

**RULE NO.: R161-19.16**

**NOTICE OF PROPOSED RULE**

**POSTING DATE: July 9, 2019**

The Director of the Department of Austin Water proposes to adopt the following rule on or after August 10, 2019.

Comments on the proposed rule are requested from the public. Comments should be submitted to Mr. Eric Langhout, P.E.; Austin Water, 3907 S. Industrial Dr., Suite 236, Austin, Texas 78744, 512-972-0073, or via email at [Eric.Langhout@austintexas.gov](mailto:Eric.Langhout@austintexas.gov). To be considered, comments must be submitted before August 10, 2019, the 32nd day after the date this notice is posted. A summary of the written comments received will be included in the notice of rule adoption that must be posted for the rule to become effective.

An affordability impact statement regarding the proposed rule has been obtained and is available for inspection or copying at the address noted in the preceding paragraph.

**EFFECTIVE DATE OF PROPOSED RULE**

A rule proposed in this notice may not become effective before the effective date established by a separate notice of rule adoption. A notice of rule adoption may not be posted before August 10, 2019 (the 32nd day after the date of this notice) or not after September 17, 2019 (the 70th day after the date of this notice).

If a proposed rule is not adopted on or before September 17, 2019, it is automatically withdrawn and cannot be adopted without first posting a new notice of a proposed rule.

**TEXT OF PROPOSED RULE**

A copy of the complete text of the proposed rule is available for public inspection and copying at the following locations. Copies may be purchased at the following locations at a cost of ten cents per page:

Austin Water, located at 3907 S. Industrial Dr., Suite 236, Austin, Texas, 78744. See Mr. Eric Langhout, P.E. and:

Office of the City Clerk, City Hall, located at 301 West 2nd Street, Austin, Texas.

## **BRIEF EXPLANATION OF PROPOSED RULE**

R161-19.16: Proposed revision to the Standard Specifications Manual:

- **Standard Specification 510**

These changes to the Standard Specification 510 is to describe the Construction Method, the Measurement, and the Payment for Standard Detail 510-AW-01 “Temporary Support for AC and CI Pipe Above WW Service”.

## **AUTHORITY FOR ADOPTION OF PROPOSED RULE**

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to regulate construction requirements is established in Section 552.001 of the Texas Local Government Code and Title 15 of the City Code.

**CERTIFICATION BY CITY ATTORNEY**

By signing this Notice of Proposed Rule R161-19.16, the City Attorney certifies the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

**REVIEWED AND APPROVED**

\_\_\_\_\_  
Greg Meszaros, Director  
Austin Water

Date: \_\_\_\_\_

\_\_\_\_\_  
Anne L. Morgan  
City Attorney

Date: \_\_\_\_\_

DRAFT

## ITEM NO. 510 - PIPE 11-28-17

### 510.1 - Description

This item governs the furnishing and installing all pipe and/or materials for constructing pipe mains, sewers, laterals, stubs, inlet leads, service connections, culverts, temporary service lines and temporary diversion lines, including all applicable Work such as excavating, bedding, jointing, backfilling materials, tests, concrete trench cap, concrete cap and encasement, etc., prescribed under this item in accordance with the provisions of the Edwards Aquifer Protection Ordinance, when applicable, and City of Austin Utility Criteria Manual, Section 5, "Working in Public Rights-of-Way." The pipe shall be of the sizes, types, class and dimensions indicated or as designated by the E/A and shall include all joints or connections to new or existing mains, pipes, sewers, manholes, inlets, structures, etc., as may be required to complete the Work in accordance with specifications and published standard practices of the trade associations for the material specified and to the lines and grades indicated. This item shall include any pumping, bailing, and drainage when indicated or applicable. Unless otherwise provided, this item shall consist of the removal and disposition of trees, stumps and other obstructions, old structures or portions thereof such as house foundations, old sewers, masonry or concrete walls, the plugging of the ends of abandoned piped utilities cut and left in place and the restoration of existing utilities damaged in the process of excavation, cutting and restoration of pavement and base courses, the furnishing and placing of select bedding, backfilling and cement or lime stabilized backfill, the hauling and disposition of surplus materials, bridging of trenches and other provisions for maintenance of traffic or access as indicated.

### 510.2 - Materials

The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation into the Work are of the kind and quality that satisfies the specified functions and quality. Austin Water Utility Standard Products Lists (SPL) form a part of the Specifications. Contractors may, when appropriate, elect to use products from the SPL; however, submittal to the E/A is still required. Should the Contractor elect to use any materials from these lists, each product shall be completely and clearly identified by its corresponding SPL number when making the product submittal. This will expedite the review process in which the E/A, and, if necessary, the Austin Water Utility Standard Products Committee, decides whether the products meet the Contract requirements and the specific use foreseen by the E/A in the design of this engineered Project. The purpose of the SPL's is to expedite review, by the E/A and, if necessary, the Austin Water Utility Standard Products Committee, of Contractor product submittals. The SPL's shall not be considered as being a pre-approved list of products necessarily meeting the requirements of the Project. Items contained in the SPL cannot be substituted for items shown on the Drawings, or called for in the specifications, or specified in the Bidding Requirements, Contract Forms and Conditions of Contract, unless approved by the E/A in conjunction with the Austin Water Utility Standard Products Committee. The Standard Product List current at the time of plan approval will govern.

### 510.3 - Construction Methods

#### (1) General

Prior to commencing this Work, all erosion control and tree protection measures required shall be in place and all utilities located and protected as set forth in "General Conditions". Clearing the site shall conform to Item No. 102S, "Clearing and Grubbing". Maintenance of environmental quality protection shall comply with all requirements of "General Conditions" and Item No. 601S, "Salvaging and Placing Topsoil".

The Contractor shall Work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of all existing utilities. If at any time the Contractor's operations damage the utilities in place, the Contractor shall immediately notify the owner of the utility to make the necessary repairs. When active wastewater sewer lines are cut in the trenching operations, temporary flumes shall be provided across the trench while open and the lines shall be restored when the backfilling has progressed to the original bedding lines of the sewer so cut.

The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours or to make other adjustments to utility lines in order that the Contractor may Work with a minimum of delay and expense. The Contractor shall cooperate with all utility owners concerned in effecting any utility adjustments necessary and shall not hold the City liable for any expense due to delay or additional Work because of conflicts arising from existing utilities.

The Contractor shall do all trenching in accordance with the provisions and the directions of the E/A as to the amount of trench left unfilled at any time. All excavation and backfilling shall be accomplished as indicated and in compliance with State Statutes.

Where excavation for a pipe line is required in an existing City street, a street cut permit is required and control of traffic shall be as indicated in accordance with the Texas Manual on Uniform Traffic Control Devices.

Wherever existing utility branch connections, sewers, drains, conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed by the Contractor through cooperation with the owner of the utility, structure or obstruction involved. In those instances where their relocation or reconstruction is impractical, a deviation from line and grade will be ordered by the E/A and the change shall be made in the manner directed.

Adequate temporary support, 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, and at the expense of, the Contractor and as approved by the E/A. Where a proposed wastewater service pipe will cross underneath an existing asbestos cement or lead-caulk-joint cast iron water main, the Contractor shall provide temporary support for the water main pipe as shown in the drawings.

Where traffic must cross open trenches, the Contractor shall provide suitable bridges in conformance with Standard 804S-4. Adequate provisions shall be made for the flow of sewers; drains and watercourses encountered during construction and any structures, which may have been disturbed, shall be satisfactorily restored upon completion of Work.

When rainfall or runoff is occurring or is forecast by the U.S. Weather Service, the Contractor shall not perform or attempt any excavation or other earth moving Work in or near the flood plain of any stream or watercourse or on slopes subject to erosion or runoff, unless given specific approval by the E/A. When such conditions delay the Work, an extension of time for working day contracts will be allowed in accordance with "General Conditions".

(2) Water Line/New Wastewater Line Separation

Separation between water, reclaimed water, and wastewater lines shall be provided as shown in the Drawings.

Crossings of water, reclaimed water, and wastewater lines shall conform to details in the Drawings.

Wastewater manholes within 9 feet of water and reclaimed water lines shall be made watertight according to details in the Drawings.

(3) Utility and Storm Sewer Crossings

When the Contractor installs a pipe that crosses under a utility or storm sewer structure and the top of the pipe is within 18 inches of the bottom of the structure, the pipe shall be backfilled as shown in the Drawings. When the Contractor installs a pipe that crosses under a utility or storm sewer structure that is not shown in the Drawings, the pipe shall be backfilled as directed by the Engineer. Payment for backfilling pipe at utility or storm sewer structures not shown in the Drawings shall be by Change Order.

510.4 - Measurement

Pipe will be measured by the linear foot for the various types, sizes and classes. Parallel lines will be measured individually.

Where a line ties into an existing system, the length of the new line will be measured from the visible end of the existing system at the completed joint. Unless otherwise indicated, the length of water, reclaimed, and wastewater lines will be measured along pipe horizontal centerline stationing through fittings, valves, manholes, and other appurtenances.

Ductile iron fittings, whether standard mechanical joint or integral factory restrained joint type, will be measured by the ton and paid for in accordance with the schedule in Standard Products List WW-27C. Bolts, glands and gaskets will not be measured for payment. Steel cylinder concrete pipe fittings and welded steel pipe fittings will not be measured separately and are included in the unit price for the respective pipe bid items.

Factory restrained joint pipe meeting the requirements of Standard Products List WW-27F will be measured by the linear foot. The estimated quantity on the bid form is only for restrained joint pipe having integral mechanically restrained joints.

Connecting a new water, wastewater, or reclaimed water service to an existing, comparable type of private service will be measured by each connection. Service pipe from the main to the service connection will be measured by the linear foot.

The Contractor shall be responsible for removing and treating ground water flowing into a trench up to a baseline flow rate of 350 gpm of sustained flow for each mainline open trench (no more than 300 linear feet open trench per work zone segment is allowed at one time). This baseline flow rate is not a prediction of ground water conditions to be expected on the Project. Rather, it establishes contract terms regarding the quantity of ground water for which the contractor is responsible without extra or separate compensation. The flow rate must exceed 350 gpm continuously for at least 4 consecutive hours to be considered sustained flow. It is expected that trench dewatering for this baseline rate may be accomplished with a single 3-inch trash-type pump per open trench; however, measured flow rate, not pump size, type or characteristics shall be used to determine if the baseline rate has been exceeded. Flow rate shall be determined by measurements made at the discharge point of the water treatment facilities. Surface storm water flowing into a trench shall be the Contractor's responsibility to remove and treat without compensation, regardless of inflow rate or volume.

Adjustment of elevations during construction resulting in changes in flow line elevations of plus or minus two feet or less will not be considered for credit or additional compensation and no measurement for payment will be made.

Stormwater pipe will be measured along the slope of the pipe. Where drainage pipe ties into inlets, headwalls, catch basins, manholes, junction boxes or other structures that length of pipe tying into the structure wall will be included for measurement but no other portion of the structure length or width will be so included.

Excavation and backfill, when included as pipe installation will not be measured as such but shall be included in the unit price bid for constructing pipe and measured as pipe complete in place including excavation and backfill.

When pay items are provided for the other components of the system, measurement will be made as addressed hereunder.

Video inspection of newly installed box culverts and storm drain pipe will be measured per linear foot of pipe videoed.

Jumper hose will be measured per linear foot of hose installed, including all depths, excavation and backfill, complete, and in place.

**Temporary pipe support for utility crossings will be measured by each location.**

Source: [Rule No. R161-17.05](#), 5-31-2017.

#### 510.5 - Payment

Payment for pipe, measured as prescribed above, will be made at the unit price bid per linear foot for the various sizes of pipe, of the materials and type indicated, unless unstable material is encountered or trench excavation and backfill is bid as a separate item.

The concrete seal, foundation rock or coarse aggregate when used as directed in unstable material will be paid for at the unit price bid per cubic yard, which shall be full payment for all excavation and removal of unsuitable material and furnishing, placing and compacting the foundation rock, coarse aggregate or other approved material all complete in place.

Excavation and backfill, when included as a separate pay item, will be paid for by Pay Item No. 510-E or 510-F.

No separate payment will be made for dewatering a trench with ground water inflow of less than the baseline rate of 350 gpm of sustained flow as described above. Dewatering of those trenches shall be included in the contract unit price of the Pipe pay item. Payment for dewatering a trench with ground water inflow exceeding 350 gpm of sustained flow shall be agreed by change order. Dewatering of bore pits shall be included in the contract unit price for Bore Entry Pit or Exit Pit regardless of inflow rate or volume unless specified otherwise in the bid item for Bore Entry Pit or Exit Pit.

##### (1) Pipe

Payment for pipe, measured as prescribed above, will be made at the unit price bid per linear foot complete-in-place as designed and represented in the Drawings and other Contract documents. Restrained joint pipe meeting the requirements of Standard Products List WW-27F will be paid for separately at the unit price bid per linear foot. Unless otherwise provided herein, as separate pay item(s), the bid price per linear foot of pipe shall include the following:

- a. clearing
- b. constructing any necessary embankment

- c. excavation
- d. disposal of surplus or unusable excavated material
- e. furnishing, hauling and placing pipe
- f. field constructed joints, collars, temporary plugs, caps or bulkheads
- g. all necessary lugs, rods or braces
- h. pipe coatings and protection
- i. connections to existing systems or structures, concrete blocking and thrust blocks and restrained joints
- j. preparing, shaping, pumping for dewatering, and shoring of trenches
- k. bedding materials
- l. backfill materials
- m. hauling, placing and preparing bedding materials
- n. particle migration measures
- o. hauling, moving, placing and compacting backfill materials
- p. temporary and permanent pavement repairs and maintenance
- q. temporary removal and replacement of pavement, curb, drainage structures, driveways, sidewalks and any other improvements damaged or removed during construction
- r. cleanup
- s. vertical stack on deep wastewater services
- t. all other incidentals necessary to complete the pipe installation as indicated.
- u. pipe joint restraint devices, where specified or allowed, meeting Standard Products List WW-27A or WW-27G.

No separate payment will be made for thrust restraint measures.

Steel cylinder concrete pipe fittings and welded steel pipe fittings will not be paid for separately. These will be included in the unit price bid for the bid item Pipe.

(2) Concrete Cradles and Seals

When called for in the Bid, concrete cradles and seals will be paid for at the unit Contract price bid per linear foot for the size of pipe specified, complete in place.

(3) Concrete Retards

When called for in the Bid, Concrete retards will be paid under Item No. 593S, Concrete Retards."

(4) Boring or Jacking.

When called for in the Bid, boring or jacking will be paid under Item 501S, "Jacking or Boring Pipe.

(5) Wet Connections to Potable or Reclaimed Water Mains

When called for in the bid, wet connections will be paid at the unit price bid per each, complete in place, according to the size of the main that is in service and shall be full compensation for all Work required to make the connection and place the pipe in service. (See subsection 510.3 'Construction Methods' part (24) (b) 'Wet Connections to Existing Water System').

(6) Fittings



Ductile iron fittings, furnished in accordance with these specifications, will be paid for at the unit price bid per ton, complete in place, according to the schedule of weights in Standard Products List WW-27C. Bolts, glands, and gaskets will not be paid for separately and shall be included in the contract unit price for fittings.

(7) Concrete Trench Cap and Encasement

Where the distance between the top of the concrete encasement and the top of the trench cap is less than 36 inches, the concrete cap and encasement shall be poured as one unit and paid for under this bid item at the Contract price bid per linear foot. When the distance above is greater than 36 inches or when the trench cap is placed separately, the trench cap shall be paid for as a separate item, per linear foot, complete in place.

(8) Cement-Stabilized Backfill

Cement-stabilized backfill will be paid for at the unit price bid per linear foot and shall be full payment to the Contractor for furnishing and installing the required material, mixed, placed and cured complete in place.

(9) Concrete Encasement

When called for in the Bid, Concrete Pipe Encasement will be paid under Item No. 505S, "Encasement and Encasement Pipe".

(10) Pressure Taps

Pressure taps will be paid for at the unit price bid, complete in place, according to the size tap made and the size main tapped and shall be full payment for furnishing all necessary materials, including tapping sleeve and valve, making the tap, testing and placing the connection in service.

(11) Excavation Safety Systems

When called for in Bid, Trench Safety Systems shall conform to Item No. 509S, "Excavation Safety Systems."

(12) Connecting a New Water, Wastewater, or Reclaimed Water Service to an existing, comparable type of private service will be paid for at the unit price bid, complete in place, according to the size of new service and size of existing private service, and shall be full payment for furnishing and installing all necessary materials, such as cleanouts, pipe, couplings, and fittings, and including excavation and backfill.

(13) Video Inspection

Video Inspection of Newly Installed Box Culverts and Storm Drain Pipe will be paid for at the unit price bid per linear foot and shall be full payment for all labor, equipment, and materials required for video inspection per this specification, including all submittals of CD/DVD as required.

(14) Jumper Hose

Jumper Hose will be paid at the unit bid price, complete and in place, including installation and removal of all materials necessary to provide a fully functional jumper hose. This item shall also include adequate protection for the jumper hose within vehicular traffic areas.

**(15) Temporary Pipe Support for Utility Crossings**

**Temporary Pipe Support for Utility Crossings will be paid at the unit bid price, complete and in place, including installation and removal of all materials necessary to provide a fully functional pipe support.**

Source: [Rule No. R161-17.05](#), 5-31-2017.

Payment, when included as a Contract pay item, will be made under one of the following:

<b>Pay Item No. 510-AR__Dia.:</b>	Pipe, __ Dia. __ Type (all depths), including Excavation and Backfill	Per Linear Foot.
<b>Pay Item No. 510-ARRJ__Dia.:</b>	Factory Restrained Joint Pipe, __ Dia., Class __ Ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.
<b>Pay Item No. 510-BR__x__Dia.:</b>	Connecting New __ Service to Existing Private Service (__ Dia. New Service to __ Dia. Private Service)	Per Each.
<b>Pay Item No. 510-CR:</b>	Pipe Excavation, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-DR:</b>	Pipe Trench Backfill, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-ER:</b>	Concrete Seal or Cradle, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-FR:</b>	Concrete Trench Cap, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-GR:</b>	Concrete Cap and Encasement, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-HR:</b>	Cement Stabilized Backfill, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-IR: __ x __ Dia.:</b>	Pressure Taps, __ Dia. x __ Dia.	Per Each.
<b>Pay Item No. 510-JR: __ x __ Dia.:</b>	Wet Connections, __ Dia. x __ Dia.	Per Each.
<b>Pay Item No. 510-KR:</b>	Ductile Iron Fittings	Per Ton.
<b>Pay Item No. 510-ASD__Dia.:</b>	Pipe, __ Dia. (all depths), including excavation and backfill	Per Linear Foot.
<b>Pay Item No. 510-CSD:</b>	Pipe Excavation, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-DSD:</b>	Pipe Trench Backfill, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-ESD:</b>	Concrete Seal or Cradle, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-FSD:</b>	Concrete Trench Cap, __ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-GSD:</b>	Concrete Cap and Encasement, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-HSD:</b>	Cement Stabilized Backfill, __ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-AW__Dia.:</b>	Pipe, __ Dia. __ Type (all depths), including excavation and backfill	Per Linear Foot.
<b>Pay Item No. 510-AWRJ__Dia.:</b>	Factory Restrained Joint Pipe, __ Dia., Class Ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.

<b>Pay Item No. 510-BW</b> ___ × ___ Dia.:	Connecting New ___ Service to Existing Private Service (___ Dia. New Service to ___ Dia. Private Service)	Per Each.
<b>Pay Item No. 510-CW:</b>	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-DW:</b>	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-EW:</b>	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-FW:</b>	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-GW:</b>	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-HW:</b>	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-IW:</b> ___ × ___ Dia.:	Pressure Taps, ___ Dia. × ___ Dia.	Per Each.
<b>Pay Item No. 510-JW:</b> ___ × ___ Dia.:	Wet Connections, ___ Dia. × ___ Dia.	Per Each.
<b>Pay Item No. 510-KW:</b>	Ductile Iron Fittings	Per Ton.
<b>Pay Item No. 510-AWW:</b> ___ Dia.:	Pipe, ___ Dia. ___ Type (all depths), including Excavation and Backfill	Per Linear Foot.
<b>Pay Item No. 510-AWWRJ</b> ___ Dia.:	Factory Restrained Joint Pipe, ___ Dia., Class ductile Iron, (all depths) including Excavation and Backfill	Per Linear Foot.
<b>Pay Item No. 510-BWW</b> ___ × ___ Dia.:	Connecting New ___ Service to Existing Private Service (___ Dia. New Service to ___ Dia. Private Service)	Per Each.
<b>Pay Item No. 510-CWW:</b>	Pipe Excavation, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-DWW:</b>	Pipe Trench Backfill, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-EWW:</b>	Concrete Seal or Cradle, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-FWW:</b>	Concrete Trench Cap, ___ Ft. Width	Per Linear Foot.
<b>Pay Item No. 510-GWW:</b>	Concrete Cap and Encasement, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-HWW:</b>	Cement Stabilized Backfill, ___ Dia. Pipe	Per Linear Foot.
<b>Pay Item No. 510-KWW:</b>	Ductile Iron Fittings	Per Ton.
<b>Pay Item No. 510-VIDEO</b>	Video Inspection of Newly Installed Box Culverts and Storm Drain Pipe	Per Linear Foot.
<b>Pay Item No. 510-JH</b>	2-inch Jumper Hose	Per Linear Foot.
<b><u>Pay Item No. 510-PSUC</u></b>	<b><u>Temporary Pipe Support For Utility Crossings</u></b>	<b><u>Per Each</u></b>

An "R" after the pay item indicates the use for reclaimed water.

An "SD" after the pay item indicates the use for storm drain.

A "W" after the pay item indicates the use for water.

A "WW" after the pay item indicates the use for wastewater.

Source: [Rule No. R161-17.05](#), 5-31-2017.

**End**

Applicable References:

*Standard Specifications Manual*: Item Nos. Ref: 102S, 210S, 402S, 403, 501S, 505S, 506, 507S, 509S, 593S, 601S, 604S

*Standards Manual*: Standard Detail Nos. 510S-1, (520 - series).

*Design Criteria Manuals*: Utilities Criteria Manual, Section 5.