CHAPTER 3
WATER SYSTEM DESIGN CRITERIA

3.01 WATER DESIGN GENERAL

A. Criteria for the design of water service and water distribution lines are herein established. All water lines constructed within the City of La Porte or its Extraterritorial Jurisdiction (ETJ) shall follow these criteria and be in agreement with the City of La Porte Comprehensive Plan.

B. Design, construction and sizing of all water mains and appurtenances shall meet or exceed the requirements of the Texas Commission of Environmental Quality (TCEQ) as per 30 TAC 290 and Texas Board of Insurance (TBI).

C. The public water system shall not extend beyond the individual water meter. All waterline construction in public rights-of-way up to and including construction to the water meter shall conform to these standards.

D. Design and construction shall conform to the City of La Porte construction details.

E. The "City of La Porte" for the purposes of these criteria shall consist of all land within the city limits, and land located within the City's ETJ.

F. The final decision approving authority for the City of La Porte with respect to the water system design criteria shall be the Director of Planning or his designated appointee.

3.02 DESIGN REQUIREMENTS

A. Obtain approval from the Director or Planning of his designated appointee for exceptions or deviations from these requirements. Exceptions or deviations may be given on a project by project basis.

B. Lines:

1. Locate water lines within street rights-of-way, or appropriate utility easement:

a. No 2-inch water mains are allowed.

b. Four-inch mains shall only be used with special approval of the Director of Planning or his designated appointee, shall serve no more than 16 residential lots, and shall be supported on both ends by an 8-inch water main or larger. A dead end 4-inch main may supply a maximum of 10 lots, shall not exceed 400 feet in length and shall terminate with a blow off. Fire hydrants are not allowed on a 4-inch main.

c. Six-inch interconnected/looped mains shall only be used with special approval of the Director of Planning or his designated appointee, shall be a maximum of 800 feet long, and shall be supported on both ends by an 8-inch main or larger. Dead end 6-inch mains shall not be more than six hundred feet (600') in length and shall terminate with a blow-off. Fire hydrants are not allowed on a 6-inch main.

d. Except when 4-inch and 6-inch diameter lines are permitted under the above criteria, all water lines shall have a minimum diameter of 8-inches when such runs are used for lines less than 1000 feet long or when such water lines are required to have a fire hydrant or flushing valve.

e. Ten inch diameter water line is not permitted.

f. Pipe with a 12-inch diameter should be used for lines greater than 1000 feet in length.

g. Dead-end lines:

(1) Dead-end lines shall be avoided and may only be considered when a looped or interconnected water main system is not nearby. Such dead-end lines shall only be installed when special approval from the Director of Planning or his designated appointee is obtained.

(2) The design of all water distribution systems should include the opportunity for future looping or interconnect of any approved or proposed dead-end line.

(3) Dead-end lines within public right-of-way:

(a) On permanent dead-end lines not serving residential cul-de-sacs, the line shall be 8 inches in diameter and shall not exceed more than 700 feet in length from the closest interconnection main line and shall terminate with a fire hydrant, flushing valve or blow-off valve.

(b) In temporary dead-end situations or if the possibility for future extension of the water line exists do not reduce pipe sizes successively. Carry 8-inch diameter pipe to the last appurtenance or the plug. Place the last service as near as possible to the end and install a standard blow off valve and box at the end of the 8-inch diameter line. The maximum length of such a line shall be 700 feet.

(c) In unavoidable permanent dead-end situations, reduce the sizes of pipe successively. Carry an 8-inch pipe to the last fire hydrant, then use 4-inch pipe to the end of the line and lay 4-inch line in accordance with Article 3.02, Section B, Clause 1, Item b. Provide a standard two-inch (2") blow off at the end of the main.

(d) Isolate dead end lines with a line valve.

(4) Water lines located in a public easement on private property in non-single family residential applications with 1 or more fire hydrants or flushing valves shall be 8-inch diameter with interconnection to at least 2 supply sources when possible.

(a) Appropriately sized domestic service shall be taken from the 8-inch lines.

(b) The design engineer shall submit water/hydraulic modeling data to the Director of Planning or his designated appointee demonstrating that adequate water pressures can be maintained given projected water demand in non-single family residential applications.

(c) The design engineer shall submit water/hydraulic modeling data to the Director of Planning or his designated appointee demonstrating that fire flow capacity is available for the non-single family residential applications.

h. Water line placement in side lot easements shall not be allowed except by special approval of the Director of Planning or his designated appointee. Where side lot easement water do receive special approval they may be lain in a continuous steel casing pipe. When such casing is

required by the City of La Porte, extend the casing uninterrupted from building line to building line. No horizontal or vertical deflections are allowed. Construct encased water line of ductile iron or restrained joint bell and spigot pipe to prevent lateral movement. Provide and install casing spacers and end seals. This item shall only apply to publicly maintained lines.

2. The use of steel pipe for use as a water line transmission pipe is prohibited. Steel pipe shall only be used for water line casings only.
3. Water Line Testing: All newly installed water lines shall be designed to hold 125 psi hydrostatic pressure for 4 hours. If a leak is detected within that 4 hours, an 8 hour test shall be required. Hydrostatic tests shall be performed per AWWA standard specifications for installation of cast iron water main C-600.
4. Chlorination: All newly installed water lines shall have to pass bacteriological testing before being accepted for maintenance by the City of La Porte. The City will conduct the bacteriological testing. The City will pay for passing tests and the developer/contractor shall be responsible for the cost of failed tests.

C. Location (See Table 3.1)

1. Boulevard streets: If approved, public water lines, may be located within the esplanade. Water lines should be located as near the centerline as possible to avoid conflict with future pavement widening. The lines should be located in the street right-of-way to avoid conflict with future pavement widening.
2. Locations within an easement: Locate water lines in the center of a 10-foot minimum width dedicated water line easement. For location within side lot easements, the minimum easement width shall also be 20 feet. The Director of Planning or his designated appointee may require a wider easement if the line is to be buried more than 8 feet deep from natural ground surface at any point in the easement. Obtain approval from the City of La Porte for lines to be located in smaller or multi-use easements.
3. When a water line is placed parallel to but not crossing any other proposed or existing utility line, other than a sanitary sewer, the water line shall have a minimum of 4 feet horizontal clearance from the outside wall of the existing utility to the outside wall of the proposed waterline. Any proposed deviation from these criteria must first be approved by the Director of Planning or his designated appointee.
4. A minimum distance of 2 feet shall be maintained from the right-of-way or easement line to the outside edge of the water line.

Table 3.1
WATER LINE LOCATION WITHIN A STREET RIGHT-OF-WAY

RIGHT-OF-WAY WIDTH & EXISTING OR ANTICIPATED CURB FACE TO CURB FACE PAVING WIDTH		8" & SMALLER *(1) (2) (3)*	12" & LARGER *(1) (2) (3)*
100-FOOT ROW ALL STREETS:		8 feet	7 feet
80-FOOT ROW ALL STREETS:		7 feet	6 feet
60-FOOT ROW ALL STREETS:			
MAJOR THOROUGHFARE:	44 feet	5 feet	5 feet
COMMERCIAL, SCHOOL, PARK:	40 feet	7 feet	6 feet
RESIDENTIAL:	27 feet	12 feet*(4)*	12 feet*(4)*

(1) The numbers listed in the right two columns of Table 3.1 are the maximum allowable distance from the right-of-way to the centerline of the proposed water line.

(2) The minimum distance from the right-of-way line to the centerline of the proposed water line shall be 5 feet without a water line easement adjacent to the right-of-way.

(3) All distances are from back of curb.

(4) Investigate the possibility of a future 35-foot curb face to curb face curb and gutter street section to replace an existing street with roadside ditches and place the waterline the appropriate distance behind the future curb.

D. Depth of Cover (See Table 3.2)

1. Provide the minimum depths of cover shown in Table 3.2 from the top of natural ground behind the curb for curb-and-gutter streets, or from the lowest elevation of the nearby ditch bottom for roadside ditch street sections whichever is applicable unless a variation is granted by the Director of Planning or his designated appointee.
2. Whenever possible, changes in grade or alignment to clear utilities or underground features should be accomplished by deflecting pipe joints. The maximum designed deflection shall be ½ of the manufacturer's allowable deflection. The use of regular bends for any change of grade shall not be allowed except when prior approval is obtained from the Director of Planning or his designated appointee.
3. If a depth greater than 8 feet or less than 4 feet to the top of the pipe is proposed, a ductile iron or other comparable high hoop strength material pipe shall be used and continued for all areas the depth of cover exceeds 8 feet or is less than 4 feet.

    a. All transitions from ductile iron pipe to approved water main materials shall be constructed using electrically isolated flange joints.
    b. Ductile iron or other comparable high hoop strength material pipe shall be constructed in accordance with City of La Porte construction details for water lines.

Table 3.2
DEPTH OF COVER FOR WATER LINES

SIZE OF LINE	DEPTH OF COVER*	
	TOP-OF-CURB	OPEN-DITCH
8-INCH & SMALLER	4 FEET	5 FEET below ultimate flowline
12-INCH & LARGER	5 FEET	5 FEET below ultimate flowline

**When crossing easements whose owning or governing agency has stricter depth of cover criteria than that shown in Table 3.2, the stricter of the two shall apply. Where other agencies have review authority or jurisdiction and have different depth of cover requirements, the stricter of the two shall apply.*

E. Appurtenances

1. Do not place appurtenances in pavement when the appurtenance would be covered in whole or in part by pavement. Gate valves may be placed in sidewalks or paved roadways provided that the top of the valve box is flush with the finished pavement.
2. All water system valves shall conform with AWWA standards and shall include:

   a. Cast iron valve boxes are required on all valves less than 12 inches. Valve vaults are required on all valves 16 inches and larger.
   b. All valves shall be sized to equal the size of the water main on which it is located.

3. Valves

   a. Spacing – set at maximum distances along the water line as follows:

      (1) 8" & Smaller – 1000 feet
      (2) 12" & Larger – 2000 feet
      (3) The total number of valves at any water line intersection shall equal the total number of lines leading out from the intersection point minus one.
      (4) Tapping Sleeve & Valve – Sleeve and bolts shall be stainless steel.

   b. Location

      (1) Normally, locate valves at street intersections along the street right-of-way lines projected across the water line where possible. Tapping sleeve and valves are excluded from this requirement.
      (2) Isolate fire hydrants and flushing valves from the service main with a valve located in the fire hydrant or flushing valve branch. This valve should not be located in the slope or flowline of roadside ditches.
      (3) Intermediate valves, not located on the projection of the right-of-way line, shall be located on the water line 5 feet from a fire hydrant but shall not be set in a driveway.
      (4) Locate valves a minimum of 10 feet horizontally away (either direction) from any sanitary sewer crossing.
      (5) Valves located near reducers shall be located on the smaller diameter pipe.
      (6) All water mains shall be valved within the street right-of-way.

Valves shall not be placed under or within 2 feet of ultimate pavement, when it is known that the street will be widened in the future, without prior approval of the City of La Porte.

(7) Valves shall be placed at the end of all water mains that are to be extended in the future and the main shall be extended a minimum of one pipe joint past the valve.

c. Valve Type

(1) 12" & smaller – Resilient seated, corrosion resistant, Gate valves, meeting AWWA C509, counter-clockwise opening with mechanical joints

(2) 14" & larger – Butterfly valves meeting AWWA C504, with corrosion resistant coating. All Butterfly valves shall be installed in a vault of adequate size & construction subject to approval by the Director of Planning or his designated appointee.

4. Fire Hydrants and Flushing Valves

a. Spacing

(1) Single family residential development – 500 foot maximum spacing.

(2) All other development – 300 foot spacing.

b. Location in or along street right-of-way

(1) Locate fire hydrants primarily at street intersections.

(2) Locate fire hydrants at the end of a curb radius of a street intersection, 3 feet behind back of curb or projected future curb in a curb & gutter road construction application.

(3) On streets with roadside ditches, set the fire hydrants within 5 feet of rights-of-way lines. Fire hydrant lead valves should not be located in the slopes or flow lines of ditches.

(4) Set fire hydrants not located at intersections or block corners on lot lines, as extended to pavement, when located between right-of-way intersections. These locations may be adjusted 5 feet either way to avoid driveways or obstructions. In either case, do not locate fire hydrants closer than 5 feet from driveways.

(5) Fire hydrants are not allowed in esplanades of streets.

(6) On all Texas Department Transportation (TXDOT) rights-of-way, set the fire hydrants and flushing valve set-backs from the edge of right-of-way shall adhere to TXDOT criteria.

(7) Investigate the possibility of a future 35-foot face-to-face curb-and-gutter section to replace existing streets roadside ditches.

c. Location of fire hydrants or flushing valves outside street rights-of-way and in public easements:

(1) The City will review and approve all submitted locations of fire hydrants and flushing valves in all developments within the City of La Porte and its ETJ.

(2) Locate fire hydrant and flushing valves in protected, easily accessible areas behind curb lines.

(3) For fire hydrants or flushing valves that are located adjacent to water lines constructed in 10 foot wide water line easements, the fire hydrant or flushing valve shall be centered in a minimum 15 foot by 15 foot separate easement.

(4) For non-residential developments in the City of La Porte and its ETJ, provide isolation valves at each end of fire loops requiring on-site fire hydrants.

d. Fire hydrant leads shall be designed to have a minimum 4 foot bury where possible. Bends or offsets in a fire hydrant branch should not be used. Bends may be used on the water main and not the fire hydrant branch to maintain a 4 foot bury or a 3 foot back of curb set-back.

e. The lower horizontal flange of a fire hydrant shall not be more than 6 inches above the surrounding natural ground at any point.

f. The bottom of the Hydrolock connection shall not be less than 18 inches from the surrounding natural ground.

g. All fire hydrants installed in the City of La Porte and its ETJ shall be Mueller Super Centurion 250 or American Darling or approved equal.

h. All fire hydrants installed in the City of La Porte and its ETJ shall have a Hydrolock quick-connect 5 inch steamer connection facing the nearest main street.

i. Do not install fire hydrants within 10 feet vertically or horizontally of sanitary sewers and force mains.

j. Fire hydrant restraints - EBAA Iron Series 1500 force restraint sleeves for pipe joints or approved equal.

5. Fittings

a. Fittings shall be Ductile Iron Compact Fittings (2 inch to 12 inch), AWWA C153/A21.53.84, conforming to the minimum requirements of "Gray-Iron and Ductile-Iron Fittings." For fitting of 14 inches through 48 inches used on water mains, AWWA C110 (ANSI 21.10) or current revision shall govern. Fittings shall be furnished with bituminous or cement mortar lined AWWA C104 (ANSI A21.4). Properly designed thrust blocks shall be provided for each fitting where necessary and in accordance with City of La Porte standard construction details. At each fitting there shall be EBAA Iron Series 1500 force restraint sleeves for pipe joints or approved equal.

b. Use plugs with retention clamps and carrying the designation "plug and clamp." Thrust blocking is required for dead-end lines that are plugged.

c. All water main joints shall be push on joints. Mechanical joints should not be used in underground applications without prior approval of the Director of Planning or his Designated appointee. Mechanical joints may be used for above ground waterline installations.

d. All fittings are to be double wrapped in 6 mil plastic.

6. Ductile Iron Pipe

a. Ductile iron pipe shall be provided with polyethylene encasement. Provide minimum 2 wraps of 8-mil polyethylene, or

b. Polyethylene tube encasement shall conform with the minimum requirements of "Polyethylene Encasement for Gray and Ductile Cast Iron Piping for Water and other Liquids," ANSI/AWWA C-105,

current revision. Soils within the project shall be tested to adequately determine the requirements of the encasement. Appendix A of ANSI/AWWA C-105 shall be consulted where questions regarding soil conditions and encasement arise.

F. Water Meter Service

1. All water meters 2 inches and smaller shall be installed by the City of La Porte.
2. Vaulted water meter installation shall be undertaken by private contractors with prior approval from the City of La Porte.
3. Stub outs for future water service are not allowed except where part of a preapproved master plan, site plan development plan or track development plan.
4. Minimum size water service line and fittings shall be ¾ inch meter with $^5/_8$ inch stop at the meter for any single connection for residential homes. The City of La Porte Building Inspections Department should be consulted to ensure the proper sized meter is selected for any proposed service.
5. Water service leads from the water main to the water meter shall be placed at a minimum 4 foot below final paving elevations.
6. Water meters shall be ¾ inch to 2 inch displacement type, magnetic drive, cold water meters.
7. Meter boxes shall be located just within the public right-of-way along the projection of a lot line. Location of meters in the ditch of open ditch streets shall be avoided. Meter boxes shall be installed no more than 2 inches above final natural ground.
8. Back-flow prevention devices shall be installed in line on the private water meter service line on all commercial developments, irrigation metered service, and shall be installed in all applications where the City of La Porte's Plumbing Code and its latest revision so requires.

G. Water Line Crossings within the City of La Porte

1. Public and private utility crossings other than sanitary sewer: Where a water line crosses another utility other than a sanitary sewer, a minimum of 6 inches of clearance must be maintained between the outside wall of the water line and the outside wall of the utility.
2. Stream or ditch crossings

   a. Elevated crossings

      (1) Water lines shall be ductile iron pipe or other comparable high hoop strength material and shall extend a minimum of 15 feet beyond the last bend or to the right of way line, whichever is greater.
      (2) Elevated crossings are preferred to underground crossings.
      (3) Use a separate elevated supporting structure for 12 inch and larger water lines. Locate structures a minimum of 10 feet from any existing or proposed structures.

         (a) Adequate structural capacity shall have been calculated and provided for including considerations for pipe deflection and all applicable loading.
         (b) Clearance for maintenance purposes above bent cap elevation shall be provided where elevated water lines are to be run under bridges.

(4) When approved by the Director of Planning or his designated appointee, bridge attachments for elevated water line crossings may be made instead of separately supported crossings.

(5) Design elevated crossings with the elevation of the bottom of the water line 2 feet above the 100-year floodplain elevation

(6) Create a high point in the elevated stream or ditch crossing and provide an air release valve at that highest point of the water line.

(7) Provide sufficient span length to accommodate the cross section of future widening of the stream or ditch to ultimate cross section.

(8) Base the columns' support designs on soil capacity, spacing, loading, and all pertinent structural requirements.

(9) Spacing of supports shall consider effect of support on channel hydraulics and be subject to city approval.

(10) Provide pedestrian pipe guards on elevated crossings. The Planning Department can be contacted for this detail.

b. Underground Crossings

(1) Provide a minimum 5 foot clearance from the top of the pipeline to the ultimate flow line of the ditch.

(2) Provide sufficient length to exceed the ultimate future development of the stream or ditch.

(3) Water lines shall be C-900 or ductile iron pipe and shall extend a minimum of 15 feet beyond the last bend or to the right of way line, whichever is greater.

(4) Where other agencies have review authority or jurisdiction and have different underground crossing requirements, the stricter of the two shall apply.

3. State Highway and County Road Crossings

a. Extend carrier pipe from right-of-way to right-of-way

b. In cases where the State of Texas or Harris County shall have review powers, the use of any and all materials and the design thereunto appertaining shall be governed by their requirements. The approval of the design by the appropriate governmental agency shall be sought, obtained and demonstrated to the City of La Porte before plans will be approved.

c. Where additional right-of-way has been acquired for future widening, the casing shall extend 5 feet beyond each right-of-way line.

4. Railroad Crossings

a. For mainline and spurline railroad crossings, the water line shall meet the requirements of the governing agency and such requirements shall be followed from 5 feet beyond each right-of-way line and across the right-of-way itself. Any deviation must be approved by the railroad companies. The approval of the design by the appropriate governing agency shall be obtained and demonstrated to the City of La Porte before plans will be approved.

b. Where there is no railroad but a railroad owned easement or right-of-way, as a minimum extend a steel casing from right-of-way to right-of-way line.

c. The approval of the design concept by the railroad involved must be obtained and demonstrated to the City of La Porte before plans will be approved.

5. Additional Requirements

a. Use isolated flange joints for transitions between two dissimilar metallic pipes. Isolate water lines from casing with spacers and supports.
b. The carrier pipeline shall extend a minimum of 1-foot beyond the end of the casing to allow flanged joints to be constructed if necessary.

6. Oil and Gas Pipeline Crossings

Use PVC pipe when crossing a non-service transmission pipelines regardless of depth. All non-service transmission pipeline crossings must have the approval of the company whose lines are being crossed. Maintain a minimum 2 foot vertical separation between the pipeline and the water line.

7. Fireflow Waterline Loops within Non-Residential Developments

For non-residential developments inside the City of La Porte and requesting on-site water mains, comply with the following requirements to allow maintenance and future repair operations if the City of La Porte will be the entity maintaining the water main:

a. Where approved by the Director of Planning or his designated appointee, if there is placement of paved parking or paved private drives over the installed water line then the City of La Porte is not required to replace or repair paving or paved areas when such paving is disturbed by needed water line repairs.
b. Avoid laying any new water lines under proposed or existing pavement but where unavoidable, provide minimum 20 foot interval longitudinal expansion or construction joints in the easement over the water line.
c. Fireflow waterline loops within non-residential developments that are to be maintained by the City of La Porte shall be placed in a water line easement that shall be given, conveyed, granted or dedicated to the City.
d. There shall be no structures or equipment pads constructed over a publicly maintained water line.

H. Auger Construction: Use the following general criteria for establishing auger, bore and jack, or microtunneling sections when site conditions require their use:

1. Improved streets – Use auger or microtunneling construction to cross a street regardless of surface. Auger or microtunneling length shall be computed as roadway width at the proposed bore location plus a minimum of 10 feet to either side of roadway.
2. Driveways – Use auger or microtunneling construction to cross improved driveways. Bore and jack, auger or microtunneling length shall be a minimum of the driveway's width.
3. The City of La Porte Planning Department shall be consulted for a auger pit/bore pit backfill details.

I. Circulation and Flushing for Water Quality: The layout of the water distribution system shall provide for maximum circulation of water.

1. Provide a source of fresh water at each end or at multiple points of a subdivision or development. Provide ways to create circulation and place valves and fire hydrants to allow simple flushing of lines.
2. Where stubs are provided for future extensions, isolate the stubs with a valve and no service connections will be allowed beyond the valve before the line is extended. Place one full joint of pipe between the valve and the plug.

J. New Water Lines Constructed Near Sanitary Sewers and Force Mains and Manholes

1. New Water Lines Parallel to Sanitary Sewer and Force Mains: Locate water lines a minimum of 10 feet horizontally, outside wall to outside wall, when parallel to sanitary sewers and force mains. Use the following procedure when site conditions prohibit achieving 10 feet of separation. When the 10 foot separation cannot be achieved the approval of the Director of Planning or his designated appointee must be obtained:

   a. When a new water line is to parallel an existing sanitary sewer force main or gravity sewer and the 10 foot minimum separation cannot be achieved, the existing sanitary sewer shall be replaced with lined ductile iron pipe, SDR-26 with pressure gaskets, or PVC C-900 150 psi pipe or better and equipped with pressure type joints.
   b. The water lines and sanitary sewer shall be separated by a minimum vertical distance of 2 feet and at least 4 feet horizontally (per 30 TAC 290.44) measured between the nearest outside walls of the pipes, where the water line shall always be located above the sewer.

2. New Water Lines Crossing New and Existing Sanitary Sewers and Force Mains

   a. No protection is required if the sanitary sewer is 10 feet below the water line.
   b. Use the protective requirements given in Table 3.3 and 3.4 for sanitary sewer crossings not 10 feet below the water line.

3. Sanitary Sewer Manholes: Provide a minimum 10 foot horizontal clearance from outside wall of existing or proposed manholes, make manholes and connecting sewers watertight and test for leakage. If a 10 foot clearance cannot be obtained, the water line may be located closer to the manhole when prior approval has been obtained from the Planning Director or his designated appointee by using one of the procedures below; however, in no case shall the clearance be less than 4 feet.

   a. The City of La Porte may require the water line may be encased in a casing when site conditions dictate or when the water line is within 5 feet of a manhole. The carrier pipe shall be a minimum of 1 joint of 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the water conveyance pipe.
   b. The water line may be augured, bore &jacked, or microtunneled past the manhole with at least one 18 foot section of 150 psi pressure pipe installed centered about the existing sanitary manhole with pressure grouting of the annular space using a bentonite/clay mixture or other commercial grouts.

Table 3.3
WATER LINE – SANITARY SEWER CROSSINGS

PRIMARY CONDITION	**PROPOSED WATER EXISTING SANITARY**				**PROPOSED WATER PROPOSED SANITARY OR EXISTING WATER PROPOSED SANITARY**			
SECONDARY CONDITIONS	WATER OVER SANITARY		WATER UNDER SANITARY		WATER OVER SANITARY		WATER UNDER SANITARY	
IF THE CLEARANCE IS	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'
*Protection Requirement	1	2	3	4a or 4b	5	6a	3	6b & 6c

*PROTECTION REQUIREMENTS FOR SANITARY SEWER CROSSINGS
(All clearances shall be measured from outside wall to outside wall)

1. *One 20-foot joint of C-900 or C-905 PVC, 150 psi centered over sanitary sewer; 6-inch minimum clearance.*
2. *If no evidence of sanitary sewer leakage, center one joint of water line over sanitary sewer; 24-inch minimum clearance. If the sewer line is leaking, the sewer line shall be replaced with 150 psi lined ductile iron pipe or other approved pressure pipe with appropriate adapters on all portions of the sanitary sewer within 10 feet of the water line.*
3. *Not allowed.*
4. a. *Auger, bore & jack or microtunnel 10 feet minimum each side of sanitary sewer. Place one 20-foot joint of C-900 or C905, 150 psi, centered under sanitary sewer. Fill bore hole with bentonite/clay mixture or grout; 2 foot minimum clearance.*
   b. *OR replace the existing sanitary sewer with 150 psi lined ductile iron pipe, C-900 or other approved pressure pipe with appropriate adapters on all portions of the sanitary sewer within 10 feet of the water line.*
5. *Minimum 18 foot joint of sanitary sewer, 150 psi lined ductile iron pipe, C-900 or other approved pressure pipe centered at the water line, 6 inch minimum clearance. Also center an 18 foot joint of waterline over the sanitary sewer line. The sanitary sewer line shall be embedded in cement stabilized sand for one pipe segment plus 1 foot beyond each joint.*
6. a. *Center a minimum 18 foot joint of sanitary sewer, 150 psi, lined ductile iron pipe, C-900 or other approved pressure pipe on water line.*
   b. *Use cement stabilized sand backfill for all portions of the sewer within 10 feet of the waterline, as measured perpendicularly from any point on the water pipe to the wastewater pipe (minimum 2.5 sacks cement per cubic yard of sand). The cement-stabilized sand bedding shall start at a point 6 inches below the bottom of the sanitary sewer to 6 inches above the top of the sanitary sewer and one quarter of the pipe diameter on either side of the sewer.*
   c. *Center a minimum 18 foot joint of waterline on the sanitary sewer line.*

Table 3.4
PROTECTION REQUIREMENTS AT
WATER LINE – FORCE MAIN CROSSINGS

PRIMARY CONDITION	**PROPOSED WATER EXISTING FORCE MAIN**				**PROPOSED WATER PROPOSED FORCE MAIN OR EXISTING WATER PROPOSED FORCE MAIN**			
SECONDARY CONDITIONS	WATER OVER FORCE MAIN		WATER UNDER FORCE MAIN		WATER OVER FORCE MAIN		WATER UNDER FORCE MAIN	
IF THE CLEARANCE IS	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'	Less than 2'	Greater than 2' but less than 10'
*Protection Requirement	1	2	3	4a or 4b	5	6a	3	6a & 6b

*PROTECTION REQUIREMENTS FOR FORCE MAIN CROSSINGS
(All clearances shall be measured from outside wall to outside wall)

1. *Construct waterline with a 20-foot ductile iron section with all related appurtenances centered above the force main; 6-inch minimum clearance.*
2. *Construct water line with one 20 foot joint of C-900, C-905 PVC centered above the force main.*
3. *Not allowed.*
4. a. *Auger, bore & jack or microtunnel 10 feet minimum each side of force main. Place one 20-foot joint of C-900 or C905, 150 psi, centered under sanitary sewer. Fill bore hole with bentonite/clay mixture or grout; 2 foot minimum clearance.*
   b. *OR replace the existing force main with 150 psi lined ductile iron pipe with appropriate adapters on all portions of the force main within 10 feet of the water line.*
5. *Center a minimum 18 foot joint of force main, 150 psi lined ductile iron pipe under water line and use cement-stabilized sand backfill for all portions of the sanitary sewer force main with 10 feet of the water line as measured perpendicularly from any point on the water pipe to the sanitary sewer force main pipe (minimum 2.5 sacks cement per cubic yard of sand). The cement-stabilized sand bedding shall be from a point 6 inches below the bottom of the sanitary sewer force main to 6 inches above the top of the sanitary sewer force main and one quarter of the pipe diameter of the sanitary sewer force main on either side of the sanitary sewer force main.*
6. *Minimum 18 foot of sanitary sewer force main, 150 psi lined ductile iron pipe centered at the water line.*

3.03 QUALITY ASSURANCE

A. Prepare calculations and drawings prepared under the supervision of a Texas Professional Engineer trained and licensed under the disciplines required by the nature of the drawings. The final design drawings, must be sealed, signed and dated by the Professional Engineer responsible for development of the drawings.

B. For Elevated Stream and Ditch Crossings: Prepare design calculations for support columns and column spacing.

3.04 EXTRA TERRITORIAL JURISDICTION

The criteria herein described in this chapter shall be applicable to all water main and appurtenance construction and all devices thereunto related within the ETJ of the City of La Porte except where specifically denied or where specific exemptions for the ETJ have been enumerated.