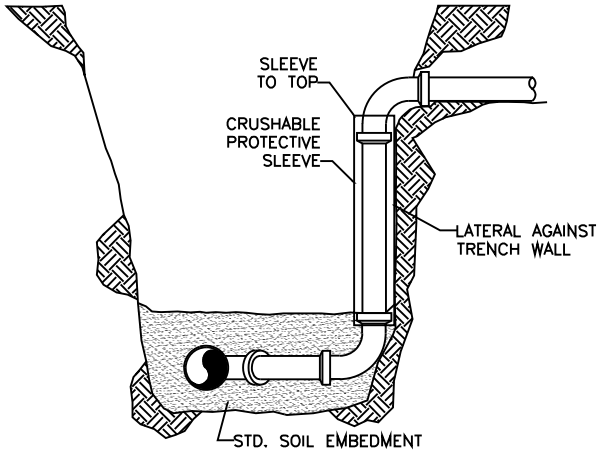
SANITARY SEWER SERVICE WYE



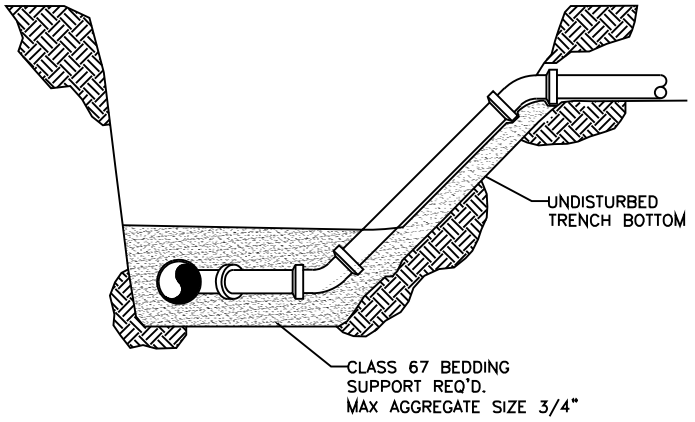
FOR MODERATE TRENCH DEPTH



RIGID SLEEVE FOR ANY TRENCH
(CONCRETE MUST SUPPORT SLEEVE)



CRUSHABLE SLEEVE – ANY DEPTH
(SLEEVE OF NEAR ZERO COLUMN STRENGTH)



SLOPING LATERAL TRENCH – ANY DEPTH
(SLOPE AT 1:1 OR FLATTER)

CITY OF PEA RIDGE

SANITARY SEWER DETAIL - S11

REVISION DATE:

DRAWN BY:

CHECKED BY:

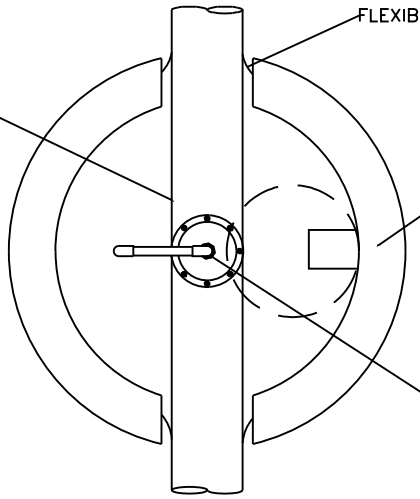
APPROVED BY:

DATE:

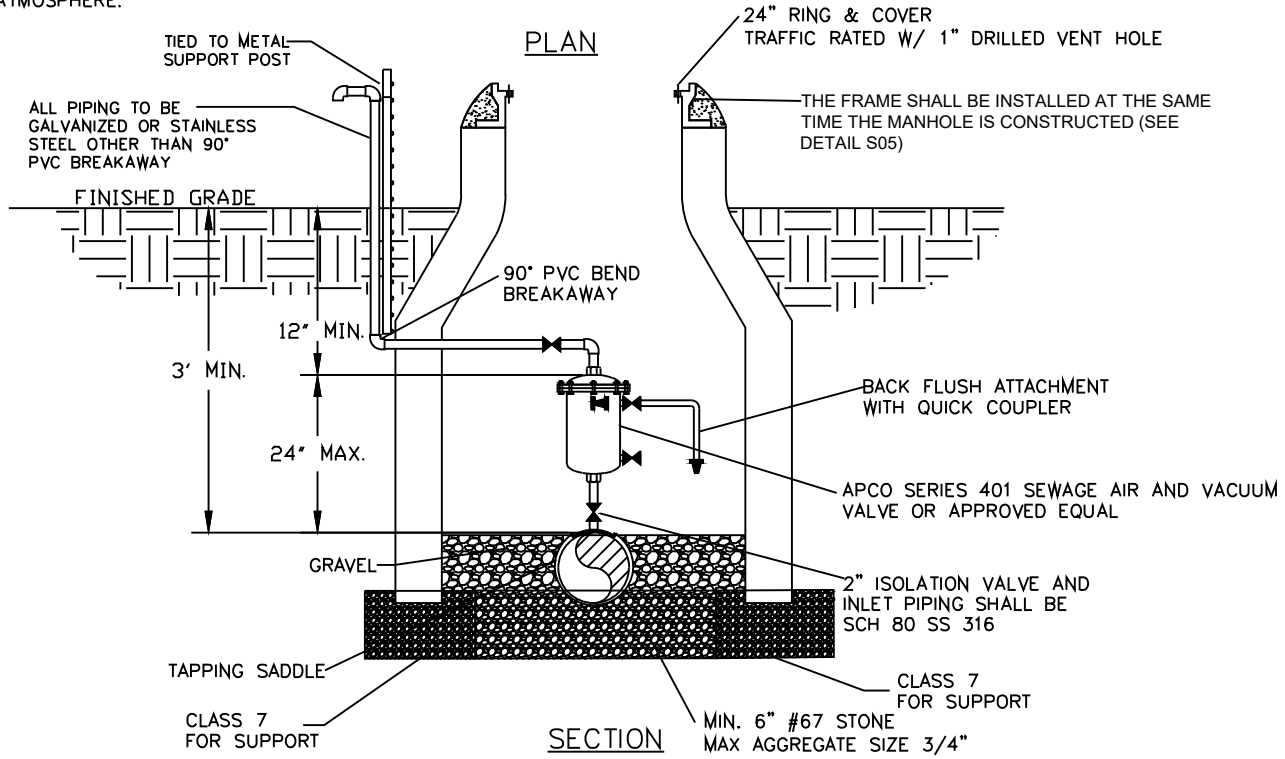
AIR VACUUM/RELEASE MANHOLE FOR FORCE MAIN

NOTES:

1. FORCE MAIN PIPE SHALL BE CENTERED ACROSS MANHOLE.
2. CONTRACTOR TO INSTALL FORCE MAIN AT DEPTH REQUIRED TO FACILITATE INSTALLATION OF AIR RELEASE MANHOLE AT HIGH POINT OF LINE.
3. ALL FITTINGS TO BE FOR SANITARY SEWER APPLICATION.
4. ALL COMBINATION AIR/VACUUM RELEASE VALVES MUST BE VENTED OUTSIDE OF PIT/VAULT TO ATMOSPHERE.



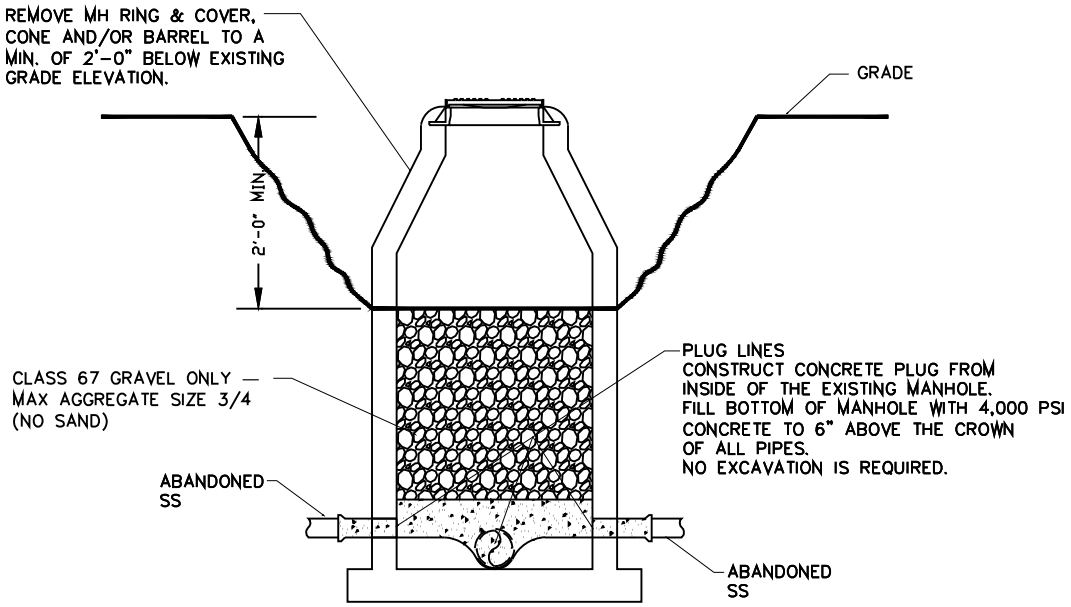
PLAN

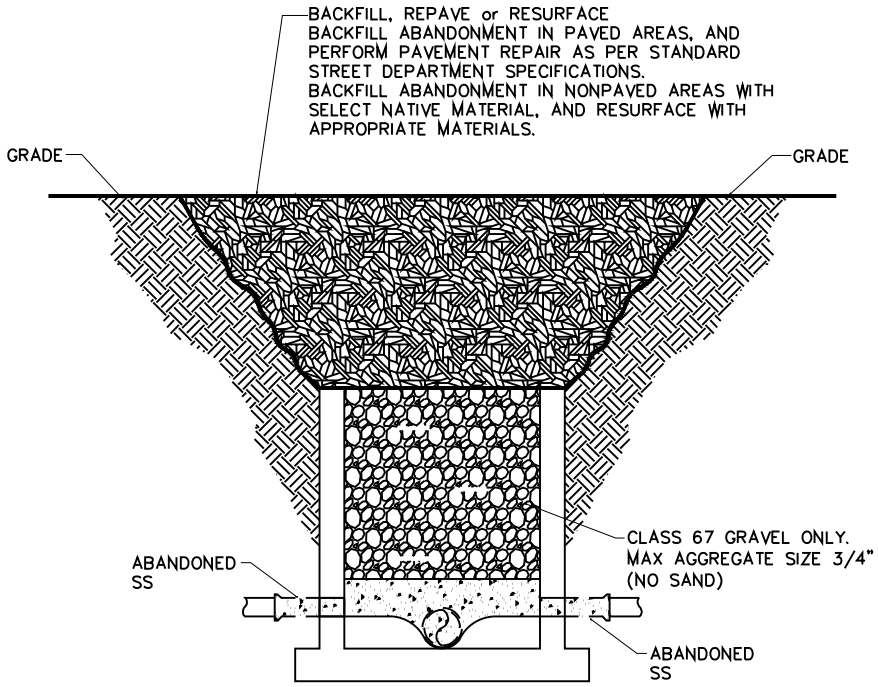


SECTION

CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S12	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

EXISTING MANHOLE ABANDONMENT DETAIL 5 FEET OR DEEPER





CITY OF PEA RIDGE		SANITARY SEWER DETAIL - S13	
		REVISION DATE:	
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE: