CAPITAL IMPROVEMENT PLAN

2019-2050

WATER AND WASTEWATER

FOR

CITY OF WILLOW PARK, TEXAS

Revised July , 2019

CITY COUNCIL

Doyle Moss	Mayor
Lea Young	Mayor Pro-Tem

Eric Contreras
Amy Fennel
Gary McKaughan
Greg Runnebaum

Bryan Grimes	City Administrator
Bernie Parker	Assistant City Administrator

Prepared By:

JACOB MARTIN

Firm #2448
Project #: 16768

325.695.1070
817.594.9880
info@jacobmartin.com
www.jacobmartin.com
3465 Curry Lane
Abilene, TX 76906
1508 Santa Fe, Suite 203
Weatherford, TX 76086

TBPE Firm #: 2448 | TBAE Firm #: BR 2261 | TBPLS Firm #: 10024300 – Abilene | TBPLS Firm #: 10193992 - Weatherford

CITY OF WILLOW PARK
CAPITAL IMPROVEMENT PLAN

JULY 2019

I. GENERAL

A. Introduction

The City of Willow Park authorized JACOB & MARTIN, LLC to prepare a water and sewer capital improvement plan in January, 2017. The City has authorized an update to the plan as well as the addition of discussions for capital improvements to the street and drainage systems as well. Willow Park is located in an area of rapid growth, along the Interstate 20 corridor, approximately 20 miles west of the City of Ft. Worth.

The outlook for the City of Willow Park is for sustained growth over the next 30 to 35 years. It is therefore imperative for the City to maintain a workable plan to prepare for and accommodate that growth with the least detrimental impact to the public.

B. Purpose

The purpose of the updated plan is to evaluate the City's existing water, wastewater, street, and drainage facilities and provide a plan which will allow the City to conduct orderly improvement of the water and wastewater systems to meet demands through the year 2050.

C. Scope of Work

The following areas are to be considered:

- Population & Land Use Assumptions
- Water & Wastewater Design Criteria
- Water Use Projections
- Water Supply
- Water System Infrastructure
- Recommended Water System Improvements
- Costs of Water System Improvements
- Wastewater Flows
- Wastewater System Infrastructure
- Recommended Wastewater System Improvements
- Costs of Wastewater System Improvements
- Street Inventory and Evaluation
- Recommended Street Improvements
- Drainage Inventory and Evaluation
- Recommended Drainage Improvements

D. Description of Plan Area

The plan area includes the City Limits and Extraterritorial Jurisdiction (ETJ) of the City of Willow Park. The plan area is depicted in Figure I.1.

E. Water Plan Approach

The approach to the development of the water plan involves the following steps:

1. Develop water use projections and estimate per capita use (current & future)
2. Identify and evaluate current & potential water supply sources
3. Inventory and evaluate the current infrastructure
4. Develop strategies for addressing current shortfalls & meeting future demands
5. Develop costs and financing strategies for addressing the identified needs

F. Wastewater Plan Approach

1. Develop wastewater flow projections and estimate per capita contributions
2. Identify and evaluate current & potential treatment alternatives
3. Inventory and evaluate the current infrastructure
4. Develop strategies for addressing current shortfalls & meeting future needs
5. Develop costs and financing strategies for addressing the identified needs

G. Street Plan Approach

1. Inventory and evaluate the current streets
2. Develop strategies for addressing current shortfalls & meeting future needs
3. Develop Costs and financing strategies for addressing the identified needs

H. Drainage Plan Approach

1. Inventory and evaluate the current drainage infrastructure
2. Develop strategies for addressing current shortfalls & meeting future needs
3. Develop Costs and financing strategies for addressing the identified needs

II. DEVELOPMENT AND GROWTH

A. Population Projections

According to the 2000 and 2010 Census, the City's population was 2,849 and 3,779, respectively. This is a population increase of approximately 33% in ten years or a 3.3% increase per year.

CITY OF WILLOW PARK

FIGURE I.1

ETJ MAP

JULY 2019

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-695-1070
1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880
FIRM# F-2448

NORTH

1" = 2400'

LEGEND

- CITY LIMITS
- ETJ BOUNDRY
- WATER STORAGE TANKS
- WELL
- LIFT STATION
- CREEK

Various sources including, the Census Bureau, the Texas Water Development Board, the City's Comprehensive Plan, and previous engineering studies for the City of Willow Park have been used to develop the historical and projected population growth for the City as illustrated in Table II.1. Based on this data, Willow Park is projected to increase in population by an average 5.5% per year through the year 2050. This growth will be impacted early in the planning period by development projects that are currently being proposed. There are approximately 75 residential housing units in platted developments approved for construction as well as approximately 20 retail units. Additionally, a Tax Increment Redevelopment Zone (TIRZ) has been adopted by the City Council (Reinvestment Zone Number One) encompassing the Trinity Meadows Race Track property. The TIRZ includes 408 residential housing units to be phased in through the year 2022. These proposed additions, as well as other anticipated development, have been incorporated in the population and utility connection projections. Ultimate population is based on available land and land use assumptions as discussed in Section II.B. Therefore, the total utility service projection is limited by the build-out potential of various types. The water system currently serves the majority of the population and the water service projections, therefore follow a similar growth pattern. The sewer system only serves a portion of the total population. It is expected that, ultimately, residences and businesses not currently receiving sewer service will be tied on throughout the planning period. However, due to financing and other constraints, much of this change over would not be expected to occur until late in the planning period. Therefore, the sewer service projection is weighted to the end of the planning period. This is consistent with the City's plans for new wastewater treatment facilities which would cover a useful life of 20 years before additional improvements would be necessary. This limitation would also delay the addition of currently non-served residences and businesses.

TABLE II.1
POPULATION PROJECTION

Year	Estimated Population	Total Water Connections	Total Sewer Connections
2010	3,779	1640	480
2011	3,885	1678	504
2012	4,003	1734	555
2013	4,131	1774	615
2014	4,305	1848	675
2015	4,804	1889	720
2016	5,083	1900	897
2017	5,314	1999	996
2018	5,416	2048	1045
2019	5,855	2222	1219
2020	6,323	2407	1404
2025	7,598	3161	1918
2030	7,954	3797	2156
2035	9,256	4432	2744
2040	10,771	5068	3333
2045	12,535	5704	5704
2050	14,587	6351	6351

B. Land Use

As previously mentioned, the City of Willow Park is located along the Interstate 20 (I-20) Corridor approximately ten miles east of Downtown Weatherford and twenty miles west of Downtown Fort Worth. The City is a small North Central Texas community developed on mostly high and flat to steep rolling terrain in eastern Parker County. As development and growth occur within the City, the infrastructure needs to be expanded to serve existing and future residences and businesses in the service area.

A land use inventory or assessment identifies the current uses of the land throughout the planning area. An inventory of the City's land use is shown in Figure II.1 – Existing Land Use Map and the acreages are tabulated below in Table II.2 from the City's 2014 Comprehensive Plan. The inventory is a critical set of data used to create a Future Land Use Plan. The Existing Land Use Map and acreage tabulations should be updated as new building permits are issued and property tax records are changed. This will allow the City to evaluate where it is in relation to its Future Land Use Plan.

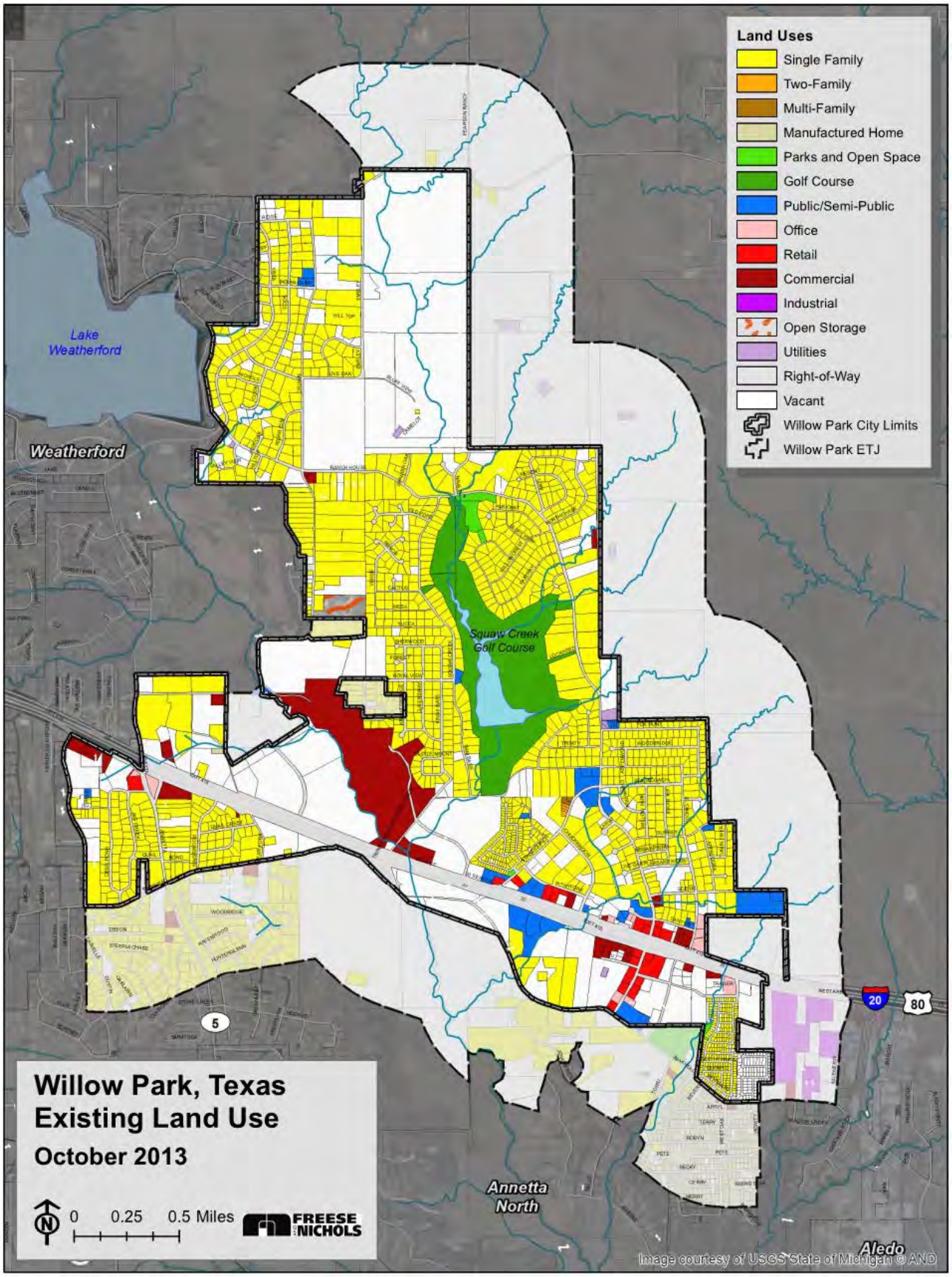

Land Uses
Single Family
Two-Family
Multi-Family
Manufactured Home
Parks and Open Space
Golf Course
Public/Semi-Public
Office
Retail
Commercial
Industrial
Open Storage
Utilities
Right-of-Way
Vacant
Willow Park City Limits
Willow Park ETJ
Lake Weatherford
Weatherford
Squaw Creek Golf Course
Annetta North
Aledo
20
80
5
Willow Park, Texas
Existing Land Use
October 2013
0 0.25 0.5 Miles
FREESE NICHOLS
Image courtesy of USGS State of Michigan © AND

FIGURE II.1

TABLE II.2

EXISTING LAND USE						
	CITY LIMITS		**ETJ**		**TOTAL**	
Type of Land Use	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Residential - Single Family	1,726	41.3%	388	12.0%	2,114	28.5%
Residential - Two-Family	1	0.0%	0	0.0%	1	0.0%
Residential - Multi-Family	1	0.0%	0	0.0%	1	0.0%
Residential - Mftd-Home	1	0.0%	126	3.9%	127	1.7%
Retail	33	0.8%	0	0.0%	33	0.4%
Office	16	0.4%	0	0.0%	16	0.2%
Commercial	199	4.8%	14	0.4%	213	2.9%
Industrial	0	0.0%	60	1.8%	60	0.8%
Public/Semi-Public	93	2.2%	19	0.6%	112	1.5%
Parks & Open Space	14	0.3%	19	0.6%	33	0.4%
Golf Course (Private)	250	6.0%	0	0.0%	250	3.4%
Right-of-Way	467	11.2%	117	3.6%	584	7.9%
Total Developed Land	**2,801**	**67.0%**	**743**	**22.9%**	**3,544**	**47.7%**
Agriculture & Vacant	1,377	33.0%	2,501	77.1%	3,878	52.3%
Total Land Area	**4,178**	**100.0%**	**3,244**	**100.0%**	**7,422**	**100.0%**

Based on a Comprehensive Plan that was adopted by the City in 2002, there was approximately 2,522 developed acres or 33% of the total 7,588 acres of land within the City Limits and ETJ. Based on the Comprehensive Plan that was adopted by the City in 2014, there was approximately 3,544 developed acres or 48% of the total 7,422 acres of land within the City Limits and ETJ, while the remaining acreage is vacant or used for some agricultural purpose. Between 2002 and 2014, the developed area for the City has increased by approximately 15%. Currently, the most predominant land use is residential which is approximately 2,243 acres or 63.3% of the total 3,544 developed acres. The future land use, according to the plan, is expected to be predominantly residential as well. Office, retail, commercial and industrial land uses cover approximately 322 acres or 9.1% of the developed land. Most of the existing office, retail, commercial and industrial land uses in the City are located along the frontage of Interstate 20. Most of the future office, retail, commercial and industrial land uses are expected to continue along the highway frontage with minor development for these land uses occurring away from the highway. Figure II.2 - Future Land Use Plan shows the expected development areas by land use types. Table II.3 below shows the expected acreage and percentage for each land use type from the City's 2014 Comprehensive Plan.

TABLE II.3

FUTURE LAND USE		
Type of Land Use	**Acres**	**Percent**
Residential	5,092	68.6%
Commercial	477	6.6%
Industrial	90	1.3%
Retail	135	1.9%
Parks & Open Space	591	8.2%
Golf Course	250	3.4%
Mixed Use	70	1.0%
Total Developed	**6,705**	89.8%
Right-of-Ways	736	10.2%
Total Planning Area	**7,422**	100.0%

Corrected from Comprehensive Plan

Future Land Use Map

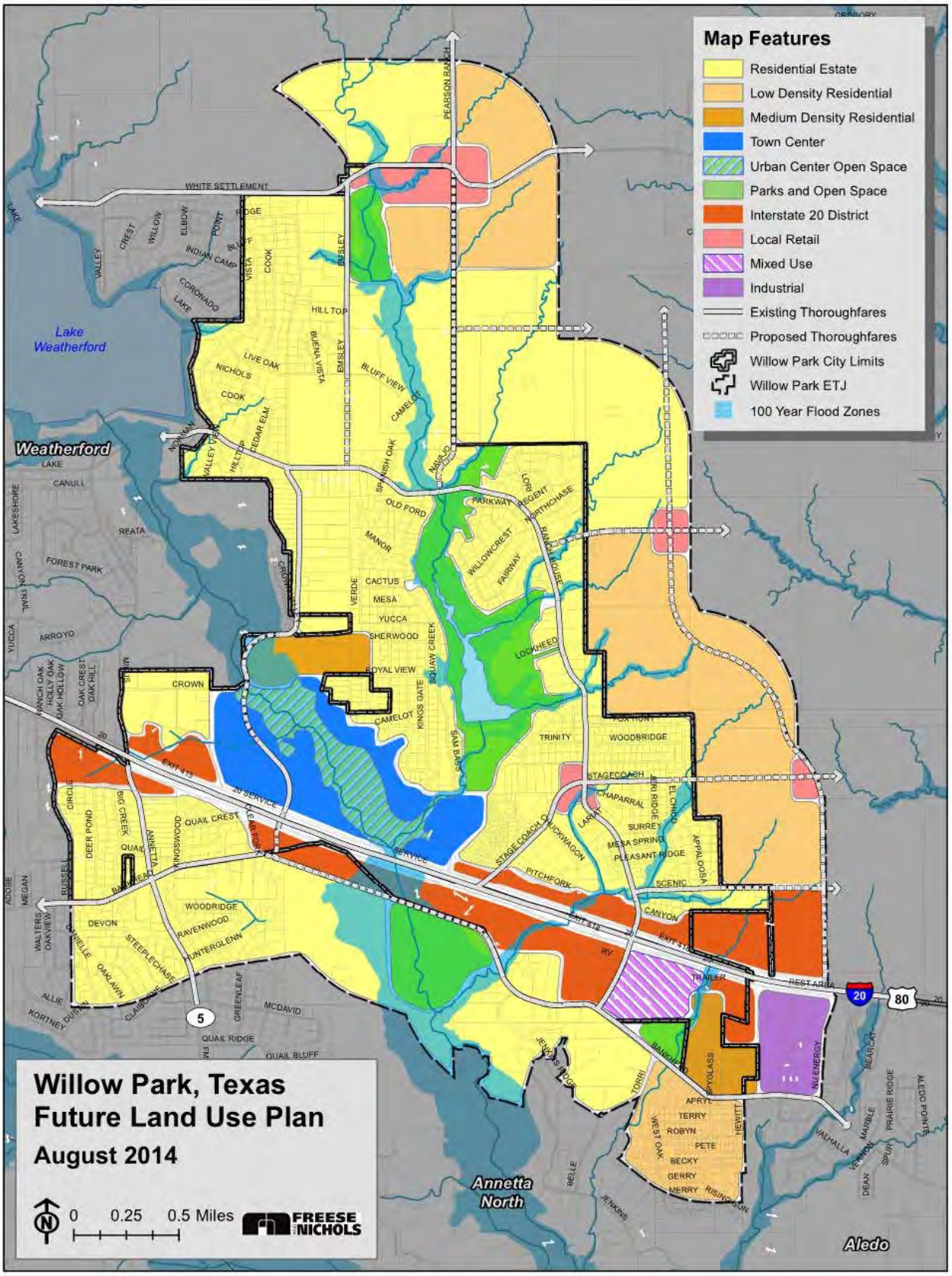


FIGURE II.2

III. WATER SYSTEM

A. Regulations

The agency which oversees public water systems in the State of Texas is the Texas Commission on Environmental Quality (TCEQ). The TCEQ is tasked with insuring compliance with EPA and Texas regulations concerning the quality, capacity, and operation of water systems. The rules promulgated by the TCEQ for this purpose are found in 30 TAC Chapter 290. Subchapter D of the 290 rules pertains to the operational requirements and capacities for public water systems. The relevant sections of the rules for this discussion are 290.44(d) and 290.45(b)(1)(D)(iv). Section 290.44(d) states that "the system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gpm per connection". This is the peak hourly demand requirement which must be met by public water systems. The TCEQ further requires, in Section 290.45(b)(1)(D)(i), that supplies of 0.6 gpm per connection be available (peak day requirement) for either well supplies or surface water sources. Section 290.45(b)(1)(D)(iv) requires 100 gallons per connection of elevated storage or a pressure tank capacity of 20 gallons per connection. Section 290.45(b)(1)(D)(ii) requires a total storage capacity of 200 gallons per connection. Each section cited herein pertains to groundwater supplies. The requirements for surface water systems are the same, for systems serving more than 250 connections, and are found in Section 290.45(b)(2) of the TCEQ regulations. The TCEQ's regulations governing public water systems can be viewed online at www.tceq.texas.gov/rules/indxpdf.html.

B. Water Use

The City's historical and projected water use is illustrated in Table III.1.

TABLE III.1
METER CONNECTIONS PROJECTION

Year	Water conn	Yearly Flow (MG/Yr)	Avg. Daily Flow		Max Daily Flow		Peak Hour gpm/conn
			MGD	gpm/conn	MGD	gpm/conn	
2007	1,451	209.44	0.57	0.27	1.80	0.86	2.15
2008	1,524	236.16	0.65	0.29	1.99	0.91	2.27
2009	1,607	206.56	0.57	0.24	1.79	0.77	1.93
2010	1,640	213.56	0.59	0.25	1.34	0.57	1.42
2011	1,678	237.42	0.65	0.27	1.23	0.51	1.27
2012	1,734	221.65	0.61	0.24	1.04	0.42	1.04
2013	1,774	185.97	0.51	0.20	1.15	0.45	1.13
2014	1,848	222.99	0.61	0.23	1.00	0.37	0.93
2015	1,889	225.12	0.62	0.23	1.13	0.42	1.04
2016	1,885	229.42	0.63	.23	0.92	0.34	.85
2017	1885	247.90	0.68	0.25	1.30	0.60	1.50
2018	1955	248.83	0.68	0.24	1.25	0.60	1.50

2019	2052	269.63	0.74	0.25	1.30	0.60	1.50
2020	2407	292.00	0.80	0.25	2.08	0.60	1.50
2025	3161	415.36	1.14	0.25	2.73	0.60	1.50
2030	3797	498.93	1.37	0.25	3.28	0.60	1.50
2035	4432	582.36	1.60	0.25	3.83	0.60	1.50
2040	5068	665.94	1.82	0.25	4.38	0.60	1.50
2045	5704	749.51	2.05	0.25	4.93	0.60	1.50
2050	6351	834.52	2.29	0.25	5.49	0.60	1.50

Historically, the City's average day, peak day, and peak hourly flows have been somewhat less than the guidelines established by the TCEQ. The average day flow, expressed as gallons per minute per connection (gpm/conn) between 2007 and 2019 has been 0.25. Repairs and water conservation measures have led to a general decline in average daily water use for the system and this trend would be expected to continue. The City's peak day use has averaged 0.55 gpm/conn and the peak hourly use has averaged 1.37 gpm per connection. The TCEQ requires planning and design for 0.6 gpm/conn peak day and 1.5 gpm/conn peak hourly flow as discussed in Section III.A. For planning purposes, the TCEQ criteria has been used to project peak day and hourly water uses through the year 2050.

C. Water Supply

The current water supply for the system is from twenty-five Paluxy and Trinity formation groundwater wells. The capacity of the City's existing wells is indicated in Table III.2.

It is estimated that the City of Willow Park's current well water supply will become insufficient in 2019. Water conservation and addressing water loss issues could prolong this supply, however, reduction in well capacity may offset any savings. The City's wells have been decreasing in capacity over the last several years due to reduction in aquifer levels and poorer water quality. Regardless, the water supply issue should be addressed immediately to avoid shortages in the future. With this in mind, the City has negotiated for an alternate water supply to address future needs with the City of Fort Worth. The proposed project will involve piping treated surface water to the east side of the City along the IH20 frontage. The City is in the preliminary engineering phase of this project. In the meantime, the City is drilling additional wells and rehabilitating existing wells to address short term demands. Table III.2 includes well projects completed to date.

TABLE III.2
WATER WELL INVENTORY

Well #	Capacity (gpm)	Depth	Pump (HP)
1	60	182	7.5
2	36	148	7.5

3	48	166	7.5
4	24	177	7.5
5	26	158	7.5
6T	64	620	10
6P	50	160	7.5
7	37	135	7.5
9T	114	650	15
9P	85	260	7.5
10T	31	650	15
10P	58	270	7.5
11	35	215	3
El Chico T	50	650	15
El Chico P	22	221	5
14	44	290	7.5
15	97	650	30
16T	35	624	10
16P	26	269	3
WWN	31	250	5
WWS	37	255	3
WSO-T	85	650	15
WSO-P	38	235	5
WSS	12	256	3
WSN	17	256	1
Total GPM	1,137		
Total MGD	1.64		

D. Existing Water System

The City's existing water facilities are depicted in Figure III.1 – Water System Inventory Map. Approximately 43% of the well supply is conveyed directly to the City's Indian Camp pump station and elevated tank site on the north end of the system. The pump station at this site fills the adjacent elevated tank and provides supply flow to the rest of the system. The water is conveyed through the distribution system and the City's main 12-inch supply line to the Foxhunt elevated tank and pump station site. Additional groundwater is pumped into the system at this site. The Foxhunt elevated tank is on the same pressure plane as the Indian Camp tank (North Pressure Plane), but generally provides service to the southeast portion of the system. Well 9, Well 10 and the El Chico well site located downstream of the Foxhunt elevated tank site, provide additional groundwater into this portion of the system as well. The Indian Camp elevated tank site provides direct service to the southwest portion of the City's system and supply flow to the Willow Oaks pressure plane (South Pressure Plane) on the far southwest corner of the service area. Well 11 and the Willow Wood wells and pump station located centrally in the City's system provides additional groundwater into the distribution system prior to the South Pressure Plane. The Willow Springs Oaks pump station and elevated tank site

CITY OF WILLOW PARK

FIGURE III.1

WATER SYSTEM INVENTORY MAP

JULY 2019

provides direct service to the South Pressure Plane. The Willow Springs pump station and well site located on the east end of the South Pressure Plane provides additional groundwater into this portion of the system. Schematic layouts of the City's pumping and storage facilities are included in Appendix A.

The City's distribution system is comprised of approximately 74 miles of pipe ranging in size from 2-inch to 12-inch. An evaluation of the system has been made and locations of deteriorated and undersized pipe determined. Deteriorated pipe has led to significant water loss due to pipe breaks in the system as well as service outages. Undersized lines require higher feed pressures to maintain minimum service requirements. These higher pressures lead to even more breaks in vulnerable areas of the system. Additionally, adequate fire protection requires larger pipes to insure sufficient flow can be maintained during a fire. A 6-inch pipe is the smallest size that is acceptable for fire coverage and there are several locations within the City where neighborhoods are being served by 2-inch pipes. Additionally, adequate fire coverage requires fire hydrants spaced at 500 to 1,000 feet depending upon the area. Many areas in the City exceed even the 1,000 foot separation. The City has a project underway to address many of these areas. The City's system is looped, from north to south, in three locations. Additional north-south, as well as east-west, looping will be necessary to insure adequate flow throughout the system.

E. Storage and Pumping Requirements

According to TCEQ regulations, the following minimum requirements must be provided by a community-type water system that serves more than 250 connections. Minimum residual pressure of 20 psi and a minimum normal operating pressure of 35 psi with an instantaneous use in the system of 1.5 gpm per connection are required.

*TOTAL STORAGE CAPACITY		200 Gallons per Connection
PRESSURE MAINTENANCE FACILITIES:		
A.	Pressure Tank	20 Gallons per each Connection
B.	Elevated Tank	100 Gallons per Connection
WATER SUPPLY FLOW RATE:		0.6 gpm per Connection
SERVICE PUMPS:		2 or more pumps with total rated capacity of 2.0 gpm per connection or 0.6 gpm if 200 gallons per connection of elevated tank capacity provided

* Pressure tank storage is not recognized.

1. Ground Storage

The City of Willow Park currently maintains nine ground storage tanks at seven locations within the system. An inventory of the ground storage facilities is included in Table III.3. Table III.4 provides the expected ground storage requirement based on the water customer projections from Section III.B. As evidenced in these tables, the City will meet the projected regulatory requirement for ground storage volume with the existing facilities. However, from an operational standpoint, additional ground storage may be needed to meet the needs of additional supply and blending as well as insuring adequate emergency supply.

TABLE III.3
GROUND STORAGE FACILITIES

Site Name	Ground Elev. (Ft. above MSL)	Capacity (MG)
Indian Camp Rd.	1,012	0.500
		0.350
Well 9	896	0.06
Fox Hunt	963	0.286
Site 10 (Surry Ln)	954	0.092
El Chico	945	0.031
Willow Wood	944	0.042
Willow Springs	958	0.024
Willow Springs Oaks	975	0.042
		0.031
Total Ground Storage		**1.458**

TABLE III.4
PROJECTED GROUND STORAGE REQUIREMENTS

Year	Water Connections	Required Ground Storage (MG)
2017	1855	0.377
2018	1955	0.391
2019	2100	0.420
2020	2407	0.481
2025	3161	0.632
2030	3797	0.759
2035	4432	0.886
2040	5068	1.014
2045	5704	1.141
2050	6351	1.270

2. High Service Pumping

The City currently maintains eight pump stations located throughout the system. An inventory of the pumping facilities is included in Table III.5. Based on an elevated storage requirement of 100 gallons per connection, the pumping requirement for the City would be 2.0 gallons per connection. The ultimate high service pump capacity under this scenario would be 12,680 gpm. While the pumping improvements proposed with the new surface water supply will increase the overall capacity, there would still be a significant shortfall of over 6,000 gpm. It would not be realistic to expect an upsize of the existing pump stations to make up this shortfall as the existing piping and other infrastructure would not hold up. Therefore, we have completed the analysis using the alternate elevated storage requirement of 200 gallons per connection and the corresponding pumping requirement of 0.6 gpm per connection. Table III.6 provides the expected high service pump requirements based on this scenario and the water customer projections from Section III.B. As evidenced in these tables, under this scenario, the City can meet the required pumping capacity through the year 2050.

TABLE III.5
HIGH SERVICE PUMP FACILITIES

Site Name	Ground Elev. (Ft. above MSL)	Pump (HP)	Capacity (gpm)
Indian Camp Rd.	1,012	30	700
		30	700
		30	700
Well 9	896	7.5	80
		7.5	80
Fox Hunt	963	20	300
		20	300
Site 10 (Surry Ln)	954	15	350
		15	350
		15	200
El Chico	945	5	100
		10	200
		10	200
Willow Wood	944	10	175
		10	175
		10	175
Willow Springs	958	10	175
		10	175
Willow Springs Oaks	975	10	200
		10	200
		10	200
Total High Service Capacity			**5,735**

TABLE III.6
PROJECTED HIGH SERVICE PUMP REQUIREMENTS

Year	Water Connections	Required High Service Pump Capacity (gpm)
2017	1855	1113
2018	1955	1173
2019	2100	1260
2020	2407	1444
2025	3161	1897
2030	3797	2278
2035	4432	2659
2040	5068	3041
2045	5704	3422
2050	6351	3811

*Based on 0.6 gpm per connection.

3. Elevated Storage

The City of Willow Park currently maintains three elevated storage tanks at the Indian Camp, Fox Hunt and Willow Springs Oaks locations. The Indian Camp and Fox Hunt tanks provide pressure maintenance for the North Pressure Plane with high water levels of 1,132 MSL. The South Pressure Plane is served by the Willow Springs Oaks tank with a high water level of 1,102 MSL. An inventory of the elevated storage facilities is included in Table III.7. Table III.8 provides the expected elevated storage requirement based on the water customer projections from Section III.B and a requirement of 200 gallons per connection, as discussed in Section III.E.2. As evidenced in these tables, the elevated tank capacity would be insufficient by the year 2025.

TABLE III.7
ELEVATED STORAGE FACILITIES

Site Name	Ground Elev. (Ft. above MSL)	Capacity (MG)
Indian Camp Rd.	1,012	0.250
Fox Hunt	963	0.250
[redacted]		
Willow Springs Oaks	975	0.125
Total Ground Storage		**0.625**

TABLE III.8
PROJECTED ELEVATED STORAGE REQUIREMENTS

Year	Water Connections	Required Elevated Storage (MG)
2017	1855	0.371
2018	1955	0.391
2019	2100	0.420
2020	2407	0.481
2025	3161	0.632
2030	3797	0.759
2035	4432	0.886
2040	5068	1.014
2045	5704	1.141
2050	6351	1.270

*Based on 200 gallons per connection.

From a regulatory standpoint, the facilities meet the projected ground storage and pumping needs through the planning period. Based on population projections, the elevated storage capacity becomes deficient beginning in 2025. Phased improvements will be necessary for the City to meet regulatory requirements and maintain a high level of service to its customers.

F. Recommended Water System Improvements

An analysis of the system has identified a number of areas that are or will likely become deficient by the year 2050. Water supply, elevated storage, and distribution piping network are elements that should be addressed over the next several years and beyond.

1. Water Supply

The City's water supply is the most pressing need. The City's existing groundwater supply is insufficient according to TCEQ requirements (although supply exceeds actual peak flows). The utilization of groundwater to accommodate future growth will be inadequate, although drilling some additional wells will serve as an interim measure until the proposed surface water supply can be brought on-line. Three wells are currently in progress and will extend the operational supply for a couple of years. This may allow sufficient time to complete a surface water supply project. The City is also currently in the process of rehabilitating several wells which will help to alleviate the supply issue in the short term.

The City has negotiated a contract for the purchase of treated surface water with the City of Ft. Worth. This is a joint project with the City of Hudson Oaks and is in the preliminary engineering phase. It would provide 3.5 MG of surface water supply to the City. The recommended infrastructure would include a supply line along the north side of Interstate 20 to be shared with the City of Hudson Oaks, a pump station and blending station near the intersection of Interstate 20 and Tricia Trail, and transfer lines to connect to the City's well supply lines and distribution system. The proposed pump station would likely consist of one 0.5 MG ground storage tank and three high service pumps of approximately 1,000 gpm each. It is recommended that the proposed improvements be phased in as the need arises based on demand. Phase 1 of the improvements would include a shared 18-inch supply line with Hudson Oaks from the City of Ft. Worth connection, the transfer and blending pump station and a 14-inch blended water transfer pipeline. Phase 2 of the improvements would consist of a 14-inch transfer line to the City's existing Fox Hunt elevated tank site where it could be distributed to a larger portion of the system. The recommended improvements are depicted in Figure III.2.

CITY OF WILLOW PARK

FIGURE III.2

WATER SUPPLY IMPROVEMENTS MAP

JULY 2019

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448

NORTH

1" = 1200'

- EXISTING 2" WATER LINE
- EXISTING 3" WATER LINE
- EXISTING 4" WATER LINE
- EXISTING 6" WATER LINE
- EXISTING 8" WATER LINE
- EXISTING 10" WATER LINE
- EXISTING 12" WATER LINE
- EXISTING 36" WATER LINE
- CITY LIMITS
- CREEKS
- ELEVATED TANK
- WELL
- PUMP STATION
- FIRE HYDRANT
- PRV
- 2" WELL LINE
- 4" WELL LINE
- 8" WELL LINE
- PHASE 1 PROPOSED 14" BLENDED WATER TRANSFER LINE
- PHASE 2 PROPOSED 14" BLENDED WATER TRANSFER LINE
- PROPOSED 14" SUPPLY LINE
- PROPOSED 18" SUPPLY LINE
- PROPOSED TRANSFER STATION AND BLENDING SITE

EMERGENCY PALUXY WELL #7
GROUND ELEVATION = 950'

(1) PALUXY GP
(1) TRINITY GT

WELL #6
GROUND ELEVATION = 920'

PALUXY
WELL #5
GROUND ELEVATION = 920'

PALUXY
WELL #1
GROUND ELEVATION = 910'

PALUXY
WELL #3
GROUND ELEVATION = 919'

PALUXY
WELL #4
GROUND ELEVATION = 918'

PALUXY
WELL #2
GROUND ELEVATION = 920'

2 WELLS
#15 TRINITY
#14 PALUXY
250,000 GALLON ET
448,000 GALLON GST
498,000 GALLON ST
GROUND ELEVATION = 1,010'

PUMP STATION
GROUND ELEVATION = 993'

RESERVOIR

LAKE WEATHERFORD

CITY OF WEATHERFORD
WATER PURIFICATION PLANT

PUMP STATION
NOT ACTIVE
WEATHERFORD
INTERCONNECT
GROUND ELEVATION = 911'

PALUXY WELL #9P AND 9T
DIRECT TO MAIN
EMERGENCY
GROUND ELEVATION = 893'

WILLOW WOOD
NORTH WELL
GROUND ELEVATION = 944'

WILLOW WOOD
PUMP STATION

FOREST CIR

0.045 GST
GROUND ELEVATION = 944'

WELL #11
GROUND ELEVATION = 894'

WELL #5
WILLOWWOOD
SOUTH WELL
GROUND ELEVATION = 914'

FOXHUNT PS
250,000 ET
GROUND ELEVATION = 963'
286,000 GST
16P (PALUXY)
16T (TRIN)'

12" PRV (60 PSI)

WELL #10
TRINITY WELL
PALUXY WELL
0.096 GST
GROUND ELEVATION = 949'

GST 42,000 GALLONS
ELEVATED TANK
125,000 GALLONS
WILLOW SPRINGS OAKS
PUMP STATION
(1) TRINITY WELLS
(1) PALUXY WELL
GROUND ELEVATION = 971'

WILLOW SPRINGS PUMP STATION
2 - PALUXY WELLS
2 - 42,000 GST
CLA VALVE
GROUND ELEVATION = 956'

EL CHICO PUMP STATION
42,000 GALLON ET
PALUXY WELL
TRINITY WELL
GROUND ELEVATION = 945'

PHASE 1
14" SUPPLY LINE

PHASE 2 14"

PHASE 1 14"

WILLOW PARK
WATER TRANSFER
AND BLENDING
STATION

18" (7,000')

Elevated Storage

The previous Capital Improvement Plan recommended siting a new 0.25 MG elevated tank in the vicinity of the existing El Chico Pump Station. This would be an advantageous site and would address some high pressure issues as well. An alternative may be to site the proposed Fort Worth pump station at a high enough elevation to serve as elevated storage. Adding a larger elevated tank and eliminating two existing tanks would also be an alternative. Ultimately, two elevated tanks will be required to address the long term projections (2050). A second new elevated tank or replacement of an existing tank would be recommended for future development with an added capacity requirement of 0.4 MG. Future development patterns would drive the location of this tank which would become necessary by the year 2040.

2. Distribution System

Most of the water loss in the City's system is attributable to deteriorated, leaking cast iron or ductile iron waterlines. The City has completed a construction project which includes replacing several sections of deteriorated lines as well as upsizing some lines. Additional projects are under construction as of the date of this report. There are several additional, deteriorated lines in the system that are in need of replacement as depicted in Figure III.3. Additionally, there are a number of lines that are less than 6-inches in diameter and serving residential areas. It is recommended that these lines be upsized to 6-inch and that fire hydrants be installed in locations where the maximum separation is being exceeded. All of the proposed water distribution and storage improvements are depicted in Figure III.3.

G. Priority and Cost Estimates

The following costs and priority timelines may help in planning and budgeting for capital improvement projects. Table III.9 includes both the estimated costs of the recommended improvements and the recommended timeframes for completion of those projects.

TABLE III.9
WATER SYSTEM IMPROVEMENTS
PRIORITY AND PROJECTED COSTS

Priority	Description	Cost
2017 -2022		
1	Expand Groundwater Supply (3 wells) (underway)	$500,000
2	Complete Phase 1 Surface Water Tie-in To Ft. Worth	$7,573,500
2022-2030		
3	El Chico Elevated Tank	$1,500,000
4	Replacement of Deteriorated Lines	$ 550,000
5	Crown Road Loop 12” Loop	$1,300,000
6	New Energy/Bay Hill Loop	$ 370,000
2030-2040		
7	Complete Phase 2 Surface Water Transmission Line	$1,500,000
8	0.4 MG Elevated Tank	$1,800,000
9	Fire Hydrant Additions (not associated with linework)	$ 100,000
2040-2050		
10	Russell Road	$ 340,000
11	Upsize of Small Lines	$1,320,000

The costs in Table III.9 make allowance for inflation. Item 2, the Phase 1 Surface Water Tie-in includes an equity buy-in to the City of Ft. Worth. The line replacement item, Item 4, is a maintenance issue which will reduce water loss and save cost for repairs once completed. The line upsizes and hydrants are not demand driven and are not critical from an operational standpoint. The City must weigh this against safety concerns when attributing a priority to this item. The remainder of the recommended improvements are driven by increased demand in the system and there should be flexibility in the timing of the improvements. The pace at which development occurs may accelerate or delay the need for these items. Development may also help to offset the cost of these improvements through cost sharing agreements and impact fees.

IV. WASTEWATER SYSTEM

A. Regulations

The TCEQ is also the agency which oversees wastewater systems in the State of Texas. The TCEQ is tasked with insuring compliance with EPA and Texas regulations concerning the effects of wastewater discharge into the waters of the State as well as public welfare and air quality. The rules promulgated by the TCEQ for this purpose are found in 30 TAC Chapter 217. Subchapter B of the 217 rules pertains to the determination of capacity and design loadings for wastewater systems. Subchapter C sets out the regulations regarding collection systems and Subchapters E through L pertain to the design and sizing of wastewater treatment systems.

The TCEQ's regulations governing wastewater systems can be viewed online at www.tceq.texas.gov/rules/indxpdf.html.

B. Wastewater Flows

Wastewater flow data for the years prior to 2014 was not available. The data for this period was taken from the previous Capital Improvement Plan or estimated from other available data. Critical parameters for wastewater systems design are average daily flow and peak hourly flow. Wastewater flow projections were made using the same growth patterns and land use assumptions discussed in previous sections. However, in the case of wastewater, there are approximately 1,003 water customers which are not currently connected to the sewer system. While it is reasonable to assume that, as facilities are made available, these customers will eventually be connected to the sewer collection system, it is not likely to happen until late in the planning period. Growth patterns and the timing of improvements will dictate to a large degree when these connections would come on line. Based on this information, to be discussed further in a later section, this is anticipated to occur starting in the year 2035 and the wastewater projections have been adjusted accordingly.

TABLE IV.1
WASTEWATER CONNECTIONS AND FLOW PROJECTIONS

Year	Sewer conn	Yearly Flow (MG/Yr)	Avg. Daily Flow		Peak Hour gal/day/conn
			MGD	gal/day/conn	
2010	480	44.90	0.123	256	480
2011	504	33.58	0.092	182	402
2012	555	51.83	0.142	256	704
2013	615	57.47	0.157	256	704
2014	675	77.20	0.212	314	862
2015	720	91.08	0.250	347	954
2016	757	77.20	0.212	263	723
2017	757	57.4	0.157	208	571

2018	789	86.3	0.236	300	824
2019	813	89.0	0.244	300	825
2020	1404	153.74	0.421	300	825
2025	1918	210.02	0.575	300	825
2030	2156	236.08	0.647	300	825
2035	2744	300.47	0.823	300	825
2040	3333	364.96	1.00	300	825
2045	5704	624.59	1.711	300	825
2050	6351	695.43	1.905	300	825

C. Existing Wastewater System

The City's existing wastewater system is shown schematically in Figure IV.1. It consists of approximately 13.5 miles of 6-inch through 12-inch gravity mains and 2.7 miles of 2-inch through 6-inch force main, currently serving 897 customers. The wastewater system currently serves less than half the residences and businesses in Willow Park. Wastewater collected from the system is transferred by force main from three sewer lift stations. An area located on Crown Road on the west side of the City which serves eight homes utilizes individual, private lift stations. Sewer is transferred from these lift stations via a single, 2-inch force main directly to the wastewater treatment plant.

The Willow Park Village lift station serves the area generally east of Ranch House Road, south of Interstate 20, west of Hewitt Lane, and north of Bankhead Highway. The lift station was upgraded in 2015 and includes three 35 horsepower pumps rated at approximately 219 gpm each. This lift station pumps to a manhole in Willow Crossing Road through a 6-inch force main.

The Beavers Creek lift station serves the area bounded generally on the north by Scenic Drive, on the east by Tricia Trail, on the south by East Bankhead Highway, and on the west by Chuckwagon Trail. This station also receives flow from the Willow Park Village lift station. The Beavers Creek lift station was also upgraded in 2015 and consists of three 20 horsepower pumps rated at an estimated 278 gpm each and pumps via 6-inch force main to a manhole in Pitchfork Trail.

The Kings Gate lift station receives flow from the entire collection system except the few homes on Crown Lane previously mentioned. This station was upgraded along with the others and currently consists of three 25 horsepower pumps rated at an estimated 256 gpm each. This lift station pumps to the wastewater treatment plant through a 6-inch force main. The lift station clogs frequently due to the nature of the sewage and is in need of a grinder to eliminate heavy solids.

CITY OF WILLOW PARK

FIGURE IV.1

SEWER SYSTEM INVENTORY MAP

JULY 2019

JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

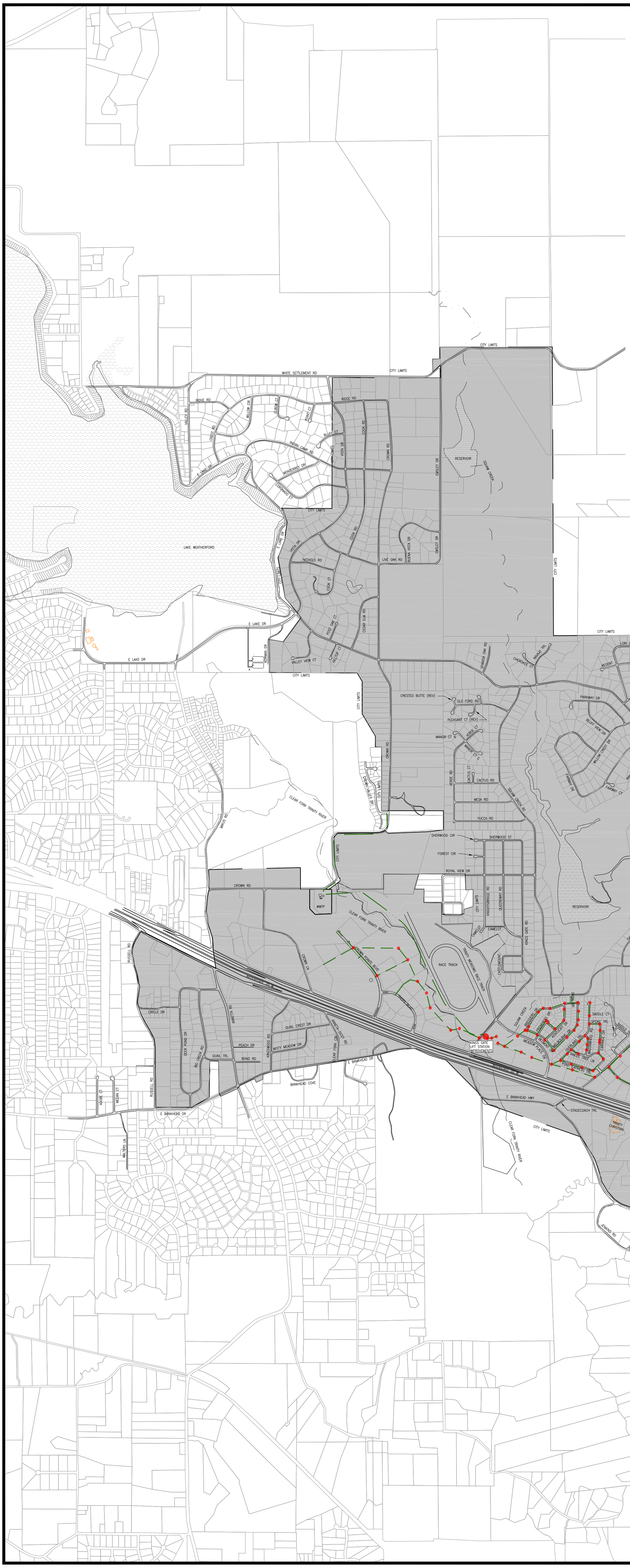
FIRM# F-2448

NORTH

1" = 1200'

LEGEND

- EXISTING SEWER LINE
- EXISTING FORCEMAIN
- CITY LIMITS
- CREEKS
- MANHOLE
- LIFT STATION
- CLEANOUT



The current capacity of the wastewater treatment plant is 500,000 gpd. The plant has been installed within the last year as an interim solution to the City's overall wastewater treatment needs. However, a project is in progress to expand the existing plant by an additional 500,000 gpd package. The interim facility is a conventional activated sludge wastewater plant just as the original plant was. The service area is located in the drainage basin for Lake Benbrook which has been designated as an impaired stream. Because of this, the TCEQ requires lower limits than would be typical for a plant of this size. The ultimate effluent standards in place for the plant are BOD-5 ppm, TDS-5 ppm, ammonia-nitrogen-1.5 ppm, and phosphorous-1.0 ppm. In order to meet these limits, filtration and coagulant feed are required to the plant. While this has been determined to be acceptable for the interim, 0.50 MGD plant, the TCEQ may not allow additional flow to be discharged into the Lake Benbrook watershed. Therefore, other options, such as land irrigation of effluent will have to be explored for the ultimate buildout.

D. Recommended Wastewater System Improvements

The capacity of the wastewater system has been impacted a great deal by inflow and infiltration as well as a high rate of growth in the community. Inflow and infiltration (I&I) occur when segments of the collection system are in disrepair and allow stormwater and water from other sources to infiltrate the sewer system. The City has had significant (I&I) over the last few years which results in overflows of manholes (unauthorized discharges), overburdening of lift stations and force mains, and capacity exceedance at the wastewater treatment plant. The City has begun the process of identifying sources of I&I and has significantly improved the system in recent months, however, some areas of the system still need to be addressed. Additionally, the City's Kings Gate lift station is in need of upgrades to prevent clogging of pumps and related treatment issues. Improvements discussed in the following sections are depicted in Figure IV.2.

1. Collection System

It is recommended that the City continue smoke testing and video of existing sewer mains. Problem areas identified to date have been addressed, but it is expected that other areas will be identified. It is also recommended that the City adopt and enforce a pretreatment program to prevent toxic materials from entering the collection system and eventually interfering with the treatment process. The Kings Gate Lift station should be equipped with a grinder as previously stated.

Recent improvements to the lift stations should last, with proper maintenance, for many years. The location and patterns of development will dictate when potential

CITY OF WILLOW PARK

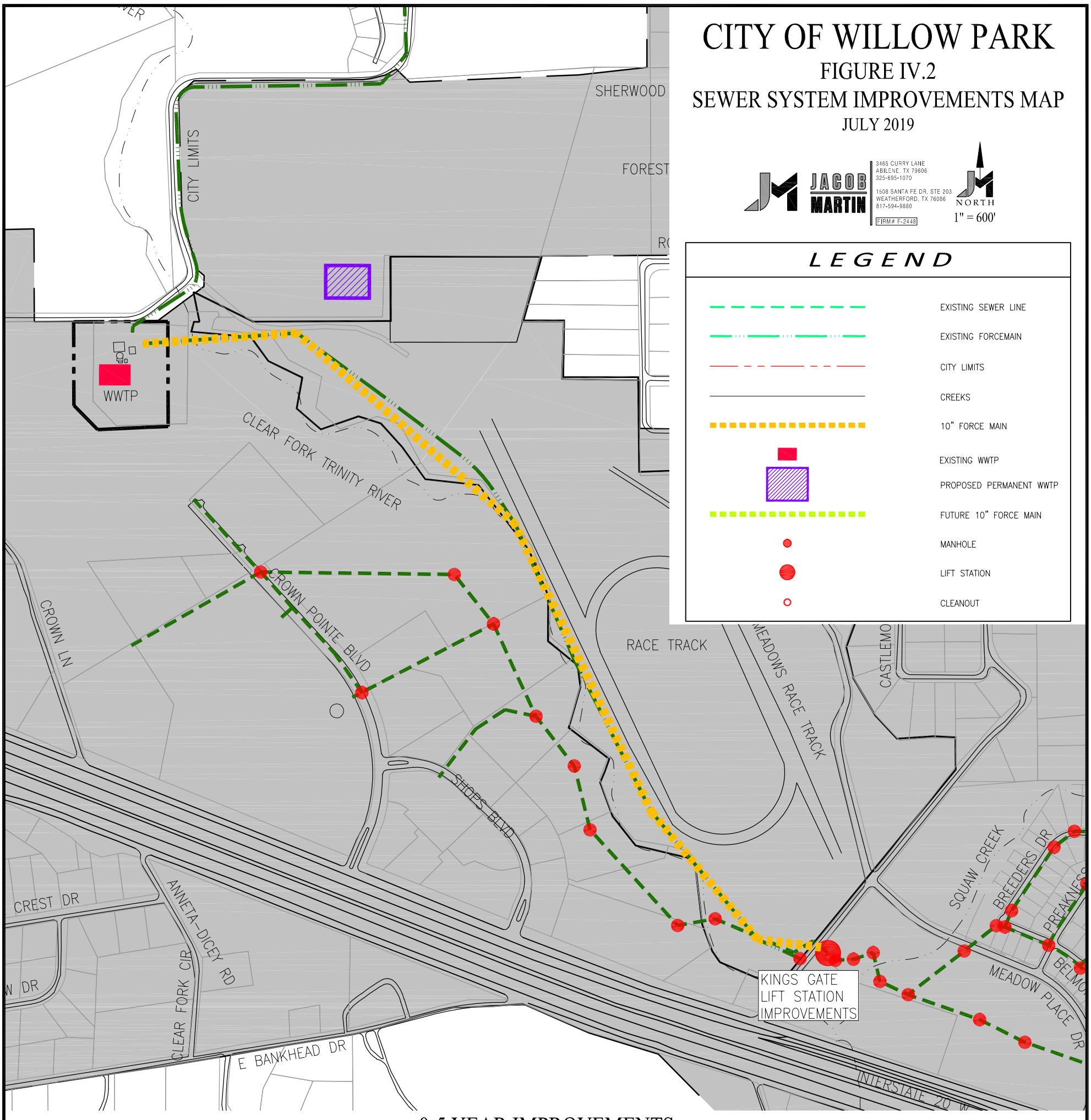
FIGURE IV.2
SEWER SYSTEM IMPROVEMENTS MAP
JULY 2019

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-695-1070
1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880
FIRM# F-2448

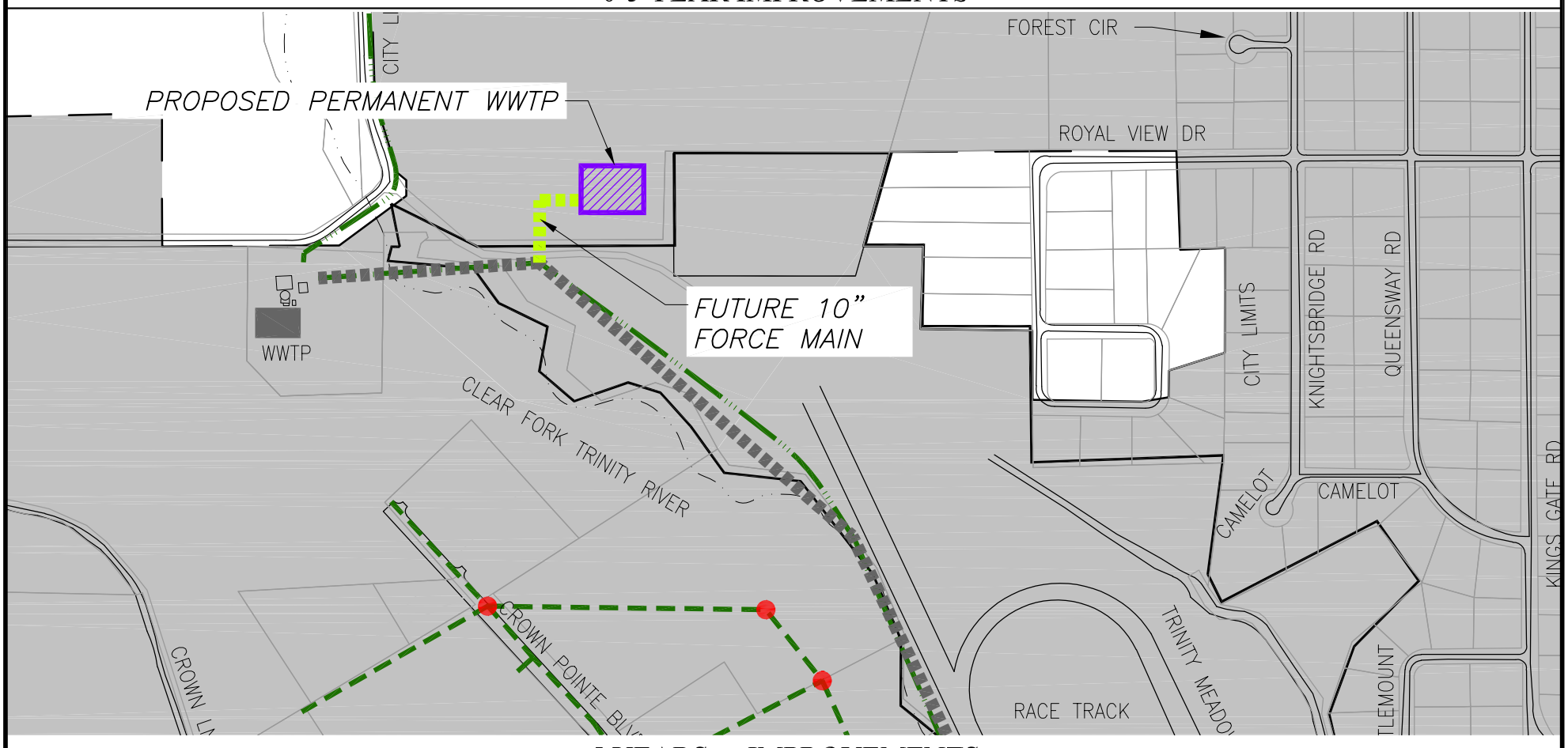
NORTH
1" = 600'

LEGEND

- EXISTING SEWER LINE
- EXISTING FORCEMAIN
- CITY LIMITS
- CREEKS
- 10" FORCE MAIN
- EXISTING WWTP
- PROPOSED PERMANENT WWTP
- FUTURE 10" FORCE MAIN
- MANHOLE
- LIFT STATION
- CLEANOUT



0-5 YEAR IMPROVEMENTS



5 YEARS + IMPROVEMENTS

improvements will be necessary as well as the need for new lift stations and collection lines. These improvements should be implemented through development impact fees.

2. Wastewater Treatment

As mentioned previously, the City has begun the preliminary engineering for a new 1.0 MGD wastewater treatment plant which would utilize the treatment equipment currently in place as well as added units. Based on the information in Table IV.1, the current plant would only be compliant until 2022 and the TCEQ has indicated that an acceptable timeframe for the interim plant will be approximately five years. Therefore, the City should strive to have a permanent solution for the wastewater treatment issues to be online as soon as possible. A suitable location for the permanent plant site must be selected as well. The City is exploring a potential site that may be better suited than the existing location. The proposed permanent plant would be designed for 1.0 MGD with expansion capabilities. This would be compliant up until the year 2040 at which time expansion would need to be underway for an ultimate capacity of 2.0 MGD. Conventional activated sludge remains the most efficient form of treatment, although all available technology should be investigated in light of the very stringent effluent limitations the plant will have to meet. Additionally, it is recommended locations for the irrigation of effluent be identified and secured as this will be a requirement of future permits for the disposal of wastewater effluent. Golf courses, parks, and athletic fields are among the sites commonly used for irrigation. The City is currently investigating a number of sites for this purpose. Other potential options should be explored as well including a joint effort with other communities to reduce the cost of the facility.

E. Priority and Cost Estimates

The following costs and priority timelines may help in planning and budgeting for capital improvement projects. Table IV.2 includes both the estimated costs of the recommended improvements and the recommended timeframes for completion of those projects. The costs in Table IV.2 make allowance for inflation.

TABLE IV.2
WASTEWATER SYSTEM IMPROVEMENTS
PRIORITY AND PROJECTED COSTS

Priority	Description	Cost
2017 -2022		
1	Collection System Inspection and Testing	$50,000
2	Permanent 1.0 MGD Wastewater Treatment Plant	$6,500,000
3	Kings Gate Lift Station Grinder	$75,000
2022-2030		
3	Collection System Improvements (I&I Reduction)	$100,000
2030-2040		
4	Wastewater Treatment Plant Expansion	$5,000,000

V. STREET SYSTEM

A. Inventory

An inventory of the City's existing streets was performed including arterial, collector, and local streets. This is depicted in the Figure V.1, Street System Map.

B. Evaluation

An evaluation was made of the condition of each street and improvements recommended based on the type of street, traffic volume, and condition. Table V.1 shows the streets identified as being in need of rehabilitation along with priorities and the associated cost.

While streets are not regulated like water and wastewater, the condition of the street can have a significant impact to the safety of residents and should be treated accordingly. Likewise, funding for street improvements is generally only available through the issuance of taxes and use of proceeds from property and sales taxes. Therefore, planning for future improvements is critical to maintain an adequate street system.

As part of that process, a seal coat program should be considered to maintain and extend the life of the streets that are not currently in poor condition or soon to be improved. A yearly operating allowance should be considered for this purpose in the street department budget and is usually in the range of $100,000 for a city the size of Willow Park.

For the streets that have been identified as in need of major rehabilitation, consideration should be given to the type of improvement that will result in the most economical solution while providing the longest life cycle for the street. Local streets that see lower traffic volume as well as lower weight vehicles may be asphalt reconstruction or overlay, while streets that see heavier traffic volumes and loads may warrant more expensive concrete paving. In general, the subgrade soils in Willow Park are expansive, which was not accounted for when much of the existing street system was constructed. In most cases, where street rehabilitation is recommended, subgrade stabilization should be considered as well. In some areas that have been recently upgraded and this was not done, the surface layer is showing evidence of premature cracking due to the subgrade condition.

TABLE V.1
STREET IMPROVEMENT PRIORITIES

Priority	Street	Street (Start)	Street (End)	Linear Feet	Street Type	Type of Replacement	Overall
1	Old Ford Road	Squaw Creek Road	End	1,600	Local	Reconstruction	300,000
1	Sam Bass Court	Sam Bass Road	End	1,300	Local	Reconstruction	243,750
1	Trinity Court	Trinity Drive	End	900	Local	Reconstruction	
1	Crown Road	Live Oak Road	Ridge Road	4,050	Arterial	Concrete	1,300,000
1	Ridge Road	Cook Road	Vista Drive	700	Local	Reconstruction	131,250
1	Vista Drive	Ridge Road	Coronado Court	2,250	Local	Reconstruction	421,875
2	Ranch House Road	Crown Road	Vista Drive	2,400	Arterial	Concrete	765,000
2	Mesa Springs Road	Ranch House Road	Jeri Ridge Road	800	Local	Reconstruction	150,000
2	Squaw Creek Road	Ranch House Road	Sam Bass Road	8,000	Major Collector	Concrete	2,600,000
SUBTOTAL							**5,911,875**
3	Lariat Court	Ranch House Road	End	400	Local	Reconstruciton	75,000
3	Buena Vista Drive	Emsley Drive	Live Oak Road	2,000	Local	Reconstruction	375,000
3	Valley View Court	Ranch House Road	End of Previous	750	Local	Reconstruction	140,625
3	Crown Road	Live Oak Road	Ranch House Road	2,300	Arterial	Concrete	733,000
3	Quail Trail	Big Creek Road	FM 5	750	Local	Overlay	60,938
3	Circle Court	Circle Drive	End	450	Local	Reconstruction	84,375
4	Chaparral Court	Willow Park Drive	Stagecoach Trail	1,000	Local	Reconstruction	187,500
4	Jeri Ridge Road	Pleasant Ridge Lane	Surry Lane	700	Local	Reconstruction	131,250
4	Jeri Ridge Road	Surry Lane	Stagecoach Trail	1,500	Local	Overlay	122,000
4	Appaloosa Street	Surry Lane	Scenic Trail	1,600	Local	Reconstruction	300,000
4	Buffalo Court	Appaloosa Street	End	400	Local	Reconstruction	75,000
4	Live Oak Court	Ranch House Road	End	500	Local	Reconstruction	93,750
4	Knights Bridge Road	Royal View Drive	Camelot	1,350	Local	Overlay	109,688
4	Castlemount	Kingsgate Road	Kingsgate Road	1,500	Local	Overlay	121,875
4	Camelot	Queensway Road	Kights Bridge Road	500	Local	Reconstruction	93,750
4	Vista Drive	Live Oak Road	Nichols Road	1,000	Local	Reconstruction	187,500
4	Vista Drive	Coronado Court	Live Oak Road	1,500	Local	Reconstruction	281,250
4	Kingswood Road	East Bankhead Drive	IH20 Service Road	1,800	Local	Overlay	146,250
4	Bond Road	FM 5	End	600	Local	Overlay	48,750
SUBTOTAL							**3,367,500**
5	Chuckwagon Trail	Stagecoach Trail	Pitchfork Trail	2,000	Local	Overlay	162,500
5	Stagecoach Trail	Ranch House Road	El Chico Trail	2,000	Minor Collector	Reconstruction	375,000
5	El Chico	Surry Lane	Pleasant Ridge	1,000	Local	Reconstruction	187,500
5	El Chico Trail	Fox Hunt Trail	Surry Lane	1,600	Local	Overlay	130,000
5	Surry Court	Ranch House Road	End	550	Local	Reconstruction	103,125
5	Surry Lane	Tumbleweed Trail	Ranch House Road	2,500	Local	Overlay	203,125
5	Trinity Drive	Ranch House Road	Sam Bass Court	1,400	Local	Overlay	113,750
5	Tumbleweed Trail	Surry Lane	Appaloosa Street	1,100	Local	Overlay	89,375
5	Crested Butte Court	Old Ford Road	End	200	Local	Reconstruction	37,500
5	Pleasant Court	Old Ford Road	End	400	Local	Overlay	32,500
5	Ranch House Court	Ranch House Road	End	500	Local	Overlay	40,625
5	Royal View Drive	Queensway Road	City Limit	950	Local	Overlay	77,188
5	Vista	Nichols Road	Ranch House Road	1,200	Local	Reconstruction	225,000
5	Hill Top Court	Ranch House Road	End	400	Local	Reconstruction	75,000
5	Cook Road	Indian Camp Road	Ridge Road	1,650	Local	Overlay	134,063
5	Emsley Drive	Live Oak Road	White Settlement Road	4,700	Minor Collector	Reconstruction	881,250
5	Live Oak Road	Crown Road	Cook Road	2,000	Local	Overlay	162,500
5	Live Oak Road	Crown Road	Emsley Drive	1,500	Local	Reconstruction	281,250
5	Russell Road	East Bankhead Drive	Circle Drive	2,600	Local	Overlay	211,250
5	Misty Meadows Drive	Quail Crest Drive	Kingswood Road	1,250	Local	Overlay	101,563
5	Quail Crest Drive	Clear Fork Circle	Kingswood Road	1,500	Local	Overlay	121,875
SUBTOTAL							**3,745,938**
TOTAL							***$ 13,025,312.50***

CITY OF WILLOW PARK

FIGURE V.1

STREET IMPROVEMENTS MAP

JULY 2019

JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
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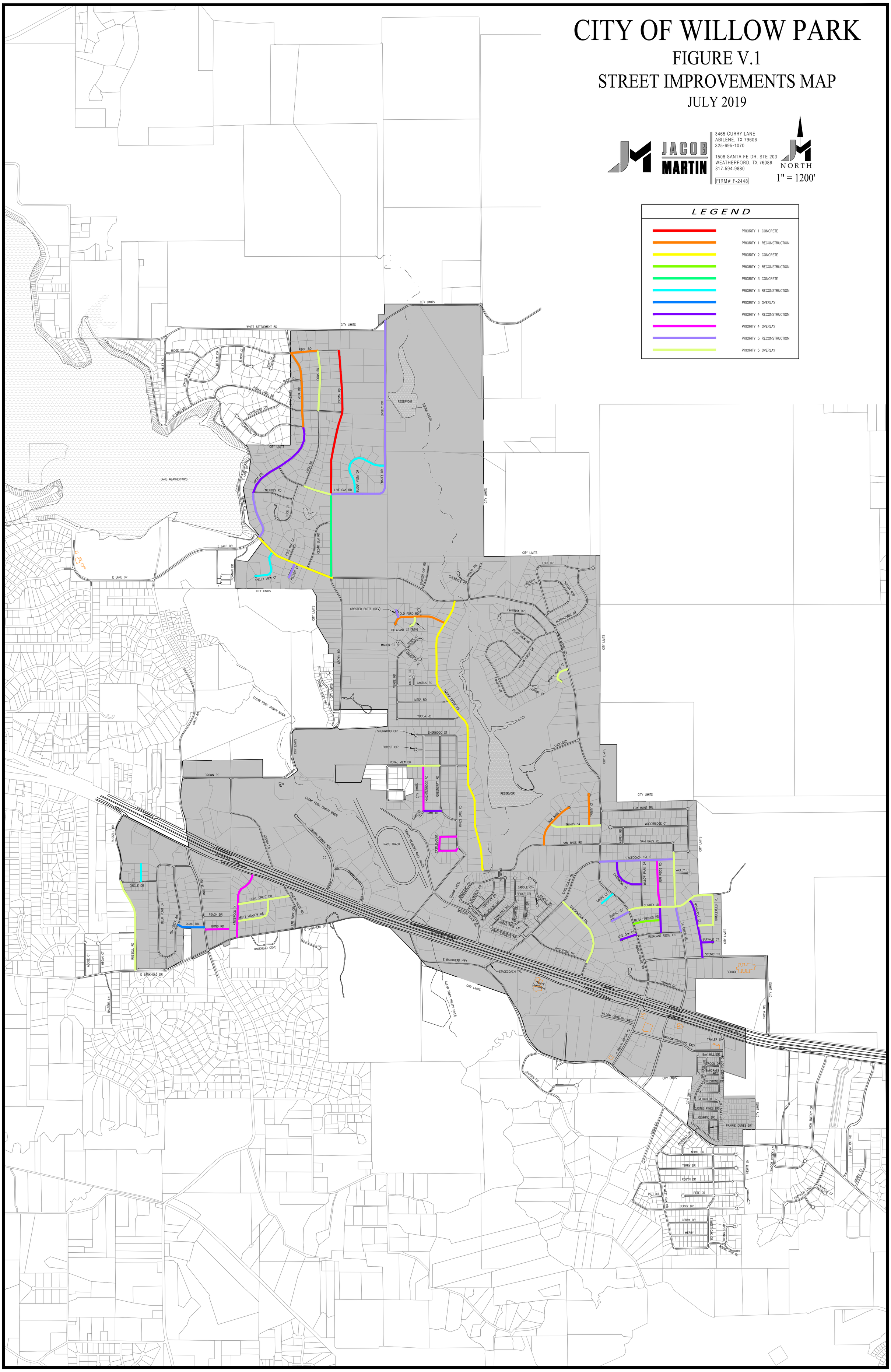
FIRM# F-2448

NORTH

1" = 1200'

LEGEND

- PRIORITY 1 CONCRETE
- PRIORITY 1 RECONSTRUCTION
- PRIORITY 2 CONCRETE
- PRIORITY 2 RECONSTRUCTION
- PRIORITY 3 CONCRETE
- PRIORITY 3 RECONSTRUCTION
- PRIORITY 3 OVERLAY
- PRIORITY 4 RECONSTRUCTION
- PRIORITY 4 OVERLAY
- PRIORITY 5 RECONSTRUCTION
- PRIORITY 5 OVERLAY



VI. DRAINAGE SYSTEM

A. Inventory

In 2019, the City authorized JACOB & MARTIN, LLC to complete a master plan for the City's drainage system. That study was completed in March 2019 and contains an inventory of the City drainage infrastructure as well as hydrologic and hydraulic analyses for most of the system's conveyance structures components. Table VI.1 is a summary of the findings of that report. Figure VI.1 shows the City's drainage infrastructure.

Table VI.1
PROPOSED DRAINAGE SYSTEM IMPROVEMENTS

Project Years	Items of Description	Cost
1-5	• Install area inlet near Ranch House Road and Regent Row and approximately 600LF of 54" RCP storm drain to the creek. • Clear debris blocking channel near I-20 and Chuckwagon Trail. Install concrete inlet to divert water from flooding the I-20 access road. • Improve drainage channel on east side of the City near Valley Ct. and El Chico Trail. • Improve area where Squaw Creek crosses under Sam Bass Rd. Remove excess concrete, clear site, and improve channel. • Install 36" RCP culvert at upstream end of channel near 133 Sam Bass Rd and regrade channel. • Replace undersized culverts that have over 150 cfs of incoming flow. • Establish drainage utility or other means of managing a stormwater program.	$ 1,400,000
6-10	• Continue to replace undersized culverts and continue stormwater management program.	$ 250,000/yr

CITY OF WILLOW PARK

FIGURE VI.1

DRAINAGE IMPROVEMENTS MAP

JULY 2019

JACOB MARTIN

3465 CURRY LANE
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1508 SANTA FE DR, STE 203
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FIRM# F-2448

NORTH

1" = 1200'

LEGEND

PRIORITY 1 IMPROVEMENTS

PROPOSED CHANNEL IMPROVEMENTS

PROPOSED CHANNEL IMPROVEMENTS

PROPOSED STORM DRAIN IMPROVEMENTS

PROPOSED CHANNEL IMPROVEMENTS

PROPOSED CHANNEL IMPROVEMENTS

PROPOSED STORM DRAIN IMPROVEMENTS

PROPOSED CHANNEL IMPROVEMENTS

VII. CONCLUSIONS AND RECOMMENDATIONS

Based on our evaluation of the City of Willow Park's water and wastewater systems, we offer the following conclusions and recommendations to assist the City with decisions related to capital improvements through the year 2050.

A. Water System

Resolving the City's water supply needs is of the highest priority. The following is recommended toward that end:

- Complete the new and rehab water well program as a stop gap measure by 2020.
- Complete surface water improvements to Ft. Worth by 2022.

These projects would resolve current water supply deficiencies and would be anticipated to address water supply needs through the year 2050.

The reduction of water loss and improving pressure maintenance while serving expected growth should be the next priority:

- Install a new elevated tank near the El Chico Pump Station by 2025.
- Complete replacement of old, poorly installed and deteriorated lines by 2030.
- Complete the Crown Road loop by 2030.
- Complete the Bay Hill loop by 2030.

These projects would protect the water supply and insure that expected growth could be accommodated.

Long term supply and demand service should be considered early in the planning period to eliminate shortages in the future:

- Install Phase 2 of the Ft. Worth supply facilities by 2035.
- Replace an existing elevated tank with a larger tank by 2040.
- Install fire hydrants in various locations as needed by 2040.

The completion of the Ft. Worth water supply infrastructure would help insure adequate supply through the year 2050. The location of the proposed elevated tank upsize would depend on growth patterns and condition of the existing tanks.

- Complete the Russell Road loop by 2050.
- Upsize small lines in existing service areas by 2050.

These improvements would allow complete distribution of each water source throughout the service area.

B. Wastewater System

The upgrade of the City's wastewater treatment system should be the highest priority. The City should continue with the projects that are underway to address this concern:

- Upgrade the existing Kings Gate lift station by early 2020.
- Begin permitting and design for a new permanent wastewater plant by 2020.

In order to prolong the life of the treatment system and eliminate unauthorized discharges, the City should undertake collection system improvements as soon as possible.

- Begin collection system inspection and testing by 2020.
- Complete collection system replacements and repairs by 2022.

The ultimate solution to the City's wastewater treatment and disposal issues should be resolved as quickly as possible.

- Complete the permanent 1.0 MGD wastewater treatment plant by 2023

Planning for expansion on the proposed permanent wastewater plant will allow for the City to serve future growth in the wastewater system without unnecessary capital expenditure.

- Complete expansion of the permanent wastewater plant by 2040.

C. Streets

A focus on the upgrade of the City's streets should be maintained. The City should continue with the projects that are underway to address this concern:

- Complete priority 1 and 2 street improvements by 2025.
- Begin a yearly seal coat program by 2020.

In order to ensure a safe and adequate street system other lower grade streets should be upgraded:

- Begin priority 3 and 4 street improvements by 2025.
- Continue yearly maintenance program.

Assuming yearly maintenance is performed on all streets, the final priority upgrades can be completed without revisiting previously rehabilitated streets.

- Complete priority 5 and beyond streets by the year 2035
-

D. Drainage

Inadequate drainage can result in significant property damage, damage to infrastructure and even loss of life. Additionally, drainage issues tend to worsen over time as erosion occurs. The City should allocate funds to address significant drainage issues:

- Complete priority years 1-5 by 2025.
- Complete second tier priority projects by 2030.

VIII. FINANCING OF IMPROVEMENTS

The water and wastewater improvement projects currently underway are being funded by low interest loans from the Texas Water Development Board and local bond issues. The larger, future recommended improvements should be funded by the Texas Water Development Board as the terms of their funding is very favorable. Smaller projects should be funded by a combination of yearly budgeting and bond issues.

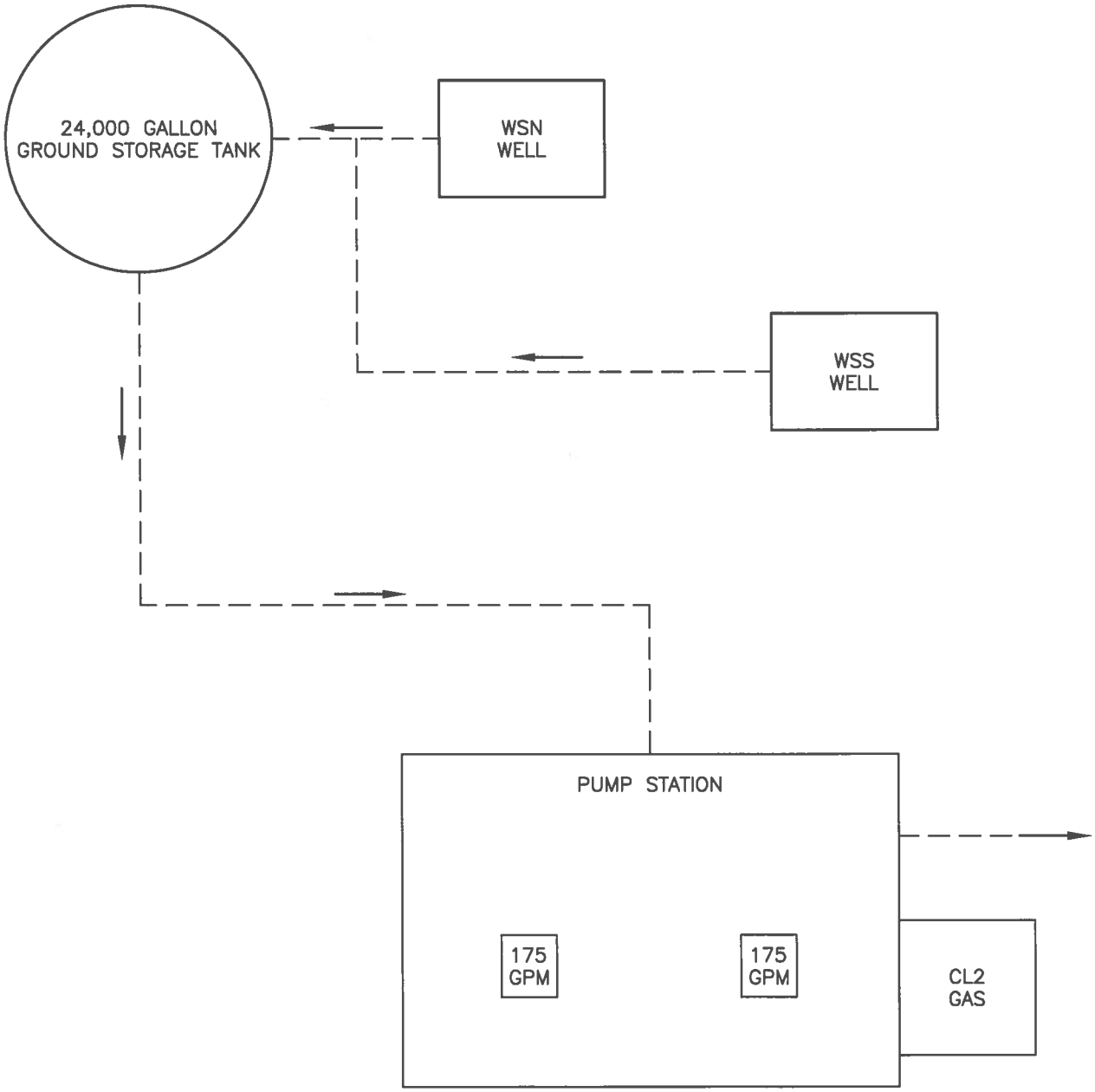
Street and drainage projects are not generally ranked well enough to be funded through state and federal agencies. The City should consider allocating in the yearly budget for as much as possible and fund larger projects through general obligation bonds or tax notes.

Additionally, capital improvement fees should be evaluated periodically. These fees can be used to fund much of the improvements needed in the system. As development increases in the City, impact fees will also serve to offset potential rate increases. Regardless of the financial vehicles used to fund the recommended projects, it is likely that water and sewer rates will have to increase as well.

IX. CLOSURE

The City should continue to evaluate this plan on a five year basis. As development occurs, the need and timing for various improvements will be more clearly defined. The City should continue to encourage develop in accordance with the most recent comprehensive plan and this document.

APPENDIX A – Pump Station Schematics

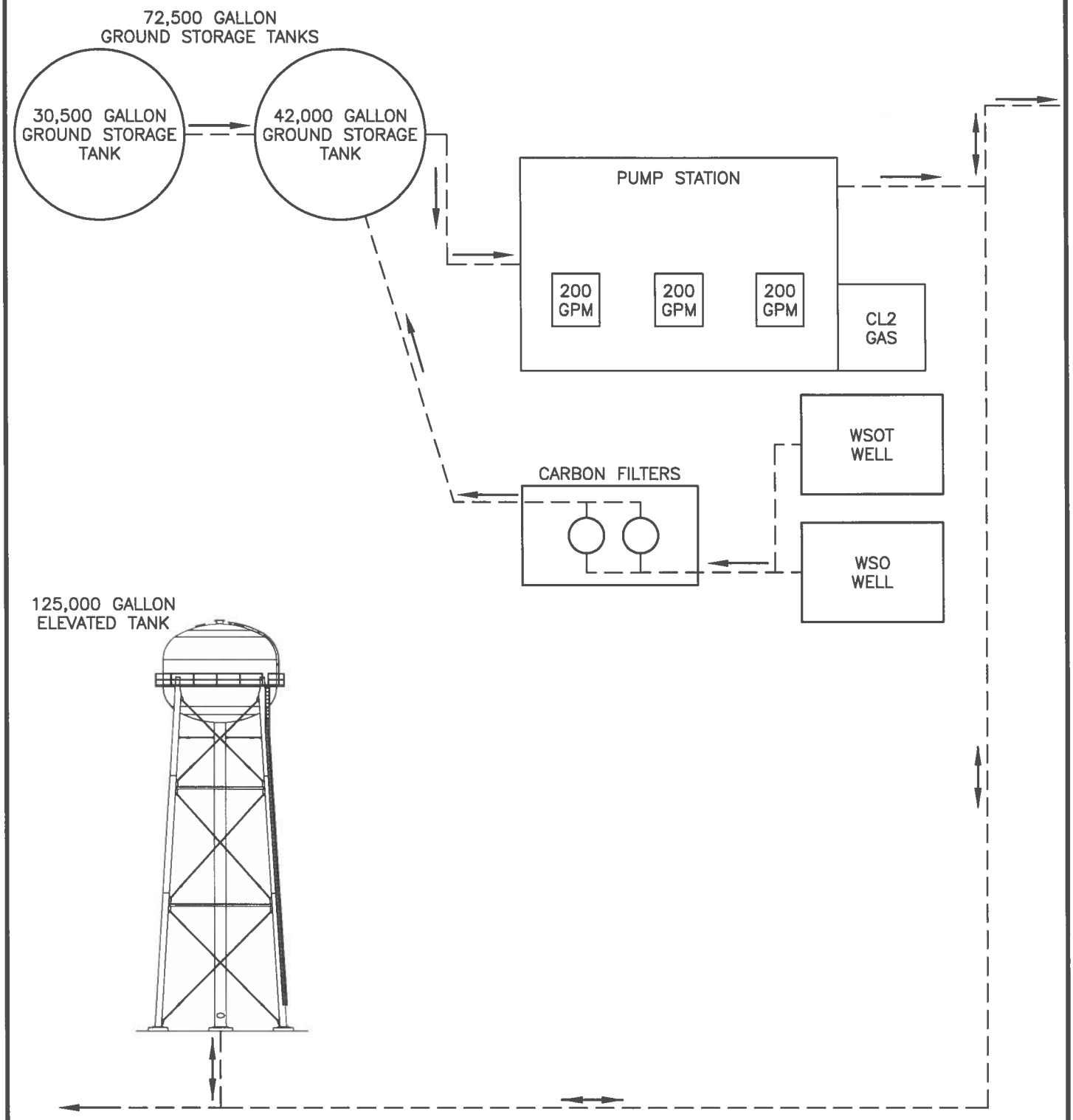


WILLOW SPRINGS

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS
516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-695-1070
1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-8680
FIRM # F-2448



WILLOW SPRINGS OAKS

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

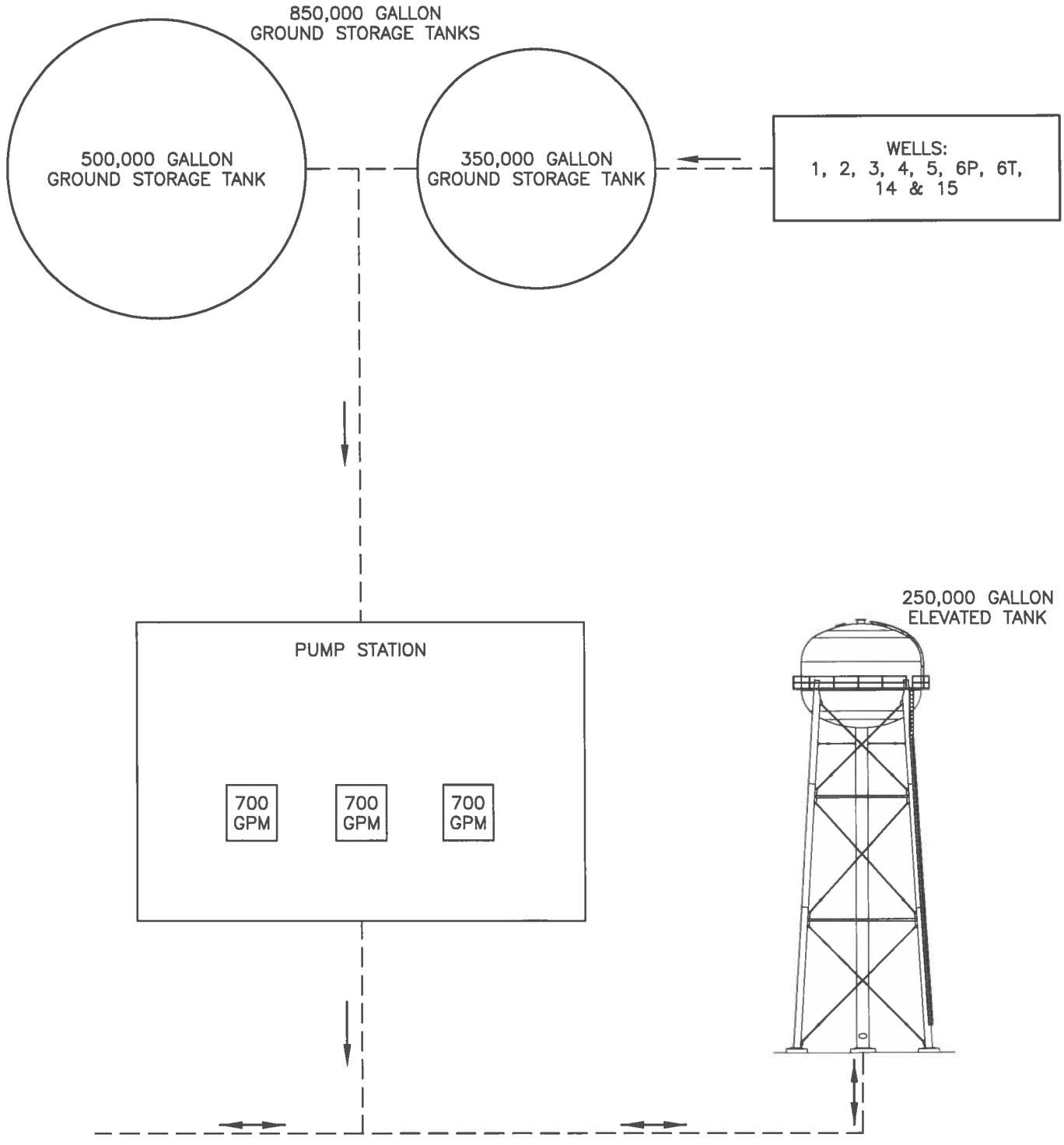
516 Ranch House Road * Willow Park, Texas 76087
Phone 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448



INDIAN CAMP

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

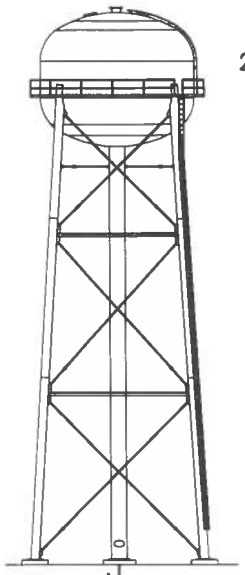
516 Ranch House Road * Willow Park, Texas 76087
Phone 817-441-7108 * Fax 817-441-6900

JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448



250,000 GALLON
ELEVATED TANK

WELL (16T)

WELL (16P)

WELL (9)

PUMP STATION

CL2
GAS

300
GPM

300
GPM

286,000 GALLON
GROUND STORAGE TANK

FOX HUNT

STATION SCHEMATIC

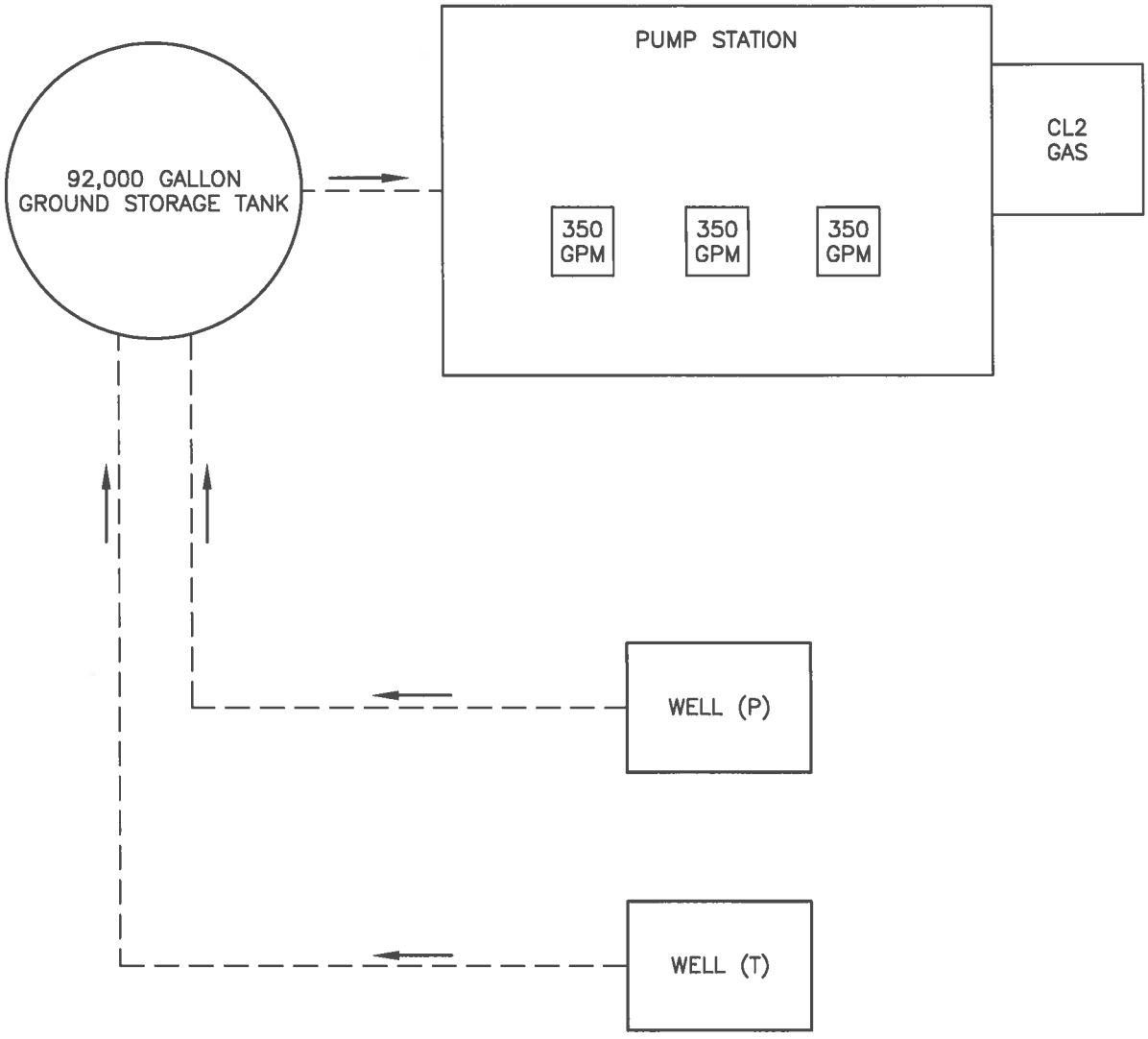
CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS
516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2446



SURREY LANE (SITE 10)

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

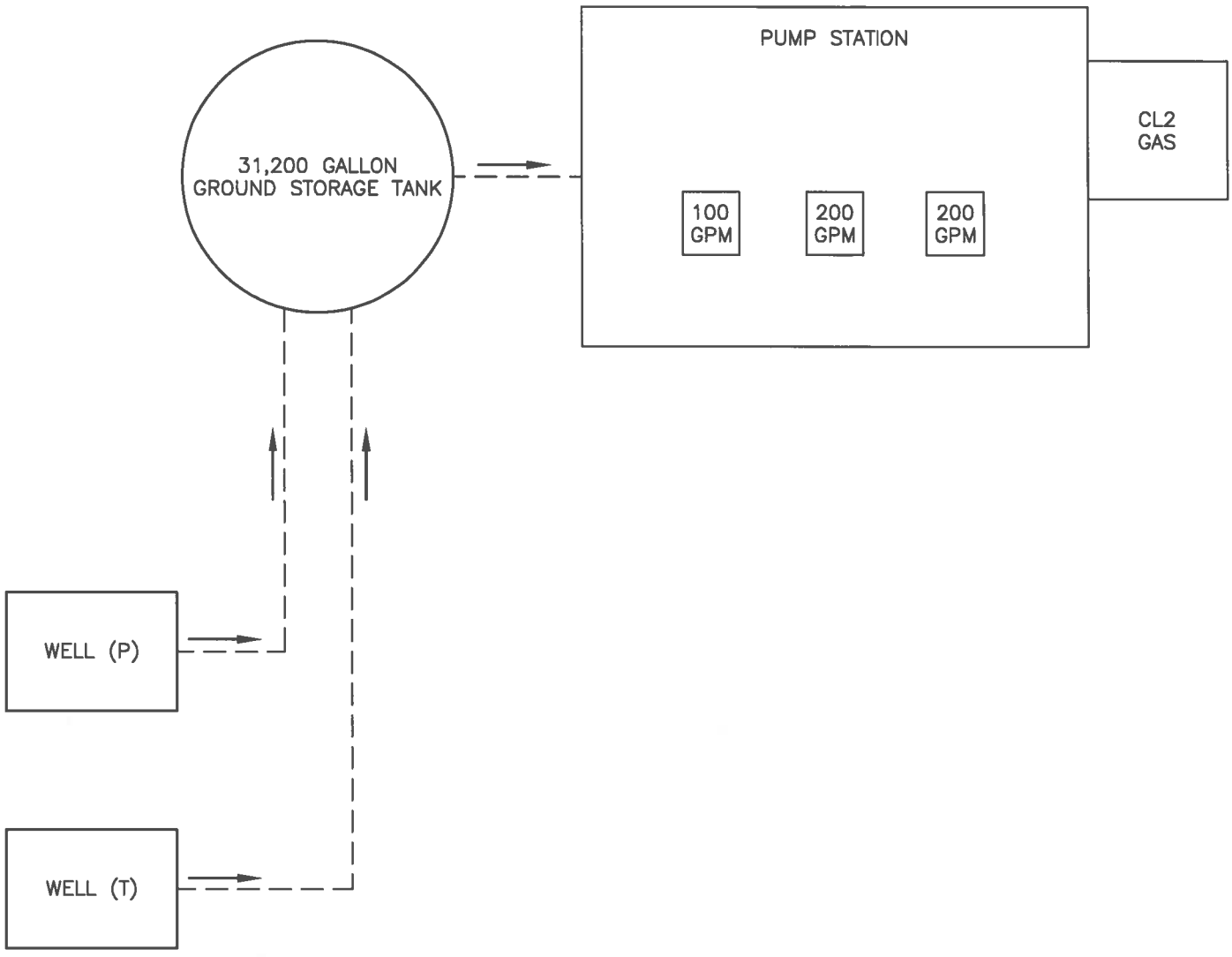
516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN

3485 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448



EL CHICO

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

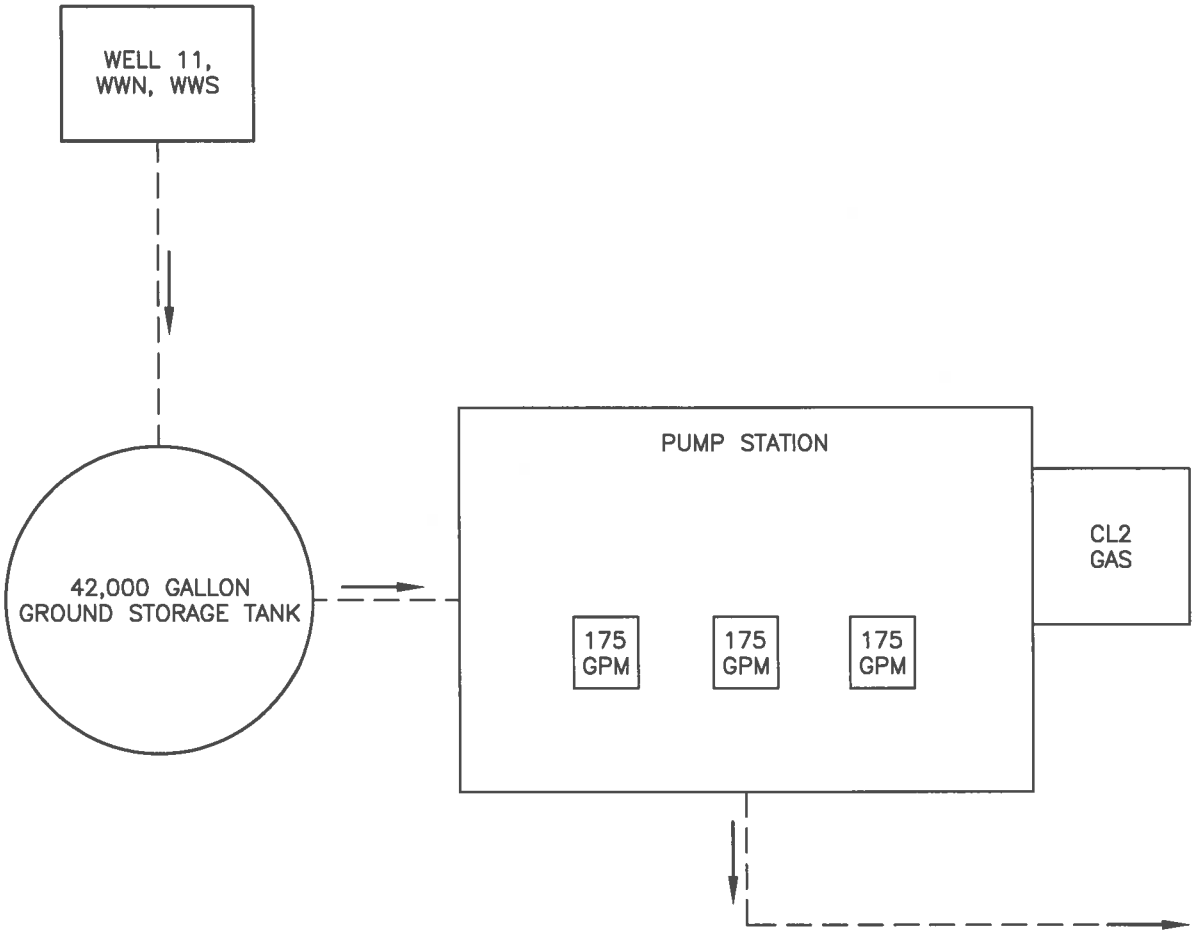
516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN

3405 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448



WILLOW WOOD

STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

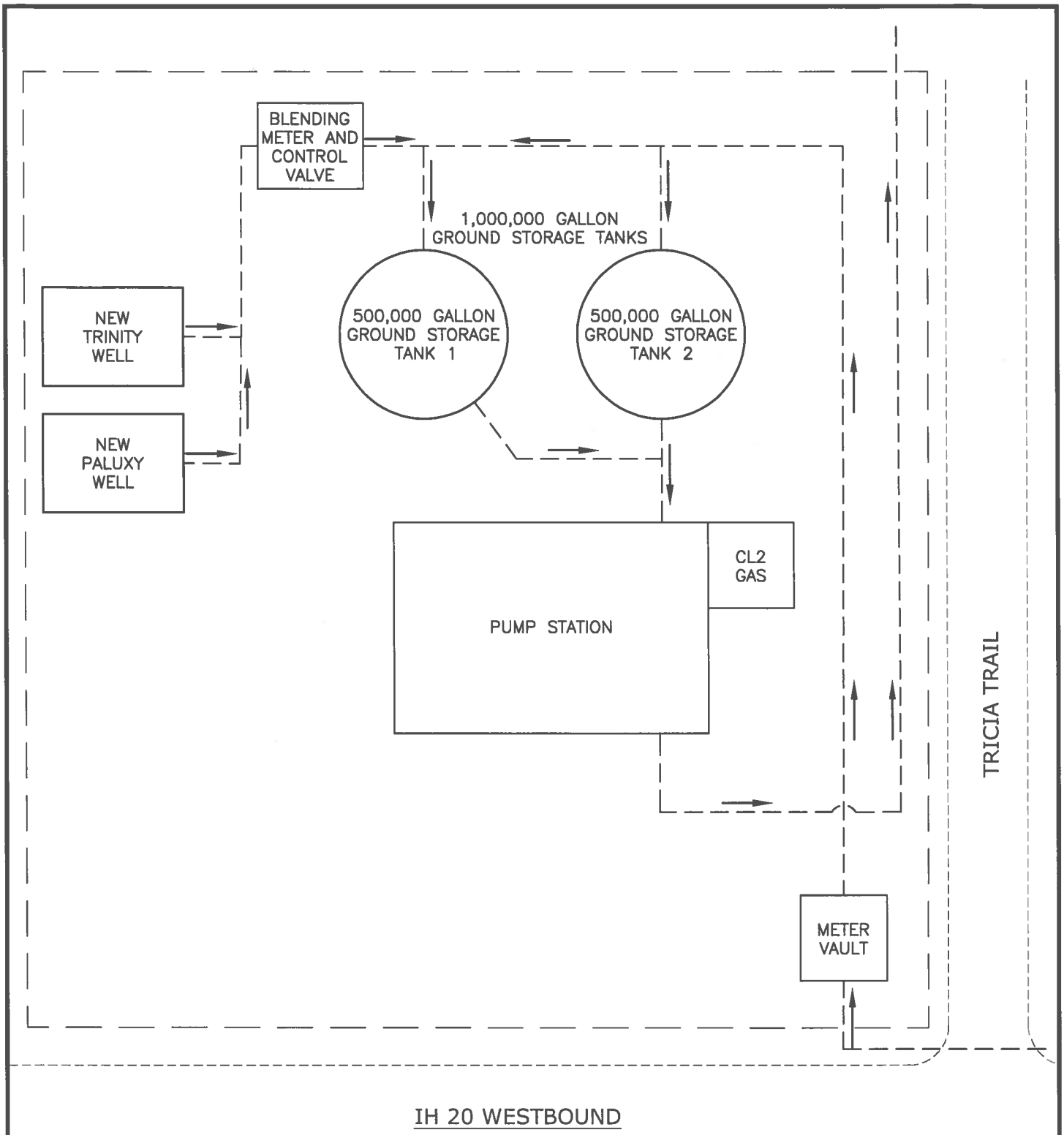
JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

1509 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2446

APPENDIX B – Proposed Surface Water Pump Station Schematic



PROPOSED SURFACE SUPPLY

PUMP STATION SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS

516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

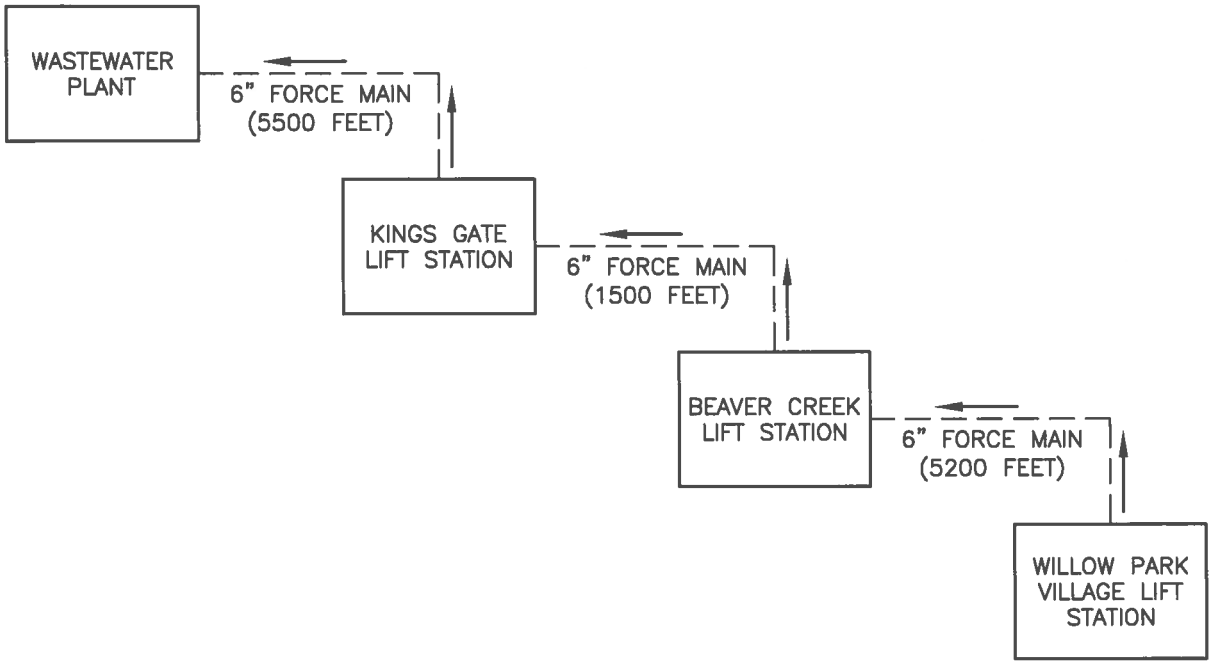
JACOB MARTIN

3465 CURRY LANE
ABILENE, TX 79606
325-695-1070

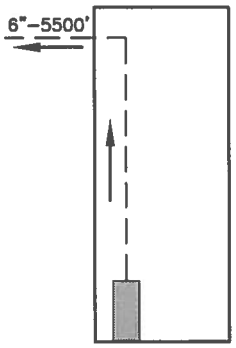
1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880

FIRM# F-2448

APPENDIX C – Lift Station Schematic

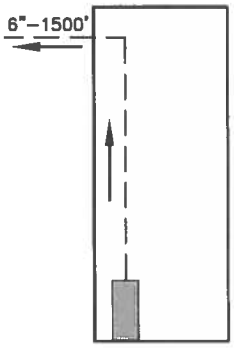


KINGS GATE LIFT STATION



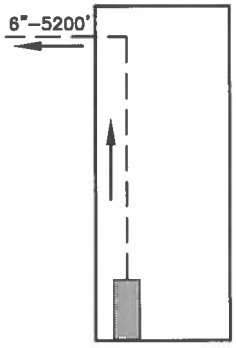
KINGS GATE LIFT STATION
3-25 H.P. PUMPS
FIRM PUMPING CAPACITY=512 G.P.M.

BEAVERS CREEK LIFT STATION



BEAVERS CREEK LIFT STATION
3-20 H.P. PUMPS
FIRM PUMPING CAPACITY=556 G.P.M.

WILLOW PARK VILLAGE LIFT STATION



WILLOW PARK VILLAGE LIFT STATION
3-35 H.P. PUMPS
FIRM PUMPING CAPACITY=438 G.P.M.

LIFT STATION

SCHEMATIC

CITY OF WILLOW PARK,
PARKER COUNTY, TEXAS
516 Ranch House Road * Willow Park, Texas 76087
Phone: 817-441-7108 * Fax: 817-441-6900

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-695-1070
1508 SANTA FE DR, STE 203
WEATHERFORD, TX 76086
817-594-9880
FIRM# F-2448