

CITY OF LA MARQUE

CHAPTER 4

SANITARY SEWER DESIGN CRITERIA

CHAPTER 4 – SANITARY SEWER DESIGN

4.1 SANITARY SEWER DESIGN GENERAL

- 4.1.1 Criteria for the design of sanitary sewer service and collection lines are herein established. All sanitary sewer lines constructed within the City of La Marque or its Extraterritorial Jurisdiction (ETJ) shall follow these criteria and be in agreement with the City of La Marque Comprehensive Plan.
- 4.1.2 Design, construction and sizing of all sanitary sewer systems shall meet or exceed the requirements of the Texas Commission of Environmental Quality (TCEQ) as per 30 TAC Chapter 217.
- 4.1.3 The “City of La Marque” for the purposes of these criteria shall consist of all land within the city limits, and land located within the City’s ETJ.
- 4.1.4 Design and construction shall conform to the City of La Marque construction details and construction specifications.
- 4.1.5 This chapter addresses the design of the sanitary sewer systems to be located within the public right-of-way or a dedicated public easement. Sanitary sewers located on private property that are not in a dedicated public easement shall not be considered part of the publicly maintained sanitary sewer system.
- 4.1.6 The approving authority for the City of La Marque with respect to the sanitary sewer system design criteria shall be the City Engineer.

4.2 DEFINITIONS

- 4.2.1 Public Sanitary Sewer - Sewers that are maintained by the City of La Marque and located in dedicated public easements or street rights-of-way, including pre-existing sanitary sewer lines that are serving the public at the time of the adoption of these regulations, and new public sanitary sewers that are installed in accordance with these standards.
- 4.2.2 Private Sewer – Sewers that are constructed and maintained by a private entity. Private sewers shall be located on private property. Private sewers are subject to the design and construction requirements of the Plumbing Code.
- 4.2.3 Sanitary Sewer Main – A sewer which receives the flow from one or more lateral sewers.
- 4.2.4 Lateral Sewer – A sewer running laterally down a street, alley or easement which receives flow from abutting property.
- 4.2.5 Service Lead – A sewer which branches off of a public sewer and extends to the

limits of the public right-of-way. It shall be construed as having reference to a public sewer branching off from a main or lateral sewer to serve one or more houses, single family lots, or other types of small land tracts situated in the same block, but not directly adjacent to the main or lateral sewer. A service lead shall never exceed 100 feet in perpendicular length from the intersecting sewer main or lateral. If the sewer is designed to serve more than two houses, or the equivalent of two single family residences along a street, a lateral sewer as defined above shall be constructed.

- 4.2.6 Stack - A riser pipe constructed on main or lateral sewers which are deeper than 6 feet to facilitate construction of service leads or service connections.
- 4.2.7 Force Main - A pressure-rated conduit (i.e. ductile iron pipe, pressure-rated PVC, etc.) which conveys wastewater from a pump station to a discharge point.

4.3 DESIGN REQUIREMENTS

- 4.3.1 Easements: Sanitary Sewer Easements – the following minimum easements are required when facilities are not located within public street rights-of-way:
 - A. The width of all exclusive sanitary sewer easements shall be equal to the depth of the sewer from finished grade plus two (2) pipe diameters, rounded up to the nearest multiple of 5-feet. Sewer shall be located in the center of the easement. The minimum width of a sanitary easement shall be twenty (20') when not adjacent to public street rights-of-way.
 - B. Exclusive sanitary sewer easement adjoining a public right-of-way shall be a minimum of ten feet (10').
 - C. Exclusive easements for force mains of all sizes shall have a minimum width easement of fifteen feet (15') for a single force main where the force main is not located adjacent to a public right-of-way. Where the force main is located in an easement adjacent to public rights-of-way, the force main may be located at the center of a ten-foot (10') easement. Where the force main is located less than five feet (5') from the right-of-way line within the public right-of-way, the minimum easement width shall be ten feet (10') adjacent to the right-of-way.
 - D. Combined storm and sanitary sewer easements shall have minimum widths as required in Section 5.3.1 for storm sewer easements. Additionally, the sanitary sewer main, trunk or force main shall be located such that the centerline of the pipe shall be located in at least half the width of the easement, as defined in Section 5.3.1.C, but not less than seven and one-half feet (7.5'), from the edge of the easement.
 - E. For combined storm and sanitary sewer easements located adjacent to public rights-of-way where the sanitary sewer is located along the outside of the

easement, the centerline of the sanitary sewer pipe shall be located in at least half the width of the easement defined in Section 5.3.1.C, but not less than seven and one-half feet (7.5') from the outside edge of the easement.

- F. Where sanitary sewers or force mains are installed in easements separated from public rights-of-way by other private or utility company easements, the sanitary sewer easement should be extended along or across the private utility company easement to provide access for maintenance of the sewer or force main.

4.3.2 Drawings to be Furnished

- A. Before any sanitary sewer main or lateral sewer is constructed and before the City will approve any proposed sanitary sewer for construction, plan-and-profile sheets of the proposed sanitary sewer shall be prepared and submitted to the City for approval.
- B. These drawings shall become the property of the City of La Marque.
- C. Drawings shall include at a minimum layout sheets with contours, plan-and-profile sheets, and details sheets for special items.
- D. The construction drawings shall show at a minimum the exact location of the proposed sanitary sewer in the right-of-way, alley, or public easement with respect to the edge of the particular right-of-way, survey base line, any nearby utilities, 100-year floodplain elevation within the project area, major landscaping, and other structures (above ground and below ground) within the construction site.

4.3.3 Sanitary Sewer Mains and Lateral Sewers

- A. Sanitary sewers shall be identified by number, letter, or other identification as shown on the sanitary sewer layout sheet and manholes shall be identified by letter or number.
- B. Sanitary sewers must be shown in both plan and profile views.
- C. The profile shall show other underground and surface utilities and facilities, both in parallel and at crossings; the size, grade, and type of pipe of the proposed line, the elevations of the proposed line to the hundredths of a foot at manholes, changes of grade and clean outs where allowed; and the proposed finished grade over the sewer with elevations. Where proposed fill or cut is contemplated, the proposed new natural ground line should be shown as a separate line from the pre-existing natural ground line. Type of pipe, bedding and backfill shall comply with City of La Marque standard specifications and standard details, or if not available, shall comply with the City of Houston standard specifications and standard details.

- D. The construction drawings shall show the existing natural ground line at either the right-of-way or edge of easement when the proposed sanitary sewer is to be placed:
 - a. Between the existing pavement and the right-of-way line.
 - b. Between existing pavement and an existing or proposed easement.
- E. When a sanitary sewer is located under existing pavement, then the finished elevations of the pavement shall be shown on the construction drawings.

4.3.4 Plan and Profile Required for Sewer Mains

- A. Sanitary sewer overall layout sheets for single family residential subdivisions should use a standard engineering scale large enough to show the entire project on preferably one, but no more than two, standard 24"x36" sheets. In all cases, the following information must be shown on the layout.
 - a. All easements containing or buffering sanitary sewers, including corresponding recording information, if recorded by separate instrument.
 - b. Sanitary sewer sizes are shown at points of size change and between all manholes.
 - c. All manhole locations.
 - d. The sanitary sewer alignment shall accurately reflect in the plan and profile sheets the location of the sanitary sewer as shown on the detailed plan view. Alignment shall be stationed with 100-ft. stations.
 - e. Service leads that cross street pavement or serve adjacent property are to be shown on the overall layout.
 - f. The number, size, and layout of the lots depicted on both the overall sanitary sewer layout sheet and the individual plan-and-profile sheets shall match the number and size of the lots depicted on the final plat after recordation.
 - g. The direction of flow for existing and proposed sanitary sewers shall be shown on the overall sanitary sewer layout sheet.
 - h. The location of the proposed sanitary sewer within either the public right-of-way or a dedicated public easement.
 - i. The overall sanitary sewer layout sheet shall show the area, in acres or in number of lots plus any acreage outside the project area, which

the proposed sewer is designed to serve. Include a vicinity map which references the project or lots to nearby major thoroughfares.

- B. Commercial sanitary sewer layouts shall follow the same overall layout sheet format.
- C. Horizontal and vertical scales for the detailed plan-and-profile views shall be confined to standard engineering scales.
- D. The plan view shall show, at a minimum, all of the following information for the project area:
 - a. Topographical features.
 - b. Stationing for the proposed sewers.
 - c. All existing utilities including gas, power, telephone, fiber optic, cable , etc.
 - d. Any significant landscaping or other structures which might impact construction or construction-related activities.
 - e. The width and type of existing and/or proposed easements.
 - f. Proposed service leads.
 - g. The limits of any proposed bore and jack, microtunnel, or auger operations.
 - h. Locations where pressure pipe is to be installed for water line crossings.
 - i. The proposed sanitary sewer with pipe diameter, length, material type, and grade clearly labeled.
- E. The profile view shall show, at a minimum, all of the following information for the project area:
 - a. Underground and surface utilities/facilities which are either parallel to the proposed sanitary sewer or cross the proposed sanitary sewer within the construction site.
 - b. The proposed sanitary sewer's diameter, grade, length, and material type for each section between manholes. This shall be labeled on every applicable page and identified as "proposed."
 - c. The flowline elevation and centerline station for every sanitary sewer at every manhole.

- d. The top of rim elevation of affected existing and proposed manholes.
 - e. The flowline elevation and centerline station at each sheet break.
 - f. The type of pipe bedding and backfill shall comply with City of La Marque standard specifications and standard details where applicable.
 - g. The finished grade for proposed and existing pavement. Where cut and fill are proposed, the proposed new natural ground line should be shown as a separate line from the existing natural ground line.
 - h. The existing natural ground line at the centerline of the sanitary sewer when a sewer is to be placed between the edge of pavement and the public right-of-way. In the cases where roadside ditches exist, the centerline elevations of the roadside ditch shall be shown.
 - i. The existing ground line at the centerline of the proposed sanitary sewer where a sanitary sewer is to be placed within an existing easement. Show any proposed cut and fill as described above.
 - j. The limits of any proposed bore and jack, microtunnel, or auger operations.
 - k. Locations and limits of where pressure pipe is to be installed for water line crossings.
 - l. The location of special backfill and any proposed stacks shall be identified by stations indicated on the design plans.
 - m. Avoid vertical breaks in profiles. Use alternate scale for all profile sheets if all of proposed sanitary sewer cannot be shown on any one profile section for the station run indicated in plan view for that sheet.
- F. All construction drawings for new sanitary sewers shall show the proposed location, by stations and offsets, of all service leads, and service connection risers.

4.3.5 Service Lead Construction for Residential and Commercial Developments

- A. Space the location of service leads so as to limit the number of service lead taps to the lateral sewer or sewer main. Service leads should be spaced at every other property line between two adjoining residential lots unless there is an odd number of lots. The City reserves the right to direct the engineer to relocate any proposed service lead upon reviewing any submitted plans. A single 6-inch service lead located at the property line between two adjoining residential lots would serve two single-family residences with a wye placed at

the end of the service lead. The wyes shall be located at the private property line.

- a. Near side double sewer service leads shall not exceed 5 feet in length, shall terminate at the property line, and shall be located within the public right-of-way or public easement.
 - b. In cases where the sanitary trunk main is further than 5 feet from edge of the right-of-way, a single 6-inch service shall be run from the sewer main to the edge of the right-of-way whereupon a wye shall be placed as described above. This shall apply to residential sanitary service leads and not to commercial service taps.
- B. Any far side service lead of more than 150 feet perpendicular to the street right-of-way shall be treated as a lateral sewer.
- C. Service leads for single-family developments should connect to the manhole whenever practical. Commercial or industrial service leads expected to discharge more than 5000 gallons-per-day shall discharge directly into a proposed or existing sanitary sewer manhole. Where the flowline of the service lead is 30 inches or greater above the flow line of the manhole, provide a standard drop manhole.
- a. Service leads shall be provided to serve each lot or parcel within a proposed residential, commercial or industrial development. The detail for a typical near-side and far-side service leads shall be included with the construction drawings.
 - b. Service leads shall be a minimum of 6 inches in diameter where two or more lots or parcels are served. If the perpendicular length of a service lead exceeds 100 feet, it shall be considered a lateral sewer, the minimum diameter shall be 8 inches, it shall end in a manhole, and a manhole shall be utilized for connection to the public sewer.
 - c. In such cases where a service lead is proposed to run diagonally across the street, prior approval from the City Engineer must be obtained.
 - d. Service leads with a diameter of 6 inches shall utilize full body fittings be they extruded or factory-fabricated for connection to a proposed public sewer or an approved saddle-type connector for connection to an existing public sewer.
 - e. PVC saddle-type connectors with gasket and stainless steel straps shall be installed with the stub oriented 45 degrees from the springline. Tees may be oriented the in the same manner.
 - f. The service lead shall be placed so as to minimize the use of bends as

site conditions permit.

- g. For existing residential lots (which are not served in accordance with these guidelines) that need a service lead, if the distance to the nearest existing sanitary sewer is less than 60 feet, the service lead shall be a 6 inch service tap if only one lot or parcel is to be served. Commercial and industrial lots and parcels shall have a minimum 6 inch service tap under the same conditions.
- h. The location where the service lead or wye meets the property line shall be shown on the plans and as-builts, and marked in the field as shown on the standard details. There shall be a riser placed where the service lead meets the property line so that the service lead stub-out can be recovered at the time that the connection to the service lead is made.
- i. All service leads shall be installed at the time of the construction of the sanitary sewer in new residential subdivisions.

4.3.6 General Requirements

- A. A licensed plumber shall be responsible for connecting private residential sanitary sewer service to the public sanitary sewer system, to wyes and/or tees or to lateral sewers as indicated on the plans. Said licensed plumber shall be responsible for a properly installed and watertight private residential service connection.
- B. Commercial service connections to the public sanitary sewer shall be made at manholes.
- C. Materials and construction shall conform to the City of La Marque Standard Specifications and Standard Details where applicable.
- D. All constructed sanitary sewer lines shall be air tested for leaks and a mandrel pulled for structural defects. All sanitary sewer testing shall comply with or exceed the procedures and qualifications listed in Texas Administrative Code, Chapter 217.57. Manhole testing shall comply with or exceed the procedures and qualifications listed in Texas Administrative Code, Chapter 217.58.
- E. All public sanitary sewers and service leads shall have bedding and backfill that shall comply with or exceed City of La Marque Standard Specifications and Details. Those sanitary sewers that are bore and jacked, microtunneled, augured, or encased in a steel pipe may require special bedding and backfill.
- F. Backfill shall be in accordance with Standard Details.

- G. Public sanitary sewers and force mains shall be located in either the public right-of-way or public easements. Side lot and back lot easements are not allowed. The location of the sanitary sewer within a dedicated public easement shall be along the centerline of the proposed public easement or as close to the centerline as can be designed. In those instances where the public easement is adjacent to the public right-of-way, the lateral location of the sanitary sewer shall be at the discretion of the Design Engineer with City approval.
- H. The drawings of the sanitary sewer shall show the location of any existing pipe or duct that might interfere with the construction of the sanitary sewer and call to the attention of the City any known obstacles that might be encountered in constructing the sanitary sewer in any location under consideration. The Professional Engineer of Record shall determine the existence of pipes, ducts, obstacles and other utilities (i.e. gas, telephone, electric, fiber optic, cable, etc.) from a visual survey on the ground plus research of the public records and private records when available.
- I. Sanitary sewers within the City of La Marque's jurisdiction shall be designed and installed at such a size and depth as to allow for orderly expansion of the system, so as to avoid duplication in the future.
- J. Sanitary sewers shall be separated from water lines by a minimum of 9 feet of horizontal clearance. See Chapter 3 Water System Design for water and sanitary sewer crossing design criteria.
- K. Sanitary sewers shall be separated from storm sewer lines by a minimum of 4 feet of horizontal clearance and the storm sewer line shall be above the sanitary line where possible.
- L. For sanitary sewers crossing utilities other than water or storm sewer (i.e. gas, telephone, electric, fiber optic, cable, etc.) a minimum of 12 inches of horizontal clearance shall be maintained as measured from outside wall to outside wall.

4.3.7 Line Size

- A. The minimum pipe diameter for a public sanitary sewer main or lateral sewer other than a service lead shall be 8 inches.
- B. Service leads 6 inches in diameter shall not serve more than the equivalent of 2 single family lots or other equivalent types of small land tracts. Four inch service leads are not allowed.
- C. Service leads for single family residential lots shall have a recommended grade of 0.70% and a minimum grade of 0.50% for a 6 inch line.

- D. For commercial service leads such as street bores, the required size of the line shall be established from the plumbing drawings. Commercial, industrial, and office areas shall be designed for an average daily flow that can be anticipated from the contributing service area.
- E. Commercial sewer service leads shall be 6 inch pipe or larger. A single 6 inch commercial service connection shall not serve more than one commercial lot or parcel. Four inch service leads for commercial developments are not allowed.
- F. Sewer mains and lateral sewers shall meet at a manhole. Sewer mains and lateral sewers shall end in a manhole.
- G. The City Engineer shall have final review and approval authority as to the size and depths required for sanitary sewer mains and lateral sewers.

4.3.8 Line Depth

- A. The sanitary sewer should be laid with the top of the pipe a minimum of 4 feet below the surface of the natural ground or finished grade.
- B. Sanitary sewers laid in street rights-of-way with a curb and gutter section shall have a minimum cover of 4 feet from the top of the pipe to the flowline elevation of the gutter in the street at all locations. The Professional Engineer of Record shall account for any anticipated future sanitary sewer extension whereas the future sanitary sewer extension shall have a minimum 4 feet of cover from the top of the pipe to the flowline of the gutter of the street. The Professional Engineer of Record shall adjust the depth of the proposed pipe accordingly. The City of La Marque reserves the right to require greater depth where the need is perceived by the City.
- C. Sanitary sewers laid in street rights-of-way with crowned roads and roadside ditches shall have a minimum depth of 5 feet from the crown of the road to the top of the pipe and an absolute minimum cover of 4 feet below the flowline of a roadside ditch when non-rigid pipes of low hoop strength are used. The City of La Marque shall have final determination on any deviation from these criteria.
- D. Where the cover over the pipe is less than 4 feet, the sanitary sewer shall be laid with Class 150 pressure pipe, steel pipe or ductile iron pipe. Class 150 pressure pipe must be backfill with cement stabilized sand in accordance with the Standard Details. Ductile iron pipe may be used but shall be lined with either a polyethylene or polyurethane coating with manufacturer recommendation and applied by the pipe manufacturer. The minimum liner thickness shall be 40 mil. Other rigid pipe or pressure pipe will be considered for approval on a case-by-case basis.

- E. Maximum depth for 8-12 inch diameter collection lines shall be 20 feet from average ground surface to sanitary sewer invert. Depths greater than 20 feet shall require the use of Class 150 pressure pipe with backfill in accordance with the Standard Details. Ductile iron pipe may be used but shall be lined with either a polyethylene or polyurethane coating with manufacturer recommendation and applied by the pipe manufacturer. The minimum liner thickness shall be 40 mil.

4.3.9 Line Grades

- A. The following table lists the minimum grade for 6-inch to 27-inch diameter public sanitary sewers. The recommended velocity for a sanitary sewer flowing full shall be 2.3 feet per second (fps). The minimum velocity for a sanitary sewer flowing full shall be 2.0 feet per second (fps). The maximum recommended grade shall be calculated by the Professional Engineer of Record for a maximum velocity of 4.5 fps based on a Manning equation for full flow with the Manning’s “n” equal to 0.013.

PIPE SIZE (I.D., In.)	MINIMUM GRADE (PERCENT)
6	0.70
8	0.44
10	0.33
12	0.26
15	0.19
18	0.15
21	0.13
24	0.11
27	0.087

- B. For sewers larger than 27 inches in diameter, the Professional Engineer of Record shall determine the appropriate grade utilizing Manning’s Formula, using a minimum full pipe velocity of 2.fps.

4.3.10 Gravity sanitary sewers shall be laid in straight alignment with uniform grade between manholes. Non-uniform grade change without the use of manholes at the grade change is not allowed.

4.3.11 Manholes

- A. Type: Manholes shall be precast concrete manholes in accordance with the standard detail. Some sewer configurations may require the use of Corrosion Resistant Manholes with specific approval by the City. It shall be the responsibility of the Professional Engineer of Record to ensure that the precast manholes conform to the latest ASTM requirements. Manhole covers

shall have the City of La Marque logo on them. All manholes shall be installed with stainless steel or polyethylene manhole inserts with 1/8 inch vents and strap handles.

B. Location: Manholes shall be placed at changes in alignment, changes in grade, changes in size of sanitary sewers, at the intersection of sanitary sewers, junction points, and either at street, alley, or easement intersections.

a. The maximum distance between manholes shall be determined from the following table for 8 inch to 48 inch pipe diameters. Spacing for manholes on sewer mains with diameters larger than 48 inches shall be recommended on an individual basis by the Professional Engineer of Record subject to City of La Marque approval.

PIPE DIAMETER IN INCHES	MANHOLE MAXIMUM SPACING IN FEET
8-15	400
18-48	800
>48	Per PE of Record, subject to City of La Marque Approval

b. Place manholes at the dead-end of sewer mains and lateral sewers.

c. Manhole covers shall be cast iron, traffic bearing type ring and cover.

d. Criteria for Manhole Junctionures

- (1) Connections between public sanitary sewers and the manhole shall adhere to the following criteria.
 - (a) The elevation of the crown of the discharging sanitary sewer shall match the elevation of the crown of the receiving sanitary sewer for both equal and unequal pipe diameters.
 - (b) Drop manholes are allowed. A drop connection or drop manhole is required when the difference in elevation between the effluent flowline and the influent flowline is greater than 30 inches.

4.3.12 Manholes should be located as to minimize or eliminate the inflow of stormwater into the sanitary sewer. The top of manhole rim shall be set a minimum of 3 inches above the surrounding finished grade when the manhole is not in a paved roadway. Sealed manholes are required on all newly constructed manholes within the 100-year flood plain. Under no circumstances shall the elevation of the top of rim of a sanitary sewer manhole be below the 100-year base flood elevation for the area in

which it is built.

4.3.13 Manholes shall be constructed in accordance with the Standard Details where applicable. All manholes shall include rubber seals precast into the manhole for pipe inserts (no cement or grout). Precast manholes shall incorporate a boot-type connector for sanitary sewer diameters up to 24 inches. For sanitary sewer diameters greater than 24 inches, utilize either the boot-type connector (if available) or an integral gasket.

4.3.14 Steps in manholes are not allowed.

4.3.15 All manhole adjustments shall be made with precast concrete rings when an additional precast vertical section is too large. No brick manholes are allowed.

4.3.16 All manholes shall be tested by the construction contractor and results provided to the City of La Marque before being accepted by the city for maintenance. The City of La Marque reserves the right to require retesting of manholes if there is reason to question the results. All manhole testing shall comply with or exceed the procedures and qualifications listed in Texas Administrative Code, Chapter 217.58.

4.3.17 Lift Stations

- A. Lift station design and construction drawings as well as design requirements and pertinent data shall be sealed by a Professional Engineer registered in the State of Texas and submitted with the construction drawings for review by the City. Lift stations shall comply with Texas Administrative Code, Chapter 217.59-217.63.
- B. Lift Stations should be considered only when a gravity system cannot be achieved from both an engineering and an economic standpoint. Lift stations should only be considered with prior approval from the City of La Marque or where the lift station is designed to be temporary in nature.
- C. Operation and maintenance should be considered in the design of the lift station and the location of the lift station.
- D. Wet Wells
 - a. Provide adequate clearance between pumps so as to easily facilitate retrieval of a pump (refer to manufacturer's recommendations). A minimum of 2 feet of clearance shall be provided between pumps and walls.
 - b. Wet well working volume shall be sized to allow for the following minimum pump cycle times:

Pump Horsepower (largest pump)	Minimum Cycle Time (minutes)
Less than 50	6
50-100	10
Over 100	15

- c. Tie reinforcing steel in lift station base to walls to provide watertight wet well (includes caisson construction).
- d. The below grade wet well and valve vaults are subject to buoyant forces. Include buoyancy calculations to ensure that the structure weight (include walls and slab only) will be sufficient to offset these forces.

E. Lift Station Site

- a. Site shall have a minimum size of 50 feet by 50 feet.
- b. Site access shall be provided by a minimum 15-foot wide public right-of-way or permanent access easement.
- c. Provide a 14-foot wide asphalt or concrete vehicular access road to the site. Drive shall terminate adjacent to the station with a parking space such that a truck mounted hoist can remove pumps. Lift Station located within or adjacent to a residential subdivision shall be required to have a concrete driveway.
- d. Wet well or dry well structures shall be a minimum of 12 feet from outside walls of structure to site boundary fencing.
- e. Indicate method of drainage of site on site plan. Internal drainage, sheet flow, and valley gutter driveways are acceptable. Drain to street or storm sewer, never onto adjacent private property.

F. Site Security

- a. Lift station shall be enclosed in a building or fenced in such a way to deter unauthorized operation, vandalism, or terrorism.
- b. Fence shall be constructed of masonry, CCA cedar, or heart redwood, with steel posts set in concrete. Fence shall be at minimum 8 feet high.
- c. Fence shall be located completely inside the site boundary.

- G. The design of the lift station, including all electrical and mechanical equipment, must be designed to withstand and operate during a 100-year

flood event. The lift station's control panel shall be located a minimum of 2 feet above the nearest base flood elevation. The top of concrete of the lift station's wet well shall be a minimum of 2 feet above the nearest base flood elevation.

- H. Pumps shall be sized to operate at optimum efficiency. Minimum acceptable efficiency at the operating point shall be 60%. Include pump and system head curves and pump information summary chart on plans.
- I. A peak factor of 4 shall be used for Lift Station design.
- J. Low water level shall be at least 6 inches above impeller, higher if required by manufacturer. Complete immersion of submersible pump motor at low water level is preferred.
- K. Vent pipe shall be 8 inches minimum diameter and shall be equipped with odor control system.
- L. Nuts, bolts, chains, and all other metal components within wet well shall be stainless steel, not carbon steel.
- M. Dual stainless steel guide rails (or other pump removal method that avoids entering wet well) are required for submersible pumps.
- N. Bedding for PVC force main is bank sand, a minimum of 6 inches on all sides of pipe.
- O. PVC force mains shall be Pressure Class 150 or DIP bedded in bank sand and polyethylene wrapped.
- P. The velocity in the force main and riser pipes shall be less than 8 fps and greater than 2 fps.
- Q. Backfill structural excavations (wet well, etc.) with cement stabilized sand.
- R. Lift station site plans shall be submitted in scales of 1 inch = 5 feet or 1 inch = 10 feet.
- S. Provide a protective coating to interior walls of wet well. The City Engineer shall approve coating or additive used.
- T. Lift station shall be equipped with a telephone dialer and a red alarm light, approved by City. A float or transducer system shall be installed and shall be connected to telemetry system to monitor the status of the lift station.
- U. Power supply to lift station shall be 3 phase and 480 volts where possible.

- V. A system of floats or approved transducer system shall be provided to control pumps.
- W. A tee, plug valve, and blind flange assembly are required on the force main on the downstream side of the discharge valves and header. This is required so truck-mounted pumps can bypass the lift station pumps and piping while emergency repair or maintenance work is being done.
- X. Lift station must be equipped with a tested quick-connect mechanism or a transfer switch properly sized to connect to an on-site generator.
- Y. All lift station shall be required to have on-Site Generators. Generators must be sized to operate the lift station at its firm pumping capacity or at the average daily flow, if the peak flow can be stored in the collection system.

4.3.18 Design Analysis

- A. Calculations of design flows for the overall development or project shall be approved by the City of La Marque.

4.4 QUALITY ASSURANCE

4.4.1 Prepare calculations and construction drawings under the supervision of a Professional Engineer trained and licensed under the disciplines required by the drawing. The final construction drawings must be sealed, signed, and dated by the Professional Engineer responsible for the development of the drawings. If more than one Professional Engineer was responsible for the development of the design/construction drawings, then the appropriate Professional Engineer should seal the drawings he is responsible for.

4.5 UNSEWERED BUILDING SITES AND SEPTIC TANKS

4.5.1 It is the responsibility of the land owner to contact the City to determine if a site has sanitary sewer service available.

4.5.2 If a lot or parcel is within 500 feet of an existing sanitary sewer then the site shall tie-on to the existing sanitary sewer. The owner/developer must pay for all materials, installation, and testing before the city will accept the sewer for maintenance.

4.5.3 Building sites proposing On-Site Sewage Facilities (OSSF) (i.e. septic tanks) shall obtain approval and applicable permits from the Galveston County Department of Environmental Health. A copy of the permit shall be provided to the City of La Marque prior to OSSF installation.