

CCSUD WATER DISTRIBUTION DESIGN CRITERIA

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PART 1 - GENERAL

The following information is intended to assist engineers and the public with the requirements to receive water service and connect to the Crystal Clear Special Utility District (CCSUD/District) water system, including the design and construction of water facilities within the service area. Information herein is to provide minimum requirements only. Additional requirements may be imposed by the CCSUD if warranted.

1.1 WATER POINT OF DELIVERY

- A. The point where water leaves the line or apparatus owned by CCSUD and enters the line or apparatus owned by the customer. Typical points of delivery include domestic and irrigation water meters, fire line up to the containment backflow device, and hydrant meters.
- B. The point of delivery for CCSUD's owned and maintained water service lateral is the line side from the water main to the water meter. The customer is responsible for the line from the meter to the private plumbing which includes, but may not always be the case, a customer yard cut-off.
- C. The customer is responsible for the construction, operation, and maintenance of the customer's installation beyond the point of delivery and has sole control and supervision over customer's installation, including compliance with plumbing codes.

1.2 STANDARD PRODUCTS LIST PROCEDURES

- A. Introduction:
 - 1. Through previous investigation, testing and usage by CCSUD, certain types, brands and models of some products and materials have established a satisfactory record for certain services. These products have been tabulated by manufacturer's names on the Approved Equipment List (AEL). The AEL should not be interpreted as being pre-approved lists of products necessarily meeting the requirements for a given construction project and products included in the lists shall not be substituted unless they are approved by CCSUD and/or the District's Engineer. Contractors electing to use products from the AEL shall submit a list of products for approvals for their use.
 - 2. Products in use by CCSUD are subject to ongoing consideration and evaluation by staff. When changes, deletions, or additions become necessary and are approved, the product list will be revised and included in updates to the AEL.
 - 3. Questions concerning the AEL may be addressed to CCSUD and/or the District's Engineer.

PART 2 - CONSTRUCTION PLAN INFORMATION AND SUBMITTAL REQUIREMENTS

2.1 GENERAL

- A. Utility Coordination:

1. The Developer or Developer's consulting Engineer must request a utility coordination meeting with CCSUD and the District's Engineer to discuss the proposed placement of the CCSUD water mains, meters and appurtenances in relation to the right-of-way and other utilities.
 - a. CCSUD water mains must be located within an easement. CCSUD will not accept water mains located within public right-of-way.
 - i. If the proposed CCSUD water mains are placed in an exclusive easement, the easement shall be within private property and 20-foot in width.
 - ii. If the proposed CCSUD water mains are placed in a shared easement, CCSUD prefers that wet utilities are placed closer to the edge of right-of-way and dry utilities are placed in the back of the easement.
 - iii. Meters shall also be placed in easements and be located per CCSUD's Service Connection Details.
2. Once an agreed placement of the CCSUD water mains has been discussed, please submit an electronic copy of the complete construction plans to CCSUD and the District's Engineer for verification of conformance to CCSUD's technical specifications and standard water details.

2.2 WATER SYSTEM PLANS

- A. Plans submitted to CCSUD must show approved easements and/or permits on highway and/or railroad crossings, including the volume and page number of recorded easement(s) and permit numbers if applicable.
- B. All water plans will include the following items:
 1. Engineer's dated signature and seal of a Professional Engineer licensed in the State of Texas on each plan sheet.
 2. Engineering firm name and registered number (format F-xxxxx) on each plan sheet.
 3. Date of plans and revisions.
 4. North arrow and scale must be shown. The standard horizontal scale for plan and profile sheets shall be 1" = 50', 40' or 20' for the plan view. The vertical scale shall be 1" = 5', 4' or 2'. The same scale shall be used on all plan and profile sheets. For sheets other than plan and profile, horizontal scales of 1" = 50', 40' or 20' may be used as appropriate.
 5. A general location map.
 6. CCSUD water main notes, available at [CCSUD's website](#).
 7. Size, pipe material and location of main with respect to the easements and rights-of-way.
 8. Property lines and dimensions, legal description, lot and block numbers, rights-of-way dimensions, and curb and sidewalk locations and street names.

9. Location, size, and material of all existing water and wastewater mains, lines, and services. The direction of flow in the wastewater mains shall be indicated.
 10. Location, size, and description of other utilities where they may conflict with water or wastewater mains or other service lines.
 11. Curve data for roads, property lines, and water and wastewater lines.
 12. Final plat recording or land status report.
- C. Final plan approval may require additional authorizations, including, but not limited to the following:
1. Texas Department of Transportation permit (TxDOT)
 2. Railroad permit (ex: UPRR)
 3. Gas Company permit
 4. Easement acquisition (Volume and Page listed on plans)
 5. City approval
 6. County approval
 7. Texas Commission on Environmental Quality approval (TCEQ)
- D. All plan view drawings shall include all applicable items listed in the General Requirements mentioned above plus the following items.
1. The location of all existing and proposed water services, water mains, valves and fire hydrants shall be identified.
 2. Station numbers for mains shall be identified for beginning points, ending points, points of curvature, points of tangent, points of reverse curve, points of intersection, valves, fire hydrants, other appurtenances, grade breaks and at all proposed connections to existing or proposed water mains.
 3. Station numbers shall be identified for the water mains where they cross any other utility.
 4. Appurtenances shall be shown, and details of all required appurtenances shall be included in the plans.
 5. Joint restraint lengths (when required) shall be shown in the plan view.
 6. Culverts, bridges, and other drainage structures.
 7. One-hundred-year flood plain limits shall be shown.
 8. **Include or provide table with designed living unit equivalents (LUEs) per phase/unit of the project.**
- E. A profile view shall be provided where water mains cross or intersect with roads, drainage structures, ditches, creek crossings, sewer, gas, electric, railroad or other utility. It shall show all applicable items listed in the General Requirements plus the following items:
1. The existing ground profile and proposed street finish grade or subgrade.

2. Station numbers and elevations of all utility crossings.

(NOTE: Plan approval shall expire one year after the date of current approval. If construction has not begun on the water system infrastructure per plan within one year of the approval date, the construction plans must be resubmitted for approval and must include all criteria in effect at the time resubmitted.)

PART 3 - DESIGN REQUIREMENTS FOR WATER DISTRIBUTION

3.1 INTRODUCTION

- A. These guidelines are intended to establish the minimum basic design requirements for water infrastructure within CCSUD's service area but do not address major facilities such as water plants, booster stations and storage tanks. Sound engineering judgment shall be utilized to determine if these minimum requirements are suitable for each engineering design.
- B. All projects are required to be built in accordance with CCSUD's technical specifications. Any variation from CCSUD's standards is subject to the district's approval.
- C. All plans for such facilities shall be prepared by or under the supervision of a Professional Engineer, licensed in the State of Texas. It will be the responsibility of the Developer's consulting Engineer to ensure that the plans are in compliance with the latest versions of all applicable federal, state, and local ordinances, rules and regulations. These include, but are not limited to, the following:
 1. Rules and Regulations for Public Water System – Texas Commission on Environmental Quality (TCEQ)
 2. CCSUD Technical Specifications and Standard Water Details
 3. CCSUD Water Design Criteria
 4. CCSUD Electrical Design Criteria
 5. CCSUD Wastewater Design Criteria

CCSUD's listed items can be found at [CCSUD's website](#).

3.2 WATER SYSTEMS

- A. Size and Capacity Determination
 1. Calculations
 - a. Hazen Williams Friction Coefficient $C = 100$, higher C coefficient may be used for new mains only upon approval by CCSUD with sufficient documentation to show effects of long-term use.
 - b. Average day demand = 300 gal/connection/day
 - c. 1 standard residential connection = 1 LUE
 - d. An LUE calculator is available for determining LUE counts and water usage for non-standard service. The LUE calculator can be found at [CCSUD's website](#).

2. Peak Hour Demand Requirements
 - a. The maximum allowable velocity shall not exceed 5 feet per second (fps).
 - b. The minimum pressure at any point in the affected pressure zone must not be less than 35 psi.
3. Emergency Demand (Fire Flow) Requirements
 - a. The maximum allowable velocity shall not exceed 10 fps.
 - b. Fire flow requirements will be by the applicable city and extra-territorial jurisdiction fire codes and fire marshal requirements.
 - c. The minimum residual pressure at any point in the affected pressure zone at peak day plus fire flow must not be less than 20 psi.
4. Sizing of Water Mains - Computer modeling is preferred for sizing water mains. However, for water mains less than 12 inches in diameter other engineering calculation methods may be accepted. The largest size, as determined by comparing the service area's peak hour demand and peak day plus fire flow demand, shall be used.

B. Water Mains

1. Water mains shall be placed in the CCSUD exclusive easement or public utility easement (PUE) as agreed upon in the Non-Standard Service Agreement (NSSA). Easements shall be shown and labeled on the plat and plan set.
2. Water mains shall be a minimum of 8 inches. The minimum main size for any street type, however, will be governed by various factors which include fire protection requirements, high density land usage, and the designer's consideration of general system gridding, future transmission mains, neighboring developments, and area configuration. Looped systems are required for service reliability.
3. Water main velocities under typical system operations (non-fire flow events) shall be under 5 fps. During fire flow events, velocities shall not exceed 10 fps.
4. Water mains under existing or proposed roads shall be ductile iron or encased with PVC pipe. The ductile iron pipe or PVC casing shall extend a minimum of 5 feet past each end of road pavement or from the end of the sidewalk.
5. Water mains should be located where maintenance can be accomplished with the least interference with traffic, structures, and other utilities. The following are requirements when crossing CCSUD water mains:
6. The separation between water and wastewater mains must comply with TCEQ rules or have a variance approved by TCEQ before submittal to CCSUD.
 - a. 30 TAC §217.53 (d) (3)

- b. 30 TAC §290.44 (E)
- 7. Storm Pipe or Channel Crossing
 - a. Water main crossing under a storm pipe or concrete channel crossing is required to be encased by PVC or steel casing. The casing shall extend 5 feet from the edge of the channel on both sides horizontally. Specify which type of casing is proposed.
 - b. A minimum depth of 2.5 feet from the bottom of the storm pipe or concrete channel to the top of water main casing shall be provided. The diameter size of the casing shall be based on the Casing Detail.
 - c. When crossing under a proposed manmade earthen channel, a minimum depth of 2.5 feet from the bottom of the channel to the water main shall be provided. Casing is not required to be installed.
- 8. TxDOT Roadway Crossing
 - a. The Developer or the Developer's consulting Engineer shall coordinate with the District's Engineer to process a TxDOT permit on behalf of CCSUD.
 - b. The requirements for crossing under a TxDOT road shall be per the Casing Detail.
 - c. A TxDOT checklist is provided in Appendix A. The items on the checklist shall be addressed on the construction plan set in order for TxDOT to approve the permit request.
- 9. All fire lines shall have a gate valve on the line at the connection to the water main and a backflow preventer inside the property line. All fire lines shall have an approved backflow device. Additional backflow prevention requirements can be found in Section 3.3 below and in CCSUD's technical specifications and standard water details.

C. Joint Restraints

- 1. No water line shall be deflected either vertically or horizontally, more than that recommended by the manufacturer of the pipe or coupling without the appropriate use of bends or offsets. Fittings shall be required where more than two pipe lengths are deflected.
- 2. Restraint lengths shall be calculated per the EBBA calculator found at <https://ebaa.com/calculator/>. Show restraint lengths of fittings in one of the following formats:
 - a. Call out restraint length at each fitting.
 - b. Insert table with type of fitting and corresponding restraint length.
 - c. Include note that states "ENTIRE LENGTH OF PIPE SHALL BE RESTRAINED."
- 3. A minimum safety factor of 1.5 shall be used when calculating restrained water line lengths.
- 4. A test pressure of 250 psi shall be used when calculating the water line restrained line lengths.

5. The USDA NRCS Web Soil Survey website found at [Getting Started With Web Soil Survey | Natural Resources Conservation Service \(usda.gov\)](https://www.nrcs.usda.gov/soil-survey) is recommended to be used to determine the soil type. Select proposed area, and follow the tabs below:
 - a. Soil Data Explorer
 - b. Soil Reports
 - c. Soil Physical Properties
 - d. Engineering Properties
- D. Gate Valves
1. There shall be a valve in each fire hydrant lead restrained to the main.
 2. Valves shall be located at the following design scenarios:
 - a. Add one (1) in-line gate valve on each side of tee to the fire hydrant. These valves are in addition to the 6-inch gate valve already included in the fire hydrant assembly.
 - b. At the intersection of two or more mains, wherever there is a tee, a gate valve is required to be installed on each side of the tee.
 - c. At the intersection of two or more mains, wherever there is a cross, a gate valve is required to be installed on each side of the cross.
 - d. On both sides of a bore under roadways, railroads, or large creeks/rivers.
 3. If an existing main is tapped to make a service connection, only one valve at the tap is required.
 4. No concrete or pavement may be placed above the gate valves.
 5. At dead ends, gate valves shall be located one (1) pipe length (10-ft. minimum) from the end points of the main. The Developer's consulting Engineer shall provide (and show on drawings) complete restraint for all such valves, pipe extensions, and end caps.
 6. Valves having "push on" joints are not permitted for fire hydrant leads and laterals.
- E. Air Release Valves
1. On water mains 12 inches in diameter and larger, combination air valves will be placed at all high points, long ascents, decreased upslope, both sides of a roadway or large creek crossing; and, at horizontal runs placed at intervals every $\frac{1}{4}$ to $\frac{1}{2}$ mile. Air/vacuum and vacuum release valves may be approved on a case-by-case basis.
 2. Air release valves can be sized per "Manual of Water Supply Practices, M51: Air-Release, Air/Vacuum & Combination Air Valve by AWWA, latest edition" or other applicable methods.
- F. Pressure Reducing Valves
1. Where pressures are 75 psi or above, it is required for developers to

place pressure reducing valves on service lines on the property side of the meter at time of construction.

2. Pressure reducing valves shall be installed on water mains at CCSUD's direction.

G. Fire Hydrants

1. Hydrants shall be spaced and installed as required by the local city having jurisdiction and/or the current adopted fire code.
2. For those areas outside of a local city jurisdiction, hydrants shall be spaced and installed as required by the local fire marshal or a minimum of every 1,000 feet, whichever is more stringent.
3. Only the applicable fire hydrant detail shall be included in the plan set.
 - a. If the property is located within the City of New Braunfels ETJ, only the CCSUD Fire Hydrant Detail (New Braunfels) shall be used.
 - b. If the property is located within the San Marcos ETJ, only the CCSUD Fire Hydrant Detail (San Marcos) shall be used.
 - c. If the property is not located within any of the surrounding ETJs, the standard CCSUD Fire Hydrant detail shall be used.
4. Fire Hydrants located at the end of dead-end mains and cul-de-sacs will be required in place of a permanent blow-off. The following configurations are acceptable:
 - a. Provide (1) 8" 90-degree bend (MJ); (1) 8"x6" reducer (MJ); and then the fire hydrant assembly.
 - b. Provide (1) 8"x6" reducer (MJ); (1) 6" 90-degree bend (MJ); and then the fire hydrant assembly.
 - c. The Fire Hydrant Assembly Detail per CCSUD details includes the hydrant, 6" gate valve, 6" valve box, anchor tee, and the DI pipe.
5. The District does not allow private fire hydrants. All fire hydrants, regardless of location (private property or public right-of-way) are the property of the District and shall require an easement if installed on private property. The entire fire hydrant assembly shall have restrained joints.

H. Looping and Dead-End Mains

1. Where feasible, all pipelines other than those in cul-de-sacs, shall be connected to other distribution pipelines to allow all services to receive water from two directions for system redundancy.
2. If an installed dead end is temporary and will later be extended to another subdivision phase or unit, then a temporary flush valve can be installed instead.
3. Dead end mains shall be a minimum of 6 inches.
4. Temporary dead end mains may be allowed under the following conditions:

- a. The extension is shown on the overall development plans.
- b. A temporary 2-inch flush valve is installed per CCSUD details.
- c. Fire flow and daily demand can be met with the dead end main.

I. Services

1. Water services shall be installed according to CCSUD's technical specifications and standard water details.
2. Service connections are only allowed on distribution mains. Service connections are not allowed on transmission mains without approval by CCSUD.
3. Taps that are 2 inches or greater will require a gate valve. Corporation stops are only acceptable on 1-inch taps.
4. All short services shall have their own individual saddle taps.
5. In short service connections, the house side of the meter box shall be located 2 feet behind the proposed distribution main inside private property between the water main and the house or building that is being serviced by that meter.
6. In long service connections, the house side of the meter box shall be 2 feet inside the easement in private property.
7. Meters shall be horizontally placed 5 feet from the lot line at the front of the lot.
8. Field coordination for meter placement on a case-by-case scenario will need to be discussed with CCSUD and the District's Engineer prior to any construction.

J. Connection to Existing Water Mains

1. Use cut-in tees when water service interruption is permissible (*preferred option*).
2. Use tapping sleeves when water service cannot be interrupted.
 - a. Size on size tapping sleeves is NOT PERMITTED without approval by CCSUD or engineer. For example, tapping a 6-inch sleeve into a 6-inch diameter water main would not be permitted.

3.3 BACKFLOW PREVENTION REQUIREMENTS AND DEVICES

- A. Backflow prevention assemblies shall be designed and installed per CCSUD technical specifications and standard water details.
- B. The customer service application must be accompanied by a water service layout plan showing all proposed structures to be connected to the water system and illustrating the proposed type and size of backflow prevention assemblies to be installed. CCSUD and/or the District's Engineer shall review and approve of the plans and backflow prevention assembly prior to installation.
- C. All backflow prevention devices shall be located on private property within a

CCSUD easement and as close as possible to the public right-of-way. All backflow prevention devices shall be accessible to CCSUD.

- D. All types of establishments listed in Appendix B must provide for the containment of contamination within their premises, either by an air gap separation between the meter and the first tap or tee, or by having each of the internal plumbing facilities properly air gapped. If the containment air gap separation is impractical, and reliance is placed instead on individual internal air gaps or vacuum breakers in a customer's system, CCSUD may require additional protection in the form of either an R/P assembly, for customers handling hazardous contaminants, or a D/C assembly, for customers handling pollutants.
- E. Single check valve. The single check valve is not considered to be an approved assembly and will be used only in limited instances such as for directional flow control.
- F. Refer to Appendix B for more information regarding required backflow prevention.
- G. Private plumbing installations must adhere to state rules and regulations relating to backflow and cross connection control and shall be inspected in accordance with the following rules:
 - 1. All new residential or commercial facilities are required to comply with these criteria. Compliance with these requirements will be verified in conjunction with the new customer's application for water service. All customer owned backflow prevention assemblies must be tested upon installation, repair or relocation. Because backflow prevention assemblies are mechanical devices that will degrade over time, all backflow assemblies should be tested annually to ensure they are in working order. It shall be the responsibility of the property owner or the customer's representative of the property owner to provide verification of the required approvals upon request.
 - 2. CCSUD has chosen to partner with Vepo, LLC to allow for the online submission of Backflow Prevention Assembly Test and Maintenance Reports. All testing information will be entered directly by the tester into the online password protected system provided by Vepo, LLC. Testers will no longer be able to submit paper test reports directly to CCSUD. Additional information and how to register your backflow prevention assembly is available at this weblink:<https://www.crystalclearsud.org/backflow-prevention-assemblies>.
 - 3. Service lines for customers that are considered as having a high backflow hazard are required to install a reduced pressure zone (RPZ) backflow prevention assembly. CCSUD may require field inspection of the customer's premises to determine the actual or potential hazards and the appropriate backflow prevention needed.
- H. BACKFLOW PREVENTION FOR FIRELINES
 - 1. Backflow prevention is required on all fire line installations. All fire lines shall have an approved double check detector assembly (DCDA) installed per CCSUD technical specifications and standard water

details.

2. Installation and operation must comply with standards set forth by AWWA and all federal, state, and local laws, rules and regulation, codes and ordinances.
3. The DCDA shall be installed as close to the existing water line as practical. Assembly must be accessible for testing and maintenance. Location must be approved prior to installation.
4. Assemblies must be Underwriters Laboratory (UL) approved for fire protection purposes.
5. The type and extent of backflow prevention needed for a particular fire protection system is subject to approval by CCSUD. Devices currently installed that are not the correct assembly as required by CCSUD Rules and Regulations, shall require a complete replacement of the device to meet the requirements and construction standards.
6. Pressure losses across backflow prevention assemblies must be accommodated in the design or redesign of a fire protection system. This factor is particularly important when redesigning existing fire protection systems. All backflow prevention assemblies for fire line installations must be UL listed.
7. Backflow prevention requirements for fire lines:

TYPE OF FIRELINE	DEVICE OR ASSEMBLY
Fire line with no chemical additive and no additional water supply	DCDA
Fire line utilizing a pressure pump system	A/G or RPDA
Fire protection system utilizing chemical additives	A/G or RPDA
Fire protection system with access to an auxiliary water supply	A/G or RPDA

I. RECORDS AND TESTS

1. In order to assure that backflow prevention assemblies continue to operate satisfactorily, each customer that is required to use an assembly is required to have periodic testing of the assembly performed in accordance with this section. All assemblies must be tested at the time of installation, and at the time of any repair or relocation. All tests and repairs must be performed by a certified tester. The tester must complete a test and maintenance report form and submit the form to the director. It will be the responsibility of the customer to initiate the testing and any maintenance determined by the test to be necessary, and to submit written results to CCSUD.
2. Time schedule. All assemblies must be tested in accordance with the following schedule*:

ASSEMBLIES	SCHEDULE*
Reduced pressure principle assembly	Annually
Double check assembly	Every 3 years
Double check detector assembly	Every 3 years
Pressure type vacuum breaker	Annually
Atmospheric vacuum breaker	Annually

**CCSUD may require devices to be tested at more frequent intervals based upon imminent public health and safety hazards presented.*

3. Testing by CCSUD. CCSUD's personnel may perform periodic tests on assemblies at random locations to ensure that acceptable test standards are being followed by certified testers. CCSUD's personnel may also randomly select and tag assemblies in a manner that will determine if the assemblies have been tested as required.
4. Backflow prevention assemblies installed on fire lines must be tested per the table above. The assembly must be cleaned, and all rubber parts replaced when deemed necessary by the certified tester or the assembly manufacturer. If a backflow prevention assembly is found to be malfunctioning in an annual testing process, the assembly must be completely torn down and rebuilt at that time. CCSUD will track individual assemblies to ensure compliance with these requirements.

PART 4 - CONSTRUCTION INSPECTION, ACCEPTANCE AND WARRANTY

4.1 CONSTRUCTION INSPECTION PROCEDURE

- A. CCSUD will provide a "Start of Construction" checklist. The checklist items shall be submitted and coordinated with CCSUD personnel before starting construction.
- B. All contractors working on the District's distribution system shall meet or exceed the District's insurance requirements. The contractor shall provide liability insurance coverage from an insurance company licensed to do business in Texas by an amount acceptable to the District, prior to the commencement of construction and must receive, in writing from the District, approval of said insurance company and coverage.

4.2 CCSUD FINAL ACCEPTANCE

- A. The Developer or Developer's consulting Engineer must contact CCSUD to schedule a final walkthrough. The following shall be provided to CCSUD for record keeping:
 1. Punch list of remaining action items.
 2. Final punch list of completed action items.
- B. Once a final walkthrough has been completed, the Developer or consulting Engineer must submit the items per the "Project Close Out" checklist provided by CCSUD.

END OF SECTION

APPENDIX A

TxDOT CHECKLIST

TxDOT Checklist				
Order		Yes	No	N/A
1.	Is the location and identification (highway number) of the TxDOT highway clearly indicated on the plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Are the utility plans legible, drawn to scale, and accurately dimensioned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Is the location of the proposed utility line clearly shown on the plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Are other existing utility lines in the vicinity shown on the plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Are the right of way line and edge of highway pavement clearly shown on the plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	For lines to be installed parallel to the highway, is the distance from the right of way line and from the edge of highway pavement clearly shown?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	For installations parallel to the highway, does the installation alignments change? Alignment changes need to be justified and reasonable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Are appropriate temporary erosion control devices (e.g., rock berms, silt fences) shown where the line will be across/along a creek, drainage way, steep slope, within the Edwards Aquifer Recharge Zone, or in other critical areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	For aerial installations, do the plans clearly show and differentiate between existing poles and new poles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	For highway crossing, is the location of the crossing clearly shown on the plans? The crossing should be as close to 90 degrees as practical.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	For lines crossing the highway, crossing intersecting streets/county roads, or passing through the critical root zone of desirable trees, is it clearly shown that the line will be installed by boring? In addition, casing should be shown under highways and paved city street/county road intersections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Is the UIR request for the relocation of existing utilities to clear a proposed TxDOT Project? If yes, please provide the ROW and construction project number (CSJ#).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX B

BACKFLOW PREVENTION

DEFINITIONS OF TYPES OF BACKFLOWS

SYMBOL	DEFINITION
A/G	Air Gap Separation
RPDA	Reduced Pressure Detector Assembly
R/P	Reduced Pressure Backflow Prevention Assembly
D/C	Double Check Valve Assembly
DCDA	Double Check Detector Assembly
PTVB	Pressure Type Vacuum Breaker
AVB	Atmospheric Vacuum Breaker

TYPES OF USE OF DEVICE OR ASSEMBLY

TYPE OF USE	DEVICE OR ASSEMBLY
Aircraft hangers	D/C
Aircraft and missile plants	R/P or A/G
Aircraft repair facilities	R/P
Animal feedlots	R/P
Automotive plants	R/P or A/G
Automotive repairs	RP
Auxiliary water supply	R/P
Breweries	R/P
Canneries, packing houses and rendering plants	R/P
Cold storage facilities	R/P
Commercial car wash	R/P
Commercial laundry and dry cleaning facilities (dry cleaners, hotels)	R/P
Connection to sewer pipe	AG
Dairies	R/P
Dye works	R/P
Facilities with onsite carbonation units	D/C
Facilities with onsite cooling/chiller/boiler systems	R/P
Fire line (with chemical additive)	RPDA
Fire line	DCDA
Fire line—Combination with domestic water service	D/C
Food and beverage processing/packing plant	R/P
Greenhouse (with chemical)	R/P
Greenhouse (without chemical feed)	D/C

TYPE OF USE	DEVICE OR ASSEMBLY
Hospitals, morgues, mortuaries, medical clinics, autopsy facilities, sanitariums, and medical labs	R/P
Ice plants	R/P
Irrigation system	D/C or PTVB
Irrigation system (with fertilizer injector)	R/P
Irrigation systems (onsite sewage facility)	R/P
Laboratory—Chemical or clinical	R/P
Metal manufacturing, cleaning, processing and fabrication plants	R/P
Microchip fabrication facilities	R/P
Paper and paper products plants	R/P
Petroleum processes and storage plant	R/P
Photo and film processing labs	R/P
Plants using radioactive material	R/P
Plating or chemical plant	R/P
Power plant	R/P
Private individual/unmonitored well	A/G or R/P
Reclaimed water systems	R/P
Restaurants	D/C
Restricted, classified or other closed facilities	R/P
Rubber plants	R/P
RV parks	R/P
Sewage lift stations	R/P or A/G
Sewage treatment plants	R/P or A/G
Slaughter houses	R/P
Steam plants	R/P
Stock yard	R/P
Schools—Colleges, universities, high schools, intermediate schools, middle schools (elementary schools — individual review)	R/P
Swimming pools/hot tubs—Public	R/P
Swimming pools—Residential	PTVB or A/G
Tall buildings or elevation differences where the highest outlet is 80 feet or more above the meter	D/C
Transportation terminal	R/P

Uses not listed in this table may require backflow prevention through air gaps or backflow prevention assemblies depending on the nature of the use, the equipment, and the plumbing system. These will be determined on an individual basis by CCSUD and/or M&S Engineering.