CITY OF CORPUS CHRISTI WATER DISTRIBUTION SYSTEM STANDARDS

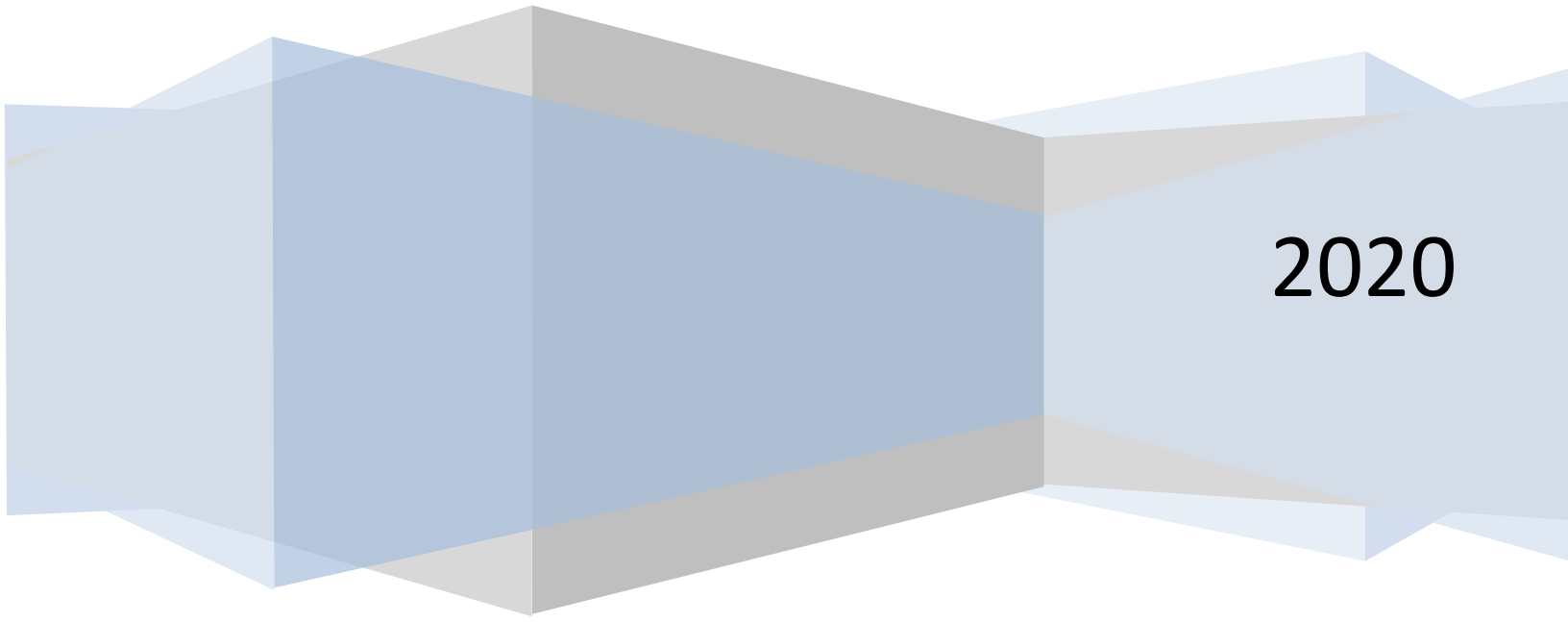

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Table of Contents

GENERAL PROVISIONS

Scope

The Water Distribution System Standards (hereafter Water Standards) herein are general conditions and specifications that pertain to the design and construction of water mains that will be built within the boundaries of the Certificate of Convenience and Necessity (CCN) jurisdiction of the City of Corpus Christi, as granted by the State of Texas, and shall govern in the planning, design, and installation of such work: providing that these specifications and/or amendments thereto shall not limit the City's right to change all or part of the rules, regulations and specifications as set out herein.

Authority

The Water Standards are to be read as a whole, and all requirements must be complied with. Enforcement of each paragraph is independent of the section that it is in and can be enforced at any stage of the development process. Whenever a local code or ordinance, or a state or federal statute cited by this Water Distribution System Standards is later amended or superseded, the citation shall be deemed to refer to the amended statute or the statute that most closely corresponds to the superseded statute.

Administration

Ownership of Mains: After the City has accepted completion of the construction of the water mains, and after the warranty on the water mains has expired, the mains will become sole property of the City and will be subject to its control and management.

Obligation for Service: Every customer who receives water service from the City will be subject to the City Charter, Unified Development Code and the Water Standards, and failure to comply with the Water Standards may result in the revocation of water service.

Conflicting Jurisdictions:

Other Districts - When a proposed subdivision is required to plat by the City of Corpus Christi and is within an area served by a utility district other than within the City of Corpus Christi's CCN, the Sub-divider and/or Developer shall obtain approval for construction from the other district, before proceeding with work.

OCL Areas in the City's CCN - OCL areas within the City of Corpus Christi's CCN jurisdiction shall comply fully to the Water Standards. An *OCL Water Contract* will be required from applicants who desire water and are located outside the City limits of Corpus Christi, Texas.

Main Extension Charges: Taps made to a water main for a main extension will be subject to an extension charge, as determined by Ordinance in the water fee schedule.

Approved Materials: All materials not commonly used and proposed for the water distribution system shall be approved in accordance with the City of Corpus Christi Standard Construction Specifications by the Utilities Department.

Variances and Waivers: Variances and waivers to the Water Standards may be requested on a case-by-case basis. Any request for deviations or variances from the Water Standards must be submitted to the Executive Director of Water Utilities in writing and must have prior written approval by the Executive Director before it goes into effect. If a response to the request is not provided by the Executive Director within ten (10) working days of receiving the written request, the variance request shall not be approved.

Changing the Water Standards: Whenever change(s) to these Water Standards are needed, they shall be made by the Executive Director of Water Utilities. The Executive Director of Water Utilities will, at his/her discretion, give public notice before the changes are made. The Executive Director of Water Utilities reserves the right to change the Water Standards immediately, to address conditions that are deemed to be a hazard to public safety.

Regulations: The water distribution system design shall comply with the standards and regulations found in the Federal Registers and in the Texas Administrative Code, as enforced by the Texas Commission on Environmental Quality (TCEQ) and the Texas Department of Health and shall conform to the requirement for peak hour customer demand and system operational demands, as determined by the Executive Director of Water Utilities. Unless otherwise specified within these Water Standards, the design, location, materials and standards of construction of the water distribution systems shall be those commonly used and adopted by the industry for the intended area of application.

Civil Drawings: Civil or Utility Drawings signed and sealed by an Engineer licensed by the State of Texas shall be required for the construction of all main improvements to the water distribution system.

Sufficient Detail: All the drawings and details for the public water improvement project shall be in the plans that are submitted for review. Whenever the Executive Director of Water Utilities assesses that more detail is needed in the proposed drawings, the City reserves the right to require the Engineer to provide more details and/or calculations before the plans can be approved.

Submittals: Upon request, the Developer shall furnish the City with specification sheets, showing complete details, dimensions, and materials used, for any of the materials that are proposed for construction of the water distribution system. Upon request, the manufacturer shall furnish the City with a certified letter stating that their material meets the specifications. Also, upon request, the Contractor, the sub-contractor, and/or the manufacturer shall furnish the City a certified copy of the physical tests of all materials used in the manufacture and installation of the material or product provided.

Field Drawings: A red-lined drawing of the proposed water construction shall be maintained on the job site by the Contractor. The approved changes to the drawings shall be promptly marked in red by the Contractor on the field drawings, at the time that the changes are made, and when the job is completed, the red-line drawing shall be turned in to the Engineer of Record, who will use the red-lined drawing to produce the Record Drawing of the project.

Record Drawings: **T**he Engineer of Record shall provide a certified electronic red-lined copy of the Record drawings to the Executive Director of Water Utilities, in a PDF file format, for each project designed. Site development projects to previously platted properties shall also require record drawings. The Record Drawing shall also show the GPS Coordinates of all the new valves and fire hydrants, and the accuracy of the GPS Coordinates shall be to one (1) foot or less.

Certification of Compliance: Along with the transmittal of the electronic red-lined copy of the Record Drawings, the Engineer shall submit a sealed letter, certifying that he/she has verified that the Record Drawings reflect what was built.

Operation of Valves: No valve or other control device on the existing water distribution system shall be operated for any purpose by anyone other than the Utilities Department, unless it is done under the direct supervision of the Utilities Department and direction of the Executive Director of Water Utilities.

Tapping the Main: Tapping of live main shall be made only by City Water Department Crews or under the direct supervision of a certified City employee that has obtained at least a TCEQ "C" Water License. The Contractor shall coordinate all work with the certified licensed City employee that will be inspecting the work, at least seventy-two (72) hours prior to the requirement of the tap being made. The Contractor shall not make taps to the main, unless the Contractor is on the Approved Utility Tapping Contractor List.

Notifications of Interruptions: The Developer shall give two (2) business days notice to the Executive Director of Water Utilities or approved representative prior to notifying the affected residents about any interruption of service. The Developer shall notify the affected residents in writing at least twenty-four (24) hours before interrupting water service.

Emergency Notification: Whenever unforeseeable events are such that interruptions to the water service must occur immediately, verbal and/or written notification shall be made by the Contractor to the Executive Director of Water Utilities and to those who will be affected by the shutdown.

Call Before You Dig: The Contractor shall be responsible for identifying any other utility that may interfere with the proposed work. The Contractor shall call the number designated by State regulations for this purpose before digging and shall make every effort to determine that no other utility is in the way before digging.

DEFINITIONS

The vocabulary used in this document has the usual and customary definitions of words, as used in the industry and in the dictionary, unless otherwise noted in this section or in City Ordinance No. 4168, municipal planning, and engineering practices, and hereby shall supersede the normal and customary use of the word.

Approved Drawings – drawings that have been stamped “Released for Construction” and signed by an authorized employee of the City of Corpus Christi

Auto Flusher – a device that is attached to the water main which can be programmed to release water automatically at certain intervals for the purpose of flushing the water main

AWWA - American Water Works Association

Backflow Protection - the prevention of a contaminant from entering into the City distribution system either by mechanical means or by a physical air gap

Backflow Testing Certificate – a certificate or report by a State-licensed and City-registered Backflow Assembly Tester that certifies the test and maintenance of a backflow device

Bypass Assembly – an assembly which consists of tees, valves, and piping that is connected to either side of a device for the purpose of reducing pressure to the device by isolating the device and allowing water to bypass around the device

CCN - Certificate of Convenience and Necessity, as defined in the Texas Water Code

CDBG – Community Development Block Grant

CIP – is used as an acronym for Capital Improvement Program or for Cast Iron Pipe, whichever is applicable

City – the City of Corpus Christi, Texas, a municipal Corporation, and those acting in official capacity on behalf of the City

City Contracts – are contracts that are made between the City and any other entity or individual. The responsibility for final enforcement of contracts involving the City is by City Charter vested in the City Manager

City Attorney - the City Attorney of the City of Corpus Christi, Texas, or his/her duly authorized assistants or agents

City Council - the Council of the City of Corpus Christi, Texas

City Engineer - the City Engineer of the City of Corpus Christi, Texas, or his/her duly authorized representative

City Manager - the Manager of the City of Corpus Christi

Commercial Projects - these are building-permit projects that include public improvements such as fire hydrants, fire lines, and FLDC vaults and/or any her public water improvements

Construction Meter – a temporary meter that is attached to and locked by the City onto a fire hydrant

Contractor – the Utility Contractor who installs the water main

Dead-End Main – Any water main that is 100 feet or longer in length and terminates at a point other than a connection to another line or main within the distribution system

Designer – the Engineer or person responsible for designing the proposed project

Developer – the one (or a representative of the one) that is proposing to improve their property by adding to or modifying City infrastructure. In some cases the City of Corpus Christi may be the developer.

Development Services Engineer - the Engineer in the Special Services Section of the Department of Development Services, in the City of Corpus Christi, Texas, or his/her duly authorized representative

Distribution System Looping – Alignment or routing of water distribution mains in combination with associated mains that provide service to each adjoining property using a minimum of two independent routes of water flow

Engineer – a professional engineer, licensed by the State of Texas

ETJ – Extraterritorial Jurisdiction

Executive Director of Water Utilities - the person (or representative of the person) designated by the City of Corpus Christi to oversee all the water operations in the City of Corpus Christi

Fee Schedule – the fees that pertain to the water distribution system as adopted by ordinance.

Finish Grade - the level of the top surface (soil, concrete, asphalt, etc.) of the anticipated improvement

Fire Line - a term used to define a privately owned and maintained water main that feeds a fire sprinkler system or other privately-owned fire protection system, is governed by the National Fire Protection Association regulations, and is physically isolated from the water distribution system by means of a valve at the main and a backflow protection device in the system

FLDC Assembly – the term used for a Fire Line Detector Check (FLDC) assembly which consists of a Double-Check Detector Assembly, with outside-stem-and-yoke (OS&Y) valves on both sides, as per the Standard Water Detail

gpm - gallons per minute

GPS – Global Positioning System

Industrial Areas - will be defined as high density areas that include all the industrial zoning districts

Loop – A water main that starts at an existing water main and connects to another existing water main, providing for distribution system looping

Mains - is a collective term that includes AWWA-approved pipes, fittings, valves, fire hydrants, and other appurtenances required for the water distribution system:

Transmission Mains – Mains of larger than 16 inches inside diameter used to transport water from treatment facilities to distribution areas. Transmission mains are those mains that are identified in the Water Master Plan.

Grid Mains – Mains of 12 to 16 inches inside diameter that serve as distribution supply mains. Grid mains are those mains that are identified in the Water Master Plan.

Distribution Mains – Mains of 6, 8 or 12 inches inside diameter connected to the grid mains that provide fire protection and domestic service.

Major Water Projects - are projects whose designs are coordinated through the City Engineering Department, which may consist of CIP, CDBG, NIP, and TxDOT

Medium-to-High Density – are defined as denser than two-family dwellings

Meter Yoke the end of the service line that has the curb stop and to which the meter attaches to

NFPA – National Fire Protection Association

NIP – Neighborhood Improvement Program

OCL - property that is located Outside of the City Limits

OCL Water Contract - the "Standard Form Contract for Providing Water Where Property is Situated Partly or Wholly Beyond City Limits" form that is signed by an applicant and whose requirement is based on the City Code of Ordinances, Article VIII Water Service Outside City, Section 55-110 -114

OS&Y – Outside Stem and Yoke

Pigging the Line – the process of pulling a device known as a "pig" through a pipe, for the purpose of removing any debris from the inside of the main

Plumbing Code – the most current Plumbing Code adopted by the City Council

private fire service line – as defined by NFPA-13

Professional Engineer – the same as the Engineer

psi - pounds per square inch

Record Drawings - are the electronic red-lined drawings that are created by the designing Engineer at the end of the project, from the field red-lined set that was produced by the Contractor

Residential Areas - are defined as low density areas that include farm buildings, one-family dwellings, two-family dwellings, travel trailer park districts, and manufactured home districts

ROW - public Right Of Way

Service Lines – are water lines that are tapped to the main and directly connected to domestic and irrigation water meters

"Shall" & "May" - as used herein, the word "shall" is mandatory, the word "may" is permissive

Standard Details - the drawing details that are maintained and approved by the City Engineer and are found on the City's website.

Standard Construction Specifications – the water distribution system specifications maintained and provided by the City

Sub-divider - the terms, "sub-divider" and "developer", are synonymous and are used interchangeably, as set out in the Unified Development Code

Subdivisions - the division of any lot, tract or parcel of land into two or more parts, lots, or sites, as set out in the Unified Development Code

Subdivision and Commercial Projects – are plans for subdivisions and commercial projects drawn up by the Developer which are approved by the City

TCEQ – the Texas Commission on Environmental Quality

Temporary Dead-end Main – a dead-end main, where a complete extension for a looped line is already programmed to begin construction within three years

TS&V - Tapping Sleeve and Valve(s)

TxDOT – the Texas Department of Transportation

U.E. - Utility Easement; a portion of land, described by metes and bounds and recorded at the Nueces County Courthouse which gives the City the right to access and maintain the mains

Untreated water – raw water that has not been treated at the water treatment plant

Utility Department Engineer – the person who is employed by the Executive Director of Water Utilities to make engineering decisions about utilities for the City

Water Blend – untreated water that blends Lake Texana water with Nueces River water

Water Distribution System – the system which consists of all mains in the water distribution system of the City of Corpus Christi

Water Fee Schedule – the fee schedule adopted by City Council which outlines the fees for public water services

Water Inspector- an individual, licensed by TCEQ with at least a Class C Water License, and that acts on behalf of the Executive Director of Water Utilities

Water Master Plan – the latest plan that projects for future development of the water distribution system and that has been adopted by the City Council

Water Standards – the directions and requirements contained herein and is also known as the City of Corpus Christi Water Distribution System Standards

WATER LINES

Location of Mains: All water mains shall be located on public rights of way or public utility easements, as approved by the Executive Director of Water Utilities.

Looping of Water Mains: All proposed water distribution system mains shall start and end at a source of potable water within the water distribution system. No dead-end mains shall be allowed in the distribution system, unless authorized by the Executive Director of Water Utilities.

Maximum Length of Mains:

Grid Mains – Grid mains shall not exceed either of the two following lengths: 6,000 feet, or a length that would, by fluid hydraulics, render the line incapable of producing the flows and pressures set out herein for the type of areas served, considering the pressures and flows that exist at the main's connection. Grid mains are those mains that are identified in the Water Master Plan.

Distribution Mains – Distribution mains shall not exceed either of the two following lengths: 3,000 feet, or a length that would, by fluid hydraulics, render the line incapable of producing the flows and pressures set out herein for the type of areas served, considering the pressures and flows that exist at the main's connection.

Alignment of Water Mains: All water mains shall be located in the public rights of way or in utility easements. The placement of the mains shall be along the dedicated streets between curb and sidewalk, or as approved by the Executive Director of Water Utilities. When installed in a public utility easement, the water main shall be centered, or it shall be located to one side, to maintain the required separation from other utilities. The public utility easement shall be a minimum of 15 feet.

Extensions: All new lots within the boundaries of the City's CCN must provide water mains along the entire street frontages of the property. Extensions of water mains shall be of adequate size to provide for fire flow and shall originate and end at points in the water distribution system which will provide for effective circulation and efficiency of operation, as determined by the Executive Director of Water Utilities. The design of an extension shall take into effect the adequate capacity of present and future requirements for the area to be benefited, the distribution system efficiency, the ease of maintenance requirements, the anticipated life of such extensions, and the constructability, as determined by the Executive Director of Water Utilities. Tapping Sleeve and Valves shall be used to tie into the existing mains whenever possible, to reduce the possibility of service interruptions. No water main extension shall be connected to the system if the cost to the City is so great that in the opinion of the Executive Director of Water Utilities, the expense is not justified on sound business principles.

Cul-de-Sacs: All proposed mains that extend into cul-de-sacs shall be looped.

Proposed Dead-End Mains: Water quality must be addressed in all proposed designs. Proposed Dead-End Mains will not be allowed. In extreme situations, dead-end mains may be considered by the Executive Director of Water Utilities. If considered, the Engineer shall work with the Utilities Department on the design of the proposed system, so that water quality is addressed.

Existing Dead-End Mains: Where a proposed development includes areas currently served by dead-end mains, or where the development proposes to connect to a dead-end main, required infrastructure improvements that provide for establishing distribution system looping, and the elimination of dead-end mains shall be designed.

Temporary Dead-End Mains: Dead-end mains may be temporarily permitted for phased construction, provided that the water distribution system shall not be activated for service beyond the point where looping requirements are met. For the Developer to activate the temporary dead-end, the Developer must provide looping, using a temporary main of a minimum of a four-inch (4") Polyethylene that is placed in a temporary utility easement of five feet (5') minimum or in a public right of way.

Utility Easements: A utility easement is required within private property along all Arterial and Collector Streets and within private property in all locations where mains are proposed. The minimum width of public utility easements for water mains shall be fifteen feet (15'), except for utility easements along and parallel to Collector Streets, for which the requirement shall be a minimum of ten feet (10'). Transmission Mains must be installed in utility easements that have a minimum of 25 feet (25') in width. No permanent structure shall be built in a utility easement. Anything that is built or placed in a utility easement shall be considered temporary and shall be subject to demolition or removal. The utility easements must be drawn on the construction plans, and a Plat shall not be approved without the required utility easement properly drawn on the plat, nor shall a Certificates of Occupancy be issued until the associated utility easement has been recorded at the County Courthouse. The purpose of utility easements for water lines shall be to provide an easement for the water main only, excluding all other utilities.

Pipe Sizes: Pipe sizes shall be those approved by the Executive Director of Water Utilities and shall be designed by an Engineer to provide the required flow.

Minimum Size of Mains: The minimum size of any main on the water distribution system, excluding service lines and temporary mains, shall be six inches (6"), unless otherwise approved by the Executive Director of Water Utilities.

Separation from Sanitary Sewer: The separation distances between the water main and the sanitary sewer system shall be in accordance with the applicable requirements of TCEQ.

Main Material: Mains used in the water distribution system shall be AWWA-approved for use on domestic water systems, as per City Specifications, and as approved by the Executive Director of Water Utilities.

Distance from Buildings: No water main shall be installed within fifteen feet (15') horizontally to the nearest edge of an existing building foundation, and no building foundation shall be built within fifteen feet (15') horizontally from the outer edge of an existing water main.

Utility Clearance: The clearances between water mains and other utilities shall be as follows:

TCEQ Clearance – The clearances required by TCEQ between water mains and sanitary sewer systems.

Parallel Utilities – No utilities shall be installed parallel to and above or below, within eighteen inches (18") horizontally from the outer edge of the water main and parallel on either side of the line for the entire length of the water line.

Crossing Utilities – Crossings of all utilities shall be a minimum distance of 18" from the outer face of the water main in all directions unless otherwise approved by Utilities Department. Designed variances to the minimum clearance shall be prominently marked on the Water Layout portion of the Construction.

Depth of Cover: The depth of cover shall be measured from the surface of the finished grade to the top of the pipe barrel. Unless otherwise shown on the drawings, the depth of cover shall be a minimum of thirty-six inches (36") and a maximum of forty-eight inches (48") below natural ground and minimum of forty-eight inches (48") under pavement. Field changes that have been approved by the designing Engineer that deviate from the drawings shall be promptly red-lined on the field drawings. Designed variances to the minimum and maximum clearance shall be prominently marked on the Water Layout portion of the Construction.

Parallel Fire Protection: For streets that have a one hundred (100') or greater right of way width or 4 travel lanes or greater, parallel fire protection shall be required, with fire hydrants on both sides of the street.

Private Concrete Streets: Unless otherwise approved by the Executive Director of Water Utilities, the mains shall not be installed under private concrete streets, but shall be placed in utility easements, away from under the concrete. All mains crossing the concrete streets shall be in an appropriately-sized casing. In addition, the service lines that cross under the private concrete streets shall be increased by at least one full size from that specified herein and shall be installed inside utility easements.

Transmission Mains: Transmission mains shall be built in accordance to accepted engineering practices for the area and in accordance with all applicable Health and Safety standards, as required by TCEQ and the Executive Director of Water Utilities. The Transmission Mains shall also meet all operational integrity requirements, as determined by the Executive Director of Water Utilities.

Untreated and Blend Water: Distribution piping for Untreated Water and Blend Water shall comply with the provisions of the Transmission Main requirements.

VALVES AND FITTINGS

Approved Valves: All valves must be AWWA approved for use in domestic drinking water systems and follow City of Corpus Christi Standard Construction Specifications.

Valve Spacing: For all mains except transmission mains, the maximum spacing between valves shall be no more than six-hundred feet (600') on center. Valves to be located near Fire hydrant assemblies when possible. Spacing and location of valves on a transmission main shall be approved by the Executive Director of Water Utilities.

Minimum Number of Valves: The minimum number of valves in the immediate proximity of a "Tee" shall be two (2). The minimum number of valves in the immediate proximity of a "Cross" shall be three (3). See Standard Details for valve installation at intersections.

Valve Sizes: The size of the valve shall match the diameter of the main that it is connected to.

Non-Rising Stems: Unless otherwise specified, all valves in the water distribution system shall open left (counter clockwise), shall be parallel to the main, and shall be non-rising stem valves.

TS&V: Tapping sleeves shall be appropriate for the type and size of pipe to be tapped. Sleeves on asbestos- cement pipe shall be full-bodied stainless steel.

Stub-Outs: Unless approved by the Executive Director of Water Utilities stub-outs for future connections will not be permitted.

Gate Valves: Resilient-Seat Gate Valves shall be used for pipe sizes of sixteen inches (16") or smaller.

Transmission Main Valves: Butterfly or Gate valves shall be used for sizes of larger than sixteen inches (16") as approved by the Utilities Department. These valves shall open left (counter clockwise) and be clearly labeled on the construction drawings, and the plans shall also be labeled with the number of turns to close.

Bypass Assemblies: Gate Valves that are twenty-four (24") or larger shall have bypass assemblies.

Operating Wheels: Valves that are twenty-four inches (24") and larger and that are in vaults or above the ground shall have the main valve stem furnished with a combination hand wheel and operating nut.

Position Indicators: All valves that are above ground or in a vault, except for the OS&Y valves, shall be furnished with a position indicator.

Air-Release Valves: Air-Release Valves shall be used on Transmission Mains, wherever the Engineer determines that they are required.

Fittings: Fittings shall be mechanical joint ductile iron, or as approved by the Executive Director of Water Utilities. Fittings that are three inches (3") or smaller shall be of brass, or as approved by the Executive Director of Water Utilities. Fittings for polyethylene service lines shall be restrained compression fittings with stainless steel inserts.

Cast Iron Valve Boxes: Cast iron valve boxes shall be provided over all operating valve nuts. The word "WATER" shall be cast in the top cover. The boxes and lids shall be given a coat of hot tar dip. The top cover shall be equal to the standard City of Corpus Christi pattern as detailed in the City of Corpus Christi Standard Water Details. The extension pipe of the valve boxes shall be eight-inch (8") C-900 PVC and shall extend from the valve box support lip to the top surface of the valve body. Cast

iron valve Boxes shall be firmly supported, free and clear of the valve, and maintained centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished grade.

Valve Extensions: Valves extensions shall be provided for valve nuts that are more than five feet (5') in depth. Extensions shall be factory made, and the Executive Director of Water Utilities shall approve the length and type of extension, before the extension is installed. The valve extensions shall have a valve box installed over them, and the extension pipe of the valve boxes shall be eight-inch (8") C-900 PVC and shall extend from the box to the valve nut.

Elevation of Valve Boxes: The top of valve boxes shall be flush with finish grade, except in cultivated areas, where the top of the valve box shall be set twenty-four inches (24") above natural ground protected with steel bollards.

Valve Vaults: All geared valves shall be set in reinforced concrete vaults, as designed by the design Engineer. The vaults shall have spring-loaded aluminum access lids, and the wrench nut of the valve shall be readily accessible for operation through the vault opening. If valve vaults are installed in areas of vehicular traffic, they must be equipped with aluminum H-20 traffic-loading lids, and the Developer must provide submittals that document the engineered lid. Drawings for the installation of the valve vault must be provided by the Developer to the City and approved by the Executive Director of Water Utilities. Vaults shall be constructed in a manner that will permit minor valve repairs and afford protection to the pipe from impact or settlement where it passes through the vault walls.

Tapping Sleeve and Valves: All tapping sleeve and valves shall be hydrostatically tested and approved before they are installed. The Tapping Sleeve and Valve shall pass with zero (0) leakage for five (5) minutes at 75 psi prior to tapping.

FIRE PROTECTION

Fire Hydrant Specifications: Fire hydrants shall conform to AWWA standards.

Breakable Couplings – All fire hydrants shall be of the traffic-model type, equipped with safety breakable couplings on both the hydrant barrel section and the stem. The coupling shall be so designed that in case of a traffic collision, the barrel and the stem collar shall break before any other part of the hydrant breaks. Weakened steel or weakened cast iron bolts that are used in the breakable-barrel couplings shall not be accepted.

Shut-Off - The type of shut-offs for fire hydrants shall be of compression type only.

Nozzles - Fire hydrants shall be equipped with two (2) threaded hose nozzles of two-and-one-half inches (2 ½") inside diameter and one (1) larger nozzle of a four inch (4") inside diameter.

Nozzle Threads - The hose nozzles shall have two-and-one-half inch (2 ½") National Standard Thread (7 ½ threads per inch), and the larger nozzle shall have six (6) threads per inch, with an outside diameter of four-point-six-five- eight inches (4.658"), pitch diameter of four-point-five-four-three inches (4.543"), and a root diameter of four-point- four-zero-six inches (4.406").

Valve Opening - The minimum size of the main valve opening at the base of the fire hydrant shall not be less than five-and-one-fourth inches (5 ¼") inside diameter.

Valve Seat Ring - The valve seat ring shall not be made an integral part of the shoe. The valve seat ring shall be bronze and shall thread into a bronze drain ring.

Nozzle Cap Chains - Fire hydrants shall be supplied without nozzle cap chains.

Open Left - The fire hydrants shall open counter clockwise.

Color of Finish – The upper barrel, bonnet, and nozzle caps of the fire hydrant shall be painted chrome yellow.

Operating Nuts - The operating and cap nuts shall be tapered pentagon one-and-three-sixteenths (1 3/16") point- to-face at base and one-and-one-eighth inch (1 1/8") point-to-face at the top of the nut. The operating stem nut shall be made of bronze.

Barrel Sections - The fire hydrant shall be made in two or more barrel sections with flanges connecting the upper barrel to the lower barrels and the lower barrel to the shoe. The barrel sections shall be painted chrome yellow.

Stainless Steel Bolts – All of the bolts on the body of the fire hydrant shall be 304 or 316 stainless steel.

Weep Hole Mechanism - Fire hydrants shall drain through "weep holes" located at the seat of the fire hydrant, and the drain holes shall be in the open position when the fire hydrant is closed. Drain valves operating through springs or gravity are not acceptable.

Location of Fire Hydrants: Fire hydrants shall be installed in utility easements or on public rights of way, at street intersections or on streets between property lines, to avoid future driveway conflicts. Fire hydrants shall be installed between the curb and the sidewalk nearest to property lines and accessible to the Fire Department.

Fire Hydrants Spacing: In single-family and duplex residential areas, fire hydrants shall be located with a maximum spacing distance of 600 feet on center, as measured along the centerline of the street. In commercial, light industrial and heavy industrial areas, fire hydrants shall be located with a maximum spacing distance of 300 feet on center, as measured along the centerline of the street. The spacing and location of fire hydrants on transmission mains shall be those approved by the Executive Director of Water Utilities.

Fire Flow: Main lines in Residential Areas shall be sized so that the minimum flow of water from any single fire hydrant shall be no less than seven-hundred-and-fifty (750) gpm with twenty (20) psi residual pressure considering the domestic use of two (2) gpm for every lot in the subdivision. Commercial Areas shall be sized so that the minimum fire flow from any single fire hydrant shall be no less than one-thousand-five-hundred (1,500) gpm with twenty (20) psi residual pressure. Main lines in Light and Heavy Industrial Areas shall be sized so that the minimum fire flow from any single fire hydrant shall be not less than three-thousand (3,000) gpm with twenty (20) psi residual pressure, considering the anticipated domestic flow of the area being served. If developer cannot meet these standards they may also use the current adopted Fire Code to meet fire flow requirements.

Fire Hydrant Barrier Protection: Whenever there is a risk of vehicular traffic damage, bollards must be installed. The bollards shall be of six-inch (6") diameter galvanized pipe, in a forty-two inch (42") deep by eighteen inch (18") in diameter concrete foundation, extending four feet (4') above grade level, shall be filled and top-round mounded with concrete, and shall be painted with reflective red paint. The bollards shall be spaced no more than five feet (5') apart and shall be configured according to the Water Details.

Maximum Distance to Residential Lots: The maximum distance from a fire hydrant to the edge of any one-and-two-family residential lot shall be five-hundred feet (500').

Horizontal Clearances from Fire Hydrants: All fire hydrants shall have a three-foot (3') radius clear horizontal distance from the outer edge of the fire hydrant barrel to any vertical obstruction. The fire hydrant shall be readily accessible for Fire Department use, at all times. The fire hydrant shall have a minimum of eighteen inches (18") from the back of curb to the front edge of the larger nozzle connection, and the pumper nozzle shall be facing in the direction of the street or in a direction that the fire truck can most readily access the fire hydrant. When located next to a side walk, the outer face of the large nozzle cap shall be no closer than six inches (6") from the edge of the sidewalk.

Out of Service: Fire hydrants that are out of service shall be identified by the color black.

Temporarily Out of Service – Whenever a fire hydrant is placed temporarily out of service, the fire hydrant shall be wrapped securely with 8 mil. black plastic.

Long-Term Out of Service – Whenever a fire hydrant is placed out of service for an extended period of time, the entire fire hydrant shall be painted black.

Private Fire Lines with Hydrants: Unless approved in writing by the Executive Director of Water Utilities, private fire lines with hydrants shall not be allowed. If permitted, a water meter and double-check detector shall installed at the property line. Fire lines and hydrants shall be maintained by the owner.

Fire Hydrants in Sidewalks: Fire hydrants shall not be installed in sidewalks, unless no other location is reasonably available. In that event, fire hydrants shall be located so that sidewalks have a minimum of three feet (3') radius of unobstructed sidewalk passageway around the fire hydrant.

Fire Hydrant Assemblies: Fire hydrant assemblies shall be constructed as per the City of Corpus Christi Standard Water Details.

Breakable Coupling: Fire hydrants shall be buried to the Bury Line, as specified by the fire hydrant manufacturer. If a Bury Line is not specified by the fire hydrant manufacturer, the break-away flange of the fire hydrant shall be installed between two inches (2") and six inches (6") above the finished grade, with a typical distance of three inches (3"), so that the fire hydrant can be sheared off when hit by a vehicle. The bolts that are used for the breakable coupling shall be those specified by the manufacturer.

Post-Indicator Valves: Post-indicator valves shall be installed as per the National Fire Protection Association Code.

INSTALLATION OF WATER LINES

Alignment Conflict: Mains shall be installed in accordance with the specified lines and grades. Fittings, valves, and fire hydrants shall be at the specified locations. Where the grade or alignment is obstructed by existing utility structures, such as conduits, ducts, pipes, and connections to sewers or drains, etc., the obstruction shall be protected at the Contractor's expense, in cooperation with the owners of such utility structures. Temporary support and adequate protection of all underground and surface utility structures encountered in the progress of the work shall be furnished by the Contractor. On subdivision and private development projects, costs of adjustment shall be borne by the Developer. If changes must be made to the engineered drawings, the changes must be approved by the Engineer and immediately recorded in the field red-lined drawings.

Plumb Installations: All valves and fire hydrant stems shall be installed plumb, prior to the hydrostatic testing of the main.

Polyethylene Wrapping: All ductile iron pipe, valves, and fittings, except pipe, valves and fittings which are located in encasement pipe or in concrete vaults, shall be wrapped with eight mil (8-mil) polyethylene material, which may be either black or clear. The wrapping shall be lapped in such a manner that all surfaces of the pipe, valves, and fittings, including joints, shall have a double thickness of polyethylene. Double thickness of polyethylene shall be lapped a minimum of eighteen inches (18"), and the lap shall be placed in the lower quadrant of the pipe and in such a manner that backfill material cannot fall into the lap. The polyethylene shall be secured in place with poly vinyl tape and/or twine at not more than six-foot (6') intervals. If wrapping is applied before the pipe is placed in the trench, then special care shall be taken in handling the pipe, so that the wrapping is not damaged. Care shall also be exercised in backfilling around the pipe and fittings, so as to not damage the wrapping. Any wrapping that is damaged shall be repaired in a manner satisfactory to the Executive Director of Water Utilities, so as to form the best protection to the pipes. The sand backfill shall be placed in a manner that will not injure the polyethylene wrapping and shall be compacted under, around the sides, and over the pipe in a manner that will reduce settlement to a minimum and as approved by the Executive Director of Water Utilities.

Sand Encasement: All pipe and fittings, which are not enclosed in a concrete vault or laid in an encasement pipe, shall be completely encased with a minimum of eight inches (8") of sand around the outer edge of the pipe. For pipes that are sixteen inches (16") and larger, the minimum thickness of the sand encasement shall be twelve inches (12") around the outer edge of the pipe. This encasement includes the bottom, sides and top of the pipe and fittings including bells, so that all portions of the main that are below the surface of the ground shall be encased, to insulate the pipe from the natural ground and from the backfill. The sand material shall be in accordance with the Standard Construction Specifications. Sand shall be subject to testing, as directed by the Executive Director of Water Utilities. If the sample does not meet the specifications herein, the sand shall be rejected, and all unapproved material shall be removed from the job site at the Contractor's expense.

Final Backfill Zone: This zone exists above the sand encasement, up to the surface of the ground. The material in the backfill zone shall be in accordance with the Standard Construction Specifications and shall be appropriate to the intended use of the grade surface.

Over-Excavation: Any part of the trench that is over-excavated shall be corrected with sand backfill.

Trenches: Trenches shall be excavated true and parallel to the pipe center line with minimum clearances as specified. Trenches shall be wide and deep enough to account for the sand encasement. Where stumps or roots are encountered, they shall be removed flush with the sides of the trench.

Restraining the Main: An appropriate number and type of restrained fittings shall be required at all Bends, Tees, incomplete Crosses, and at Blow-off valves. All special main restraints shall be designed by the Engineer, shall be included in the drawings, and shall be approved before the work is done

Restrained Joints – Restrained Fittings, Metal Harnesses, Tie Rods and Clamps or Swivel Fittings shall be used to prevent movement. Restraining devices and design configurations shall be specified by the Engineer and shall be job appropriate. All restrained fittings and devices shall be installed according to the manufacturer's specifications. Steel Rods and Clamps shall be galvanized or otherwise rust proof or coated with hot coal tar enamel. All fittings shall be wrapped with polyethylene wrapping.

Thrust Blocks – Thrust blocks shall only be used on transmission mains, as determined by the Engineer. All thrust blocks shall be designed by the Engineer. Material for thrust blocks shall be designed by the Engineer and shall be placed between undisturbed soil and the pipes and fittings being anchored. The blocking shall be placed, so that the pipe and fittings shall be accessible for repair.

Pipes and Fittings: Installation of pipe and fittings shall be done in accordance with manufacturer's recommendations, unless such recommendations conflict with the provisions herein, in which case the provisions herein shall prevail.

Pipe Deflection: Pipe deflection shall not exceed seventy-five percent (75%) of the maximum allowances recommended by the manufacturer.

Linear Locator Tape: A linear locator tape shall be installed directly above all new water pipes, on the top surface of the sand encasement.

TAPS AND METERS

Service Lines: All water service lines shall be metered. Water service lines shall be of materials as approved by AWWA for domestic water. Service-line connections may be made on water lines that are twelve (12) inches in diameter and smaller. Service lines may be connected to fire hydrant leads, provided that the service tap is made ahead of the fire hydrant valve, allowing for the fire hydrant to be shut off and serviced without the interruption of water service to any customer. To prevent from having to install a post-indicator valve on a fire line, domestic water service lines may be connected immediately after the valve that supplies the fire line. Acceptable sizes of connections will be ¾", 1", 2", 4", 6", 8" and 12".

Domestic Meters: The location of all domestic water meters shall be specified in the drawings and shall be in immediate proximity to the public right of way or a utility easement. More than one domestic water meter is permitted for a single property, provided that the meter serves a different tenant. Whenever the Executive Director of Water Utilities deems that buildings on a single property are spaced too far apart and additional water meters are warranted, more than one domestic water meter may be allowed for a single tenant.

Separate Irrigation Meters: In addition to the domestic meters, separate water meters are permitted for lawn irrigation systems, and the irrigation water meter location shall be specified in the drawings. Whenever the Executive Director of Water Utilities deems that landscaped areas on a single property are spaced too far apart, more than one irrigation water meter may also be permitted in a single property.

Location of Meters: The water meters shall be located in grassy areas, at the edge of the public rights of way or utility easements. The Developer shall mark the requested location of the water meter with a two-by-four (2x4) stake, painted blue. The Water Department shall make every effort to install the water meter at the requested location. However, the location of the main and the accessibility to the requested location will determine the final placement of the water meter. If no marking is provided by the Developer, the Water Department shall place the meter in the most cost-effective location for the City.

Fire-Line Meters: Whenever a double-check is required on a fire line, due to the fact that the line is too small to have a double-check detector, a water meter for the fire-line will be required. These meters will be provided with an OS&Y Valve ahead of the meter.

Costs for Taps and Meters: The Developer/Contractor shall be responsible for all of the costs associated with tapping the main. The cost for the taps and the meters are found in the Utility Fee Schedule. All taps and meters shall be paid for before they are installed. The Developer shall allow a minimum of ten (10) business days from the payment date for the work to be performed.

Larger Meters: For meters and/or taps that are larger than those specified in the Fee Schedule, adequate information must be provided to the Executive Director of Water Utilities, so that the meter can be specifically quoted. If the three-inch (3") and four-inch (4") meters are not installed above ground, they shall be installed in meter vaults, as specified in the Standard Water Details. Meters that are six (6) inches and larger shall be installed above ground.

Meter Manifold: If a meter manifold is installed, a one-inch (1") tap will support a maximum of two (2), three-quarter inch (¾") meters, and a two-inch (2") tap will support a maximum of eight (8), three-quarter inch (¾") meters. Any other design configuration for a water meter manifold shall be designed and sealed by the Engineer and shall be supported by calculations when requested by the Executive Director of Water Utilities. Depending on the size of the water meter manifold, a meter vault may be required, as determined by the Executive Director of Water Utilities and as specified in the Standard Water Details.

Making Taps and Setting Meters: Active mains can only be tapped by Approved Water Utility Tapping Contractors or under direct supervision by Utility Department representative. The Utility Department Crews are the only ones that are permitted to install City-read water meters.

Residential Subdivision Pre-Taps: In residential subdivisions, the Developer shall provide either a single-service connection, consisting of a one inch (1") service tap, a one inch (1") single-service line, three-quarter inch (¾") curb stop, and a meter box that is approved by the Executive Director of Utilities, or a double-service connection, consisting of a one inch (1") service tap, a one inch (1") service line, a one inch (1") double meter manifold with two- three-quarter inch (¾") curb stops, and a meter boxes that are approved by the Executive Director of Utilities. The double service connection assembly and meter box are to be set in the public right of way or easement straddling the property line of the properties served. The pipe material for the service lines shall be Polyethylene or as specified in the Standard Water Details. The distance from the curb stops and meter yoke below finished grade shall be twelve inches (12"), and the distance behind the curb shall be two feet (2').

Curb Markings: Pre-tap locations shall be marked with a brass "W" of approximately one-and-one-half inch (1 ½") in size on the side of the concrete curb, at the location where the curb stop was installed.

Construction Meters: Construction meters shall be provided, set, moved, and tested by the City.

BACKFLOW

Backflow Protection: All service connections where an actual or potential contamination hazard exists shall be protected from contamination due to backflow. Backflow protection devices shall be installed to comply with the most current adopted version of the Plumbing Code and as specified herein.

Irrigation Systems: In irrigation systems, the public water supply shall be protected from contamination using the appropriate backflow protection device, as outlined in the most current adopted version of the Plumbing Code.

Fire Lines: At connection to city water main a valve shall be installed. Fire lines shall be protected using a double-check detector assembly. For smaller fire lines, such as residential-type fire lines, that do not have double-check detectors available, a double check may be installed. In such systems, the fire line shall be controlled using an OS&Y Valve to shut off the meter. An above-ground double-check detector assembly installation shall be installed at the edge of the street right of way or the edge of the utility easement, in close proximity to the public water main. Double-Check Detector Vaults may be used, as approved by the Executive Director of Water Utilities. The above-ground piping and assembly shall be protected from freezing, as directed by the Fire Marshall. The above-ground piping and assembly shall have a concrete pad beneath it and shall be protected with bollards from vehicular traffic where applicable. The valves on both sides of the backflow protection device shall be OS&Y valves. Drawings for the installation of the fire line must be provided by the Developer and approved by the Executive Director of Water Utilities, before construction begins.

FLDC at Street Exemptions: Under the following circumstances, exemptions from the requirement to install the backflow protection device near the street right of way or utility easement shall be granted as follows:

Less than One Hundred Feet (100') – Whenever the distance from a looped main to fire sprinkler system riser is less than one hundred feet (100'), the backflow protection device may be installed inside the building, on the riser.

Compound Meter – Except on residential-type of fire lines, whenever the water meter provides for domestic and fire water, a compound meter shall be required. The domestic line may be separated from the fire line piping inside the Mechanical Room, and at this point, the backflow device on the fire line will be required inside the building. Compound meters that are over four inches (4") in size shall be installed above ground at the edge of the public right of way or utility easement.

Construction Meters: A Reduced-Pressure-Principle backflow device shall be located on the downstream side of the construction meter, to protect the water distribution system from contamination during its use.

Testing Backflow Devices: It shall be the responsibility of the Developer to have all backflow devices tested and certified upon installation, relocation, and repairs. A Maintenance and Testing Certificate shall be provided to the City of Corpus Christi annually, to certify the proper operation of each backflow preventer.

INSPECTIONS

Water Inspections: All public water improvements shall be inspected and approved by the Utilities and Engineering Departments. Inspections shall occur before the improvements are covered up, to ensure that the improvements are built according to the plans and specifications. The Developer shall give at least a seventy-two (72) hour notice for the need of an inspection.

Acceptance of Main: Acceptance of the main shall not be made, until all of the proposed work is inspected and approved by Utilities and Engineering Construction Department, the Record Drawings are received from the Engineer, and the warranty period has expired.

TESTING PROCEDURES

Hydrostatic Test: The Contractor shall provide all the materials, equipment, and labor necessary to accomplish the hydrostatic testing of the new water main. The Contractor will not be ready for the test until the Water Inspector has confirmed that all valves are accessible and open, all fire hydrants are properly set, and all the curbs and gutters have been installed.

Preparation for Hydrostatic Test: Water for filling the line shall be provided by the City of Corpus Christi through a water meter (Contractor responsible for applicable water rates) assigned to the Contractor. A gauge and meter for testing shall be supplied by the City, but the test pump with the appropriate connection points, as approved by the Executive Director of Water Utilities, shall be furnished by the Contractor. The meter shall be connected directly to the main being tested but shall be protected against extreme pressures by the use of a one-inch (1") safety relief valve, set at test pressure plus ten (10) psi.

2-Hour Test: The first hydrostatic test shall be a two (2) hour test, at a pressure of one-hundred-and-fifty (150) psi. The allowable leakage during this portion of the test shall be based on the sum of the leakage allowed in the AWWA standards for the type and quantities of pipe and appurtenances being used. This allowable leakage shall be calculated by the Engineer, based on the material quantities of the actual main installed. The required document shall be signed and sealed by the Engineer and made available to Water Inspector prior to the test. The results of the test shall be recorded and kept by the Executive Director of Water Utilities until such time as the warranty on the project has expired.

24-Hour Test: The second type of hydrostatic test shall be made no less than forty-eight (48) hours after the successful completion of the first hydrostatic test. This test shall be for twenty-four (24) hours at City pressure. There shall be zero (0) leakage allowance during this test. During the test, all exposed pipe, fittings, valves, fire hydrants, and joints shall be carefully examined, and if they are found to be leaking, they shall be corrected immediately by the Contractor. If the leakage is due to cracked or defective material, the material shall be replaced by the Contractor, and the test will have to be repeated.

This process shall continue until the water line passes both hydrostatic tests and is accepted by the Water Inspector.

Bacteriological Test: To insure the public health, safety and general welfare of the population served by the City of Corpus Christi, the Executive Director of Water Utilities shall have water-licensed personnel supervise and direct all main sterilization, taps, connections and operations according to the requirements of TCEQ. The contractor shall disinfect the new water main, in accordance with AWWA standards.

Preparation for Bacti: All pipe, valves, fire hydrants, and fittings shall be stored on timbers and kept clean. Where soil or other substances have come in contact with the water surfaces of the pipe or fittings, the interior shall be washed and sterilized with a two percent solution of calcium hypochlorite.

Bacti Test: Once the main has passed the hydrostatic test, the new line shall be disinfected according to AWWA standards and allowed to stand for forty-eight (48) hours. After the sterilization period is completed, one end of the new line shall be connected to an existing pipe that is the same size or larger and shall be flushed by the Contractor, under the direct supervision of the Water Inspector. The hypo-chlorinated water shall be disposed of in accordance with TCEQ regulations. After the flushing of the new main, a sample shall be taken, and then after a twenty-four (24) hour incubation period, the results of the bacteriological test shall be obtained. If the sample does not pass TCEQ purification standards, the sterilization procedure shall be repeated. Two series of bacteriological test failures shall require the Contractor to "pig" the system before any more bacteriological samples shall be collected. No new piping shall be accepted as part of distribution system prior to the time that the new system can be sterilized, tested, and accepted by the Water Inspector.