

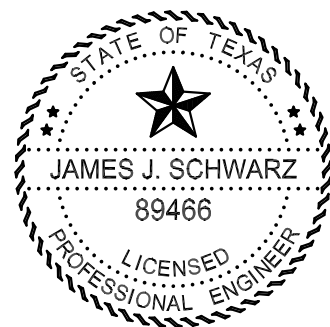
# Nueces County Water Control and Improvement District #3

## Water Distribution Standards and Development Guidelines

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## **I. DISTRICT STATUTES**

District created under:  
Revised Civil Statutes  
Article 7622

District #3 organized under the authority of Section 59 of Article of the Constitution of the State of Texas (page 30-Minute Book 1). Order of Commission Court of Nueces County Texas, made and entered on the 13<sup>th</sup> day of September, 1920 – Record Book K, Page 283-284, Deed records of Nueces County---Bond Election---November 19, 1921-----Page 18, Minute Book 1.

Shall Nueces County Water Improvement District #3 of Nueces County, Texas, be converted into a Water Control and Improvement District and thereafter be governed by and operate under the provisions of Chapter 3A, Title 128, revised Civil Statutes of Texas, 1925, together with all amendments thereof and additions thereto, whereby said District will have and can exercise all the powers, authority, functions and privileges provided in said chapter and title, in the same manner and to the same extent as if same had been organized under the provisions of said chapter and title (Volume 4, Minute Book 4, Following Page 58).

## **II. SCOPE**

The following general conditions and specifications are relative to the design and construction of water distribution system improvements and/or expansions to be constructed within the Nueces County Water Control and Improvement District #3 (District) or within the areas being served outside of the District, and shall govern the planning and installation of such work; providing that these specifications and/or amendments thereto shall not limit the District's right to change all or part of the rules, regulations and specifications set out herein; providing that all water distribution system improvements and/or expansions be located in private utility easements, unless authorized differently by the District; providing that after completion and acceptance by the District, these improvements and/or expansions shall be the sole property of the District and subject to its control and management.

### **III. SYSTEM IMPROVEMENT / EXTENSION PROCEDURES**

#### **Step 1 - Initial Consultation between Developer and District**

- Developer requests, in writing, a meeting with the District Manager, Water Superintendent and Engineer.
- Developer shall provide preliminary layout of proposed improvements.
  - Layout shall show complete build out of subdivision outlining total number of proposed connections, zoning, etc.

#### **Step 2 - District Review of Preliminary Layout**

- The District determines the impact of the proposed improvements on the distribution system and issues formal water availability letter to Developer.

#### **Step 3 - Submittal of Plans and Specifications**

- Developer submits four sets of plans of proposed improvements to District for review.

#### **Step 4 - District Review of Plans and Specifications**

- Plans are reviewed by the District, City of Robstown Inspector, City of Robstown Fire Chief, and District Engineer.
- One plan set with comments are returned to the Developer.

#### **Step 5 – Submittal of Final Plans and Specifications**

- Developer submits three sets of revised and corrected plans and specifications to District
- Developer submits original set of reviewed plans and specifications
- Developer submits copies of all required permits
- Developer submits copies of easements

#### **Step 6 – Final Review of Plans and Specifications**

- Final plans are reviewed
- District issues acceptance of plans letter (assuming all corrections have been addressed. If plan sets are rejected, the Developer will begin improvement process from Step 1.)

#### **Step 7 - Bidding and Construction**

- Developer receives bids from licensed utility contractors.
- Pre-construction meeting is held.
- Developer submits copy of the Contractor's liability insurance certificate
- District issues Notice to Proceed with Construction to Developer
- Contractor notifies District, One Call and all other appropriate agencies of start of construction 72 hours prior to beginning any mobilization
- Contractor completes project under inspection of District. Any work completed without District inspection or prior to issuance of design approval letter and

- Notice to Proceed *shall be removed and re-installed* with a District inspector present at no expense to the District.
- System improvements are pressure and disinfection tested
  - Formal punch list is prepared by District
  - Contractor makes all corrections
  - Final inspections made by the District and other agencies as required.
  - District accepts Punch List as completed

#### **Step 8 – Close out Documents**

- Developer submits three engineer sealed original As-Built plan sets and one electronic copy of plan set to the District
- Developer submits three copies of operational and maintenance manuals for any materials that have multiple and/or working parts or that have maintenance requirements.
- Developer submits certification from the design engineer that the project was constructed in accordance with the specifications and Record or “As Built” Drawings.
- Developer submits final easements to District
- Developer submits one year warranty paperwork to District
- The District issues letter of acceptance of completed project to Developer.

#### **Step 9 - One Year Warranty Inspection**

- District schedules and performs warranty inspection with Developer within 30 days prior to expiration of warranty period.
- District prepares and delivers to Developer warranty inspection punch list for defects observed during warranty inspection.
- Developer completes punch list items.
- District approves completion of warranty punch list and submits letter to Developer stating warranty period has ended.

## **IV. GENERAL PROVISIONS AND REQUIREMENTS**

### **Design**

The design, location, material and standards of construction of all water distribution systems shall not conflict with standards developed by the Texas Commission on Environmental Quality. Design issues not addressed in this manual shall be reviewed on a case by case method.

### **Capacity**

The design of an extension or improvement shall be based upon best engineering practices and guidelines set forth by TCEQ, AWWA, etc. The District reserves the right to require larger line sizes than specified if in the opinion of the District, larger lines will better meet the present and future requirements of the area to be benefited, improve distribution system operation and efficiency, minimize maintenance requirements and increase anticipated life of such extensions.

### **Origin of Extensions**

Required extensions or enlargements of water mains to a subdivision shall be of adequate size and shall originate at a point, or points of the nearest adequate and existing water main, or mains, consistent with good distribution efficiency and operations, as determined by Water Distribution Superintendent of the District. No water main extension shall be connected to the system if the cost to the District is so great that in the opinion of the District Manager, the expense is not justified on sound business principles.

### **Main Sterilization and Tap Responsibility**

To insure the public health, safety and general welfare of the population served by the District, no new piping shall be accepted as part of the distribution system prior to the time that the new system can be sterilized and has been accepted by the District.

### **Water Line Location**

All District water lines shall be located in private utility easements unless otherwise specified by the District Manager. Locations of mains in relation to sanitary sewer mains shall be in accordance with the requirement set forth in the "Rules and Regulations for Public Water Systems, Latest Edition" as promulgated by the Texas Commission on Environmental Quality. Easements shall be a minimum of 15 feet in width.

### **Variances and Costs**

All costs associated with the installation of new mains and services will be the responsibility of the developer or party who is applying for the service.

### **Areas Claimed by Others**

When a proposed subdivision location or potential consumer location is within an area served by a utility other than the District, the Developer shall furnish the District, before submission of the plat, a written statement from the authorized official of such utility to the effect that the utility can or cannot serve the consumer in accordance with the requirements of this standard.

**Canal Crossings**

All canal crossings will be cleared through the District. Bridges over canals will meet specifications as set forth by the District.

**Traffic Control**

During construction or repair of any District waterlines or appurtenances, Utility contractor shall provide approved traffic control systems as required by the Texas Department of Transportation, Nueces County, and/or City of Robstown.

**Materials of Construction**

All materials used to improve or extend the District distribution system shall be NSF 61 approved.

## V. MINIMUM DESIGN STANDARDS

### **Distribution System Piping:**

The system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. When the system is intended to provide fire fighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow conditions. The District distribution system contains pipelines that fall into the following categories:

- Transmission Mains
- Mercantile (Principal and Light) Distribution Mains
- Industrial Mains
- Residential Mains
- Domestic Service Mains
- Service Extension Lines

Transmission mains: Transmission mains in the distribution system shall be looped and have a minimum size of twelve inches (12") and shall not exceed 6,000 feet in length between cross connecting mains. Transmission mains shall be constructed of PVC or Ductile Iron pipe.

Mercantile (Principal and Light) Mains: Mercantile mains in all areas shall be looped between transmission and/or other mercantile mains and shall have a minimum size of eight inches (8"). Mercantile mains shall be the shorter of the two following lengths: 3,000 feet or a length that would render the line incapable of producing flows and pressures set out herein for the type of area to be served and with pressures and flows that exist at the supply main's connections as determined by the District Distribution Superintendent. Mercantile mains shall be constructed of PVC or Ductile Iron pipe.

Mains in principal mercantile areas shall be installed in a private utility easement and sized so that the minimum fire flow from any single fire hydrant will be not less than 3,000 gpm.

Mains in light mercantile areas shall be located in streets or fire lanes and shall be sized so that the minimum fire flow from any single hydrant will be not less than 1,500 gpm with 20 psi residual pressure.

Industrial Mains: Mains in all industrial areas shall be looped between transmission and/or other industrial mains and shall have a minimum size of eight inches (8"). Industrial mains shall be the shorter of the two following lengths: 3,000 feet or a length that would render the line incapable of producing flows and pressures set out herein for the type of area to be served and with pressures and flows that exist at the supply main's connections as determined by the District



Distribution Superintendent. Industrial mains shall be constructed of PVC or Ductile Iron pipe.

Industrial Mains shall be installed in dedicated streets and sized so that the minimum fire flow from any single fire hydrant will be not less than 3,000 gpm.

Residential Mains: Mains in residential areas shall be looped between transmission, mercantile or other residential mains of eight inches (8") or larger and shall have a minimum size of eight inches (8"). Residential mains shall be the shorter of the following lengths: 3,000 feet or a length that would render the line incapable of producing flows and pressures set out herein for the type of area to be served and with pressures and flows that exist at the supply main's connections as determined by the District Distribution Superintendent. Residential mains shall be constructed of PVC or Ductile Iron pipe.

Residential mains shall be installed in a private utility easement and sized so that the minimum fire flow at any single fire hydrant will be not less than 750 gpm.

Domestic Service Mains: Domestic service mains shall be looped between 8" residential mains of eight inches (8") or larger and shall be 6" minimum in diameter. Domestic service mains shall be constructed of PVC or Ductile Iron pipe.

Domestic service mains shall be installed in a private utility easement and sized so that the minimum fire flow at any single fire hydrant will be not less than 500 gpm.

Service Extension Lines: Short extension lines or dead end lines shall be two inches (2") Type K soft copper, provided that the number of taps does not exceed four.

### **Fire Hydrants**

All extensions or additions to the District water distribution system within the District boundaries or the area the District serves shall meet the requirements as set forth in current Key Rate Schedule as promulgated by the Texas State Board of Insurance for the installation of fire hydrants. Fire Hydrants shall be placed as follows:

- Hydrants shall be located such that there will be a standard District fire hydrant every 600 feet as measured along dedicated streets in residential areas, including dedicated easements and fire lanes in mobile home parks and travel trailer parks.
- Hydrants shall be located such that there will be a standard District fire hydrant every 300 feet as measured along dedicated streets in mercantile and industrial areas.
- Each building in the District service area shall be within 500 feet of a fire hydrant.
- Fire hydrants within areas containing apartments and apartment houses shall be located in dedicated street or utility easements and be spaced not more than 300 feet distance from fire hydrant to building. No structure shall be built within 15 feet of any portion of District water main, fire hydrants or other appurtenances.

- All fire hydrants shall have a six foot clear horizontal radius around fire hydrant free from obstructions. Hydrants shall be located on street corners or side property lines so as to be readily accessible at all times.
- Reflectors shall be installed on curbs adjacent to fire hydrants on all new construction.
- Fire hydrants located north of CR 46 shall have City of Corpus Christi threads.
- Fire hydrants located south of CR 46 shall have City of Robstown threads.

### **Valves**

Proposed system extensions or additions shall be equipped with a sufficient number of valves and so located such that no case of accident, breakage, or repair to the water distribution mains will necessitate isolation of a length of distribution pipe greater than 600 feet. All valves 16" or less in diameter shall be gate valves. Larger valves must be submitted independently for approval by District Engineer.

Valves shall be installed at the following locations

- At three sides of a cross fitting
- At two sides of a tee fitting
- Every 600 feet of straight run pipe 6" and less in diameter
- Every 1,000 feet of straight run pipe 8" in diameter
- Every 1,400 feet of straight run pipe 10" – 12" in diameter
- Every 1,800 feet of straight run pipe 16" in diameter
- On all fire hydrant branches

When there is an existing a valve within 200 feet of a tee or cross intersection in one or more directions and the requirements above would specify a new valve in that direction, the existing valve shall be deemed sufficient and an additional valve in that direction is not required.

### **Water Services**

Individual water services shall be provided from the main to each water meter for single family residences. Dual service connections may be permitted, whereby a 1" tap and 1" service line serves two 5/8" meters, under the following conditions: (1) on or adjacent to a lot with two or more meters serving two or more buildings or individual units; or (2) along a property line where the developer or builder is providing meters to each of two adjoining lots, provided each meter is on the property being served.

No individual water meter may serve more than one property. No individual service line may serve multiple buildings on the same property except when permitted by the District.

On property where two or more meters are provided to serve more than one building or unit on the same property, each meter shall be located directly in front of the unit or building served, or the meter boxes shall be clearly labeled to describe the address of the unit or building served. If labeling is used, a permanent nameplate with engraving of address shall be permanently secured to the interior wall of each meter box within 3" of

the top of the box, of non-corrosive materials. The developer is also responsible for insuring that plans for construction define which meter goes with which unit or building, and that the plumber hired to connect the plumbing to the building or units connects the plumbing to comply with the schedule shown on the plans and labeled on the meter boxes.

All service connections shall be made perpendicular from the main line and shall run straight to the meter which shall be located at the edge of the serviced lot's right-of-way or easement. All new water meter boxes or vaults shall be located outside the street, sidewalk, or parking areas in residential areas. In non-residential areas, meter location shall be considered on a case-by-case basis.

The size and type of water meter shall be determined by the District based on type of facility receiving service, projected peak water demand, and expected fluctuation in water demand, and shall be selected to insure high standards for accuracy for all service conditions. The size shall be the smallest which is designed for a normal test flow rate covering both the minimum and maximum flow rate expected by the customer.

Tapping saddles will be allowed only for service connections. All other connections shall be accomplished using ductile iron fittings.

Service line pipe shall be copper tubing. Copper water tube shall be manufactured to the requirements of ASTM B 88 – Standard Specification for Seamless Copper Water Tube – TYPE K. Pipe shall be one solid piece from tapping saddle to meter valve. No splicing of tubing is allowed.

### **Testing and Inspection**

Hydrostatic and disinfection testing of all new distribution improvements or additions is required. Tests shall be made only after the following:

Subdivisions –

- All valves are accessible and open
- All fire hydrants are properly set (i.e. plumb, at proper grade and alignment)
- All curb and gutter has been installed
- All base on street has been installed, compacted and accepted by City of Robstown
- All lot grading has been completed
- All sidewalks have been installed

Apartment Complexes, Shopping Centers and Other Commercial-

- The area above the water main has been graded five feet on either side of the centerline of the waterline for the entire length of line
- The owner signs an agreement to the effect that approval of the system is conditional upon completion of any items found deficient on a second inspection which will be conducted upon final completion of the project. Final completion shall be as defined by Water Superintendent

Other-

- Water systems that are not found in one of the above categories shall be tested when the Water Superintendent deems the system complete enough for testing.

### **Backflow Prevention**

Backflow protection devices shall be installed, tested, and maintained by the customer as required by the Water Policies. Such devices shall be required on all plumbing connections to service lines for irrigation, and to all premises except service to single-family residential dwellings. Such devices shall be installed on the customer's plumbing line beyond the water meter but prior to any branching of plumbing lines from the common line, such that all water passing through the water meter shall also pass through the protection device. No water shall be permitted at any time to by-pass backflow protection; if the customer requires a by-pass while the backflow device is being tested or repaired, the by-pass line shall include a backflow device of equal design and size as the first.

### **Irrigation Systems**

Connections to the District irrigation system shall be designed by a professional engineer registered in the state of Texas. Proposed connections will be reviewed by the District Manager and District Engineer. Criteria for design shall be determined on a case by case basis.

### **Easements**

All water distribution system extensions or additions to be owned and maintained by the District shall be within a publicly-owned and maintained street right-of-way, or within a permanent utility easement dedicated to the District. Waterlines shall be located outside of paved or otherwise improved surfaces with the exception of crossings and shall maintain separations as outlined in these standards. Preference shall be given to utility easements over street rights-of-ways when practical. Waterlines that run parallel to TxDOT or Nueces County roads shall be placed in dedicated utility easements. Waterlines shall not be placed in State or County right of way without approval of District Manager and District Engineer.

Permanent utility easements shall be of legal form satisfactory to the attorney for the District and shall reference a plat prepared and sealed by a registered land surveyor in the state of Texas showing the exact location and dimensions of the easement. All permanent utility easements shall exclude the use of the easement for utilities other than water unless authorized as a joint-use utility easement by the District Manager. For joint-use easements, TCEQ required minimum horizontal and vertical separation requirements shall be required.

For water extensions to new development, sufficient permanent utility easements shall be dedicated to the District to permit future water line extensions to all adjoining property.

Private utility easements shall be 15 feet minimum in width.

### **Separation Distances**

The following separation distances shall be followed during design and construction:

- Sanitary Sewer: See TCEQ requirements for separation distances between water and wastewater lines.
- Storm Sewer: Waterlines and storm sewer lines shall have a minimum vertical separation of 12 inches when horizontal separation is less than 3 feet unless otherwise approved by the District Engineer.
- Natural Gas Mains, Cables, and Other Utilities: Other utilities shall have a minimum horizontal clearance of 2 feet and vertical clearance of 12 inches, to permit proper maintenance of the water main unless otherwise approved by the District Engineer.

### **Road Crossings**

Waterlines that cross paved surfaces shall be placed in steel casing pipes and shall be capped and sealed on both ends. The following outlines District casing pipe requirements

- Waterlines that cross State highways must be laid in steel casing pipe meeting the requirements and method of construction of TxDOT.
- Waterlines that cross county roads must be laid in steel casing pipe meeting the requirements and method of construction of Nueces County.
- Waterlines that cross creeks, drainage canals or irrigation canals must be installed in steel casing pipe with a minimum thickness of  $\frac{1}{4}$ ". A minimum of 4' of cover is required between the top of casing pipe and invert of channel. Casing shall extend past the banks at a distance equivalent to the amount of cover + height of bank.
- All other casing pipes shall be reviewed on a case by case method.

## **VI. MINIMUM DESIGN DRAWING REQUIREMENTS**

### **General**

1. Four physical sets and one CD copy of plans are required for each project. The CD shall contain the drawings in AutoCAD format with CTB plot style or PDF format.
2. All drawings are to be submitted on 11" x 17" or 22" x 34" size sheets.
3. Each plan set will have a cover sheet that includes at a minimum the following:
  - Name of the project.
  - Name of the design firm.
  - Design firm's project number – if applicable.
  - Design firm's telephone number, mailing address and email address.
  - Engineer of Record's Name and Texas Registration Number.
  - Seal and Signature of the Engineer of Record.
  - Date of current version.
  - A general location map showing Nueces County and major roads with the location of the project identified.
4. Plan sets with five or more sheets shall have an index.
5. Plan sheets shall include:
  - Title Block
  - North Arrow oriented to the top or right of the sheet.
  - Engineer of Record's Name and Texas Registration No.
  - Seal and Signature of the Engineer of Record (final set only – Review sets shall be stamped for interim review)
  - Scale, horizontal and vertical (for profiles).
  - Date of current version.
  - Match lines on plan and profile sheets
6. The drawing set shall contain an overall project layout with all proposed and existing utilities identified.
7. All dimensioning shall be in English units.
8. All applicable NCWCID#3 standard details shall be included in set.
9. If abbreviations are used, a legend shall be present defining each abbreviation.
10. Plan sheets shall have a sequential numbering system such that it is obvious that sheets are missing from the set.
11. Drawings shall have differentiating line weights or line types that allow easy identification of drawing line work.

### **Piping Plan Views**

1. Horizontal scale to be between 1" = 1' and 1" = 50'.
3. Indicate facilities that are or will be owned by NCWCID#3 verses private or other utilities' facilities.
4. Show the design location of all NCWCID#3 facilities, including distance from rights-of-way lines; property lines; buildings or edge of pavement to each main. Distances need not be shown for water service lines and meters.
5. Each main will be marked with its size and type of material. Each fitting will be marked with its size. Each fitting will be marked with its material if the material is

different than the main's material. Valves will be marked with their size and type. Each water service line will be marked with its size. Each water service line and sewer lateral will be marked with its material unless the material is specified in a note or standard detail.

6. Show all main horizontal and vertical deflection points. A deflection point is a change in horizontal or vertical alignment other than the normal minor alignment change associated with a "straight" pipe.

7. Show and label all public and private roadways. Indicate when roadways are private.

8. Show the perimeter boundary property lines of properties contiguous to shown roadways, at the property line - roadway or right-of-way junction. Include the street address, for the property.

9. Show and dimension all rights-of-way and easements and reference as to whether by plat or otherwise.

10. All existing, proposed and to be abandoned utilities will be shown. Line type and/or weight will be used to differentiate between type of utilities and between existing, proposed and to be abandoned. The method of abandonment will be shown.

11. Show all known potential underground conflicts.

12. For developer projects:

a. Clearly indicate all boundary lines for any property to be served. Show coordinates for boundary property corners and reference one property corner to a section corner.

b. Indicate the lot and block numbers for any property to be served, and for adjoining lots.

c. Show the outline of each building to be serviced and the distances from the building to the property lines. Except for single family and multi-family residential buildings, indicate the total gross square footage of each building and its dimensions. For multi-family residential buildings, show the number of units in the building. Show the postal address for each served building. For buildings with multiple postal addresses, show the postal address for each bay, apartment, etc.

d. Indicate pavement and parking areas, and final pavement and parking area elevations.

### **Plan and Profiles - Waterlines**

1. Plan and profile sheets are required water lines 12" in diameter and larger.

2. Horizontal scale shall be 1" = 50' or larger.

3. Vertical scale to be between 1" = 1' and 1" = 5'.

4. Profiles shall show waterlines, fittings, existing utilities, etc.

5. Profiles shall be stationed starting at 5+00.

6. Intersecting waterlines shall be stationed such that station numbers are not duplicated.

## **VII. MINIMUM AS-BUILT DRAWING REQUIREMENTS**

1. As-Built drawings sets shall document changes between the design plans and actual construction. All information that is incorrect due to changes during construction will be corrected. Incorrect or no longer relevant information will be erased or struck through. Any District facilities constructed in a horizontal or vertical location materially different (five feet horizontal, one-half foot vertical) than the design location will have their design location struck through and will be redrafted at the constructed location. Design drawing dimensioning to water and sewer facilities will be corrected as necessary.
2. As Built set shall include all sheets originally included in the approved design set.
3. Show the location of easements used.
4. Indicate pipe joint locations where water and sewer piping cross.
5. Show all abandoned, demolished or disposed of system appurtenances.
6. Show elevations to the nearest tenth of a foot for:
  - a. Top of pipe for water mains at deflection points and every 200 feet along straight runs.
  - b. Top of pipe for water main fittings.
  - c. Top of pipe for connection to existing facilities.
  - d. Top of operating nut for valves.
  - e. Top of pipe of water or sewer facilities where they cross all other facilities (drainage, telephone, cable TV, electric, etc.)
7. Horizontal measurements from physical monuments or coordinates will be provided for District maintained facilities, including:
  - a. Water mains at deflection points and every 200 feet along straight runs.
  - b. The center of each fitting, valve, hydrant, water meter, etc.
  - c. The location on the water main of each tap for a service line.
  - e. The location of each connection to existing facilities.
  - f. The corners (vertices) of all easements being granted to the District as a part of the project.



# **Appendix A**

## **Nueces County Water Control and Improvement District #3 (District)**

### **Water System Improvement / Extension Checklist**

## **Nueces County Water Control and Improvement District #3 (District) Water System Improvement / Extension Checklist**

### **Step 1 - Initial Consultation between Developer and District**

- ☐ Schedule preliminary meeting with District
- ☐ Submit preliminary layout of proposed improvements

### **Step 2 - District Review of Preliminary Layout**

- ☐ Formal water availability letter issued to Developer

### **Step 3 - Submittal of Plans and Specifications**

- ☐ Submit five sets of plans and specifications

### **Step 4 - District Review of Plans and Specifications**

- ☐ One plan set with comments is returned to the Developer.

### **Step 5 – Submittal of Final Plans and Specifications**

- ☐ Submit three sets of revised and corrected plans and specifications to District
- ☐ Submit original set of reviewed plans and specifications
- ☐ Submits copies of all required permits
- ☐ Submits copies of easements

### **Step 6 – Final Review of Plans and Specifications**

- ☐ Acceptance of plans letter issued to Developer

### **Step 7 - Bidding and Construction**

- ☐ Developer bids project
- ☐ Pre-construction meeting
- ☐ Submit copy of the Contractor's liability insurance certificate
- ☐ Notice to Proceed with Construction issued to Developer
- ☐ Notification of construction start
- ☐ Construction completed
- ☐ Pressure and disinfection tests
- ☐ Formal punch list prepared
- ☐ Punch list items completed
- ☐ Final inspections

**Step 8 – Close out Documents**

- ☐ Submit three engineer sealed original As-Built plan sets and
- ☐ Submit one electronic copy of plan set
- ☐ Submit three copies of operational and maintenance manuals
- ☐ Submit “As Built” Drawings certification from the design engineer
- ☐ Submit final easements to District
- ☐ Submits one year warranty paperwork
- ☐ Letter of acceptance of completed project issued to Developer.

**Step 9 - One Year Warranty Inspection**

- ☐ Warranty inspection within 30 days prior to expiration of warranty period
- ☐ Warranty inspection punch list completed
- ☐ Punch list items completed
- ☐ Letter of Warranty end issued

## **Appendix B**

### **TEXAS ADMINISTRATIVE CODE**

<b>TITLE 30:</b>	<b>ENVIRONMENTAL QUALITY</b>
<b>PART 1:</b>	<b>TEXAS COMMISSION ON</b>
	<b>ENVIRONMENTAL QUALITY</b>
<b>CHAPTER 290:</b>	<b>PUBLIC DRINKING WATER</b>
<b>SUBCHAPTER D:</b>	<b>RULES AND REGULATIONS FOR PUBLIC</b>
	<b>WATER SYSTEMS</b>
<b>RULE §290.44 :</b>	<b>WATER DISTRIBUTION</b>

TEXAS ADMINISTRATIVE CODE  
TITLE 30: ENVIRONMENTAL QUALITY  
PART 1: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
CHAPTER 290: PUBLIC DRINKING WATER  
SUBCHAPTER D: RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS  
**RULE §290.44 : WATER DISTRIBUTION**

**(a) Design and standards.** All potable water distribution systems including pump stations, mains, and both ground and elevated storage tanks, shall be designed, installed, and constructed in accordance with current American Water Works Association (AWWA) standards with reference to materials to be used and construction procedures to be followed. In the absence of AWWA standards, commission review may be based upon the standards of the American Society for Testing and Materials (ASTM), commercial, and other recognized standards utilized by licensed professional engineers.

(1) All newly installed pipes and related products must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and must be certified by an organization accredited by ANSI.

(2) All plastic pipe for use in public water systems must also bear the National Sanitation Foundation Seal of Approval (NSF-pw) and have an ASTM design pressure rating of at least 150 psi or a standard dimension ratio of 26 or less.

(3) No pipe which has been used for any purpose other than the conveyance of drinking water shall be accepted or relocated for use in any public drinking water supply.

(4) Water transmission and distribution lines must be installed in accordance with the manufacturer's instructions. However, the top of the waterline must be located below the frost line and in no case shall the top of the waterline be less than 24 inches below ground surface.

(5) The hydrostatic leakage rate shall not exceed the amount allowed or recommended by AWWA formulas.

**(b) Lead ban.** The following provisions apply to the use of lead in plumbing.

(1) The use of pipes and pipe fittings that contain more than 8.0% lead or solders and flux that contains more than 0.2% lead is prohibited in the following circumstances:

(A) for installation or repair of any public water supply; and

(B) for installation or repair of any plumbing in a residential or nonresidential facility providing water for human consumption and connected to a public drinking water supply system.

(2) This requirement will be waived for lead joints that are necessary for repairs to cast iron pipe.

**(c) Minimum waterline sizes.** The minimum waterline sizes are for domestic flows only and do not consider fire flows. Larger pipe sizes shall be used when the licensed professional engineer deems it necessary. It should be noted that the required sizes are based strictly on the number of customers to be served and not on the distances between

connections or differences in elevation or the type of pipe. No new waterline under two inches in diameter will be allowed to be installed in a public water system distribution system. These minimum line sizes do not apply to individual customer service lines.

Maximum Number of Connections	Minimum Line Size (inches)
10	2
25	2.5
50	3
100	4
150	5
250	6
>250	8 and larger

**(d) Minimum pressure requirement.** The system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. When the system is intended to provide fire fighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow conditions.

(1) Air release devices shall be installed in the distribution system at all points where topography or other factors may create air locks in the lines. Air release devices shall be installed in such a manner as to preclude the possibility of submergence or possible entrance of contaminants. In this respect, all openings to the atmosphere shall be covered with 16-mesh or finer, corrosion-resistant screening material or an acceptable equivalent.

(2) When service is to be provided to more than one pressure plane or when distribution system conditions and demands are such that low pressures develop, the method of providing increased pressure shall be by means of booster pumps taking suction from storage tanks. If an exception to this requirement is desired, the designing engineer must furnish for the executive director's review all planning material for booster pumps taking suction from other than a storage tank. The planning material must contain a full description of the supply to the point of suction, maximum demands on this part of the system, location of pressure recorders, safety controls, and other pertinent information. Where booster pumps are installed to take suction directly from the distribution system, a minimum residual pressure of 20 psi must be maintained on the suction line at all times. Such installations must be equipped with automatic pressure cut-off devices so that the pumping units become inoperative at a suction pressure of less than 20 psi. In addition, a continuous pressure recording device may be required at a predetermined suspected critical pressure point on the suction line in order to

record the hydraulic conditions in the line at all times. If such a record indicates critical minimum pressures (less than 20 psi), adequate storage facilities must be installed with the booster pumps taking suction from the storage facility. Fire pumps used to maintain pressure on automatic sprinkler systems only for fire protection purposes are not considered as in-line booster pumps.

(3) Service connections that require booster pumps taking suction from the public water system lines must be equipped with automatic pressure cut-off devices so that the pumping units become inoperative at a suction pressure of less than 20 psi. Where these types of installations are necessary, the preferred method of pressure maintenance consists of an air gapped connection with a storage tank and subsequent repressurization facilities.

(4) Each community public water system shall provide accurate metering devices at each residential, commercial, or industrial service connection for the accumulation of water usage data. A water system that furnishes the services or commodity only to itself or its employees when that service or commodity is not resold to or used by others is exempt from this requirement.

(5) The system shall be provided with sufficient valves and blowoffs so that necessary repairs can be made without undue interruption of service over any considerable area and for flushing the system when required. The engineering report shall establish criteria for this design.

(6) The system shall be designed to afford effective circulation of water with a minimum of dead ends. All dead-end mains shall be provided with acceptable flush valves and discharge piping. All dead-end lines less than two inches in diameter will not require flush valves if they end at a customer service. Where dead ends are necessary as a stage in the growth of the system, they shall be located and arranged to ultimately connect the ends to provide circulation.

**(e) Location of waterlines.** The following rules apply to installations of waterlines, wastewater mains or laterals, and other conveyances/appurtenances identified as potential sources of contamination. Furthermore, all ratings specified shall be defined by ASTM or AWWA standards unless stated otherwise. New mains, service lines, or laterals are those that are installed where no main, service line, or lateral previously existed, or where existing mains, service lines, or laterals are replaced with pipes of different size or material.

(1) When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.

(2) Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in separate trenches.

(3) No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.

(4) Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.

(A) New waterline installation - parallel lines.

(i) Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.

(ii) Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or lateral shall be replaced with at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.

(iii) Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.

(B) New waterline installation - crossing lines.

(i) Where a new potable waterline crosses an existing, non-pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral is disturbed or shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

(ii) Where a new potable waterline crosses an existing, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it



shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

(iii) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

(iv) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform with one of the following options.

(I) Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.

(II) All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.

(III) When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described

for wastewater mains or laterals in subclause (II) of this clause or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. Both the waterline and wastewater main or lateral must pass a pressure and leakage test as specified in AWWA C600 standards.

(v) Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pressure rating of at least 150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

(vi) Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.

(5) Waterline and wastewater main or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.

(6) Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.

(7) Location of potable or raw water supply or suction lines. Suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.

(8) Proximity of septic tank drainfields. Waterlines shall not be installed closer than ten feet to septic tank drainfields.

**(f) Sanitary precautions and disinfection.** Sanitary precautions, flushing, disinfection procedures, and microbiological sampling as prescribed in AWWA standards for disinfecting water mains shall be followed in laying waterlines.

(1) Pipe shall not be laid in water or placed where it can be flooded with water or sewage during its storage or installation.

(2) Special precautions must be taken when waterlines are laid under any flowing or intermittent stream or semipermanent body of water such as marsh, bay, or estuary. In these cases, the water main shall be installed in a separate watertight pipe encasement and valves must be provided on each side of the crossing with facilities to allow the underwater portion of the system to be isolated and tested to determine that there are no leaks in the underwater line. Alternately, and with the permission of the executive director, the watertight pipe encasement may be omitted.

(3) New mains shall be thoroughly disinfected in accordance with AWWA Standard C651 and then flushed and sampled before being placed in service. Samples shall be collected for microbiological analysis to check the effectiveness of the disinfection procedure. Sampling shall be repeated if contamination persists. A minimum of one sample for each 1,000 feet of completed waterline will be required or at the next available sampling point beyond 1,000 feet as designated by the design engineer.

**(g) Interconnections.**

(1) Each proposal for a direct connection between public drinking water systems under separate administrative authority will be considered on an individual basis.

(A) Documents covering the responsibility for sanitary control shall accompany the submitted planning material.

(B) Each water supply shall be of a safe, potable quality.

(2) Where an interconnection between systems is proposed to provide a second source of supply for one or both systems, the system being utilized as a second source of supply must be capable of supplying a minimum of 0.35 gallons per minute per connection for the total number of connections in the combined distribution systems.

**(h) Backflow, siphonage.**

(1) No water connection from any public drinking water supply system shall be allowed to any residence or establishment where an actual or potential contamination hazard exists unless the public water facilities are protected from contamination.

(A) At any residence or establishment where an actual or potential contamination hazard exists, additional protection shall be required at the meter in the form of an air gap or backflow prevention assembly. The type of backflow prevention assembly required shall be determined by the specific potential hazard identified in §290.47(i) of this title (relating to Appendices).

(B) At any residence or establishment where an actual or potential contamination hazard exists and an adequate internal cross-connection

control program is in effect, backflow protection at the water service entrance or meter is not required.

(i) An adequate internal cross-connection control program shall include an annual inspection and testing by a certified backflow prevention assembly tester on all backflow prevention assemblies used for health hazard protection.

(ii) Copies of all such inspection and test reports must be obtained and kept on file by the water purveyor.

(iii) It will be the responsibility of the water purveyor to ensure that these requirements are met.

(2) No water connection from any public drinking water supply system shall be connected to any condensing, cooling, or industrial process or any other system of nonpotable usage over which the public water supply system officials do not have sanitary control, unless the said connection is made in accordance with the requirements of paragraph (1) of this subsection. Water from such systems cannot be returned to the potable water supply.

(3) Overhead bulk water dispensing stations must be provided with an air gap between the filling outlet hose and the receiving tank to protect against back siphonage and cross-contamination.

(4) All backflow prevention assemblies that are required according to this section and associated table located in §290.47(i) of this title shall be tested upon installation by a recognized backflow prevention assembly tester and certified to be operating within specifications. Backflow prevention assemblies which are installed to provide protection against health hazards must also be tested and certified to be operating within specifications at least annually by a recognized backflow prevention assembly tester.

(A) Recognized backflow prevention assembly testers shall have completed an executive director approved course on cross-connection control and backflow prevention assembly testing, pass an examination administered by the executive director, and hold current professional certification as a backflow prevention assembly tester.

(i) Backflow prevention assembly testers are qualified to test and repair assemblies on any domestic, commercial, industrial, or irrigation service.

(ii) Backflow prevention assembly testers may test and repair assemblies on firelines only if they are permanently employed by an Approved Fireline Contractor. The State Fire Marshall's office requires that any person performing maintenance on firelines must be employed by an Approved Fireline Contractor.

(B) Gauges used in the testing of backflow prevention assemblies shall be tested for accuracy annually in accordance with the University of Southern California's Manual of Cross-Connection Control or the American Water Works Association Recommended Practice for Backflow Prevention and Cross-Connection Control (Manual M14). Public water systems shall require testers to include test gauge serial numbers on "Test and

Maintenance" report forms and ensure testers have gauges tested for accuracy.

(C) A test report must be completed by the recognized backflow prevention assembly tester for each assembly tested. The signed and dated original must be submitted to the public water supplier for recordkeeping purposes. Any form which varies from the format specified in Appendix F located in §290.47(f) of this title must be approved by the executive director prior to being placed in use.

(5) The use of a backflow prevention assembly at the service connection shall be considered as additional backflow protection and shall not negate the use of backflow protection on internal hazards as outlined and enforced by local plumbing codes.

(6) At any residence or establishment where there is no actual or potential contamination hazard, a backflow prevention assembly is not required.

**(i) Water hauling.** When drinking water is distributed by tank truck or trailer, it must be accomplished in the following manner.

(1) Water shall be obtained from an approved source.

(2) The equipment used to haul the water must be approved by the executive director and must be constructed as follows.

(A) The tank truck or trailer shall be used for transporting drinking water only and shall be labeled "Drinking Water." Tanks which have been used previously for purposes other than transporting potable liquids shall not be used for hauling drinking water.

(B) The tank shall be watertight and of an approved material which is impervious and easily cleaned and disinfected. Any paint or coating and any plastic or fiberglass materials used as contact surfaces must be approved by the United States Environmental Protection Agency, the United States Food and Drug Administration, or the NSF. Effective January 1, 1993, any newly installed surfaces shall conform to ANSI/NSF Standard 61 and must be certified by an organization accredited by ANSI.

(C) The tank shall have a manhole and a manhole cover which overlaps the raised manhole opening by a minimum of two inches and terminates in a downward direction. The cover shall fit firmly on the manhole opening and shall be kept locked.

(D) The tank shall have a vent which is faced downward and located to minimize the possibility of drawing contaminants into the stored water. The vent must be screened with 16-mesh or finer corrosion-resistant material.

(E) Connections for filling and emptying the tank shall be properly protected to prevent the possible entrance of contamination. These openings must be provided with caps and keeper chains.

(F) A drain shall be provided which will completely empty the tank for cleaning or repairs.

(G) When a pump is used to transfer the water from the tank, the pump shall be permanently mounted with a permanent connection to the tank.

The discharge side of the pump shall be properly protected between uses by a protective cap and keeper chain.

(H) Hoses used for the transfer of drinking water to and from the tank shall be used only for that purpose and labeled for drinking water only. The hoses shall conform to ANSI/NSF Standard 61 and must be certified by an entity recognized by the commission. Hoses and related appurtenances must be cleaned and disinfected on a regular basis during prolonged use or before start-up during intermittent use. Hoses must be properly stored between uses and must be provided with caps and keeper chains or have the ends connected together.

(I) The tank shall be disinfected monthly and at any time that contamination is suspected.

(J) At least one sample per month from each tank shall be collected and submitted for microbiological analysis to one of the commission's approved laboratories for each month of operation.

(K) A minimum free chlorine residual of 0.5 mg/L or, if chloramines are used as the primary disinfectant, a chloramine residual of 1.0 mg/L (measured as total chlorine) shall be maintained in the water being hauled. Chlorine or chlorine containing compounds may be added on a "batch" basis to maintain the required residual.

(L) Operational records detailing the amount of water hauled, purchases, microbiological sampling results, chlorine residual readings, dates of disinfection, and source of water shall be maintained.

# Appendix C

## Specifications

FIRE HYDRANT  
GATE VALVES  
TRANSITION COUPLINGS  
PIPE RESTRAINT SYSTEM  
PVC PIPE  
DUCTILE IRON PIPE  
POLYETHYLENE WRAPPING  
SERVICE CONNECTIONS  
HYDROTESTING  
DISINFECTION  
PRESSURE PIPE INSTALLATION  
RIGHT OF WAY CROSSINGS  
BACKFILL SAND

## **FIRE HYDRANTS**

### **PART 1 – GENERAL**

Fire hydrants purchased or installed shall meet or exceed all applicable requirements and tests of ANSI and the latest revisions of AWWA Standard C502. Fire hydrants shall meet all test requirements and be listed by Underwriters Laboratories Inc. Fire hydrants shall meet all test requirements and have full approval of Factory Mutual. Hydrants shall be Mueller Super Centurion.

### **PART 2 – PRODUCTS**

Fire hydrants shall meet the following requirements:

1. Fire hydrants shall be rated for a working pressure of 250 Psig.
2. Fire hydrants shall be of the compression type, opening against the pressure and closing with the pressure.
3. Fire hydrants shall have a minimum 5-1/4" main valve opening and a minimum inside lower/upper barrel diameter (I.D.) of 7" to assure maximum flow performance. Pressure loss at 1,000 GPM shall not exceed the following values:

4" Pumper Nozzle: 2.70psi

4.5" Pumper Nozzle: 2.50psi

4. Fire hydrants shall be three-way in design, having one pumper nozzle (size as specified) and two 2-1/2" hose nozzle(s). Nozzle thread type shall be as specified by the end user. Nozzles shall thread counterclockwise into hydrant barrel utilizing "o" ring seals. A suitable nozzle lock shall be in place to prevent inadvertent nozzle removal.
5. The bonnet assembly shall provide an oil reservoir and lubrication system that automatically circulates lubricant to all stem threads and bearing surfaces each time the hydrant is operated. This lubrication system shall be sealed from the waterway and any external contaminants by use of "o" ring seals. An anti-friction washer shall be in place above the thrust collar to further minimize operating torque. The oil reservoir shall be factory filled with a low viscosity, FDA approved non-toxic oil lubricant which will remain fluid through a temperature range of -60<sup>0</sup> F. to +150<sup>0</sup> F.
6. The operating nut shall be a one piece design, manufactured of ASTM B-584 bronze. It shall be pentagon/square in shape and the nut dimensions shall be as specified by the end user. The operating nut shall be affixed to the bonnet by means of an ASTM B-584 bronze hold down nut. The hold down nut shall be threaded into the bonnet in such a manner as to prevent accidental disengagement during the



opening cycle of the hydrant. The use of Allen head set screws as a means of retention is unacceptable. A resilient weather seal shall be incorporated into the hold down nut, for the purpose of protecting the operating mechanism from the elements.

7. The direction of the opening shall be as specified by the end user. An arrow shall be cast on the bonnet flange to indicate the specified opening direction.

8. The hydrant bonnet shall be attached to the upper barrel by not less than eight bolts and nuts and sealed by an “o” ring.

9. Hydrants shall be a “traffic-model” having upper and lower barrels joined at the ground line by a separate and breakable “swivel” flange providing 360<sup>0</sup> rotation of upper barrel for proper nozzle facing. This flange shall employ not less than eight bolts. The safety flange segments shall be located under the upper barrel flange to prevent the segments from falling into the lower barrel when the hydrant is struck. The pressure seal between the barrels shall be an “o” ring. The proper ground line shall be cast clearly on the lower barrel and shall provide not less than 18” of clearance from the centerline of the lowest nozzle to the ground.

10. The operating stem shall consist of two pieces, not less than 1 1/4” diameter (excluding threaded or machined areas) and shall be connected by a stainless steel safety coupling. The safety coupling shall have an integral internal stop to prevent the coupling from sliding down into the lower barrel when the hydrant is struck. Screws, pins, bolts, or fasteners used in conjunction with the stem couplings shall also be stainless steel. The top of the lower stem shall be recessed 2” below the face of the safety flange to prevent water hammer in the event of a “drive over” where a vehicle tire might accidentally depress the main valve.

11. The lower barrel shall be an integrally cast unit. The use of threaded on or mechanically attached flanges is deemed unacceptable. The hydrant bury depth shall be clearly marked on the hydrant lower barrel.

12. Composition of the main valve shall be a molded rubber having a durometer hardness of 95 +/- 5 and shall be reversible in design to provide a spare in place. Plastic (polyurethane) main valves are unacceptable. The main valve shall have a cross section not less than 1”.

13. Hydrants shall be equipped with (2) two drain valves which drain the barrel when the hydrant is closed and seal shut when the hydrant is opened. These drain valves shall be an integral part of the one piece bronze upper valve plate. They shall operate without the use of springs, toggles, tubes, levers or other intricate synchronizing mechanisms.

14. The upper valve plate, seat ring and drain ring (shoe bushing) must be ASTM B-584 bronze and work in conjunction to form an all bronze drain way. A

minimum of two (2) internal and two (2) external drain openings are required. Drains ported through an iron shoe must be bronze lined.

15. The bronze seat ring shall thread into a bronze drain ring (or shoe bushing) providing a bronze to bronze connection. Seat rings shall be “o” ring pressure sealed

16. The shoe inlet size and connection type shall be as specified (flanged, MJ, etc.), having ample blocking pads for sturdy setting and the MJ connection must have two strapping lugs to secure the hydrant to piping. A minimum of six bolts and nuts is required to fasten the shoe to the lower barrel.

17. The interior of the shoe including the lower valve plate and stem cap nut shall have a protective coating that meets the requirements of AWWA C-550. If a stem cap nut is utilized, it must be locked in place by a stainless steel lock washer or similar non-corrosive device that will prevent the cap nut from backing-off during normal use.

19. Hydrants shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten years (10) from the date of manufacture. The manufacturing facility for the hydrant must have current ISO certification.

### **PART 3 – EXECUTION**

Hydrants shall be installed per written manufacturer’s instructions. See District detail. The District reserves the right to accept only those materials which are in full compliance with this specification and deemed most advantageous to its interests.

## **GATE VALVES**

### **PART 1 – GENERAL**

This specification covers all valves, valve operators, valve boxes, fittings, and thrust blocking required for this job. Gate valves shall be manufactured by Mueller.

### **PART 2– MATERIALS**

Gate Valves: Gate valves shall meet the following requirements:

1. The resilient seat gate valves shall fully comply with the latest revision of AWWA C509, and shall also be UL listed and FM approved. The valves shall be tested and certified to ANSI/NSF 61.
2. The valve shall have a 250 psig working pressure.
3. The valve type shall be NRS (non-rising stem) or OS&Y (outside screw & yoke) as specified.
4. The valve shall have an arrow cast on the operating nut or handwheel showing opening direction. The direction of opening shall be as specified.
5. The NRS valves shall be provided with a 2” square operating nut and OS&Y valves shall be provided with a handwheel. The bolt that attaches the operating nut to the stem shall be recessed into the operating nut so as not to interfere with valve wrench operation.
6. The valves shall have bolts and nuts for the stuffing box and bonnet with one of the following compositions: Type 304 stainless steel or Type 316 stainless steel.
7. The valve stem shall be made of bronze ASTM B-132 alloy C67600 bar stock material. The stem shall have at least one “anti-friction” thrust washer above and below the stem collar to reduce operating torque. The design of the NRS valve stem shall be such that if excessive input torque is applied, stem failure shall occur above the stuffing box at such a point as to enable the operation of the valve with a pipe wrench or other readily available tool. The stem material shall provide a minimum 70,000psi tensile strength with 15% elongation and yield strength of 30,000psi. Valves with cast stems or two piece stem collars are not acceptable.
8. The NRS valves shall have a stuffing box that is o-ring sealed. Two o-rings shall be placed above and one o-ring below the stem thrust collar. The thrust collar shall be factory lubricated. The thrust collar and its lubrication shall be isolated by the o-rings from the waterway and from outside contamination providing permanent lubrication for long term ease of operation. Valves without a stuffing box are unacceptable. Valves without at least three stem o-rings are also unacceptable.

9. The valve body, bonnet, stuffing box, and disc shall be composed of ASTM A-126 Class B grey iron or ASTM A395 or A536 ductile iron. The body and bonnet shall also adhere to the minimum wall thickness as set forth in Table 2, section 4.3.1 of AWWA C509. Wall thickness less than that in table 2 are not acceptable.

10. The valve disc and guide lugs must be fully (100%) encapsulated in SBR ASTM D2000 rubber material. The peel strength shall not be less than 75 pounds per inch. Guide caps of an acetal bearing material shall be placed over solid guide lugs to prevent abrasion and to reduce the operating torque.

11. The valves shall have all internal and external ferrous surfaces coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness. The coating shall conform to AWWA C550.

12. The tapping valves shall have an inlet flange conforming to ANSI B16.1 Class 125 for attachment to a tapping sleeve or cross. In addition, the valve inlet flange shall have a machined projection or raised face complying with MSS SP-60 for accurate alignment to the mating recess in the tapping sleeve flange. The seat opening of the tapping valves shall be at least .30" larger than the nominal pipe size to permit full diameter cuts.

13. The valves shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten (10) years from the date of manufacture.

Valve Boxes: Valve boxes shall be cast iron. Boxes shall be provided over all operating nuts of valves 16" and smaller. The word "WATER" shall be cast in the top cover. All parts of the valve box shall be bituminous coated. Valve extension pipe shall be eight inch (8") SDR 35 PVC pipe, 8" Ductile iron pipe, or smooth exterior wall non-reinforced concrete drain pipe. Boxes shall be H20 load approved.

Valve boxes shall be installed plumb and flush with surrounding grade. Boxes shall be installed so as to insure no harm is done to the valve. Boxes shall be Tyler Union, Bass & Hays or approved equal.

Valve Joints and Bolts: All valves shall be either mechanical joint or flanged, as detailed on the plans except for tapping valves which shall have a mechanical connection one side and a flange on the other side. All flanged valve bolts shall be either galvanized or stainless steel. Mechanical Joint valves shall have standard ductile iron "T" bolts, and shall be furnished with the restrained mechanical joint rings. All flanged joints shall be made using full face synthetic rubber gaskets. Natural red rubber gaskets and gaskets containing asbestos materials will not be allowed for either flanged or mechanical joint connections.

### **PART 3 – EXECUTION**

Valves shall be installed as outlined by written manufacturer's specifications.

## **TRANSITION COUPLING**

### **PART 1 – GENERAL**

Connections between pipes of differing outside diameters shall be accomplished using a transition coupling. Transition couplings provide no axial restraint and therefore shall require concrete blocking. Transition couplings shall be Smith-Blair or approved equal.

### **PART 2 – PRODUCTS**

Transition coupling materials shall conform to the following:

Sleeve: ASTM A-53, ASTM A-513 or carbon steel having a minimum yield of 30,000 psi.

Followers: Ductile Iron ASTM A536.

Gaskets: Nitrile or Buna-N-NSF61-Compounded to produce superior storage and performance characteristics while resisting water, acids, alkalies, most (aliphatic) hydrocarbons and many other chemicals. Temperature range -20°F. to 180°F.

Nuts and Bolts: High-Strength, low alloy steel with heavy, semi-finished hexagon nuts.

Finish: Fusion bonded Flexi-Coat epoxy.

### **PART 3 – EXECUTION**

Transition couplings shall be installed according to written manufacturer's recommendations.

## **PIPE RESTRAINT SYSTEM**

### **PART 1 – GENERAL**

This specification shall govern the design, manufacture, fabrication and installation of Restraint systems for Ductile Iron and PVC Pipe for water supply and transmission. All material shall be new. The system shall be Ford Uni-Flange Series 1300, 1350, 1360, 1390 or EBAA Series 2000SV, 2800, 1600.

### **PART 2 – PRODUCTS**

Material Requirements: The system shall incorporate a series of machined serrations (not “as cast”) on the inside diameter to provide positive restraint, exact fit 360 degrees contact and support of the pipe wall. Restraint device shall be manufactured of high strength Ductile Iron Material (ASTM A536) for smaller size pipe or high-grade steel for larger size pipe. Bolts and connecting hardware shall be of high strength, low alloy material in accordance with ANSI/AWWA C111/A21.11. Bolts shall be hot-dipped galvanized or stainless steel. The devices shall meet or exceed the requirements of Uni-B-13-94.

Restraint Systems shall conform to the following:

C-900 PVC – Restraints may be integrated packing gland, restraint ring or restraint ring and mechanical joint packing gland

C-905 PVC – Restraint ring and mechanical joint packing gland

Ductile Iron - integrated packing gland and restraint ring

### **PART 3 – EXECUTION**

The restraint devices shall be installed at mechanical joint fittings and at ductile iron and PVC pipe joints as noted. The devices shall be installed in accordance with manufacturer’s recommendations. Each device shall be wrapped in two layers of polyethylene sheets. The minimum downstream and upstream requirements for placing joint restraints (at bell & spigot connections) shall be as recommended by the manufacturer for the proposed laying conditions. Minimum allowable lengths are detailed in the District standard details.

## **PVC PIPE**

### **PART 1 – GENERAL**

All materials shall be approved for use in potable water systems by the National Sanitation Foundation (NSF), Standard 61.

### **PART 2 – PRODUCTS**

**C900 WATERLINE PIPE:** PVC piping 4" through 12" diameters shall meet the requirements of the latest revision of AWWA Standard C900, 'Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4" through 12" for Water' and shall be furnished in cast-iron pipe equivalent outside diameters. All pipe shall be suitable for use as a pressure conduit for potable water. The pipe shall meet the requirements of Uni-Bell Standard Uni-B-3 and shall be approved by Underwriter's Laboratories for use as a fire main.

Pressure Class: The pipe shall be Class 150 with a DR of 18.

Couplings: The pipe shall be joined using integral bells and spigot couplings. The bell shall consist of an integral wall section with a synthetic rubber, locked in place, gasket. The gasket shall comply with the requirements of the latest revision of ASTM F-477, "Elastomeric Seals (Gaskets) for Joining Plastic Pipe". Natural rubber rings will not be acceptable.

**C905 WATERLINE PIPE:** PVC piping greater than 12" diameter shall meet the requirements of AWWA C-905, latest revisions for "Polyvinyl Chloride (PVC) Water transmission Pipe, Nominal Diameter 14 in through 48 in".

Pressure Class: The pipe shall be Class 235 with a DR of 18.

Couplings: 14" and larger pipe shall be joined using integral bell and spigot couplings. The bell shall consist of an integral wall section with a synthetic rubber gasket ring that meets the requirements of the latest revision of ASTM F-477, "Elastomeric Seals (Gaskets) for joining Plastic Pipe". The bell section shall be designed to be at least as strong as the pipe wall. Natural rubber rings will not be acceptable.

**PVC PIPE >6" IN DIAMETER::** Pipe sizes less than six inches in diameter shall meet the requirements of ASTM D2241 and shall be furnished in steel pipe equivalent outside diameters. Pipe and fittings 1" and smaller shall be schedule 80 PVC. The pipe shall be bell and spigot, solvent cement joints, meeting the requirements of ASTM D1785 and ASTM D2672 or the pipe shall be screwed joints and fittings as required.

**PRESSURE TESTING:** Each standard and random length of pipe shall be tested to four (4) times the pressure class of the pipe for a minimum of five (5) seconds. The integral bell shall be tested with the pipe.

**RANDOM TESTS:** The District may subject random lengths of pipe to testing by an independent laboratory for compliance with this specification. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting the entire order.

**DELIVERY:** Pipe shall be bundled in pallets for ease of handling and storage. Pipe bundles shall be packaged to provide structural support to insure that the weight of upper units shall not cause deformation to pipe in lower units. No pipes bundles shall be accepted which show evidence of ultraviolet radiation “sunburn” on exposed pipe as may be caused from extended unprotected storage conditions. Pipe shall be homogenous throughout. It shall be free from voids, cracks, inclusions, and other defects. It shall be as uniform as commercially practical in color, density, and other physical properties. Pipe surfaces shall be free from nicks and scratches. Joining surfaces of spigots and joints shall be free from gouges and imperfections that could cause leakage.

Pipe shall be inspected by the District to assure that it meets specifications. When a load of pipe is found to have inadequate wall thickness or tolerances greater than specified, randomly selected samples of the pipe shall be immediately forwarded to an approved testing laboratory with instructions to check the pipe for compliance with applicable product standards, ASTM specifications and other specifications for the specific contract. When the testing laboratory reports concur that the pipe does not meet specifications, it is to be understood that all of the defective pipe delivered to the site will be immediately removed and replaced by the contractor at no additional cost to the owner.

**FITTINGS:** Fittings shall be ductile iron in accordance with AWWA C110, AWWA C153, or AWWA C606, latest revisions.

**Cement Lining:** Fittings shall be internally lined with cement mortar in accordance with AWWA C104. The lining thicknesses shall be equal to or greater than those for comparable size pipe.

**Buried Service Fittings:** Fittings, sizes 4" – 24", with push-on, restrained push-on, or mechanical joints shall be rated for 350 psi working pressure. Fittings, sizes 30" – 64", with push-on, restrained push-on, or mechanical joints shall be rated for 250 psi working pressure.

**Small pipe Fittings:** 3" and 2" mechanical joint fittings shall be supplied with a transition gasket, allowing them to accept iron pipe equivalent outside diameter. 4" and larger diameter pipe shall be supplied with transition gaskets, if necessary, to allow them to accept the ductile iron fittings.

### **PART 3 – EXECUTION**

**INSTALLATION:** PVC pipe shall be installed in accordance with District Standards and with the Uni-Bell Plastic Pipe Association guide for installation of PVC pressure pipe for municipal water distribution systems.



## **DUCTILE IRON PIPE AND FITTINGS**

### **PART 1 – GENERAL**

**SCOPE:** This specification shall govern the design, manufacture, fabrication and installation of Ductile Iron Pipe and fittings for water supply and transmission. All pipe and fittings must be new. The pipe, fittings, coatings, lubricants, gaskets, etc., must be NSF, Standard 61 approved.

**STANDARDS:** The following standards govern ductile iron pipe and fittings. Where standards, specifications or methods are cited without dates, the reference shall be construed to apply to the latest revision in effect at the time of contract.

- AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- AWWA C105: Polyethylene Encasement for Ductile-Iron Pipe Systems
- AWWA C110: Ductile-Iron and Gray-Iron Fittings, 3-in through 48-in for Water and Other Liquids
- AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- AWWA C115: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- AWWA C150: Thickness Design of Ductile-Iron Pipe
- AWWA C151: Ductile-Iron Pipe, Centrifugally Cast for Water
- AWWA C153: Ductile-Iron Compact Fittings, 3-in through 24-in and 54-in through 64-in for Water Service
- AWWA C600: Installation of Ductile-Iron Water Mains and their Appurtenances

### **PART 2 - PRODUCTS**

**PIPE DESIGN:** All ductile iron pipe shall be designed and manufactured in accordance with AWWA C150 and AWWA C151, respectively, for the following minimum operating conditions:

- The minimum internal design pressure shall be 150 psi with a 100-psi surge allowance, with a safety factor of 2, for a total internal design pressure of 500 psi. No reduction of safety factor for transient pressures shall be allowed.
- The external loads design criteria shall be a minimum of 4' depth of cover at 120 lbs. per cubic feet soil weight and live load based on one AASHTO H-20 truck load. The thickness design of ductile iron pipe shall be in accordance with AWWA C150.
- The horizontal deflection of cement-mortar lined ductile iron pipe resulting from external load conditions shall not exceed 3% of the pipe diameter.
- The pipe trench, per AWWA C150, for design purposes shall be: Type 4 – Pipe bedded in sand, gravel or crushed stone to depth of 1/8 pipe diameter, 4" minimum. Backfill compacted to top of pipe.

MINIMUM PIPE CLASS: Ductile iron pipe shall conform to AWWA C151. All pipe shall have a minimum pressure rating as indicated below, or higher ratings as indicated in the contract documents:

- DI pipe 4"-12" dia. 350 PSI
- DI pipe 14"-20" dia. 250 PSI
- DI pipe 24" dia. 200 PSI
- DI pipe 30" – 64" dia. 150 PSI

JOINTS, GASKETS, BOLTS AND NUTS:

- Joints: Ductile Iron Pipe and fittings shall be furnished with push-on joints, push-on restrained joints, mechanical joints, flanged joints, and grooved joints as required.
- Push-on Joints: Push-on joints shall conform to AWWA C111.
- Mechanical Joints: Mechanical joints shall conform to AWWA C111.
- Gaskets: Gaskets shall be Viton or EPDM, natural rubber and Buna N are not allowed.
- Bolts and Nuts: Bolts shall be high-strength, low-alloy steel per AWWA C111.

FITTINGS: Fittings shall be ductile iron in accordance with AWWA C110, AWWA C153, or AWWA C606, latest revisions.

- Cement Lining: Fittings shall be internally lined with cement mortar in accordance with AWWA C104. The lining thicknesses shall be equal to or greater than those for comparable size pipe.
- Buried Service Fittings: Fittings, sizes 4" – 24", with push-on, restrained push-on, or mechanical joints shall be rated for 350 psi working pressure. Fittings, sizes 30" – 64", with push-on, restrained push-on, or mechanical joints shall be rated for 250 psi working pressure.

LINING: Ductile iron pipe, specials, and fittings shall be lined with cement-mortar lining with an asphaltic seal coating, 1 mil, in accordance with AWWA C104.

EXTERIOR COATING FOR BURIED DI PIPE: The exterior of ductile iron pipe, special, and fittings shall be coated with a 1-mil asphaltic coating in accordance with AWWA C151. When specified, loose polyethylene encasement shall be supplied in accordance with AWWA C105.

### **PART 3 – EXECUTION**

INSTALLATION: The pipe shall be laid to the lines and grades specified by the Engineer. After the pipe has been laid, sand bedding material shall be brought up uniformly on each side of the pipe to the center of the pipe and mechanically tamped to a minimum of 85% proctor. The sand bedding material shall be placed to a point four (4") inches above the top of the pipe including bell and mechanically tamped to a minimum of 85% proctor. Care shall be exercised to see that the bedding material is well tamped under the pipe before bringing backfill up on the sides of the pipe. No voids or loose material around the pipe will be permitted. This bedding material backfill shall be mechanically tamped.

After this mechanically tamped bedding material has been placed, the remainder of the trench shall be backfilled and this portion of the backfill material shall be either water consolidated or mechanically tamped to a minimum of 85% proctor. The material used shall be free from rocks, roots, boulders or other unsatisfactory materials, including materials that would damage the polyethylene wrapping.

## **POLYETHYLENE WRAPPING**

### **PART 1 – GENERAL**

**SCOPE:** All ductile or cast iron or steel pipe, pipe restraints or other metal water system appurtenances laid below ground shall be wrapped in black polyethylene sheet as outlined below. Soil which is onto the pipe, valve, or metal shall be removed before installing the polyethylene.

### **PART 2 – PRODUCTS**

**MATERIAL:** Polyethylene sheets shall have a minimum thickness of 8 mils.

### **PART 3 – EXECUTION**

**PLACEMENT ON PIPE:** All ductile or cast iron pipe or steel pipe laid below ground shall be encased in two (2) layers of black polyethylene sheet placed on each joint as it is being laid, in accordance with AWWA Standard C-105, Method C, latest revision. The sheets shall be of sufficient size to provide a 12" lap at all longitudinal and transverse joints. Sheets shall be of virgin black polyethylene. The sheets shall be taped together at intervals along the joints, leaving at least 90% of the joint open.

Care shall be taken to avoid tearing or puncturing the sheet during installation and during placing and compaction of backfill. Tears and punctures shall be repaired with eight (8) mil black polyethylene sheet and/or tape.

**PLACEMENT ON FITTINGS AND VALVES:** Fittings and valves which are to be buried shall be loose wrapped with two layers of eight (8) mil black polyethylene sleeves or sheet. The sheet or sleeve shall be taped to the valve or fitting wherever operating parts must project. Tears and punctures shall be repaired as outlined above.

## **SERVICE CONNECTIONS**

### **PART 1 – GENERAL**

All new water service pipe, fittings, connectors, nipples, washers, and other appurtenances shall be non-corrosive metal (copper, brass, bronze, etc) except as otherwise specified and shall be as intended for use with other specified materials. The use of galvanized iron, steel, or plastic fittings with copper and other higher grade specified materials shall not be permitted or accepted.

### **PART 2 – PRODUCTS**

**CORPORATION STOPS:** Corporation Stops shall be brass, complete with a pack joint fitting with a retainer screw and AWWA Standard threads as per AWWA C800. Taps shall be located at 10:00 or 2:00 o'clock on the circumference of the pipe. Service taps shall be staggered alternating from one side of the water main to the other and at least 12 inches apart. The taps must be a minimum of 24 inches apart if they are on the same side of the pipe. Acceptable manufacturers shall be Mueller, or Ford Meter Box Company. No burned taps will be allowed and each corporation stop will be wrapped with Teflon tape for ductile iron pipe water mains.

**CURB STOPS:** Curb Stops shall be designed to receive the service pipe connection with straight coupling nut on the street side and on iron pipe thread connection on the opposite side. Curb stops shall be manufactured by Mueller, or Ford Meter Box Company.

**SERVICE SADDLES:** Service saddles shall double band stainless steel repair saddles, double band brass saddles or double strap brass saddles. Saddles shall be Mueller, or Ford Meter Box Company.

**SERVICE TUBING:** Copper Service Tubing shall be type K soft copper tubing per ASTM B88. The longest available length of service line should be used with no unions. As an example for a 3/4 inch service connection, no union shall be used in the installation of 60 feet or less. For 3/4 inch, only one (1) union will be allowed for each one hundred (100) foot section or fraction thereof. Unions shall be made with pack joint fitting with a retaining screw.

**METER BOXES:** Meter Boxes for 5/8 inch services shall be of round style and made of Polyvinyl Chloride Plastic with a minimum wall thickness of .375 inches. The box shall be sized to accept a 5/8, 3/4, and 1-inch water meter and shall have a minimum inside diameter of 18-inches with a 30-inch depth. The box shall have a non-locking cast iron lid.

### **PART 3 – EXECUTION**

All service connection appurtenances shall be installed per written manufacturer's instructions. See District Standard Detail.

## **HYDROTESTING**

### **PART 1 – GENERAL**

**SCOPE:** This item covers the requirements for the hydrostatic test of the water lines.

### **PART 2 – PRODUCTS**

### **PART 3 – EXECUTION**

**TEST PROCEDURE:** Pipe sections shall be hydrostatic tested as follows:

The Contractor shall install new pipelines to approximately 20 feet within the new connections or proposed changes in pressure classes. A temporary cap or plug shall be installed on each pipe end and temporarily blocked for pressure testing. After the pipe has been laid, the line pressure shall be held at fifty (50) psi for a period of twenty-four (24) hours. The Engineer shall be notified before filling any section of the pipe. A pressure gage with a minimum diameter of 4" and 5 pound numbered marking and individual markings at each 1 pound shall be furnished by the Contractor. The Contractor shall also furnish a pressure pump with drive and a meter which will measure 0.10 gallon to perform the hydrostatic test.

Before applying the specified test pressure, all air shall be expelled from the pipe. If additional taps are necessary to expel this air, they shall be made at appropriate points and tightly plugged after the test is completed. All exposed pipes, fittings, valves, and joints will be examined carefully during the test. All joints showing visible leaks, drips, seeps, etc. shall be made tight, or shall be cut out and replaced, at the Contractor's expense, as directed by the Engineer. Any cracked or defective pipe joints, fittings, or valves discovered in consequence of this pressure test, shall be removed and replaced by the Contractor with sound material, and the test shall be repeated until satisfactory to the Engineer. When hydrants are in the test section, the test shall be run against the closed hydrant and not the valve on the lead. Pipes shall be tested with all service connections from main pipe to meter location installed.

After the 24-hour stabilization, the pipeline shall be held at the test pressure of one hundred fifty (150) psi for a minimum of two (2) hours during which time the leakage determination shall be made.

**WATER FOR TESTING:** The District will provide water for one testing, disinfection, flushing and filing. Any additional water required will be purchased by the contractor from the owner at standard water rates.

LEAKAGE: Acceptable leakage for ductile iron pipe, concrete steel cylinder pipe and PVC pipe shall be less than the value indicated by the following formula:

$$L = \frac{NxDx(P)^{(1/2)}}{7400}$$

where: L = max. allowable leakage, in gallons/hour

N = number of joints in tested length

D = nominal diameter of pipeline, in inches

P = mean test pressure, in pounds/sq. inch

Should any test of combined sections of pipe laid disclose leakage greater than the specified limit, the Contractor shall at his own expense, locate and repair the defective joints until the leakage is within the specified allowance. Repairs and test shall be repeated until the line shows no defects and is accepted by the Engineer.

GUARANTEE: The pipe Contractor shall guarantee the pipeline against leaks and breaks due to defective materials or workmanship, for a period of one (1) year from the date of completion of the contract. Damage or leaks due to the acts of God or from sabotage and/or vandalism occurring after the pipeline has been accepted and placed in operation are specifically not a part of this guarantee.

When defective material and workmanship are discovered requiring repairs to be made under this guarantee, all such repair work shall be done by the Contractor at his own expense within five (5) days after written notice of any leaks has been given him by the Owner. Should the Contractor fail to repair such leaks within five (5) days thereafter, the Owner may make the necessary repairs and charge the Contractor with the actual cost of all labor and material required. In emergencies demanding immediate attention, the Owner shall have the right to repair the same and charge the Contractor with the actual cost of all labor and materials required.

## **DISINFECTION**

### **PART 1 – GENERAL**

After satisfactory completion of the pressure test, disinfect new potable water mains and existing mains that have required repair in accordance with AWWA C651 and as specified herein. Disinfect water mains in a maximum length per day of 2,000 feet. The Contractor shall provide a superintendent experienced in the required procedures for disinfecting with chlorine.

### **PART 2 – PRODUCTS (NOT USED)**

### **PART 3 – EXECUTION**

Connection to Existing System: Notify the District 48 hours prior to making connections to the existing system. Thoroughly clean the existing water main exterior prior to the installation of tapping sleeves and corporation stops. Lightly dust with calcium hypochlorite powder the water main exterior and the interior surface of the tapping sleeve, and corporation stops. After satisfactory flushing of the main, disinfect by the injection of a chlorine solution. Induce chlorine in sufficient quantity to maintain a chlorine residual of at least 50 ppm throughout the system to be tested. Maintain the chlorine solution in the system for at least 24 hours. Prior to flushing, the free chlorine residual shall be a minimum of 25 ppm. Flushing of the lines shall proceed until the lines contain the normal chlorine residual of the system.

Valves and Fire Hydrants: Open and close valves on the mains being disinfected a minimum of three (3) times during the chlorine contact period and a minimum of three (3) times during flushing. Fire hydrants and other appurtenances should receive special attention to insure proper disinfection.

Cut-In Construction: Use the following procedures for disinfecting of the new installation and the existing main at the cut-in point in accordance with AWWA C651, Section 9:

- Apply liberal quantities of hypochlorite, in the form of tablets, to the open trench.
- Interior of new pipe and fittings and the ends of the existing mains shall be swabbed or sprayed with a 1 percent hypochlorite solution before installation.
- Install a 2-inch tap downstream of the work area. The tap shall be used for blowing off the main. Or, use the next fire hydrant downstream of the work area for blowing off the main.
- Install a 2-inch tap just upstream of the new installation. Control water from the existing system so as to flow slowly into the work area during the application of chlorine. After the line is thoroughly flushed, add chlorine solution at a concentration of 100 ppm by the continuous feed method and hold in the main for 1 hour.



*Bacteriological and Chlorine Residual Sampling and Testing:*

- Test for free chlorine residual at required bacteriological test locations immediately after induction of highly chlorinated water and again after 24 hours, prior to flushing of the highly chlorinated water from the potable water system.
- Obtain two samples at each location specified after the chlorination procedure is completed, and prior to placing the system in service. Take the first sample immediately after flushing of the chlorinated water and again in 24 and 48 hours. A set of samples shall be taken as a minimum at the following locations:
  - Every 1,200 lf.
  - End of each main.
  - A minimum of one from each branch.
  - Mains at cut-in locations: Each side of work area. Time between samples to be determined by District Inspector in the field.
- Recommended additional samples. During the required sampling of water from the new system, it is recommended that samples be taken from the existing potable water source to determine if coliforms are present.
- Care in sampling. No hose or fire hydrant shall be used for the collection of samples. Take samples from an approved sample tap consisting of a corporation stop installed in the main with a copper tube gooseneck assembly. Operation shall be such as to ensure that the sample collected is actually from water that has been in the new system.
- Test samples for the presence of coliform organisms in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater. Testing method used shall be either the multiple-tube fermentation technique or the membrane-filter technique.
- Testing shall be performed by a laboratory certified for the required testing by the State of Texas.
- Test for odor. The water in the new system should also be tested to assure that no offensive odor exists due to chlorine reactions or excess chlorine residual.
- If samples show the presence of coliform, one of the procedures described below shall be followed, with the approval of the District, before placing the unit or facility in service:
  - Take repeat samples at least 24 hours apart until consecutive samples do not show the presence of coliform.
  - Again subject the system to chlorination and sampling as described in this section.
- If samples are free of coliform, and with the approval of the District, the potable water system may be placed in service.

*Contamination:* If, in the opinion of the District, possible contaminants have entered the existing water system, or water samples show the water in the existing system to be unsafe on completion of the work, the entire disinfection process shall be repeated at no additional cost to the District.

## **PRESSURE PIPE INSTALLATION**

### **PART 1 – GENERAL**

**SCOPE:** This specification covers the requirements for labor, equipment, and material necessary to install pressure water line for use in water supply and distribution systems.

#### **INSPECTION:**

- **Inspection of Material at Delivery Point:** When received from the carrier and at the time of unloading, the Contractor and Inspector shall inspect all pipe and accessories for loss or damage in transit. No shipment of material should be accepted by the Contractor unless proper exceptions are made on the receipt obtained by the carrier, at the time of delivery, as to loss and/or damage.
- **Field Inspection of Material and Workmanship:** All laying, jointing, testing for defects and for leakage under pressure, and disinfection, shall be performed in the presence of the Owner's Engineer or his authorized inspector, and shall be subject to his approval before acceptance.
- **Disposition of Defective Material:** All material found during the progress of the work to have cracks, flaws, or other defects will be rejected by the Owner's Engineer or his authorized inspector and the Contractor shall promptly remove such defective material from the site of the work.

#### **CONTRACTOR'S RESPONSIBILITY FOR MATERIAL:**

- **Responsibility for Material Furnished by Contractor:** The Contractor shall be responsible for all material furnished by him. All such material which is defective in manufacture or has been damaged in transit or has been damaged after delivery shall be replaced by the Contractor at his expense.
- **Responsibility for Safe Storage:** The Contractor shall be responsible for the safe storage of all material furnished to or by him and accepted by him until it has been incorporated in the completed project.

#### **HANDLING OF PIPE AND ACCESSORIES:**

- **Handling and Care:** Pipe and accessories shall, unless contrary instructions are received, be unloaded at the point of delivery, hauled to, and distributed at the site of the project by the Contractor. They shall at all times be handled with care to avoid damage. Material shall not be dropped or bumped against pipe or accessories already on the ground or against any other object on the ground. The pipe manufacturer will assist the Contractor in implementing proper handling procedures. The Contractor shall be responsible for any damage resulting from improper handling or care.
- **Distribution at Site of Work:** In distributing material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.
- **Materials Kept Clean:** The interior of all pipe and accessories shall be kept free from dirt and foreign matter at all times.
- **Standing Water:** Pipe shall never be installed in a trench where there is standing water.

## **PART 2 – PRODUCTS**

## **PART 3 – EXECUTION**

### **ALIGNMENT AND GRADE:**

- General: All pipe shall be laid and maintained to the required lines and grades. Fittings and valves shall be at the required locations and with joints centered, spigots home and all valve stems plumb.
- Protecting Underground and Surface Structures: Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his own expense.
- Obstructions Caused by Other Utility Structures: Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed or reconstructed by the Contractor in cooperation with the Owner of such utility structures.
- Deviation With Engineers Consent: Deviation from the required line or grade as shown on the plans shall be made only with prior approval of the Engineer.
- Subsurface Explorations: Whenever necessary to determine the locations of existing underground utility structures, the Contractor, after an examination of available records and upon the written order of the Engineer, shall make all explorations and excavations for such purpose.

**THRUST BLOCKING:** Pipe ends, changes in direction, valves and all other fittings shall be thoroughly blocked by means of poured concrete, which shall extend the full width of the trench and from the bottom of the trench to a minimum of three (3) times the diameter of the pipe. Blocking shall bear against the fitting and shall be poured against undisturbed or tightly compacted earth. If the Contractor has cut the ditch beyond the end of the pipe, he shall extend the block one-half (1/2) width of the trench into each side wall of the trench and thoroughly compact the earth behind the block. Minimum thickness of the blocking shall be eight (8) inches, and reinforcing may be required by the Engineer if the block is not poured against undisturbed earth. Concrete shall be Class N-25, with a minimum compressive strength of 2500 psi at 28 days. The area bearing against undisturbed earth shall be as shown on the plans.

### **LOWERING PIPE AND ACCESSORIES INTO TRENCH:**

- General: Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of derrick, ropes, or other suitable equipment in such manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

- **Inspection of Pipe and Accessories:** The pipe and accessories shall be inspected, by both the Contractor and Inspector, for defects prior to lowering into trench. Any defective, damaged, or unsound pipe shall be repaired or replaced.
- **Pipe Kept Clean:** All foreign matter or dirt shall be removed from the interior of pipe before lowering into position in the trench. Pipe shall be kept clean by means approved by the Engineer during and after laying. Pipe ends shall be tightly plugged overnight, and provisions made to avoid flotation of pipe until final backfill is placed.
- **Disinfection:** When taking bacteriological tests is impossible, the Contractor shall wipe any item that will contact the water with a chlorine solution. The chlorine solution will contain a minimum of 50 mg/L chlorine. In addition, the Contractor shall place 5 pounds of HTH, 65% chlorine, in the pipe ahead of a connection, valve, or any place where the waterline has been open.

**UTILITY LINE MARKING TAPE:** Detectable underground marking tape, meeting OSHA regulation 1926.956 (c)(1), shall be installed over ALL utility lines. The detectable marking zone tape shall bear the printed identification of the Utility Line below it, such as "CAUTION - BURIED WATER LINE BELOW". Tape shall be permanently printed. Surface Printing will not be acceptable. The tape shall be constructed of material that will provide maximum color contrast and visibility in all types and colors of soil. The tape shall meet APWA color code. The tape shall be lineguard III underground detectable tape or approved equal. The detectable marking tape shall be buried 6 inches over the top of the waterline. After placing sand embedment, the tape shall be placed in the backfill and allowed to settle in place with the backfill. Tape may be installed by any other method approved by the Engineer.

**TRACER WIRE:** All non-metallic pipe installed underground shall have a tracer wire installed along the length of the pipe. The wire shall be placed adjacent to, but not touching, the pipe, and in no case shall it be wrapped around the pipe. A maximum distance from the pipe to the wire is one (1) foot. Tracer wire shall be 14 gauge minimum, copper single-conductor wire with insulation and shall be continuous along the pipeline passing through the inside of each valve box.

**WATERLINE MARKERS:** Waterline markers shall be provided on both sides of each county road, state highway, railroad track, and drainage ditch crossing for main waterlines.

- **MARKERS:** The markers shall consist of a pressure penta-treated post - minimum diameter of 4" - and a fiberglass sign. The post shall be 8' long and shall be buried a minimum of 3'. The top of the post shall be notched to allow the sign to be placed against a flat surface. The sign shall be constructed of a composition of fiber reinforced fiberglass, marble, and thermosetting polymers. The signs shall be 6" high, 12" long, and 0.135 inches thick. The sign shall be resistant to U.V. degradation. The sign shall be manufactured by Carsonite or approved equal.
- **LETTERING:** The sign shall be white with black letters. The letters shall be as follows:
  - CAUTION WATERLINE (Larger Letters)
  - NCWCID #3 (Larger Letters)

- CALL 387-4549 BEFORE (Smaller Letters)
  - DIGGING IN THIS AREA (Smaller Letters)
- ATTACHMENT: The signs shall be attached to the posts using 2 stainless steel wood screws, No. 14 by 1-1/2".

## **RIGHT OF WAY CROSSINGS**

### **PART 1 – GENERAL**

The following specification shall govern waterline crossings of rights of way.

### **PART 2 – PRODUCTS**

Casing Pipe: Casing pipe, shall comply with the requirements of ANSI B36.10, latest revision, Standard for Welded and Seamless Pipe. Used pipe, in good condition (without pits) will be accepted, but must be inspected and approved by the District's Inspector. The minimum wall thickness shall meet requirements of governing agency, ie TxDOT, Nueces County, City of Robstown, UPRR, etc.

Casing Spacers: All casing spacer hardware including screws, bolts, nuts, etc. shall be stainless steel. Casing spacers shall be projection type totally non-metallic spacers constructed of performed sections of high-density polyethylene. Projection type spacers shall be RACI type spacers by Raci Spacers North America Inc. or approved equal.

### **PART 3 – EXECUTION**

Casing Pipe: Pipe shall be installed per governing agency standards. All sections of the steel casing shall be completely welded together. No openings in the connection between sections of pipe will be permitted. Molded rubber end seals shall be sized to securely attach to the exterior of casing and carrier pipe to prevent water, dirt and debris from entering the annular space between the installed pipe. Install in accordance with the manufacturer's written instructions and as shown in the plans and details.

Casing Spacers: Casing spacers shall use double backed tape to fasten tightly onto the carrier pipe so that the spacers do not move during the installation. Written installation instructions shall be provided with each shipment. Casing spacers shall have a maximum span of 10 feet dependent on the total load anticipated with the pipe full of liquid. Spacers at each end shall not be further than 12-inches from the end of the casing regardless of the size of casing and carrier or type of spacer used. The maximum load shall not exceed the load limits per spacer listed by manufacturer. A minimum of three (3) casing spacers per pipe is required for each joint. Spacer runners shall have minimum height that clears the pipe bell or as otherwise indicated on plans.

## **BACKFILL SAND**

### **PART 1 – GENERAL**

Backfill sand shall be used in the installation of all pipe and underground appurtenances. All pipe, valves and fittings shall be completely encased with a minimum of eight inches (8”) of sand. The contractor shall provide submittal information on proposed backfill sand.

### **PART 2 – PRODUCTS**

**SAND:** The sand shall be finely divided sand having the following specifications:

Passing 7/8 Sieve:	100% by weight
Passing No. 4 Sieve:	80% by weight
Clay:	Less than 20% by weight
Plasticity Index:	NP-10 max.

The sand shall have low chloride content (salt) which shall not exceed 200 ppm chlorides when used in association with Concrete Steel Cylinder or Ductile Iron Pipe. Sand used for PVC pipe does not need to meet the chloride requirements. The sand shall contain no rocks, portions of any trees including stumps or roots, and no large clumps of clay which are more than two Inches (2”) in diameter.

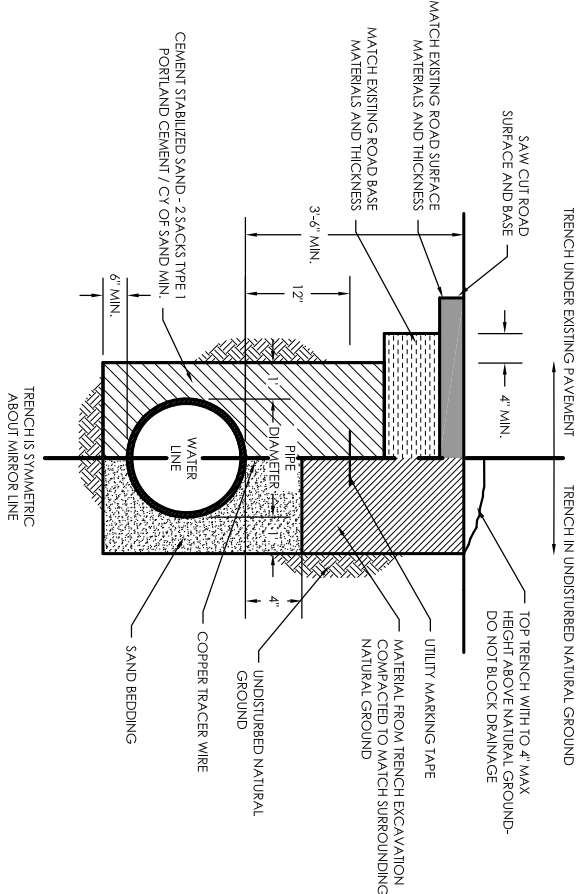
### **PART 3 – EXECUTION**

The sand shall be placed and compacted to eliminate any voids around the pipe. The material shall be compacted to a minimum 85% standard proctor.

## **Appendix D - Details**

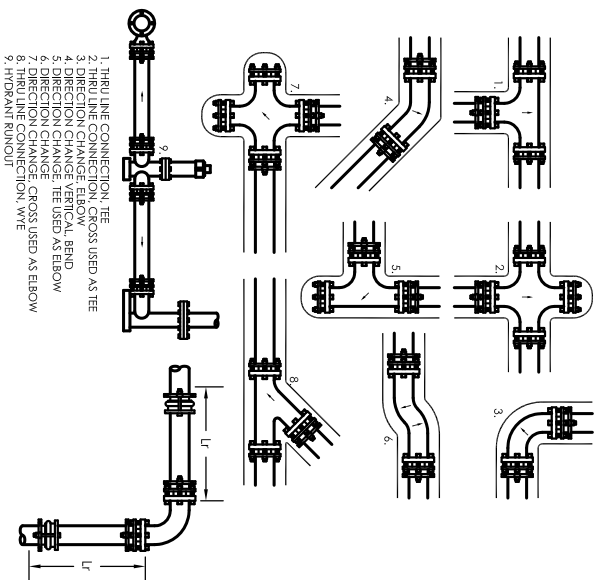
PIPE TRENCH  
TAPPING SADDLE SCHEDULE  
INDIVIDUAL METER DETAILS  
DUAL SERVICE CONNECTION  
TYPICAL RESTRAINT LOCATIONS  
TYPICAL RESTRAINT LENGTHS  
FIRE HYDRANT DETAIL  
GATE VALVE DETAIL  
CUL-DE-SAC WATER LAYOUT  
CASING DETAIL  
CONNECTION TO AC PIPE DETAIL  
CONNECTION TO PVC/DI PIPE





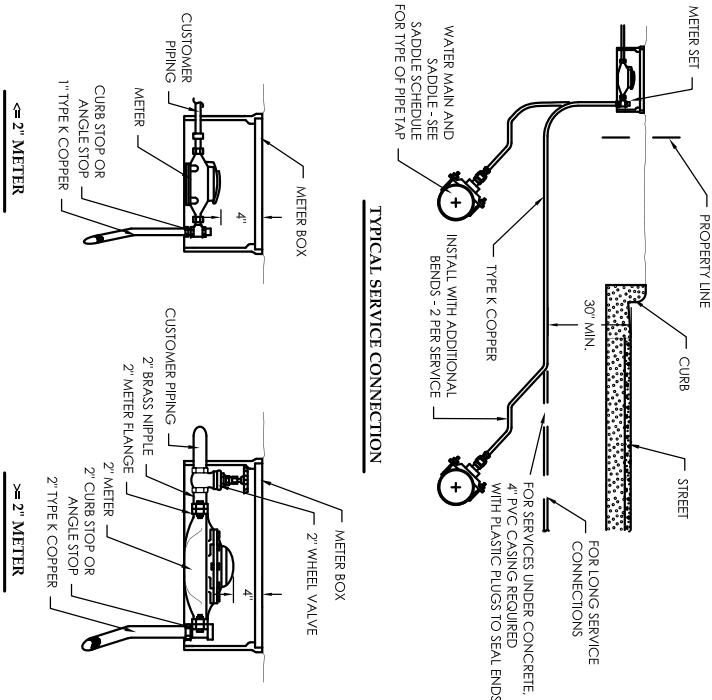
## PIPE TRENCH

N.T.S.



## TYPICAL RESTRAINT LOCATIONS

N.T.S.



## INDIVIDUAL METER DETAILS

N.T.S.

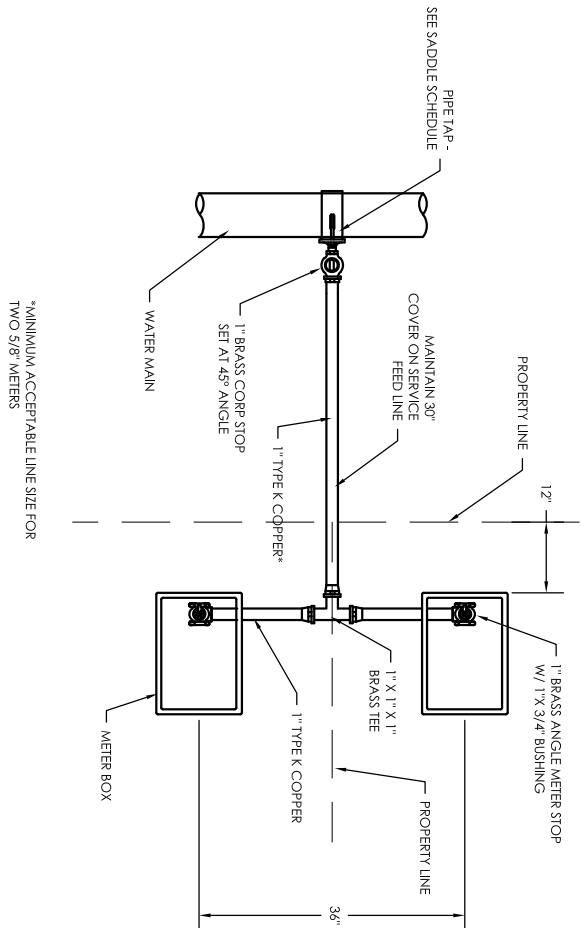
PIPE DIA. (IN.)	11.25d (FT.)	22.5d (FT.)	45d (FT.)	90d (FT.)	DEAD END (FT.)	TEE (FT.)
6	4	7	14	33	78	9
8	5	9	18	42	101	30
10	6	10	21	50	122	51
12	7	12	25	59	142	71
16	8	15	31	74	183	110

DIA. (IN.)	6 (FT.)	8 (FT.)	10 (FT.)	12 (FT.)
8	42	-	-	-
10	75	41	-	-
12	104	76	42	-
16	154	134	109	78

- NOTES:
- JOINT RESTRAINTS SHALL BE DESIGNED USING THE FOLLOWING CRITERIA - SOIL TYPE - HIGH PLASTIC CLAY W/ PIPE SURROUNDED BY GRANULAR MATERIAL SAFETY FACTOR - 2 TO 1 TRENCH TYPE - TYPE 5 DEPTH OF BURY - 3 FEET TEST PRESSURE - 150 PSI
  - THE ABOVE SCHEDULE IS A GUIDELINE. DESIGN ENGINEERS SHALL VERIFY AND REVISE CALCULATIONS AS REQUIRED BY MANUFACTURER.

## TYPICAL RESTRAINT LENGTHS

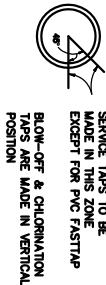
N.T.S.



## DUAL SERVICE CONNECTIONS

N.T.S.

WATER MAIN TYPE AND DIAMETER	PIPE TAPPING SCHEDULE		
	SERVICE SIZE		
	3/4"	1"	1 1/2"
4" CAST IRON DUCTILE IRON OR PVC	B OR C	B OR C	B OR C
4" ASBESTOS CEMENT PIPE	A	A	A
6" CAST IRON DUCTILE IRON OR PVC	B OR C	B OR C	B OR C
6" ASBESTOS CEMENT PIPE	A	A	A
8" CAST IRON DUCTILE IRON OR PVC	B OR C	B OR C	B OR C
8" ASBESTOS CEMENT PIPE	A	A	A
10" CAST IRON DUCTILE IRON OR PVC	B OR C	B OR C	B OR C
10" ASBESTOS CEMENT PIPE	A	A	A
>= 12" CAST IRON DUCTILE IRON OR PVC	B OR C	B OR C	B OR C
>= 12" ASBESTOS CEMENT PIPE	A	A	A



NOTES:  
1. TAPPING SADDLES SHALL BE MANUFACTURED BY METELLER, FORD OR APPROVED EQUAL.

## TAPPING SADDLE SCHEDULE

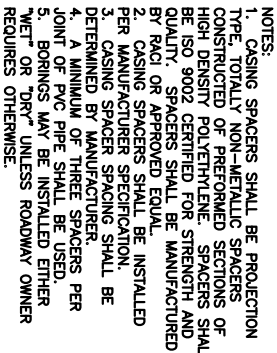
N.T.S.



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Schwarz, P.E.  
Date: 2008.12.31  
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REVISION	DATE

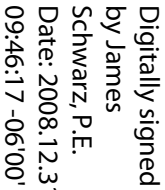
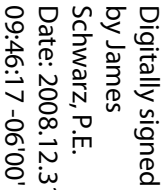
WATER DISTRIBUTION STANDARDS			
NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #3			
DATE	FILE NAME	REVISION NUMBER	SHEET NUMBER
09/05/05	DETAILS	00	1
J. SCHWARZ & ASSOCIATES, INC.			
AS NOTED			



## N.T.S.



## N.T.S.

OF 2