WEST POINT CROSSING – SANITARY SEWER LIFT STATION

DESIGN MEMORANDUM

REVISED JULY 2020

PREPARED BY:

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EXECUTIVE SUMMARY

The following is the Executive Summary for the plan submission for the West Point Crossing Sanitary Sewer Improvements. This project involves the installation of one sanitary sewer duplex lift station, gravity sanitary sewer, and 10” force main.

There is a proposed development located at the west corner of West Point Road and North Padre Island Drive intersection. Currently there is no gravity sanitary sewer in this area. There is a 6” diameter sanitary sewer force main adjacent to the proposed development. The 6” force main was installed in 2016 and runs between the existing FM 665 Lift Station on Old Brownsville Road and a gravity sanitary sewer manhole located near the intersection Bush Street and Hendricks Street. As part of the proposed improvements, the proposed West Point Lift Station will intercept the existing 6” force main. A short gap will be cut into the existing 6” force main at the proposed lift station site. At the upstream end of the force main gap, a new 5’ diameter site manhole will be installed to direct the existing 6” force main flow to the proposed West Point Lift Station. The proposed West Point Lift Station discharge piping will connect to the downstream end of the 6” force main gap.

The existing 6” force main runs between the existing FM 665 Lift Station on Old Brownsville Road (FM 665) and a discharge point at a manhole at the intersection of Hendricks Street and Bush Street, please see attached Master Plan exhibit. The proposed West Point Lift Station will be installed at a location on West Point Road approximately 750 feet to the west of the South Padre Island Drive and West Point Road Intersection. The proposed West Point Lift Station will pump in series with the existing FM 665 Lift Station. The proposed West Point Lift Station will have an interim phase and a future phase. The design flow for the interim phase is approximately one half of the future flow. The design flow for the interim phase is 674 gpm and the design flow for the future phase is 1,348 gpm. The interim flow of 674 gpm will maximize the use of the existing 6” force main. Any flow greater than 674 gpm will produce too high of velocities.

The proposed lift station will have a 10” diameter discharge header piping and will pump into the existing 6” diameter force main. Before the West Point Lift Station is upgraded with the future pumps, the future 8” diameter force main will need to be constructed. The future 8” force main will be installed in a 10 foot wide utility easement along West Point

Road, North Padre Island Drive, and Bush Street and will parallel the alignment of the existing 6” force main that is currently in service. Design of the force main will follow criteria established by TCEQ in TAC 30 Chapter 217. Material for the force main line will be PVC (Green, C-900, DR 25, pressure class 165 psi). Pipe embedment and trench backfill will conform to applicable City of Corpus Christi standards.

The lift station structure and discharge piping will be built for the future flow. The proposed West Point Lift Station will be a duplex and have a 10’ diameter x 25’ deep fiberglass wet well. Future development in this area will dictate when the lift station will need to be upgraded to be able to handle the future flow. Please see Exhibit A for the proposed services areas. Design of the proposed lift station will follow criteria established by TCEQ in TAC 30 Chapter 217 and will conform to the City of Corpus Christi standards for lift station construction. A basis of design including size, capacity and pumps is included in Section IV of this Design Memorandum.

The proposed project would include approximately 50 linear feet of 8” diameter gravity sanitary sewer to be built at master plan depths (Un-adopted City of Corpus Christi Wastewater Collection Master Plan, Greenwood WWTP Service Area, Area 5). The proposed gravity sanitary sewer will start with an upstream point near the proposed development near the West Point Road and South Padre Island Drive intersection and will extend from that point west where it will tie into the proposed West Point Lift Station.

Section I - INTRODUCTION

A. PURPOSE

The purpose of this project is to construct sanitary sewer infrastructure improvements for a proposed development. The proposed sanitary sewer infrastructure includes gravity sanitary sewer line, a lift station, and a future 8” force main.

There is a proposed development for a tract of land at the west corner of the South Padre Island Drive and West Point Road intersection. Currently there are no gravity sanitary sewer lines in this area. There are existing gravity lines on the north side of South Padre Island Drive, but there are no existing gravity sanitary sewer infrastructure on the south side of South Padre Island Drive in this area. There is an existing 6” diameter sanitary sewer force main on the north side of West Point Road.

There currently is an unadopted wastewater collection plan for this area. As part of the collection plan there is a proposed lift station and force main. As part of the proposed improvements, a segment of the permanent gravity sanitary sewer will be constructed. The downstream end of the proposed segment will discharge into the proposed sanitary sewer lift station.

The proposed improvements as part of this project will provide sanitary sewer service to not only the proposed development at the South Padre Island Drive and West Point Road intersection but will also serve future developments along West Point Road and South Padre Island within the service area of the new lift station (see attached Exhibit A for service area boundary map).

Section II - PROPOSED IMPROVEMENTS

A. GRAVITY SANITARY SEWER

1. 10" and 8" diameter PVC

All proposed PVC gravity lines will be installed at master plan depths.

2. Manholes

Manholes for this project will be spaced at a maximum of 500' apart per TCEQ Chapter 217 requirements. The upstream manholes less than 14' deep will be 4' diameter. The downstream manholes 14' and deeper will be 5' in diameter. Manhole wall thickness and construction will conform to City of Corpus Standard Details and Specifications.

B. LIFT STATION

1. Pumps and Accessories

The proposed lift station is a duplex lift station, two pumps will be installed, with one pump handling the design flow and the other pump acting as a backup pump. The lift station will initially have 60 horsepower interim pumps. When flows increase and the interim pumps near capacity, there are two options. The interim pump and the future pump use the same motor and volute but have different impellers. The volute is the lower portion of the pump that covers the impeller. The impeller is the internal rotating part of the pump that forces the waste water into the discharge piping. The first option is, if the overall condition of the pump is good, only the impeller would need to be replaced. The second option is, if the overall condition of the pump is poor and is need of replacement, the entire pump would be replaced and new pumps with the higher capacity impeller would need to be installed.

2. Wet Well

The proposed wet well will be 10' in diameter and approximately 25' deep and will be made of fiberglass.

3. Lift Station Discharge Piping and Valves (above ground)

For ease of maintenance, the proposed lift station valves will be installed above ground. All above ground discharge piping will be constructed with ductile iron pipe, fittings, and valves.

4. Wet Well Ventilation

The proposed lift station will have passive ventilation per TCEQ Chapter 217 Regulations. The passive ventilation will consist of a 6" PVC pipe with a stainless steel bird screen.

5. Flow Meter

The proposed lift station will include a flow meter to measure flow through the discharge piping. The flow meter will be installed in a fiberglass manhole adjacent to the lift station wet well downstream of the above ground discharge piping.

6. Odor Control

Due the semi-rural location of the proposed lift station, no odor control systems will be installed at the lift station site.

7. Miscellaneous Site Improvements

The proposed lift station will have a 6' tall wood picket fence with three strands of barbed wire. There will be a 3' wide personnel gate and a 12' wide main gate to allow for vehicular entry. The lift station will include a 12' wide concrete driveway that will be installed between the West Point Road edge of pavement and the top slab of the lift station wet well.

C. FORCE MAIN

1. Force Main Piping

The future 8" diameter sanitary sewer force main will be constructed of PVC (green, C-900, DR 25, pressure class 165 psi). The proposed force main will be installed with a minimum of 2'-6" of ground cover.

2. Line Valves

Live valves for isolation of the force main will be installed at maximum 2,000' intervals.

Section III - GRAVITY PIPE AND FORCE MAIN ALIGNMENT

A topographic survey will be performed to identify existing conditions, utilities and other possible obstructions.

A. LOCATIONS AND ALIGNMENT FOR PROPOSED SEWER LINES

The proposed gravity sewer line and the future 8" force main will be installed in utility easements outside of the existing street right of ways. The proposed gravity sanitary sewer will be installed within a 20' proposed utility easement outside of the West Point Road right of way. The future 8" force main will be installed within an existing 10' wide utility easement outside of the right of ways of West Point Road, North Padre Island Drive, and Bush Street. A segment of the future 8" force main will cross the West Point Road right of way (near South Padre Island Drive) in order to switch sides of the street. Also, approximately 115' feet of the future 8" force main will be installed in the Bush Street/Hendricks Street right of way in order to tie to an existing manhole on the existing gravity sewer system near the Bush Street and Hendricks Street intersection.

B. CROSSINGS

The future 8" force main will cross existing City gas lines.

1. Utilities

a. Electrical:

There are overhead electrical lines at various locations along the proposed force main route. To the best of our knowledge, all electrical lines are above ground and will not interfere with the installation of the proposed force main.

b. Telephone and Fiberoptics:

It does not appear that there will be any crossing of telephone or fiberoptic lines.

c. Water:

A preliminary investigation indicates that there will not be any crossing of existing water lines.

d. Sewer (Wastewater):

A preliminary investigation indicates that there will not be any crossing of existing sewer lines.

e. Gas Utility:

A preliminary investigation indicates that there will one crossing of an existing City gas line.

f. Petroleum and Other Petrochemical Lines:

A preliminary investigation indicates that there will not be any crossing of existing petroleum or petrochemical lines.

Section IV – LIFT STATION DESIGN CRITERIA

A. SERVICE AREA AND SITE SELECTION

The proposed West Point Lift Station is designed to serve approximately 483.3 acres of land with various uses and build out rates that include low density residential, light industrial, and commercial development. See Exhibit A for a map of the area that the proposed West Point Lift Station will serve.

As shown in Exhibit A, the existing FM 665 Lift Station will pump to the proposed West Point Lift Station.

The proposed West Point Lift Station will be located approximately 750 feet to the west of the West Point Road and South Padre Island Drive intersection on the north side of West Point Road. The lift station will be located in an easement outside of the street right of way.

B. DESIGN FLOW

The design flow for the proposed temporary lift station was calculated by determining the land use for the various parcels of land within the lift station service area per the Waste Water Collection System Master Plan, applying the master plan flow rate per land use type and then totaling the flows. A peaking factor of 4 was used and 400 gallons/day/acre was used for infiltration.

C. LIFT STATION DESIGN

The lift station will be designed using the criteria set forth in Chapter 217 of TAC 30. The primary design consideration for lift stations is given to wet well volumes. The wet well will be constructed of fiberglass and will be 10’ diameter by approximately 25’ deep.

The wet well volume required was calculated using the following formula:

$$V = (T * Q) / (4 * 7.48)$$

where T is the pump cycle time in minutes and Q is the peak flow in gallons per minute. This formula is used to calculate wet well volumes when the pump capacity is equal to the peak flow. Using a pump cycle time of 10 minutes (or 6

pump starts per hour) and a peak flow of 1,348 gpm, the wet well volume required is 450.53 cubic feet (or 5.74 vertical feet inside of the 10 foot diameter wet well).

The lift station will be designed using Flygt (Xylem) submersible centrifugal pumps. The pump motors would be 3-phase, 460V, 60 Hz.

The future force main will be 8” diameter green PVC, DR-25, pressure class 165 psi, and will be approximately 2,900 feet in length.

D. STORAGE CAPACITY

According to TAC 30 Chapter 217, storage capacity must be provided for 20 minutes of peak flow in the event of a power outage to prevent the release of untreated wastewater. This storage can be provided in the wet well volume and influent gravity line collection system.

Section V - BASIS OF DESIGN

The proposed West Point Lift Station is designed for an interim phase and a future phase. The interim phase lift station will handle flows contributed from the existing FM 665 Lift Station, the proposed development at the corner of West Point Road and South Padre Island Drive, and other developments. After completing a computer model of the wastewater pressure system, the interim pumps, with one pump running, will be able to provide a flow of 674 gpm. The interim pumps would be 60 horsepower submersible pumps.

The interim pumps would serve the area until future flows increase and require the pumping capacity of the lift station to be increased. When the pumping capacity needs to be increased, first, the proposed 8" sanitary sewer force main would have to be constructed. Second, the interim pumps would have to be upgraded. As previously stated, the interim pump and future pump use the same motor and volute but have different impellers. The impeller is the internal rotating part of the pump that forces the waste water into the discharge piping. At the time of increasing the pump capacity from interim to future, there are two options. The first option is, if the overall condition of the pump is good, only the impeller would need to be replaced. The second option is, if the overall condition of the pump is poor and is need of replacement, the entire pump would be replaced and new pumps with the higher capacity impeller would need to be installed.

After completing a computer model of the wastewater pressure system, the future pumps, with one pump running, will be able to provide a total flow of 1,348 gpm. The future pumps would be 60 horsepower submersible pumps.

A. PROPOSED WEST POINT LIFT STATION - INTERIM FLOWS

Total Interim Flow = 674 gpm

Pumping Condition = 129 feet total dynamic head

Pump = 60 horsepower

B. PROPOSED WEST POINT LIFT STATION – FUTURE FLOWS

Total Peak Future Flow = 1,348 gpm

Pumping Condition = 66 feet total dynamic head

Pump = 60 horsepower

C. EXISTING FM 665 LIFT STATION

The existing FM 665 Lift Station was built in 2016 and was designed with an interim phase and a future phase. The lift station is currently configured and

operating in the interim phase and the existing pumps have a capacity of 230 gpm and are 5 horsepower.

The total peak future flow for the FM 665 lift station is 620 gpm at 118 feet total dynamic head. The future pumps would be 34 horsepower submersible pumps.

Section VI - WORK PLAN

A. SURVEYS AND PLAN PREPARATION

1. Datum

All work on this project (surveys, plans) will be on the Texas State Plane Coordinate System, NAD 83, South Zone (City Standard Datum).

2. Ground Surveys

Ground elevations and validation of general land features shall be made to determine trench depths, utility locations and other obstructions. Specific areas of concern such as major channels and street crossings will require more than the normal surveys to identify topographic variations and other sub-surface structures.

3. Drawings

Drawings will be completed in accordance with the City of Corpus Christi's Standards, properly coordinated with the project specifications and other details and arranged in such a fashion as to allow the Contractor to accurately estimate the cost of the project and construct it.

All drawings will be produced electronically using a computer aided drafting design (CADD) package.

Horizontal and Vertical Scale: The scale recommended and utilized on this project shall be 1"= 40' horizontal, 1" = 4' vertical.

All pipeline plan and profile sheets will be so arranged as to read from left to right with the project beginning at the proposed lift station.

Where possible, plan views will be oriented with the north to either the top or left of the sheet.

Section VII - CONSTRUCTION REQUIREMENTS

A. DISPOSAL OF EXCESS SITE EXCAVATION MATERIAL

All excess excavation material shall be disposed of by the Contractor. Provisions shall be provided in the Contract Documents to direct the Contractor in proper disposal of contaminated soil.

B. RESTORATION

Fields and ditches shall be seeded or sodded to prevent erosion.

All driveways and pavements shall be repaired.

C. STORM WATER POLLUTION PREVENTION PLAN

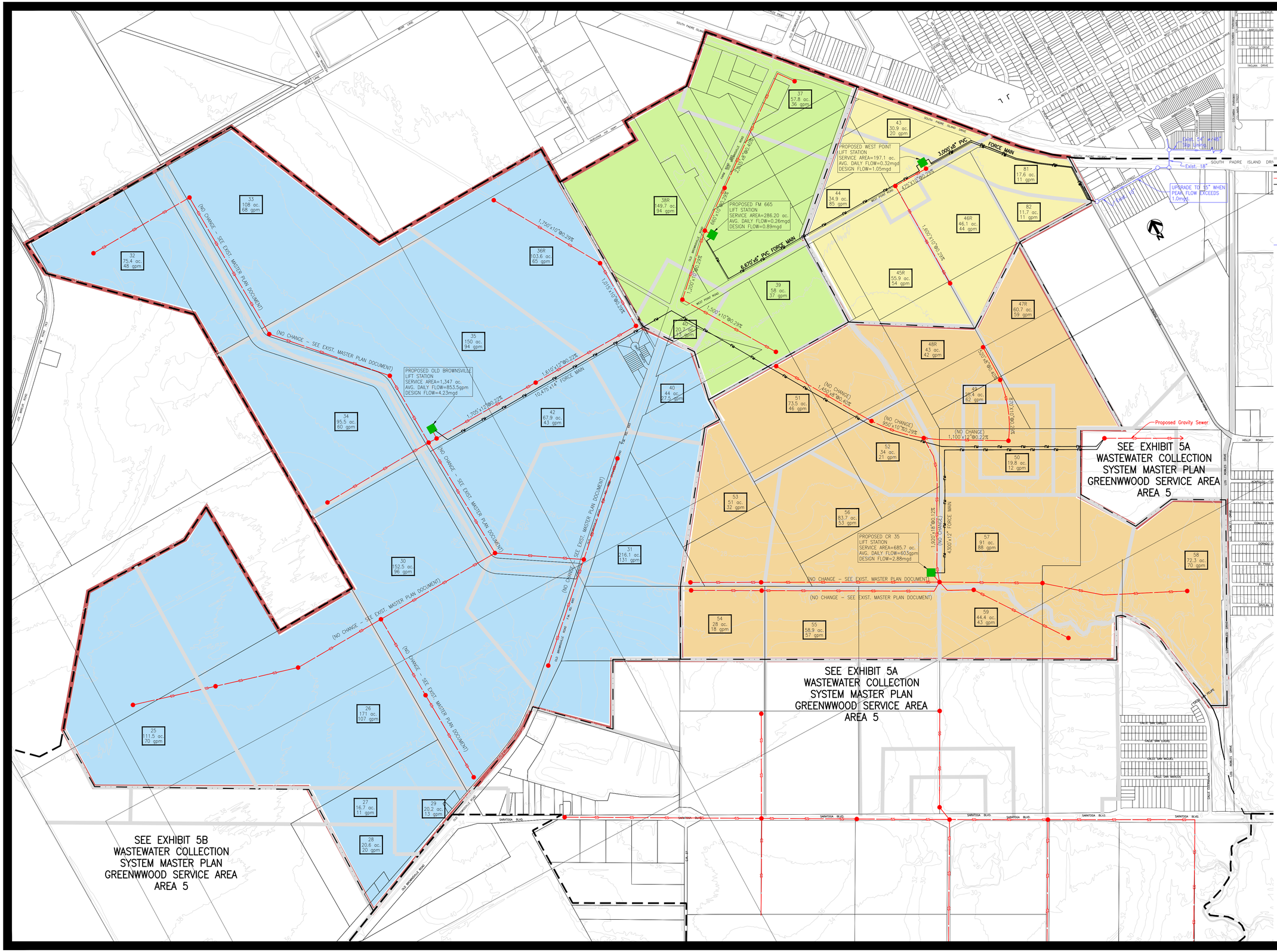
A storm water pollution prevention plan shall be incorporated into the Contractor's work plan to minimize pollution entering the storm sewers along the project (including open drainage ditches). Specific emphasis shall be made near street intersections and large drainage facilities where access to and from the work area shall be critical.

D. EROSION CONTROL

There are no specific areas where the force main installation shall cause erosion of property. Therefore, no specific erosion control measures are recommended, beyond the City Standard Stormwater Pollution Prevention Plan.

E. TRAFFIC CONTROL PLAN

A Traffic Control Plan will be provided in accordance with standard City specifications and latest edition of the Texas Uniform Manual on Traffic Control Devices.



LEGEND:

- 36R / 103.6 ac. / 65 gpm — Area Number / Area / Avg. Daily Flow
- Land Use Boundary
- Master Plan Study Limits
- Lift Station Service Area
- SS — Proposed Gravity Sewer
- FM — Proposed Force Main
- 1,250'x12"@0.22% — Pipe Length, Diameter & slope
- ac. — Area in acres
- gpm — Gallons per Minute
- gpd — Gallons per Day
- MGD — Million Gallons per Day
- Proposed Lift Station
- Proposed Manhole
- SS — Gravity Sewer (By Others)
- FM 665 L.S. SERVICE AREA 286 ACRES
- WESTPOINT L.S. SERVICE AREA 197 ACRES
- CR 35 L.S. SERVICE AREA 685 ACRES
- OLD BROWNSVILLE L.S. SERVICE AREA 1,347 ACRES

LEGEND:

1. Land use characteristics were based on existing Master Waste Water Plan Exhibit 5A.
2. A peak factor of 3 was used on all new calculations.
3. The service areas were assumed to be fully developed.
4. Contours were from City of Corpus Christi Lidar data.

THE STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY BRIAN D. WIK, P.E. TX. REG. 126591 (07/06/2020)

ADMENDMENT WASTEWATER COLLECTION SYSTEM MASTER PLAN GREENWOOD WWTP SERVICE AREA AREA 5

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900 600 300 0 600 1200
GRAPHIC SCALE
1"=600'