Water Master Plan

February 2018, Revised March 2024

2017 WATER SYSTEM MASTER PLAN

02/06/18

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Revisions to this report were made to update the Capital Improvement Plan Section on March 2024.

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I. EXECUTIVE SUMMARY

This Water System Master Plan Update and Capital Improvements Plan presents analyses, findings, and recommendations for implementing a plan to meet the City of Lake Worth's infrastructure needs until buildout. The City has nearly reached buildout of its City limits and has consequently completed the majority of the necessary water system improvements to serve their citizens. The City is beginning to move from the need to construct new water lines to the need for rehabilitation of existing infrastructure. Therefore, the basis for anticipated infrastructure improvement is for system redundancy and reliability and the need for rehabilitation of existing infrastructure.

Historical wholesale water usage data and historical customer connections from the last 10 years were provided by the City. Using the historical customer connection count and historical water usage data, Kimley-Horn projected water demand (average day, maximum day, and peak hour) values until buildout. The water system was analyzed against established TCEQ criteria for water systems. Kimley-Horn found that the City is in compliance with TCEQ criteria. Additionally, the water system was analyzed using WaterCAD™ hydraulic modeling software by Haested Methods. Fire flow tests, performed by Kimley-Horn and City staff, were used to calibrate the water system model to reflect actual system conditions within the City. The calibrated model enabled Kimley-Horn to evaluate whether the existing water system met the design criteria established by Kimley-Horn . A notable finding was that portions of the City with cast iron lines and lines smaller than 6-inch diameter have fire flow deficiencies.

Three Capital Improvement projects are recommended, totaling approximately $4.05 million dollars. These projects are focused on redundancy and reliability in the system. The projects link transmission lines to the City's water sources, the Stadium 1.0 MG EST and the two wholesale meters where the City receives water from the City of Fort Worth. If one of these sources were to fail or be taken off line, having adequate transmission capabilities will be important to efficiently move water across the City to meet peak demands.

Although not established as a Capital Improvement project, Kimley-Horn recommends the City implement a program to eliminate all cast iron water mains and water mains smaller than 6" in diameter throughout the City. Replacing small and old water lines will be important to increase the fire flow capability and water quality of the system.

REVISED MARCH 2024

II. INTRODUCTION

This report is an update to the 2000 Water System Master Plan. Significant upgrades have been made to the City's pumping, storage, and transmission infrastructure since the 2000 Water System Master Plan. Additionally, the City of Lake Worth (City) has nearly completely built-out to the city limits, save for some small tracts of land and opportunities for infill.

Because the City is nearly built-out, the focus of this report was to ensure that the existing system is adequately supporting the City's needs, to make recommendations for rehabilitation of the existing system, and to ensure system durability and reliability. Customer demands and infrastructure were analyzed and compared to existing City and TCEQ criteria to determine improvements needed to provide the City with a reliable water distribution system. Kimley-Horn's background knowledge of the history and growth of the City's water system helped facilitate the development of the following Water System Master Plan and Capital Improvements Plan.

Description of Study Area

The Water System Master Plan's study area is defined by the City's existing city limits boundary. The service area is approximately 1,590 acres (approximately 2.5 square miles). Being bound by the City of Fort Worth (Fort Worth) and Lake Worth to the west, the City's service area is not expected to grow into the future. See **Appendix A – Existing Land Use** for an illustration of the City's service area. It should be noted that there are several residential homes outside of the city limits, on Fort Worth's water system, that the City provides wholesale water service to. These residential homes have not been included on the service area boundary map.

Objective and Scope of Study

The goal of this report is to develop a strategic plan that allows the City to continue to serve its customers and citizens into the future. Most of the major infrastructure necessary for the City's buildout has already been constructed. The focus of this report was to ensure that the water system is adequate to continue to meet the City's expected level of service, ensure redundancy and reliability, provide recommendations for rehabilitation projects, and confirm adequate fire protection throughout the City.

Water System Definitions

The following terms are used throughout this report. The definitions may provide the reader a better understanding of the subtle difference between several of these terms.

Average Day Demand (ADD) - Annual water consumption divided by the number of days in a year. The average daily water demand a given water system experiences over a one-day period.

Capital Improvements Plan (CIP) - Recommended improvements to the water distribution system based on population and water demand projections for future conditions.

Demand (Consumption) - Volume of water used for a given time period, typically measured in units of Million Gallons Per Day (MGD) or gallons per minute (gpm).

Diurnal Curve – Typically a graph depicting water demand over a 24-hour period with demand plotted on the y-axis and time plotted on the x-axis.

ETJ - Extra Territorial Jurisdiction

Firm Pumping Capacity - The total pumping capacity that a pump station (by pressure plane) can deliver with the largest pump out of service.

GPD - Gallons Per Day

Maximum Day Demand (MDD) - Water consumption, in volume of water, used on the highest consumption day in a year.

MGD - Million Gallons per Day

Peak Hour Demand (PHD) - The maximum one-hour water demand given in units of volume per day that a given distribution system experienced or would experience during a particular year or other time period.

Peaking Factor - The factor applied to the maximum day demand to determine peak hour and minimum hour demand during maximum day demand conditions.

Pressure Plane (Pressure Zone) - A network of water pipes having a common pressure range; each plane may be separated from the other planes by closed valves, pressure-regulating valves, pump stations, and storage facilities.

PSI - pounds per square inch (U.S. customary units for pressure)

TCEQ - Texas Commission on Environmental Quality.

Total Pumping Capacity - The total pumping capacity that a pump station can deliver.

Transmission System (Piping) - Transmission piping typically consists of 12” diameter and larger piping, and have minimum service connections if possible and function primarily as the vehicle to move larger quantities of water throughout the water system. The distribution piping consists of 10” diameter and smaller piping.

III. DATA COLLECTION AND LAND USE

Data Collection

Evaluation of the existing system required collection of physical attributes of the existing water system and collection of historical customer demands. City staff provided the distribution piping network in electronic format, pump station information, storage tank information, and general water system operating procedures. City staff also provided historical monthly wholesale meter records for the last 10-years, monthly water well pumping records for the last 10-years, monthly customer billing records for the last 10-years, and annual building permits for the last 10-years. Maximum day and maximum hourly wholesale water usage from Fort Worth was provided by Fort Worth for the last 9-years. Texas Water Development Board utility profiles for the last 10-years were also provided by City staff. Fire hydrant flow tests and pressure tests were conducted by Kimley-Horn and City staff.

Existing Land Use

Kimley-Horn utilized land use information available from the Tarrant County Appraisal District as the starting point for the existing land use map. The Tarrant County Appraisal District maintains a database of parcels within Tarrant County, categorized by existing land use type. Kimley-Horn used current aerials of the City and site visits to verify the accuracy of the existing land use. The predominant land use in the City is single family residential. The average residential lot is approximately 1/4 acre. The City also has significant commercial development, specifically along Azle Ave. and Lake Worth Blvd. The commercial developments are a mix of retail and restaurants. The majority of the remainder of the non-residential development is composed of schools, City and County administration buildings, and notably the Ritchie Brothers auction lot. Most of the vacant land within the city limits has been developed. There are opportunities for infill in residential areas and redevelopment of commercial areas north of Azle Ave. The existing land use was an important part of understanding the water usage and distribution throughout the City. Refer to **Appendix A – Existing Land Use Map** for an illustration of the existing land use map. **Table 1** summarizes the existing land use within the City's service area.

Table 1 – Existing Land Use

Type	Existing Land Use	
	Acreage	% of total
Single Family Residential	518	33%
Multi-Family Residential	9	1%
Commercial	401	25%
Industrial	0	0%
Public / Semi-Public	19	1%
School	66	4%
Church	23	1%
Park	45	3%
Utility	4	0%
Vacant / Open-Space	142	9%
Right-of-Way	361	23%
Total	**1,588**	

Ultimate Land Use

The ultimate land use plan supplemented the existing land use plan. The remainder of the vacant land is generally categorized as infill and is anticipated to develop similar to adjacent tracts. An exception to the infill is a tract of land east of Hodgkins Rd. that is anticipated to develop as multi-family. Refer to **Appendix B – Ultimate Land Use Map** for the ultimate land use plan. The infill and redevelopment is not anticipated to have a significant impact on the water distribution system. **Table 2** summarizes the breakout of the anticipated ultimate land use within the City's service area.

Table 2 – Ultimate Land Use

Type	Ultimate Land Use	
	Acreage	% of total
Single Family Residential	594	38%
Multi-Family Residential	20	1%
Commercial	453	29%
Industrial	3	0%
Public / Semi-Public	19	1%
School	66	4%
Church	23	1%
Park	45	3%
Utility	4	0%
Vacant / Open-Space	0	0%
ROW	361	23%
Total	**1,588**	

IV. WATER DEMAND PROJECTIONS

Because the City is mostly developed, only two water demand scenarios were generated: Existing Condition and Buildout Condition. Reviewing historical building permit information and historical numbers of water connections, the City's growth has been relatively modest in the past 5 years. This growth trend would be expected as the majority of the tracts of land are developed and only infill or redevelopment opportunities are available. Due to a flat historical growth rate and the fact that future development in the City will be decided on a case-by-case basis by home owners and developers, a projected growth rate was not established for the buildout of the City. Instead, water demand projections will be presented as existing condition and buildout condition.

Water demand projections can be made using population, number of meter connections, or land use as the basis for projection. Water demands are projected into the future by determining the historical water usage per capita, per connection, or per acre of a land use type and then tying the growth of the water demand projections to the growth one of these categories. For this report, due to the availability of individual customer historical water use records by land use type, the land use method was selected as the ideal way to project future water demands.

Land Use Demand

Land use projections were used to project future water demands. The City's billing system provided monthly flows for each water connection in the City. Each connection was correlated with its corresponding land use type. With the known land use type and acreage of the corresponding parcel, a water demand loading factor could be calculated for each parcel by land use type. Controlling for statistical outliers, an average day water demand loading factor was created for each land use type to be used for projecting future water demand to undeveloped parcels. **Table 3** lists the average day water demand loading factors for each land use type. It should be noted that 2016 was used as the basis for establishing the average day water demand loading. Additional historical data from before 2016 and recent water usage from 2017 were used as a comparison to ensure that the factors established were reasonable and representative of the existing water usage in the City. It should also be noted that the existing water model was loaded with the actual water demand information available for each customer. See **Section V- Methodology** for a discussion of modeling methodology.

Table 3 – Average Day Loading Factors

Land Use	Average Day Loading Factors Gal / Acre/ Day
Single Family Residential	645
Multi-Family Residential*[1]	2,500
Commercial	900
Industrial	500
Public / Semi-Public	850
School	400
Church	100
Park	400
Utility	0
Vacant / Open-Space	0
ROW	0
*1 - Multi-Family Residential includes apartments, mobile home parks, and health care living facilities.	

Average Day Demand (ADD)

As noted above, a standard growth rate was not used to project future water demand. Water demand has been presented as existing demand and as future buildout demand. Refer to **Table 4** below for the existing average day demand and projected buildout average day demand. Should any significant redevelopment occur or a large water user come onto the City's system, Kimley-Horn recommends updating these water demand projections, and verifying no significant changes.

Table 4 – Average Day Demand

Scenario	Existing	Buildout
Average Water Use (MGD)	**0.78**	**0.90**

Maximum Day Demand (MDD)

Historical SCADA information was not available from the City's SCADA system, however, Fort Worth provided historical wholesale maximum day water usage for the last nine-years. The greatest maximum day water usage to average day water usage ratio was 2.19 / 1. Because the City supplements water received from Fort Worth with well water, it was assumed that the percentage of water used from Fort Worth versus water from the City wells was the same for average day conditions as for maximum day conditions. Refer to **Table 5** below for the existing maximum day water usage and the projected buildout maximum day water usage.

Table 5 – Maximum Day Demand

Scenario	Existing	Buildout
Maximum Water Use (MGD)	1.71	1.97

Peak Hour Demand (PHD)

Fort Worth provided historical wholesale maximum hour water usage for the last nine-years. However, because the City uses the Stadium 1.0 MG EST to reduce the peak water usage from Fort Worth, the data provided by Fort Worth would not capture the actual peak water usage in the City. Historical SCADA information was not available from the City's SCADA system. Therefore, historical water usage could not be used to determine the peak hour demand or a diurnal curve of the City's water use. The peak hour demand was expressed as a ratio of the maximum day demand, also referred to as a peaking factor. The peaking factor used for peak hour demand for the City was 2.0 / 1. The peaking factor was assumed based on the population of the City and industry standards. Refer to **Table 6** below for the existing peak hour water usage and the projected buildout peak hour water usage.

Table 6 – Peak Hour Demand

Scenario	Existing	Buildout
Peak Water Use (MGD)	3.42	3.94

Projected Connections

The number of connections that are served by a water system is not only an important data point for operation of this system, it also determines TCEQ requirements for system infrastructure, notably pumping facilities and ground and elevated storage tank facilities. As of 2016, the City serves approximately 2,260 connections. As noted previously, projecting the timeline for the buildout of the City is difficult to predict. Projecting connections followed a similar methodology to projecting water usage. The historical average flow per day per connection for the last 3-years is 0.25 gallons per minute per connection. Using this historical flow per connection and the projected buildout water usage, a buildout number of connections can be calculated. Refer to **Table 7** for the projected number of connections within the City service area. Kimley-Horn recommends updating these connection projections annually and verifying no significant adjustments to the projected number of connections.

Table 7 – Projected Connections

Scenario	Existing	Buildout
Number of Connections	**2,260**	**2,500**

V. METHODOLOGY

Water System Modeling Methodology

To evaluate the existing water system, a water model was created using WaterCAD™. Pipe data was obtained from GIS and consisted of pipe length, location, diameter, and material. Node data consisted of ground elevation and water demand. Elevated and ground storage tank attributes were obtained from record drawings provided by the City. The pump stations were modeled using record drawing information and each pump's characteristic performance curve, obtained from the pump manufacturer.

The existing water model, consisting of pipes and nodes, was built using the WaterCAD™ ModelBuilder tool. The physical connectivity of the model was validated to ensure connection accuracy between pipes and nodes. Node elevations were assigned to each node using topographic LIDAR of the City using the WaterCAD™ TRex tool. Ground storage, elevated storage, and pump stations connectivity to the system were input separately using the provided record information. The ground storage tanks located at the Azle Avenue Well Field and Stadium Pump Station were modeled as reservoirs with a constant hydraulic grade. The City receives flow and pressure from Fort Worth without an air gap or break between the systems, therefore the pressure from Fort Worth is variable. The two wholesale Fort Worth meters, Shadydell and Northwest Centre, were modeling using reservoirs with a variable 24-hour diurnal hydraulic grade. Refer to **Appendix N – North West Centre Meter 24-hr Delivery Pressure** for a depiction of the delivery pressure from Fort Worth at the Northwest Centre Meter.

The average day water use for 2016 was used as the basis for water demand in the existing model. Each customer account in the City was paired with the corresponding parcel in GIS to physically locate each account in the City. The 2016 average day water use for each customer was distributed throughout the City using WaterCAD™ TRex LoadBuilder tool, allocating the customer demands to the nearest node in the existing model. Each customer account was designated as either a residential customer or a commercial customer. A diurnal water curve representative of residential or commercial usage was applied to the demands to represent the water use throughout a 24-hour period. Pump on and off set-points, based on the elevation of the Stadium 1.0 MG EST, were provided by the City and entered into the model.

Four (4) fire flow tests and additional pressure testing were performed by Kimley-Horn and City staff. The model was calibrated to within industry standards using the field data gathered. The model was calibrated by changing the roughness coefficients in accordance with material type and pipe size.

Six different scenarios were modeled: Existing Conditions-Average Day, Existing Conditions-Maximum Day, Existing Conditions-Maximum Day & Fire Flow, Buildout-Average day, Buildout-Maximum Day, and Buildout-Maximum Day & Fire Flow. The Existing Conditions Average Day scenario was used as the calibration scenario for the model. Average Day and Maximum Day scenarios were analyzed using an extended period simulation of 24-hrs.

Resulting water pressure, pipe velocity, elevated storage tank variations, and pump operations were analyzed in each scenario to ensure the system was meeting the established criteria.

VI. DESIGN CRITERIA

City of Lake Worth Design Criteria

The following criteria were established by Kimley-Horn as minimum standards from which to evaluate current and future water system components. These criteria could change over time based on demand patterns and regulatory mandates.

Water Supply

The City receives the majority of the wholesale water from Fort Worth at the Shadydell Meter and the Northwest Centre Meter. The City also receives water from Fort Worth at the Old Mill Creek Meter, however, this meter serves only several businesses and is not connected to the overall system. It should be noted that there is no “air gap” between the Fort Worth system and the City system; the City purchases water from Fort Worth under pressure. The City also operates two well fields and pump stations, the Azle Avenue Pump Station and Stadium Pump Station. The City also operates the Stadium 1.0 MG EST. The Stadium EST serves to offset peak demands, therefore avoiding peak use charges from Fort Worth and also provides emergency pressure and storage. In 2016, the City received approximately 80% of their water from Fort Worth. Because Fort Worth is the primary source of water for the City, the contracted water supply with Fort Worth should be for supplying the maximum day demand.

During normal operations, flow delivered by Fort Worth can fill the Stadium 1.0 MG EST. In the unlikely event of extreme demands or a temporary emergency situation that the flow from Fort Worth cannot fill the Stadium EST, the well fields operated by the City should provide enough water to fill the EST in 72 hours. Consideration is given to the existing 330,000 gallons of ground storage present at the well sites. If the existing ground storage is utilized to fill the Stadium 1.0 MG EST, then the well fields should supply the remaining 670,000 gallons.

High Service Pumping Facilities

As mentioned above, the Stadium 1.0 MG EST offsets peak flow experienced in the system from the flow delivered by Fort Worth. The combination of the high service pumps at the Azle Avenue Pump Station and Stadium Pump Station should be capable of refilling the Stadium EST in 72 hours.

Ground Storage

Ground storage serves two functions:

- Equalization for differing feed rates between the water supply and pumping to the system.
- Emergency capacity in the event of temporary loss of water supply.

Generally, ground storage facilities are located at water supply points or at each pump station within the water distribution system. Although ground and elevated storage facilities perform separate functions within the system, both are aimed at decreasing the impact of demand fluctuations. Their capacities are established based on knowledge of how demand varies seasonally and daily. As discussed above, the combination of well fields and ground storage should be capable of supplying adequate flow to fill the Stadium 1.0 MG EST in 72 hours.

Elevated Storage

Elevated storage serves three purposes:

- Functionally, elevated storage equalizes the pumping rate to compensate for daily variations in demand and to maintain a fairly constant pumping rate (usually referred to as operational storage), or a pumping rate that conforms to the requirements of the local electrical rate structure or avoids peak use surcharges from wholesale providers.
- Provides pressure maintenance and protection against surges created by instantaneous demand, such as fire flow and main breaks, and instantaneous change in supply, such as pumps turning on and off.
- Maintains a reserve capacity for fire protection and pressure maintenance in case of power failure to one or more pump stations. Sufficient storage should be maintained to provide four (4) hours of fire flow demand during a loss of power to the pump station or interruption in flow from Fort Worth.

Elevated storage is evaluated separately for each pressure plane. Excess storage on any given pressure plane may only be credited on a lower plane. If dual electrical feed is present for pump stations, system reliability is increased and storage dedicated for fire protection can be reduced.

The design criteria set for the City consisted of three levels. **Level 1**: Adequate operational (equalization) storage established by determining the required volume to equalize the daily fluctuations in flow from Fort Worth during the maximum day demand; **Level 2**: The reserve volume equal to 750 gpm for four (4) hours required for fire protection; **Level 3**: Emergency storage equal to 20% of the combined equalization and fire storage volume. Because elevated storage is approximately four times more expensive than ground storage, an economical balance between elevated storage and pumping should be sought.

Transmission System

The function of the transmission system is to transfer water across the water system and fill the elevated storage tank. There are three conditions for which the transmission system is evaluated:

- **Peak hour demand** - This is the maximum demand that the system experiences. It is the condition under which the lowest operational pressures are experienced.
- **Tank filling (minimum hour demand)** - This is the period during which the elevated tanks are replenished. This is the period of lowest demand during the peak day. It normally occurs after midnight and is the condition under which the highest operational pressures are experienced.
- **Fire flow demand** - During the maximum day demand, the local transmission lines are tested to ensure that fire protection requirements are met. Pressures are allowed to fall below normal operating pressures, but should not drop below 20 psi at any point in the system.

The transmission system should be sized to maintain a minimum pressure of 40 psi during normal operating conditions and a minimum pressure of 20 psi during extreme operating conditions. In an urban-type water system, operating pressures of 30-35 psi normally result in customer complaints. For most water systems, pressures above 80 psi are undesirable and should be avoided if possible. The transmission system should also be sized to limit maximum velocity in the pipe to seven (7) feet per second. The maximum pressure in extreme conditions should be limited to 120 psi because high operating pressure will result in increased system maintenance and increased operational cost.

Texas Commission on Environmental Quality (TCEQ) Design Criteria

The City has a permanent interconnection with Fort Worth's system and relies on Fort Worth to meet their production requirements. Therefore, section §290.45(f) and §290.45(f)(5) of Chapter 290 of the Texas Administrative Code, "Public Drinking Water," stipulates the minimum requirements for the City water system.

> *"Purchased water systems. The following requirements apply only to systems which purchase treated water to meet all or part of their production, storage, service pump, or pressure maintenance capacity requirements."* *§290.45(f)*

> *"For systems which purchase water under direct pressure, the maximum hourly purchase authorized by the contract plus the actual service pump capacity of the system must be at least 2.0 gpm per connection or provide at least 1,000 gpm and be able to meet peak hourly demands, whichever is less."*
>
> *§290.45(f)(5)*

See **Appendix K – City of Lake Worth and City of Fort Worth Wholesale Water Contract** and **Appendix L – City of Fort Worth Wholesale Supply Confirmation** for Fort Worth wholesale supply information. **Table 8** below summarizes the water system criteria.

Table 8 – Water System Criteria

	City Criteria	TCEQ Criteria
Water Supply	Max day demand	2.0 gpm / connection or Peak Hour Demand, whichever is less
Well Field Production	Provide enough water combined with capacity of ground storage to fill Stadium EST in 72 hours.	N/A
High Service Pumping Facilities	Fill Stadium EST in 72 hours.	N/A
Ground Storage	Provide enough capacity combined with capacity of well field production to fill Stadium EST in 72 hours.	N/A
Elevated Storage	**Level 1**: Equalization Storage during Max Day Demand **Level 2**: 750 gpm for 4 hours for Fire Protection **Level 3**: 20% of combined total for Level 1 and Level 2	N/A
Total Storage	N/A	N/A
Transmission System	Normal conditions = minimum 40 psi Extreme conditions = minimum 20 psi	Normal conditions = minimum 35 psi Extreme conditions = minimum 20 psi

VII. EXISTING INFRASTRUCTURE ANALYSIS AND RECOMMENDATIONS

The City receives the majority of the wholesale water from Fort Worth at two locations, the 6" Shadydell meter and the 6" Northwest Centre meter. The City also receives water from Fort Worth at the Old Mill Creek Meter, however, this meter serves only several businesses and is not connected to the overall system. The 6" Shadydell and 6" Northwest Centre meters are each rated up to 2,000 gpm per meter. The City water system functions as an extension of the Fort Worth system, without an "air gap" between the systems. Without an "air gap" between the City system and the Fort Worth system, the flow and pressure the City receives is dependent on the Fort Worth water system.

The Northwest Centre meter is served off Fort Worth's Northside III pressure plane and the Shadydell meter is served off Fort Worth's Northside II pressure plane. The Northside III pressure plane is served by the Bradley Elevated Storage Tank, overflow elevation of 950'. The Northside II pressure plane is served by the Caylor Ground Storage Tank, overflow elevation of 853'. Variations in the Fort Worth system result in varied flow and pressure delivered to the City system. The pressure from Fort Worth is not measured through the City SCADA system. Pressures were measured at the Northwester Centre meter over a 24-hour period. See **Appendix N – Northwest Centre Meter 24-hr Delivery Pressure** for an illustration of the variation of the pressures received from Fort Worth during a 24-hr period.

The City service area ranges from approximately 785' at its highest elevation on the east side of the City to approximately 615' at its lowest elevation on the west side of the City. In general, the topography of the City falls from east to west towards Lake Worth. The City operates two pressure planes, the East and West pressure planes. The pressure plane boundary splits the City in half and generally follows Lake Worth Blvd., Firehall Dr., and Lakeview Dr. Pressure is regulated between the pressure planes by 5 pressure reducing valves and closed distribution valves. The range of elevations in the East pressure plane are from approximately 785' to 645' and the range of elevations in the West pressure plane are from approximately 680' to 615'. For reference, see **Appendix D – Static Water Pressure** for the static pressure across the City. This map assumes that the Stadium 1.0 MG EST is at approximately 905' and that there is no demand in the system. It should be noted that water pressures can vary significantly depending on the time of day and demand in the system. Water pressures can be expected to decrease as demand in the system increases.

If an upgrade of the existing SCADA system becomes necessary, Kimley-Horn recommends that the City add pressure monitoring at the Shadydell Meter and the Northwest Centre meter to the SCADA system. Additionally, Kimley-Horn recommends adding SCADA monitoring and motor actuation to the existing pressure reducing valves. This will allow fine tuning of the pressure reducing valve settings to ensure that the valves are not closed during normal operation, potentially creating water quality issues.

Below is a discussion on the City's facilities and additional recommendations. See **Appendix C – Existing Water Map** for an illustration of the City's existing facilities.

Water Supply

The TCEQ criteria stipulates that the contracted amount of water from Fort Worth plus the City service pump capacity be 2.0 gpm / connection or be able to meet the system peak hourly demand, whichever is less. At 2.0 gpm / connection, this equates to 4,520 gpm for existing conditions, however, Kimley-Horn estimates the peak hour demand of the City to be approximately 2,375 gpm for existing conditions. The Shadydell Meter and the Northwest Centre Meter each have a Sensus 6" turbine meter, rated up to 2,000 gpm, 4,000 gpm total. The City has confirmed with Fort Worth that the Fort Worth system is capable of supplying 1.59 MGD or 1,100 gpm, as shown in **Appendix L - City of Fort Worth Wholesale Supply Confirmation.** Together with the City service pump supply of 1,400 gpm, 2,500 gpm is available to meet peak hourly demands. The wholesale connection between the City system and the Fort Worth system is sufficient to meet TCEQ criteria. At buildout of the City, Kimley-Horn estimates that Fort Worth would need to be able to provide 1.92 MGD in order to meet TCEQ criteria. Kimley-Horn recommends that the City confirm this number with Fort Worth as the City continues to move toward buildout.

Well Field Water Production and Ground Storage

The City operates two well fields, the Azle Avenue Well Field and the Stadium Well Field. The Stadium Pump Station pumps water from a 200,000 gallon ground storage tank on site and the Azle Avenue Pump Station pumps water from a 130,000 gallon ground storage tank on site. **Table 9** below summarizes the characteristics of the Azle Avenue Well Field. **Table 10** below summarizes the characteristics of the Stadium Well Field.

Table 9 – Azle Avenue Ground Storage Summary

Year Constructed	**2016**
Volume (gallons)	**130,000**
Base Elevation	**757.00'**
Overflow Elevation	**785.00'**
Tank Diameter	**28.0'**
Well Pump Installation	**1960**
Well Pump Capacity (GPM)	**90**
Well Pump On Elevation	**783.00'**
Well Pump Off Elevation	**784.00'**

Table 10 – Stadium Ground Storage Summary

Year Constructed	**2000**
Volume (gallons)	**200,000**
Base Elevation	**767.00'**
Overflow Elevation	**797.00'**
Tank Diameter	**33.75'**
Well Pump Installation	**1996**
Well Pump Capacity (GPM)	**110**
Well Pump On Elevation	**794.00'**
Well Pump Off Elevation	**795.00'**

TCEQ criteria specific to well field production is not applicable to the City. According to the City criteria, the City well field pumps and existing ground storage should provide sufficient water to fill the Stadium 1.0 MG EST in 72 hours, following a day of maximum demand and in the event that Fort Worth cannot provide enough pressure to refill the EST.

The City currently has 330,000 gallons of ground storage between the Azle Avenue Well Field and the Stadium Well Field. If the full 330,000 gallons is utilized by the high service pumps at the well field to fill the Stadium 1.0 MG EST, then the well fields should be capable

of supplying the difference of 670,000 gallons. At a combined capacity of 200 gpm, the well fields can provide 670,000 million gallons of water in 56 hours, a sufficient amount to refill the Stadium 1.0 MG EST in 72-hours.

An additional recommendation is to change the treatment process at the well fields from a chlorine based process to a chloramine based process. The City of Fort Worth uses a chloramine based process. Switching to a chloramine based process will bring the City into compliance with TCEQ criteria regarding blending of chloramine treated water and chlorine treated water.

No additional capital projects are recommended at this time. Kimley-Horn did not perform an onsite evaluation of the well fields or well pumps. Kimley-Horn recommends monitoring the well fields and well pumps for rehabilitation needs in the future.

Well Field High Service Pumping Facilities

The City operates two well pump stations, the Azle Avenue Pump Station and Stadium Pump Station. The Stadium Pump Station pumps water from a 200,000 gallon ground storage tank on site and the Azle Avenue Pump Station pumps water from a 130,000 gallon ground storage tank on site. The Stadium Pump Station has two horizontal split case pumps and the Azle Avenue Pump Station has one horizontal split case pump. **Table 11** below summarizes the characteristics of the Azle Avenue Pump Station and **Table 12** summarizes the characteristics of the Stadium Pump Station.

Table 11 – Azle Avenue Pump Station Summary

Year of Last Improvement	**2006**
Number of Pumps	**1**
Pump Manufacturer	**Paco**
Design Flow (GPM)	**400**
Design Head (FT)	**165**
Impeller Diameter (in)	**7.1**

Table 12 – Stadium Pump Station Summary

Year of Last Improvement	**2000**
Number of Pumps	**2**
Pump Manufacturer	**Paco**
Design Flow (GPM)	**500**
Design Head (FT)	**125**
Impeller Diameter (in)	**11.7**

See **Appendix M – Azle Avenue and Stadium Well Field Pump Station Manufacturer Pump Curves** for the manufacturer pump curve information for each pump. TCEQ criteria specific to well field production is not applicable to the City. According to the City criteria, the City must be able to refill the Stadium 1.0 MG EST in 72 hours, following a day of maximum demand and in the event that Fort Worth cannot provide enough pressure to refill the EST. With 1,400 gpm of pumping capacity, the City can refill the Stadium 1.0 MG EST in approximately 12 hours, as sufficient water is available from the existing ground storage and well fields.

No additional capital projects are recommended at this time. Kimley-Horn did not perform an onsite evaluation of the pump house or pumps. Kimley-Horn recommends monitoring the pump house and pumps for rehabilitation needs in the future.

Elevated Storage

The City currently has one 1.0 MG elevated storage tank, the Stadium 1.0 MG Elevated Storage Tank, constructed in 2004. During normal operation, the Stadium 1.0 MG EST can be filled by the incoming pressure from the Fort Worth system. However, during periods of high demand during the day, the Stadium EST is filled by pumps at the Azle Avenue Well Site and the Stadium Well Site. Pumps at the Azle Avenue Well Site and the Stadium Well Site are set to turn on and off based on the elevation of the Stadium EST. **Table 13** below summarizes the Stadium EST physical characteristics.

Table 13 – Stadium 1.0 MG EST Summary

Year Constructed	**2006**
Volume (gallons)	**1,000,000**
Base Elevation	**767.75'**
Bottom of Bowl Elevation	**880.00'**
Overflow Elevation	**915.00'**
Tank Diameter	**65.75'**
Pump On Elevation	**903.50'**
Pump Off Elevation	**905.00'**

TCEQ criteria specific to elevated storage is not applicable to the City. According to the City criteria, the elevated storage tank should provide equalization storage, fire flow protection, and emergency storage. Based on Kimley-Horn's analysis, the City has adequate elevated storage to provide equalization storage, fire flow protection, and emergency storage for buildout of the City. The intention of the elevated storage tank is to reduce the peak flow from Fort Worth, thereby avoiding a higher wholesale water billing tier. Additionally, the elevated storage tank provides emergency storage in the event of an interruption of flow or pressure from Fort Worth.

No capital improvement recommendations are made for elevated storage. Kimley-Horn did not perform an onsite evaluation of the Stadium EST; however, Kimley-Horn recommends performing annual inspections of the Stadium EST to determine rehabilitation needs in the future.

Water Distribution System

The current water distribution system consists of pipe sizes ranging from 1-inch to 16-inches in diameter. Most of the distribution system consists of 6-inch to 8-inch diameter pipes. Most of the transmission systems consists of 12-inch diameter pipe located along Azle Avenue and Lake Worth Blvd. There is a noticeable absence of transmission lines on the southwest side of the City. This is not concerning for normal domestic use but is an issue for having reliable fire flow from the system. Additionally, there is a significant portion of the system that is composed of pipes smaller than 6-inch in diameter. In general, pipes below 6-inch in

diameter are not recommended due to their inability to provide adequate fire flow capacity. Systematically replacing smaller diameter pipe and increasing internal looping of the distribution system will be advantageous to increasing the robustness of the water system. **Appendix F – Recommended Water Line Replacement** and **Appendix G – Recommended Distribution Looping and Redundancy** highlight existing lines that could be rehabilitated or lines that could be added to increase the efficiency of the system. **Appendix O – Distribution Replacement Example Cost** provides an example of the cost to replace 1,000 feet of distribution water pipe. **Table 14** summarizes the City's water main linear footage. In addition to removing smaller diameter pipe, a focus should be placed on removing cast iron pipe. Cast iron pipe is no longer a common pipe material recommended for new water line construction. Consequently, cast iron pipe is expected to be older and can be expected to be in poor condition. The City has approximately 111,500 linear feet of cast iron pipe in the water system.

Table 14 – Water Distribution Piping Summary

Pipe Size	Linear Footage (LF)
1"	400
2"	21,430
3"	40
4"	12,020
6"	97,840
8"	56,850
10"	530
12"	22,240
16"	3,640
Total	**214,990**

Fire Flow

A capability of any water system should be able to provide water for firefighting. The criteria that were used for analysis of the fire flow availability were assuming a fire flow demand of 750 gpm and assuming that the system not be allowed to drop below 20 psi at any point in the system during a fire flow event. **Appendix E – Fire Flows Below Design Criteria** shows the locations that do not meet the fire flow criteria. As expected, the majority of the failed fire locations occurred in portions of the system with older cast iron lines or with lines less than 6-inch in diameter. Kimley-Horn recommends a program to systematically replace cast iron lines and lines less than 6-inch in diameter. In addition to increasing fire flow capacity, replacement of cast iron lines will help to eliminate potential water quality concerns. **Appendix J – Proposed Available Fire Flow** shows the amount of available fire flow in the City if the recommended Capital Improvements Plan, detailed below, is implemented and if all cast iron lines and lines less than 6-inch in diameter are replaced with new 6-inch lines. Except for a few select locations of the City, the entire City would be compliant with the established fire flow criteria.

CAPITAL IMPROVEMENTS PLAN

From the Master Planning process, a recommended list of Capital Improvements has been developed. The focus of the Capital Improvements Plan is to connect transmission lines that connect to the ShadyDell Meter, Northwest Centre Meter, Stadium 1.0 MG EST, and the west side of the City. Connecting the City's major infrastructure with transmission lines will provide for adequate water supply and service during normal operation and emergency usage. All improvements are shown in **Appendix H – Capital Improvements Plan**. The following opinion of probable costs for each capital project assumes no design completed, based on 2024 dollars, no inflation increases, and does not include any property acquisitions.

Table 15 – Capital Improvements Plans

	PROJECT NAME	PROJECT COST
1	Shawnee Trail and Comanche Trail Water Line Improvements	$1,900,000
2	Paul Meador 16" Water Line Improvements	$1,200,000
3	Boat Club Road 12" Water Line Improvements	$950,000
	TOTAL:	**$4,050,000**

#1 – Shawnee Trail and Comanche Trail Water Line Improvements

PROJECT COST: **$**1,900,000

NOTES: This project consists of approximately 1,200 linear feet of 12" and 800 linear feet of 8" water line. This project will continue the 12" transmission line from Charbonneau Road to the southwest side of the City and replace existing water lines along Comanche Trail. This project will improve fire flow on the southwest side of the City and provide for system redundancy.

REVISED MARCH 2024

#2 – Paul Meador 16" Water Line Improvements

PROJECT COST: $1,200,000

NOTES: This project consists of approximately 1,150 linear feet of 16" water line along Paul Meador Rd. This project will connect 16" waterlines along Paul Meador Rd. in the City's commercial area. This project will help to complete the transmission system between the City's sources of water, the Shady Dell meter, the Northwest Centre meter, and the Stadium 1.0 MG EST.

#3 – Boat Club Road 12" Water Line Improvements

PROJECT COST: $950,000

NOTES: This project consists of approximately 700 linear feet of 12" water line along Lakeside Dr. and Boat Club Rd. This project will help to complete the transmission system between the City's sources of water, the Shady Dell meter, the Northwest Centre meter, and the Stadium 1.0 MG EST.

REVISED MARCH 2024

VIII. APPENDICES

Appendix A – Existing Land Use Map

Appendix B – Ultimate Land Use Map (Revised March 2023)

Appendix C – Existing Infrastructure (Revised March 2024)

Appendix D – Static Water Pressure

Appendix E – Fire Flows Below Design Criteria

Appendix F – Recommended Water Line Replacement (Revised March 2024)

Appendix G – Recommended Distribution Looping and Redundancy

Appendix H – Capital Improvements Plan (Revised March 2024)

Appendix I – Opinions of Probable Construction Costs (Revised March 2024)

Appendix J – Proposed Available Fire Flow

Appendix K – City of Lake Worth and City of Fort Worth Wholesale Water Contract

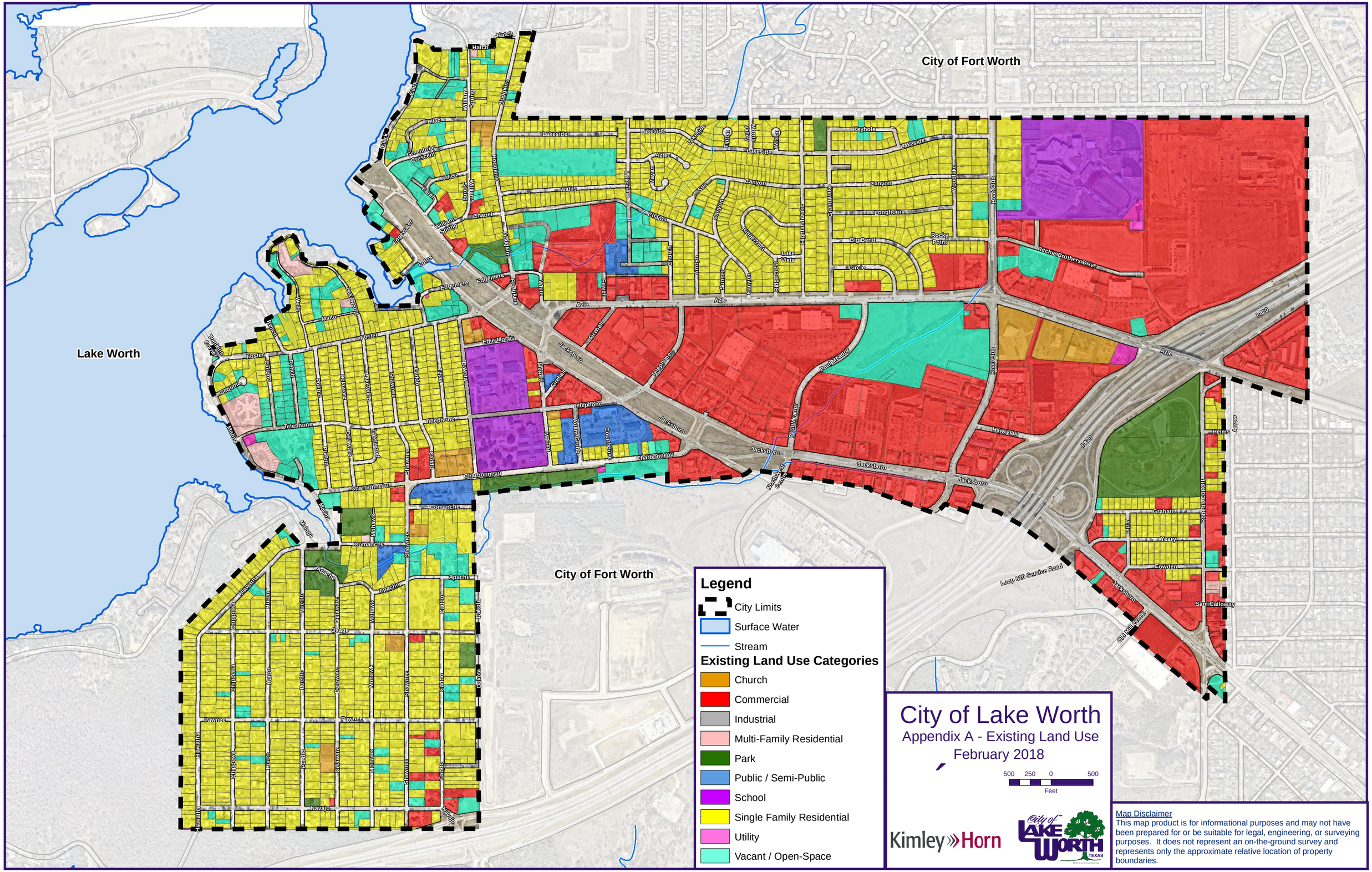
Appendix L – City of Fort Worth Wholesale Supply Confirmation

Appendix M – Azle Avenue and Stadium Well Field Pump Station Manufacturer Pump Curves

Appendix N – North West Centre Meter 24-hr Delivery Pressure

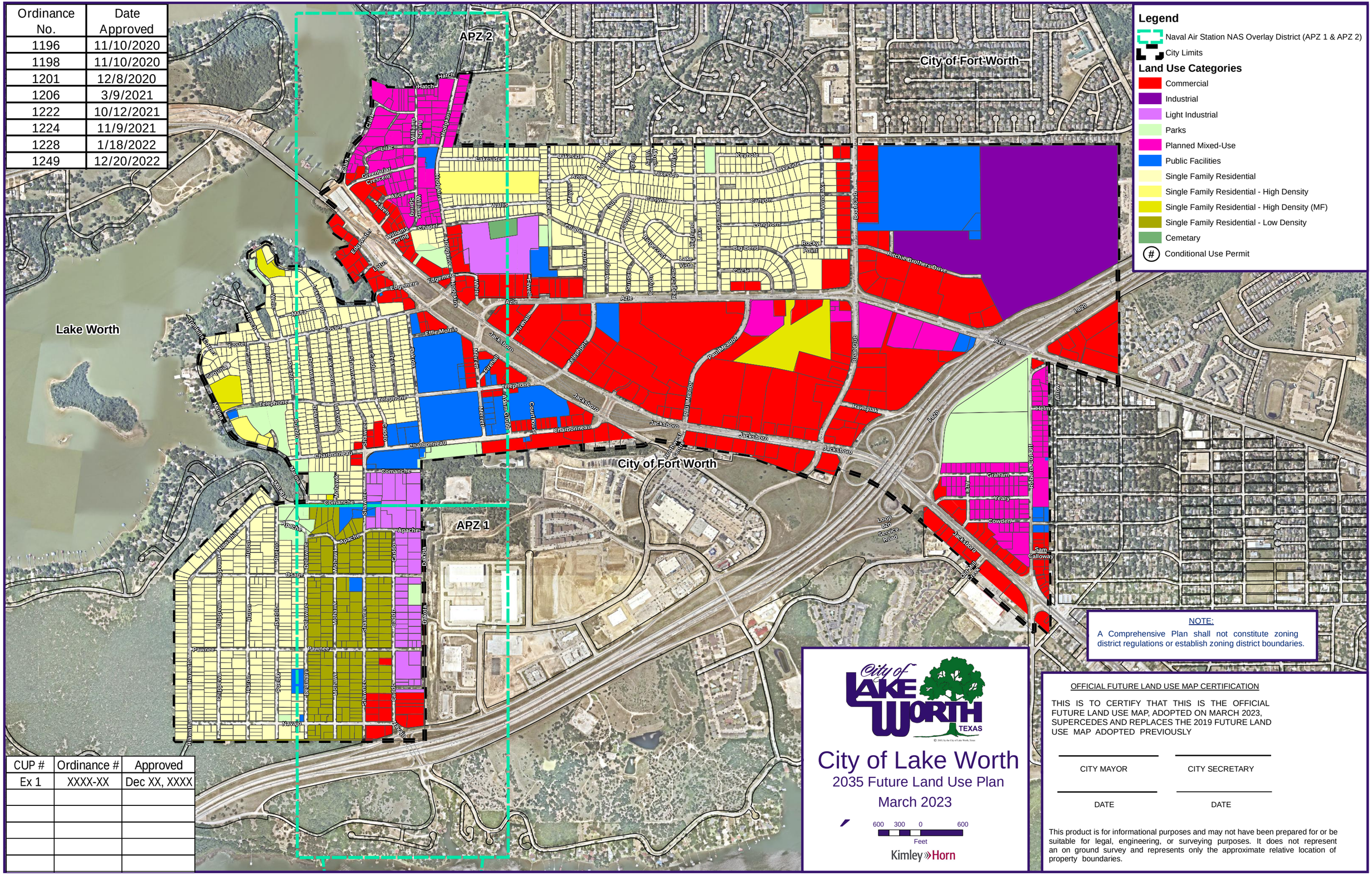
Appendix O – Distribution Replacement Example Cost

Appendix A – Existing Land Use Map


City of Fort Worth
Lake Worth
City of Fort Worth
Legend
City Limits
Surface Water
Stream
Existing Land Use Categories
Church
Commercial
Industrial
Multi-Family Residential
Park
Public / Semi-Public
School
Single Family Residential
Utility
Vacant / Open-Space
City of Lake Worth
Appendix A - Existing Land Use
February 2018
500 250 0 500
Feet
Kimley»Horn
City of Lake Worth TEXAS
Map Disclaimer
This map product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

Appendix B – Ultimate Land Use Map

Ordinance No.	Date Approved
1196	11/10/2020
1198	11/10/2020
1201	12/8/2020
1206	3/9/2021
1222	10/12/2021
1224	11/9/2021
1228	1/18/2022
1249	12/20/2022



Legend

- Naval Air Station NAS Overlay District (APZ 1 & APZ 2)
- City Limits

Land Use Categories

- Commercial
- Industrial
- Light Industrial
- Parks
- Planned Mixed-Use
- Public Facilities
- Single Family Residential
- Single Family Residential - High Density
- Single Family Residential - High Density (MF)
- Single Family Residential - Low Density
- Cemetary
- (#) Conditional Use Permit

CUP #	Ordinance #	Approved
Ex 1	XXXX-XX	Dec XX, XXXX

City of Lake Worth

2035 Future Land Use Plan

March 2023

600 300 0 600

Feet

Kimley»Horn

NOTE:

A Comprehensive Plan shall not constitute zoning district regulations or establish zoning district boundaries.

OFFICIAL FUTURE LAND USE MAP CERTIFICATION

THIS IS TO CERTIFY THAT THIS IS THE OFFICIAL FUTURE LAND USE MAP, ADOPTED ON MARCH 2023, SUPERCEDES AND REPLACES THE 2019 FUTURE LAND USE MAP ADOPTED PREVIOUSLY

CITY MAYOR

CITY SECRETARY

DATE

DATE

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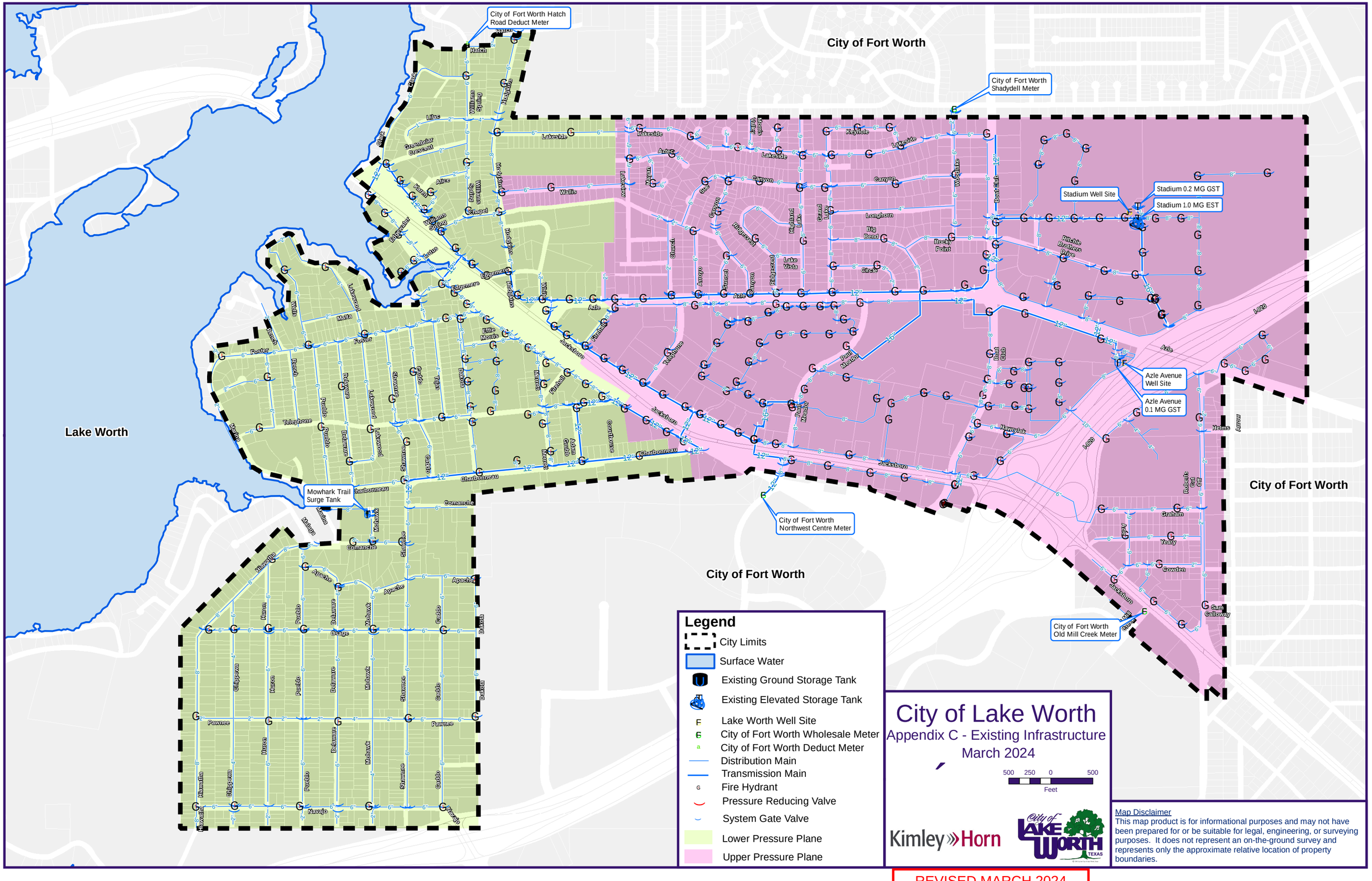
REVISED MARCH 2023

Appendix C – Existing Infrastructure


City of Fort Worth Hatch Road Deduct Meter
City of Fort Worth
City of Fort Worth Shadydell Meter
Stadium Well Site
Stadium 0.2 MG GST
Stadium 1.0 MG EST
Azle Avenue Well Site
Azle Avenue 0.1 MG GST
Lake Worth
Mowhark Trail Surge Tank
City of Fort Worth Northwest Centre Meter
City of Fort Worth
City of Fort Worth Old Mill Creek Meter
City of Fort Worth
Legend
City Limits
Surface Water
Existing Ground Storage Tank
Existing Elevated Storage Tank
Lake Worth Well Site
City of Fort Worth Wholesale Meter
City of Fort Worth Deduct Meter
Distribution Main
Transmission Main
Fire Hydrant
Pressure Reducing Valve
System Gate Valve
Lower Pressure Plane
Upper Pressure Plane
City of Lake Worth
Appendix C - Existing Infrastructure
March 2024
500 250 0 500
Feet
Kimley»Horn
City of Lake Worth TEXAS
Map Disclaimer
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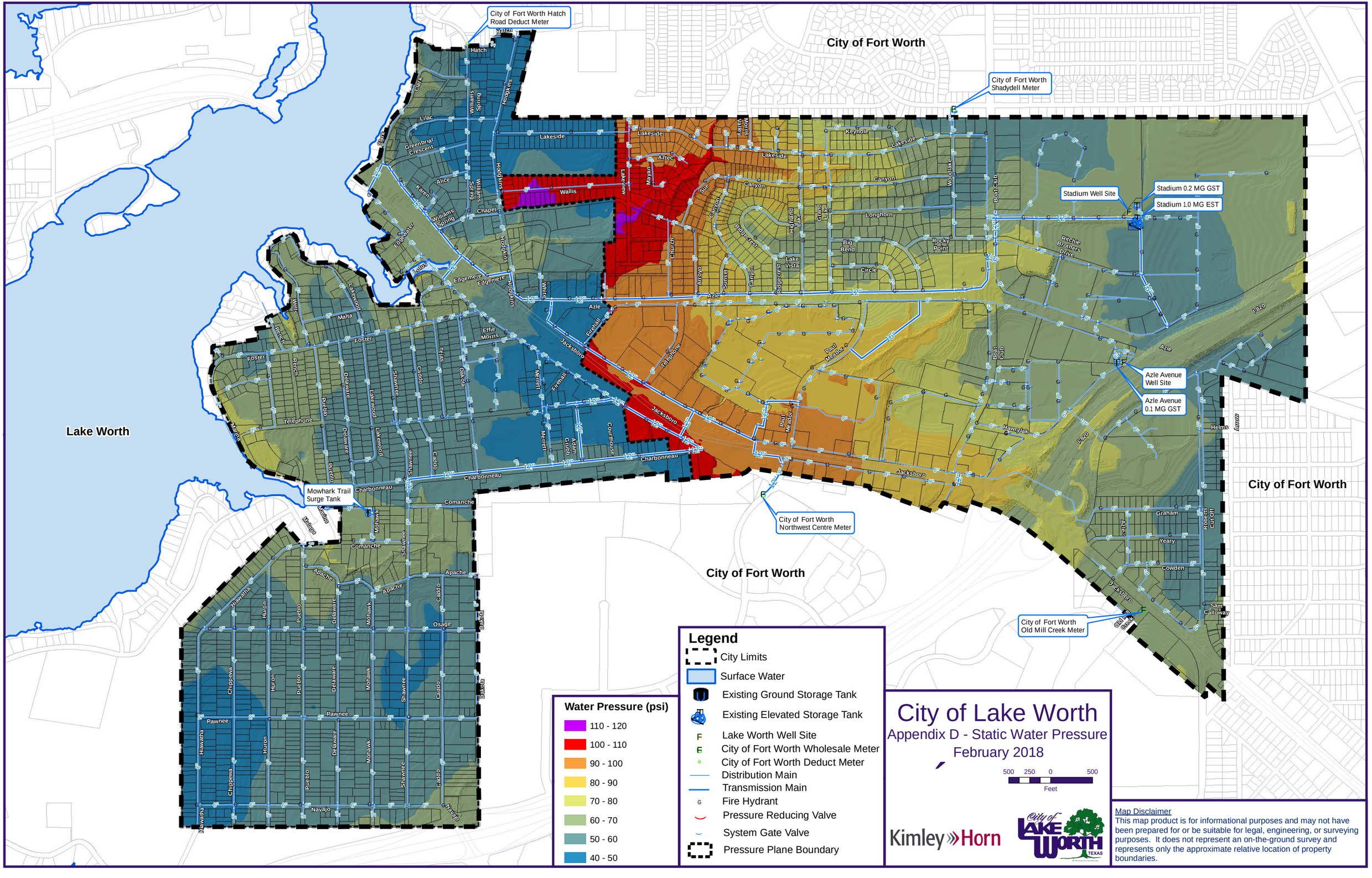
REVISED MARCH 2024

Appendix D – Static Water Pressure



Water Pressure (psi)

- 110 - 120
- 100 - 110
- 90 - 100
- 80 - 90
- 70 - 80
- 60 - 70
- 50 - 60
- 40 - 50

Legend

- City Limits
- Surface Water
- Existing Ground Storage Tank
- Existing Elevated Storage Tank
- F — Lake Worth Well Site
- B — City of Fort Worth Wholesale Meter
- a — City of Fort Worth Deduct Meter
- Distribution Main
- Transmission Main
- G — Fire Hydrant
- Pressure Reducing Valve
- System Gate Valve
- Pressure Plane Boundary

City of Lake Worth

Appendix D - Static Water Pressure

February 2018

500 250 0 500

Feet

Kimley»Horn

City of Lake Worth Texas

Map Disclaimer

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Appendix E – Fire Flows Below Design Criteria

City of Fort Worth Hatch Road Deduct Meter

City of Fort Worth

City of Fort Worth Shadydell Meter

Stadium Well Site

Stadium 0.2 MG GST

Stadium 1.0 MG EST

Azle Avenue Well Site

Azle Avenue 0.1 MG GST

Lake Worth

Mowhark Trail Surge Tank

City of Fort Worth Northwest Centre Meter

City of Fort Worth Old Mill Creek Meter

City of Fort Worth

City of Fort Worth

Legend

- Fire Flows Below Design Criteria
- City Limits
- Surface Water
- Existing Ground Storage Tank
- Existing Elevated Storage Tank
- Lake Worth Well Site
- City of Fort Worth Wholesale Meter
- City of Fort Worth Deduct Meter
- Distribution Main
- Transmission Main
- Fire Hydrant
- Pressure Reducing Valve
- System Gate Valve
- Upper Pressure Plane
- Lower Pressure Plane

City of Lake Worth

Appendix E - Fire Flows Below Design Criteria

February 2018

500 250 0 500

Feet

Kimley»Horn

City of LAKE WORTH TEXAS

Map Disclaimer

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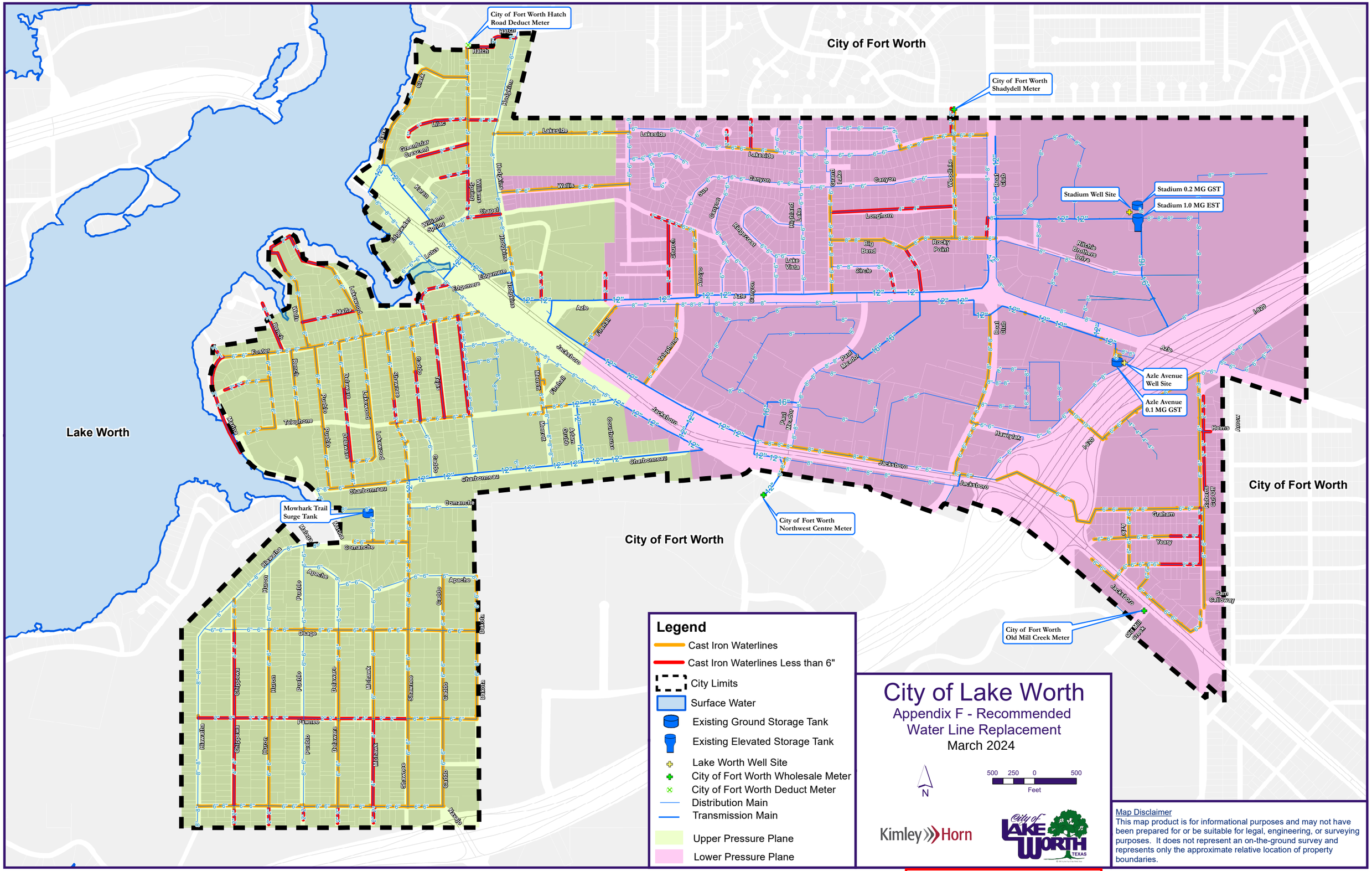
Appendix F – Recommended Water Line Replacement


City of Fort Worth Hatch Road Deduct Meter
City of Fort Worth
City of Fort Worth Shadydell Meter
Stadium Well Site
Stadium 0.2 MG GST
Stadium 1.0 MG EST
Azle Avenue Well Site
Azle Avenue 0.1 MG GST
Lake Worth
Mowhark Trail Surge Tank
City of Fort Worth
City of Fort Worth Northwest Centre Meter
City of Fort Worth
City of Fort Worth Old Mill Creek Meter
City of Fort Worth
Legend
Cast Iron Waterlines
Cast Iron Waterlines Less than 6"
City Limits
Surface Water
Existing Ground Storage Tank
Existing Elevated Storage Tank
Lake Worth Well Site
City of Fort Worth Wholesale Meter
City of Fort Worth Deduct Meter
Distribution Main
Transmission Main
Upper Pressure Plane
Lower Pressure Plane
City of Lake Worth
Appendix F - Recommended Water Line Replacement
March 2024
N
500 250 0 500
Feet
Kimley»Horn
City of LAKE WORTH TEXAS
Map Disclaimer
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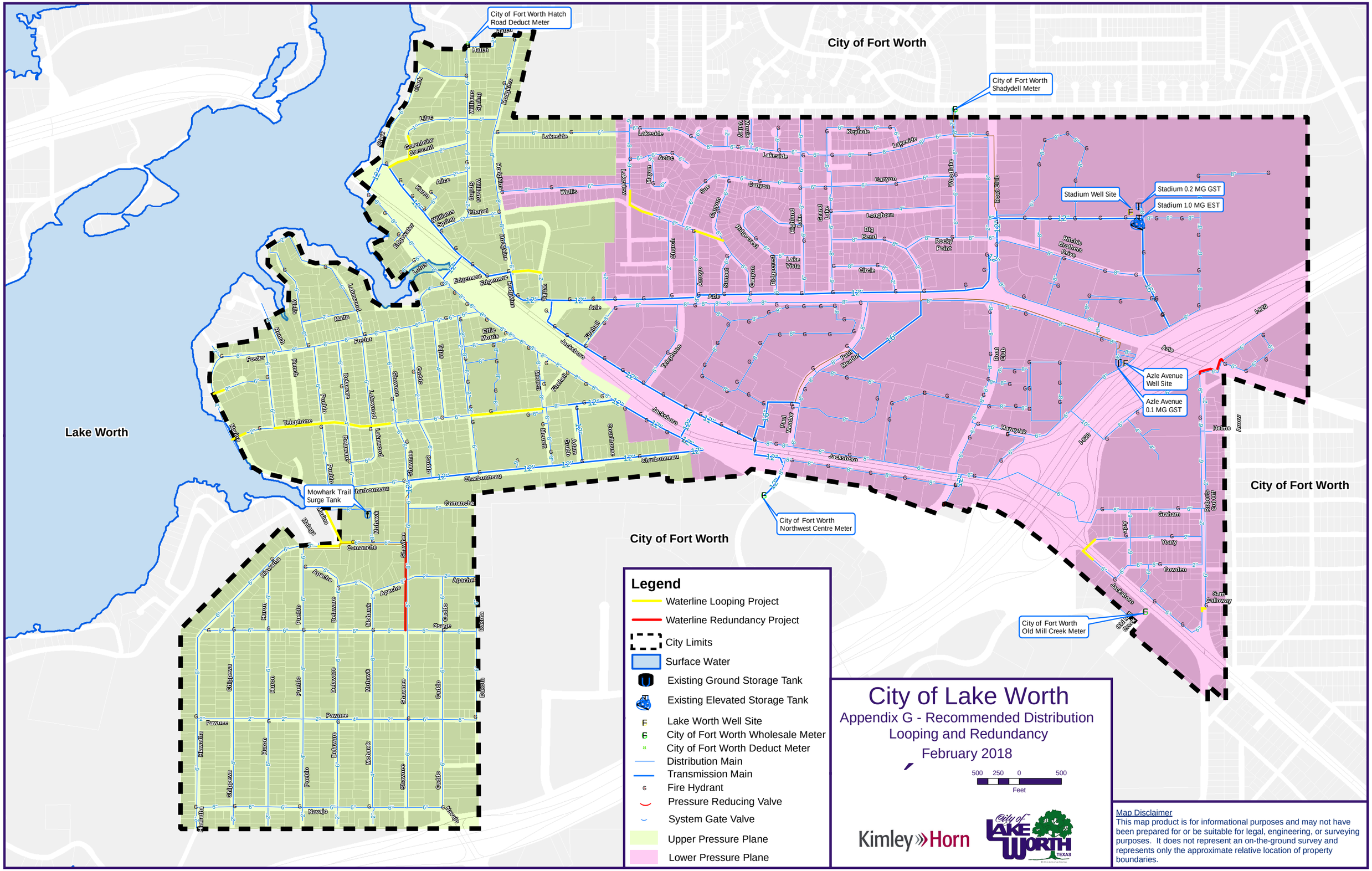
REVISED MARCH 2024

Appendix G – Recommended Distribution Looping and Redundancy


City of Fort Worth Hatch Road Deduct Meter
City of Fort Worth
City of Fort Worth Shadydell Meter
Stadium Well Site
Stadium 0.2 MG GST
Stadium 1.0 MG EST
Azle Avenue Well Site
Azle Avenue 0.1 MG GST
Lake Worth
Mowhark Trail Surge Tank
City of Fort Worth
City of Fort Worth Northwest Centre Meter
City of Fort Worth
City of Fort Worth Old Mill Creek Meter
City of Fort Worth
Legend
Waterline Looping Project
Waterline Redundancy Project
City Limits
Surface Water
Existing Ground Storage Tank
Existing Elevated Storage Tank
Lake Worth Well Site
City of Fort Worth Wholesale Meter
City of Fort Worth Deduct Meter
Distribution Main
Transmission Main
Fire Hydrant
Pressure Reducing Valve
System Gate Valve
Upper Pressure Plane
Lower Pressure Plane
City of Lake Worth
Appendix G - Recommended Distribution Looping and Redundancy
February 2018
500 250 0 500
Feet
Kimley»Horn
City of Lake Worth TEXAS
Map Disclaimer
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Appendix H – Capital Improvements Plan

City of Fort Worth Hatch Road Deduct Meter

City of Fort Worth

City of Fort Worth Shadydell Meter

Stadium Well Site

Stadium 0.2 MG GST

Stadium 1.0 MG EST

Azle Avenue Well Site

Azle Avenue 0.1 MG GST

Lake Worth

Mowhark Trail Surge Tank

City of Fort Worth Northwest Centre Meter

City of Fort Worth

City of Fort Worth Old Mill Creek Meter

City of Fort Worth

Legend

- Pending Project
- Capital Improvement Project
- City Limits
- Surface Water
- Existing Ground Storage Tank
- Existing Elevated Storage Tank
- Lake Worth Well Site
- City of Fort Worth Wholesale Meter
- City of Fort Worth Deduct Meter
- Distribution Main
- Transmission Main
- Fire Hydrant
- Pressure Reducing Valve
- System Gate Valve
- Upper Pressure Plane
- Lower Pressure Plane

City of Lake Worth

Appendix H - Capital Improvement Water Plan

March 2024

N

500 250 0 500

Feet

Kimley»Horn

City of Lake Worth Texas

Map Disclaimer

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REVISED MARCH 2024

Appendix I – Opinions of Probable Construction Costs

Kimley-Horn & Associates, Inc. **Opinion of Probable Construction Cost**

Client:	**City of Lake Worth**	**Date:**	**3/4/2024**
Project:	**Water System Master Plan**	**Prepared By:**	**HNH**
KHA No.:	**061060072**	**Checked By:**	**NRS**

Title: 1. Shawnee Trail and Comanche Trail Water Line Improvements

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization	1	LS	$60,000	$60,000
2	Traffic Control	1	LS	$24,000	$24,000
3	Erosion Control	1	LS	$24,000	$24,000
4	12" AWWA C900 DR-18 PVC Water Pipe	1,200	LF	$200.00	$240,000
5	8" AWWA C900 DR-18 PVC Water Pipe	800	LF	$175.00	$140,000
6	Water Line Trench Safety	2,000	LF	$3.00	$6,000
7	12-inch AWWA Gate Valve	8	EA	$15,000.00	$120,000
8	8-inch AWWA Gate Valve	4	EA	$9,500.00	$38,000
9	Connect to Existing Water Line	6	EA	$6,500.00	$39,000
10	Fire Hydrant Assembly	8	EA	$8,500.00	$68,000
11	Water Meter and Service	36	EA	$2,000.00	$72,000
12	Ductile Iron Fittings	2	TON	$17,500.00	$35,000
13	Hydromulch	500	SY	$6.00	$3,000
14	Asphalt Pavement Repair	1,800	SY	$200.00	$360,000
15	Curb and Gutter Repair	500	LF	$125.00	$63,000

Basis for Cost Projection:

- [x] No Design Completed
- [ ] Preliminary Design
- [ ] Final Design

Subtotal:		$1,292,000
Conting. (%,+/-)	25	$323,000
Professional Services (%,+/-)	15	$242,250
Total:		**$1,857,250**
Budget:		**$1,900,000**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

REVISED MARCH 2024

Kimley-Horn & Associates, Inc. **Opinion of Probable Construction Cost**

Client:	**City of Lake Worth**	**Date:**	**3/4/2024**
Project:	**Water System Master Plan**	**Prepared By:**	**HNH**
KHA No.:	**061060072**	**Checked By:**	**NRS**

Title: 2. Paul Meador 16" Water Line Improvements

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization	1	LS	$38,000	$38,000
2	Traffic Control	1	LS	$15,000	$15,000
3	Erosion Control	1	LS	$15,000	$15,000
4	16" AWWA C900 DR-18 PVC Water Pipe	1,150	LF	$300.00	$345,000
5	Water Line Trench Safety	1,150	LF	$3.00	$4,000
6	16-inch AWWA Gate Valve	2	EA	$20,000.00	$40,000
7	Connect to Existing Water Line	4	EA	$6,500.00	$26,000
8	Fire Hydrant Assembly	3	EA	$8,500.00	$26,000
9	Water Meter and Service	8	EA	$2,000.00	$16,000
10	Ductile Iron Fittings	3	TON	$17,500.00	$45,000
11	Hydromulch	500	SY	$6.00	$3,000
12	Asphalt Pavement Repair	1,100	SY	$200.00	$220,000
13	Curb and Gutter Repair	200	LF	$125.00	$25,000

Basis for Cost Projection:

- [x] No Design Completed
- [ ] Preliminary Design
- [ ] Final Design

Subtotal:		$818,000
Conting. (%,+/-)	25	$204,500
Professional Services (%,+/-)	15	$153,375
Total:		**$1,175,875**
Budget		**$1,200,000**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

REVISED MARCH 2024

Kimley-Horn & Associates, Inc. **Opinion of Probable Construction Cost**

Client:	**City of Lake Worth**	**Date:**	**3/4/2024**
Project:	**Water System Master Plan**	**Prepared By:**	**HNH**
KHA No.:	**061060072**	**Checked By:**	**NRS**

Title: 3. Boat Club Road 12" Water Line Improvements

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization	1	LS	$30,000	$30,000
2	Traffic Control	1	LS	$12,000	$12,000
3	Erosion Control	1	LS	$12,000	$12,000
4	12" AWWA C900 DR-18 PVC Water Pipe	700	LF	$200.00	$140,000
5	Water Line Trench Safety	700	LF	$3.00	$3,000
6	12" AWWA C900 DR-18 PVC Water Pipe (By Other than Open Cut)	100	LF	$650.00	$65,000
7	12-inch AWWA Gate Valve	3	EA	$15,000.00	$45,000
8	Connect to Existing Water Line	3	EA	$6,500.00	$20,000
9	Fire Hydrant Assembly	5	EA	$8,500.00	$43,000
10	Water Meter and Service	9	EA	$2,000.00	$18,000
11	Ductile Iron Fittings	3	TON	$17,500.00	$53,000
12	Hydromulch	500	SY	$6.00	$3,000
13	Asphalt Pavement Repair	700	SY	$200.00	$140,000
14	Curb and Gutter Repair	500	LF	$125.00	$63,000

Basis for Cost Projection:

- [x] No Design Completed
- [ ] Preliminary Design
- [ ] Final Design

Subtotal:		$647,000
Conting. (%,+/-)	25	$161,750
Professional Services (%,+/-)	15	$121,313
Total:		**$930,063**
Budget		**$950,000**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

REVISED MARCH 2024

Appendix J – Proposed Available Fire Flow

City of Fort Worth Hatch Road Deduct Meter

City of Fort Worth

City of Fort Worth Shadydell Meter

Stadium Well Site

Stadium 0.2 MG GST

Stadium 1.0 MG EST

Azle Avenue Well Site

Azle Avenue 0.1 MG GST

Lake Worth

Mowhark Trail Surge Tank

City of Fort Worth

City of Fort Worth Northwest Centre Meter

City of Fort Worth Old Mill Creek Meter

City of Fort Worth

Legend

- Meets Fire Flow Criteria
- Does Not Meet Fire Flow Criteria
- City Limits
- Surface Water
- Existing Ground Storage Tank
- Existing Elevated Storage Tank
- Lake Worth Well Site
- City of Fort Worth Wholesale Meter
- City of Fort Worth Deduct Meter
- Distribution Main
- Transmission Main
- Fire Hydrant
- Pressure Reducing Valve
- System Gate Valve
- Upper Pressure Plane
- Lower Pressure Plane

City of Lake Worth

Appendix J - Proposed Available Fire Flow

February 2018

500 250 0 500

Feet

Kimley»Horn

City of Lake Worth Texas

Notes

This map shows available fire flow values assuming that the recommended capital improvements plan has been implemented and that pipes less than 6-inch in diamter have been replaced with 6-inch diameter pipes as recommended.

Map Disclaimer

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Appendix K – City of Lake and City of Fort Worth Wholesale Water Contract

RESOLUTION #927

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAKE WORTH, TEXAS, APPROVING AN AGREEMENT BETWEEN THE CITY OF FORT WORTH AND THE CITY OF LAKE WORTH FOR A FORT WORTH WHOLESALE WATER CONTRACT.

WHEREAS, on the 11th day of April 1989, the City of Fort Worth (Fort Worth) and the City of Lake Worth (Customer) entered into an agreement, same being Fort Worth City Secretary Contract No. 17210 and Customer Resolution #495, whereby Fort Worth agreed to provide wholesale water to Customer; and

WHEREAS, on the 11th day of December 1990, Fort Worth and Customer approved an amendment to the aforementioned contract, same being City Secretary Contract No. 18603 and Customer Resolution #532; and

WHEREAS, these contracts will expire December 31, 2010; and

WHEREAS, Fort Worth and Customer desire to enter into another contract, which will take effect on January 1, 2011 and expire on September 30, 2031.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LAKE WORTH, TEXAS, THAT:

Section 1.

The City of Lake Worth shall enter into the attached Fort Worth Wholesale Water Contract with the City of Fort Worth for the supply of wholesale water.

PASSED AND APPROVED this 13th day of July 2010.

APPROVED:

Walter Bowen

Walter Bowen, Mayor

ATTEST:

Linda Rhodes

Linda Rhodes, TRMC/CMC
City Secretary

CITY SECRETARY
CONTRACT NO. 41102

AGREEMENT FOR WATER SERVICE BETWEEN THE CITY OF FORT WORTH, TEXAS, AND THE CITY OF LAKE WORTH, TEXAS

STATE OF TEXAS §
COUNTY OF TARRANT §

This Contract and Agreement ("Agreement") is made and entered into this 10th day of November, 20 10, by and between the City of Fort Worth, a municipal corporation located in Tarrant County, Texas, acting by and through FERNANDO COSTA its duly authorized Assistant City Manager, hereinafter called "Fort Worth," and the City of Lake Worth located in Tarrant County, Texas, acting by and through Walter Bowen, its duly authorized Mayor, hereinafter called "Customer," and hereinafter collectively referred to as the "Parties".

WHEREAS, Fort Worth has provided at its own expense, and now owns, operates and maintains facilities for processing and distributing a large supply of surface water, and at the present time, is qualified to furnish and deliver treated water, both within and without the corporate boundaries of Fort Worth;

WHEREAS, Customer has provided at its own expense and now owns, operates, and maintains a distribution system, and furnishes water service to the customers within its boundaries;

WHEREAS, Customer does not have and cannot provide economically and within a reasonable period of time, any other source of water supply, fully adequate to meet its present and/or future needs or potential emergency needs;

WHEREAS, it is deemed to be in the best interest of both Fort Worth and Customer that the Parties enter into a mutually satisfactory agreement by means of which Customer may obtain from Fort Worth a supply of treated water at a reasonable rate;

WHEREAS, by the execution of this Agreement, neither Fort Worth nor Customer will surrender any of its rights to the ownership and operation of its present water production and distribution facilities;

WHEREAS, Customer desires to continue to contract for the purchase of treated water and Fort Worth desires to continue to sell treated water to Customer;

WHEREAS Customer and Fort Worth desire to provide for reasonable wholesale contract rates for the purchase of treated water sufficient to assure confidence in the financial soundness of the Fort Worth utility, adequate to maintain and support the utility's credit and sufficient to enable Fort Worth to raise the money necessary for the proper discharge of its public duties in the provision of water service and

WHEREAS, Chapters 552 of the Texas Local Government Code and 791 of the Texas Government Code authorize Fort Worth and Customer to enter into this Agreement.

NOW, THEREFORE, KNOW ALL BY THESE PRESENTS that for and in consideration of the mutual covenants, promises and agreements contained herein, Fort Worth and Customer do hereby covenant and agree as follows:

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ARTICLE 1. Definitions

The following definitions, when capitalized, apply throughout this Agreement:

1.1 Annual Consumption. The total quantity of water purchased under the terms of this Agreement by Customer during the Fiscal Year as determined by the difference in the annual October meter readings.

1.2 Average Daily Use. The Annual Consumption divided by the number of calendar days in the Fiscal Year year.

1.3 Calendar Day. The period from midnight of one day to 11:59 PM of the next day.

1.4 Capital Improvements. Any of the following facilities which provide utility services and benefits common to all customers (both retail and wholesale) and that have a life expectancy of three (3) or more years, whether such improvements are located within the jurisdictional limits (including the extra-territorial jurisdiction) of Fort Worth or Customer, and consisting of: water treatment facilities; metering facilities; control systems and appurtenances; storage facilities; pumping facilities; and all mains that are sixteen inches (16") and greater in diameter. Capital Improvements include the initial construction or the expansion of such facilities, as necessary to serve new development.

1.5 Chapter 395. Chapter 395 of the Texas Local Government Code, as it may be amended or re-codified from time to time.

1.6 Customer's Service Area. The area inside the Customer's boundaries and inside the Customer's Certificate of Convenience and Necessity, as shown on **Exhibit A**, except that the Customer may, with written notice to the Director, exclude a contiguous area that receives its entire water service from provider(s) other than Fort Worth.

1.7 Customer System. All necessary Customer mains and distribution facilities on the Customer's side of the meter from and beyond the point of delivery of treated water by Fort Worth.

1.8 Delivery Facility. Any facility necessary for the transmission of water from the Fort Worth System that is on the Customer's side of the point of delivery that is constructed specifically to allow Fort Worth to serve Customer.

1.9 Director. The Director of Fort Worth Water Department or his designee.

1.10 Emergency. A situation, event or condition created by unforeseeable mechanical failure, unprecedented high rate of treated water usage (such as might result from a major fire or a major water main break) or circumstances beyond the Party's reasonable control.

1.11 Equivalent Meters or EM. A means of relating a large-use customer with a base (residential) use customer. Fort Worth Water Department uses 5/8 x ¾ inch meter capacity as an EM. The ratio of larger meter's capacity to the 5/8 x ¾ inch meter capacity is the number of EMs for each meter size.

1.12 Facility Expansion. The expansion of the capacity of an existing facility that serves the same function as an otherwise necessary new capital improvement, in order that the existing facility may serve new development. The term does not include the repair, maintenance, modernization, or an expansion of an existing facility to better serve existing development.

1.13 Fiscal Year. The fiscal year of Fort Worth, which is from October 1st through September 30th.

1.14 Fort Worth. The City of Fort Worth, acting by and through it's duly authorized Assistant City Manager, who may delegate to the Director.

1.15 Fort Worth System. The Fort Worth water treatment and distribution system.

1.16 Impact Fee. A capital contribution funding or recouping the cost of Capital Improvements necessitated by and attributable to new development, subject to and as provided in **Article 16** of this Agreement.

1.17 Maximum Day Demand. The maximum quantity of water used by Customer during one calendar day of the Fiscal Year.

1.18 Maximum Hour Demand. The quantity of water used by Customer during the one hour of the Fiscal Year that more water passed through the meter or meters serving the Customer than during any other hour of the Fiscal Year, multiplied by 24 hours and expressed as MGD.

1.19 MG and MGD. MG is million gallons; MGD is million gallons per day.

1.20 Parties. Fort Worth and the Customer, or each individually.

1.21 Rate of Use Charge. The charge for Maximum Day Demand in excess of Average Daily Use and for Maximum Hour Demand in excess of Maximum Day Demand, as provided in **§ 7.5** and **Exhibit C**.

1.22 Raw Water Charge. The rate for 1,000 gallons charged by the Tarrant Regional Water District to Fort Worth for raw water to be sold to the Customer plus four percent (4%), representing Fort Worth system losses of four percent (4%).

1.23 Return Water. All water that is returned to Fort Worth via discharge into Fort Worth's wastewater system for treatment by Fort Worth's Village Creek Wastewater Treatment Plant or another wastewater treatment plant that is owned or operated (directly or through contract) by Fort Worth.

1.24 Service Charge. A fixed monthly charge per wholesale meter, as set forth in the annual cost-of-service rate study, designed to include a portion of Fort Worth Water Department's cost for wholesale customer billing and accounting.

1.25 Street Rental. The Street Rental charged to the wholesale customers of the Fort Worth System is intended to be compensation for use of public rights-of-way. The Street Rental is established at five percent (5%)of the revenue requirements, excluding Payment in Lieu of Taxes

(PILOT). The Street Rental can not be decreased without the consent of Fort Worth in its sole discretion and, in the event of an increase, can only be increased in one percent (1%) increments once every five (5) years starting on the anniversary date of this Agreement in 2016, and shall never exceed the rate being collected from the natural gas franchised utility serving the City of Fort Worth or the rate collected from the retail water customers of Fort Worth, whichever is less.

1.26 Stand-by Charge. The fee set forth in § **7.1.3** and **Exhibit B**. The Stand-by charge is intended to allow a wholesale customer to rely on the Fort Worth System for stand-by delivery of water for the Customer's Emergency use only, as provided in § **7.6**.

1.27 System Cost. System Cost, as provided in § **6.1.2**.

1.28 TCEQ. The Texas Commission on Environmental Quality or its successor agency.

1.29 Treatment, Pumping and Transmission Charge. The rate, per 1,000 gallons used, regardless of rate of use, as determined by the annual cost-of-service rate study, and which shall include the maintenance and operation costs, and the capital facilities cost on the part of the production and transmission system related to annual use.

1.30 Volume Charge. The combined total of the Treatment, Pumping and Transmission Charge plus the Raw Water Charge in effect for the current Fiscal Year.

ARTICLE 2. Delivery of Water

2.1 Delivery. Fort Worth agrees, subject to the amount of raw and treated water available to Fort Worth, to furnish and sell to Customer treated water of potable quality meeting all applicable governmental standards, delivered under the normal operating pressure prevailing in the Fort Worth System at the Customer point or points of delivery mutually agreed upon, without guarantee of a specific minimum pressure. Mutually agreed point(s) of delivery on the Effective Date are shown on **Exhibit A**.

2.2 Acceptance and Payment. Customer agrees to accept delivery of and to pay for the water in accordance with the terms and conditions of this Agreement. Customer understands and acknowledges that Customer is responsible for maintaining water pressure in the Customer's System, and that maintaining a certain water delivery pressure requires use of storage or pumps on Customer's System.

2.3 Operations. Fort Worth is entitled at any and all times to install, repair, maintain, and replace any equipment or devices in the Fort Worth System. In an Emergency, Fort Worth may take necessary action (including reduction or cessation of water service to Customer) as necessary or appropriate to allow Fort Worth at all times to maintain a minimum pressure as required by law at all retail service locations directly served by Fort Worth, and Fort Worth is excused from the requirements of § **2.1** to the extent caused by an Emergency or by Force Majeure or Fort Worth's reasonable efforts to respond to such conditions. In the event of such service interruptions, Fort Worth shall make every reasonable effort to expedite the restoration of service in a timely manner, and shall not unreasonably interrupt, withhold or delay service to Customer.

2.4 Raw Water Contract. In accordance with the terms of Fort Worth City Secretary Contract No. 12720 between Fort Worth, the City of Arlington, the City of Mansfield, Trinity River Authority, and the Tarrant Regional Water District, this Agreement shall be deemed subordinate in all respects to the water requirements of the above contracting Parties as specified in Section 3 of that contract.

2.5 Water Use Restrictions and Conservation.

2.5.1 If Fort Worth in any way restricts, rations or conserves the use of water throughout its CCN during an Emergency declared by the Director, then within 24 hours of being notified of the action of Fort Worth, Customer shall institute and apply the same restrictions and/or measures as to the use of the water by the customers of Customer.

2.5.2 If Fort Worth in any way restricts, rations or conserves the use of water throughout its CCN as authorized by the then Fort Worth City Council and adopted by ordinance, then Customer agrees to institute, apply and enforce the same rationing, conservation measures, or restrictions to the use of water by the customers of Customer for so long as any part of the total water supply of the Customer is being furnished by Fort Worth. Customer shall submit to Fort Worth, within sixty (60) days of the action taken by the City Council of Fort Worth, a copy of the Customer's city council and/or governing board resolution and/or ordinance adopting the same measures as Fort Worth.

2.5.3 If Customer fails to comply with its obligations under this **§ 2.5** then, in addition to the remedies available under **Article 17**, Fort Worth may install or adjust any rate of flow controllers necessary to physically achieve compliance, regardless of whether the rate of flow controller to be installed or adjusted is on Fort Worth's or Customer's side of the meter.

2.6 Requirements of 30 Tex. Admin. Code Chapter 288 ("Ch. 288").

2.6.1 As required by 30 Tex. Admin. Code § 288.5(1)(G), this Agreement requires Customer to develop and implement a water conservation plan or water conservation measures using the applicable elements of Tex. Admin Code Ch. 288.

2.6.2 As required by 30 Tex. Admin. Code § 288.22(a)(8), this Agreement requires that, in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code § 11.039.

2.6.3 To the extent that Customer fails to comply with **§ 2.5** above or meet any additional requirements under 30 Tex. Admin. Code Chapter 288, Customer agrees to implement and comply with Fort Worth's water conservation plans and measures and drought contingency plan until the Customer's own plans and measures are brought into compliance.

2.7 Consultation with WCAC. Except when the Director determines that emergency conditions require short-term restriction, conservation or rationing to meet all necessary water demands, Fort Worth agrees to consult with the Wholesale Customer Advisory Committee, in the development of any restriction, conservation, rationing, or drought contingency plans that the Director determines may be necessary to address operational constraints, whether or not required by any state or federal regulatory agency, or deemed advisable by the Wholesale Customer Advisory Committee to manage long term System Costs, except where emergency conditions may dictate short-term restriction, conservation or rationing requirements as may be determined by the Director to meet all necessary water demands.

ARTICLE 3. Location and Maintenance of Measuring Devices

3.1 Metered Water. All water furnished under this Agreement by Fort Worth shall be measured by one or more suitable meters equipped with continuous flow, chart recording devices, and telemetering equipment connected with the Fort Worth control center. All meters, recording devices, telemetering equipment and appurtenances (including any flow control equipment required by § 7.2) shall be approved and installed by Fort Worth. Customer shall pay for the meter vault and all metering equipment, including telemetering equipment to the Fort Worth control center, and appurtenances, plus the installation cost thereof. Fort Worth shall pay all costs associated with the operation and maintenance of said equipment and shall pay for the replacement of said equipment as necessary. Such costs, as well as charges for the telelink line and microwave transmitter and the power to operate same, shall be a System Cost.

3.2 Point(s) of Delivery. The point or points of delivery of treated water by Fort Worth shall be the meter vault connection to Customer's side of the meter, and all necessary mains and distribution facilities from and beyond that point shall be the responsibility of Customer. The location of each meter shall be mutually agreed upon in writing by and between the Parties and the meter or meters shall not be moved or relocated except by mutual consent in writing by the Parties.

3.3 Cost of New or Additional Connections. Customer shall pay the cost of each new, enlarged or additional Customer connection to the Fort Worth System, including the cost of the wholesale meter and the Customer's proportionate share of any improvements required for that connection or related service to be provided at the delivery point. The Customer's cost shall be calculated in the same manner as the "developer's cost" for special facilities, including pipelines under Fort Worth's then-existing Water and Wastewater Installation Policy, as determined by the Director. The Customer will pay that amount to Fort Worth before making the new or additional connection to the Fort Worth System, and the amount shall not be a System Cost.

3.4 Check Meter. Either Party, at its own expense, may install a check meter to check or measure the volume of water passing the master meter, provided that, if such check meter is installed, the same rules and regulations relative to its operation, maintenance and reading shall apply as to the master meter being tested.

ARTICLE 4. Meters

4.1 Testing. Fort Worth shall routinely test for accuracy, and service and calibrate if necessary, the master meter at each point of delivery no less than once during each twelve (12) month period. Copies of the results of such calibration and all related information shall be provided to Customer. Customer shall have access to the metering facilities at all reasonable times; provided, however, that any reading, calibration or adjustment to such metering equipment shall be done by employees or agents of Fort Worth, or other mutually approved third party calibration agent, in the presence of representatives of Customer and Fort Worth, if so requested by Customer. Notification of any proposed test shall be provided to the Customer at least seventy-two (72) hours prior to such test being conducted and Customer may observe such test, if so desired.

4.2 Corrections. Upon any calibration of a Wholesale Customer's meter, if it is determined that the accuracy envelope of such meter is found to be lower than ninety-five percent (95%) or higher than one-hundred-five percent (105%) expressed as a percentage of the full scale of the meter, the registration of the flow as determined by such defective meter shall be corrected for a period extending back to the time such inaccuracy began, if such time is ascertainable; or, if such time is not ascertainable, then for a period extending back one-half (1/2) of the time elapsed since the date of the last calibration, but in no event further back than a period of six (6) months. All meters will be properly sealed, and the seals shall not be broken unless representatives of both Parties have been notified and given a reasonable opportunity to be present. If the meter, after testing, is found to be in error outside the parameters established in this Agreement, the amounts due to or due from Fort Worth shall be determined based upon the prevailing wholesale rates which were in effect at the time the meter was determined to be malfunctioning. The amount due to or due from Fort Worth shall be payable within thirty (30) days from the date of receipt of the invoice for said amounts by Fort Worth or by Customer. In addition, the Wholesale Customer's volume and rate of use records shall be corrected, as determined by the meter testing.

4.3 Requested Testing. Customer shall have the right to request Fort Worth to test any meter(s), but no more frequently than quarterly. Upon any such request, Fort Worth agrees to perform its testing and calibration of the meter(s) with notice to Customer, and the Parties shall be entitled to jointly observe any testing, calibration, and adjustments that are made to the meter(s), in the event such modifications are necessary. For such additional testing request, Fort Worth shall give Customer notice forty-eight (48) hours in advance of the time when that testing will occur. Customer shall pay the cost of the additional test requested for any meter(s) if the test shows that the meter(s) is accurate (within five percent (5%) registration), but Fort Worth shall pay the costs of the additional test if the results indicate that the meter(s) is not accurate (in excess of five percent (5%) registration).

4.4 Out of Service Meter. If any meter used to determine the flow of treated water to Customer is out of service or out of repair so that the amount of water metered cannot be ascertained or computed from reading the meter, then the water delivered during the period that the meter is out-of-service or out of repair shall be estimated and agreed upon by the Parties upon the basis of the best data available. The basis for estimating such flow includes, but is not limited to, extrapolation of past patterns of flow for that metering station under similar

conditions. If the Parties cannot agree on the extrapolated estimate of water volume delivered, then agreement on the flow volume will be determined by **§ 22.6** dispute resolution.

ARTICLE 5. Meter Reading and Billing

5.1 Reading Meters. Fort Worth will read all meters provided for herein at monthly intervals, and the Parties shall have free access to read these respective meters daily, if either Party so desires. Each Party has the duty to give immediate notice to the other of any meter that it finds is not functioning properly. Upon such notice, repairs to such meter shall be made promptly.

5.2 Records. All readings of meters will be entered into the records maintained by Fort Worth. Customer shall have access to such records during reasonable business hours and shall be furnished with monthly readings for each point of delivery metering facility.

5.3 Multiple Meters. If Customer has more than one point of connection to the Fort Worth System, the sum of all meter readings and rates of flow shall be used for the purpose of calculating the water Volume Charge and the Rate of Use Charge.

5.4 October Billing. A review of water usage amounts by Customer for the past twelve (12) months shall be made during the presentation of the October bill each year. The October statements shall be prepared so as to reflect any and all Rate of Use Charges for the Fiscal Year just ended which have not been previously billed and paid. A copy of the rate of flow charts or other records showing the Maximum Day Demand and the Maximum Hour Demand for the Fiscal Year just ended shall be furnished to Customer with the October billing.

5.5 Billing and Payment. Bills for water service shall be rendered to Customer monthly by Fort Worth, and shall be due and payable by Customer not more than thirty (30) days from the billing date. The bills will show current charges, as well as past-due charges, if any. Past-due charges shall be the total amount unpaid from all prior billings as of the current billing date. Payments received by Fort Worth shall first be applied to the past-due charges, if any, and thereafter to the current charges.

5.6 Billing Disputes. If Customer disputes a bill and is unable to resolve the difference informally, Customer shall notify the Director in writing. If the Director and Customer are unable to resolve the disputed bill, agreement on the bill will be determined by **§ 22.6** dispute resolution procedures. Dispute of a bill shall not be grounds for non-payment. If a bill or other payment is not paid as specified in this Agreement, a finance charge of ten percent (10%) per annum will be calculated from the date which the payment was required to be made. If a billing adjustment is agreed upon or otherwise established by dispute resolution, then the amount found to be incorrect will be credited to Customer's account together with an interest charge of ten percent (10%) per annum calculated from the date payment of the disputed bill was received.

ARTICLE 6. Rates

6.1 Method of Rate Determination.

6.1.1 Wholesale water rates will be based upon an annual cost-of-service rate study with a rate study conducted every three years by an independent utility rate

consultant as provided for in **§ 6.1.4**. The independent utility rate consultant shall be selected by the Director from a list of five qualified firms submitted to the Director by the Wholesale Customer Advisory Committee. The cost of any such study shall be a System Cost. All cost-of-service studies shall be conducted utilizing the utility cost basis of determining revenue requirements applicable to the wholesale customer class.

6.1.2 The System Cost (i.e., the cost-of-service for the wholesale class) shall include allocated reasonable and necessary operation and maintenance expense; depreciation expense; a fair and reasonable return on allocated capital facilities as provided in **§ 6.1.3;** general and administrative costs; commodity charges including the Raw Water Charge; the cost of treated water; transmission losses; Street Rental (calculated as provided in **§ 1.25**); and Payment In Lieu of Taxes ("PILOT" calculated as provided in **Exhibit D**). To determine the allocation and distribution of costs to the wholesale customer class, the independent utility rate consultant shall consider at least the following factors: total volume, rate of flow, metering, and customer related costs such as accounting, billing, and monitoring. Capital related costs will consist of depreciation expense and return on original cost rate base. The "rate base" shall consist of all allocated capital facilities, net of depreciation and contributions, and shall include construction work in progress, a reasonable allowance for working capital, and a reasonable inventory of materials and supplies necessary for the efficient operation of the Fort Worth System. The methodology shall be that used in the most recent wholesale water rate study completed and approved by the Fort Worth City Council before the Effective Date, which Customer acknowledges having received prior to executing this Agreement. Records of the original cost and the accumulated depreciation of all capital facilities shall be maintained in the Fort Worth Fixed Asset Tracking System. These records shall be available for inspection at the Fort Worth Water Department during reasonable business hours upon request by Customer.

6.1.3 Fort Worth shall be allowed to earn and recover in rates a rate-of-return on the rate base as described in **§ 6.1.2**. That rate of return shall be equal to the weighted average imbedded cost of outstanding debt plus one and one-half percent (1-1/2%). The parties agree that this rate of return is reasonable.

6.1.4 For the Fiscal Years beginning October 1, 2011, 2014, 2017, 2020, 2023 2026 and 2029, a detailed wholesale water rate study will be performed by an independent utility rate consultant selected by the Director in conformance with **§ 6.1.1**. The same methodology used in the immediate previous rate study will be utilized by the rate consultant so selected. In the interim Fiscal Years between detailed rate studies, Fort Worth will adjust wholesale water rates annually, using the same methodology as the last detailed rate study, and will utilize the actual operating data for the twelve (12) month period ending September 30th of the prior year, adjusted for all known and measurable changes in cost data that may have occurred since the last audited financial statement. Such adjustments should allow for year-end trending and the spreading of non-recurring expenses over an appropriate benefit period.

6.1.5 Changes in the wholesale water rate methodology will be allowed if recommended by a majority vote of the Wholesale Customer Advisory Committee and approved by the Fort Worth City Council. For purposes of this **§ 6.1.5**, a majority is defined as any combination of Fort Worth wholesale customers that took more than fifty percent (50%) of the wholesale water delivered by Fort Worth during the immediate past Fiscal Year.

6.2 Rates to be Used.

6.2.1 The rates and charges to be effective upon approval of this Agreement shall be those calculated by the most recent cost of service study and adopted by the Fort Worth City Council to take effect during the current Fiscal Year.

6.2.2 The Raw Water Charge shall be increased or decreased when the raw water cost paid by Fort Worth for water available for treatment and sale to Customer is increased or decreased as determined by the Tarrant Regional Water District in accordance with Fort Worth City Secretary Contract No. 12720.

6.2.3 The Parties agree that services obtained pursuant to this Agreement are essential and necessary to the operation of Customer's waterworks facilities and that all payments made by Customer hereunder shall constitute reasonable and necessary operating expenses of Customer's waterworks and wastewater systems within the meaning of § 1502.056 of the Texas Government Code, and the provisions of any and all ordinances of Customer authorizing the issuance of any revenue bonds of Customer which are payable from its waterworks and wastewater systems.

6.2.4 Customer agrees, throughout the term of this Agreement, to fix and collect such rates and charges for water service to be supplied as will produce revenues in an amount equal to at least (i) all of operation and maintenance expenses of such system, including specifically its payments under this Agreement; and (ii) all other amounts as required by law and the provisions of the ordinances or resolutions authorizing its revenue bonds or other obligations now or hereafter outstanding, including the amounts required to pay all principal of and interest on such bonds and other obligations.

6.2.5 Customer understands that Fort Worth City Council has the right to annually revise the rates charged to cover all reasonable, actual, and expected costs. Revision of rates shall be pursuant to the provisions set forth in this Agreement. Fort Worth shall give Customer a minimum of six (6) months notice of intent to revise rates. Fort Worth will furnish members of the Wholesale Customer Advisory Committee a draft copy of the cost-of-service study of the proposed rates sixty (60) days prior to Fort Worth submitting a rate increase request to its City Council. Within thirty (30) days of receiving the draft study, the Wholesale Customer Advisory Committee will submit its written comments on the draft study to Fort Worth, and Fort Worth will respond to these comments as soon thereafter as possible. If the Wholesale Customer Advisory Committee has not provided its written comments within said period, the Wholesale Customer

Advisory Committee is deemed to have accepted the proposed rates contained in the draft study, and Customer agrees that it will be bound by the rates as approved by the Fort Worth City Council. The rates approved by the Fort Worth City Council shall be the rates to be used in this Agreement for the succeeding Fiscal Year.

ARTICLE 7. Payment for Water

Payment of charges to Fort Worth for water used by Customer shall be made as follows:

7.1 Annual Payment. The annual payment will be the charges computed based on all water delivered by Fort Worth to Customer during the current Fiscal Year at rates set pursuant to this Agreement. For purposes of calculating the annual payment, the current year will be the Fiscal Year during which the water usage occurred. However, the minimum annual payment will be the greater of the following:

7.1.1 the current Fiscal Year Volume Charge times the current Fiscal Year Annual Consumption, plus the Service Charge, plus the current Fiscal Year Rate of Use Charges (Exhibit C, Example 1); or

7.1.2 the current Fiscal Year Volume Charge times the current Fiscal Year Annual Consumption, plus the Service Charge, plus the current Fiscal Year Rate of Use Charges applied to the average of the Maximum Day Demand above Average Daily Use and the average of the Maximum Hour Demand above Maximum Day Demand for the most recently completed three (3) Fiscal Years (to include the current Fiscal Year) (**Exhibit C, Example 2**); or

7.1.3 if applicable to Customer, a Stand-by Charge equal to:

(a) twelve (12) months;

(b) times the total number of EM units for all of the Customer's wholesale meters connected to the System;

(c) times 28,800 gallons per day;

(d) times a dollar amount equal to a three (3) year numerical average of the Treatment, Pumping and Transmission Charge per 1,000 gallons, using the Treatment, Pumping and Transmission Charge from most recent annual cost-of-service rate study performed by the independent utility rate consultant as provided in § **6.1.4** and the two years prior to the year of that study. This dollar average will remain in effect for purposes of calculating this § **7.1.3** Stand-by Charge until the next cost-of-service rate study is performed by an independent utility rate consultant as provided in § **6.1.4**.

Exhibit B presents an example calculation of the Stand-by Charge.

7.2 Withdrawal Rate. The rate at which water is withdrawn from the Fort Worth System by Customer shall be regulated by rate-of-flow controllers, pumps, or other approved methods. The rate of withdrawal shall be controlled so that the maximum rate shall not exceed 1.35 times the Maximum Day Demand experienced during the previous year unless Customer has notified the Director at least (6) months before the date of the anticipated increase in the Maximum Day Demand; provided, however that in an Emergency such as a line break, Customer shall advise the Director within 24 hours of the increase in the maximum rate of withdrawal. Customer shall furnish the Director with all pertinent information regarding the proposed increase in maximum rate of withdrawal. The Director may waive the notice requirement if, in his sole opinion, that notice is not necessary to protect the interests of Fort Worth.

7.3 Monthly Payments. The monthly payment will be the sum of (a) plus (b) plus (c):

(a) the greater of:

(i) one-twelfth (1/12) of the amount calculated in § 7.1, or

(ii) the Volume Charge times the actual volume of water taken that month;

(b) one-twelfth (1/12) of the sum of the annual Rate of Use Charges, determined as provided in **§ 7.5** and **Exhibit C**; and

(c) one-twelfth (1/12) of the sum of the Fiscal Year Service Charge.

7.4 Total Annual Payments. The total annual payment for water delivered to Customer shall be based on the annual and peak volumes delivered to Customer during the Fiscal Year, as determined by meters, flow recording devices or other approved methods, and calculated as provided in the annual payment provisions set forth above and in **Exhibits B and C**. The October monthly payment for September's usage shall contain any adjustments necessary to update the Rate of Use Charge calculations as necessary to recover the Annual Payment for the Customer's actual withdrawals from the Fort Worth System (including Rate of Use Charges for Maximum Hour and Maximum Day Demands) for the Fiscal Year just ended, during which the water usage occurred. **Exhibit C** provides examples of the Annual Bill Calculation.

7.5 Rate of Use Charge. As provided in **§§ 7.1, 7.3 and 7.4** and shown in **Exhibit C**, Monthly Payments and the Annual Payment shall include Rate of Use Charges, unless the Stand-by Charge applies. The Rate of Use Charges consist of:

(a) Maximum Day Rate of Use Charge, calculated by multiplying the "Excess Max Day Charge" per MGD from the annual cost-of-service rate study, times the Maximum Day Demand (in MGD) in excess of Average Daily Use (in MGD); and

(b) Maximum Hour Rate of Use Charge, calculated by multiplying the "Excess Max Hour Charge" per MGD from the annual cost-of-service rate study, times the Maximum Hour Demand (expressed as MGD) in excess of Maximum Day Demand (in MGD).

Exhibit C presents example Rate of Use Charge calculations. Rate of Use Charges are estimated by applying the current Fiscal Year Excess Max Day and Excess Max Hour Charges to the prior Fiscal Year's Maximum Day Demand, Maximum Hour Demand and Average Daily Use in the October through September bills, with adjustments in the October bill as necessary to recover the

Annual Payment based on the Customer's actual withdrawals (including Rate of Use Charges for Maximum Hour and Maximum Day Demands) for the Fiscal Year just ended, during which the water usage occurred.

7.6 Applicability of Stand-by Charge. Customer is subject to the Stand-by Charge if the amount of the Stand-by Charge is the greater of the Annual Payment options listed in **§ 7.1**. Customer is a Stand-by Customer if it receives water from the System for Emergency use only, and the Director has approved that use. A Stand-by Customer's obligations under this Agreement include the requirements of § 3.1 for the location, approval and installation of meters. By execution of this Agreement and approval of the Stand-by service meter, Fort Worth agrees to provide the wholesale Emergency service through the approved meter to the Stand-by Customer, subject to the terms of this Agreement; however, notwithstanding **§ 2.1**, delivery of water to a Stand-by Customer is subordinate to Fort Worth's other delivery obligations. Further, this Agreement does not grant or imply that the Standby Customer has reserved any water service, capacity or delivery from the System, other than for Emergency use as provided in this **§ 7.6**. Any change in the Stand-by Customer's use from Emergency to non-Emergency must be approved in writing by the Director. Unless otherwise agreed in writing by Customer and Director, the Stand-by Customer is not required to pay the Impact Fees required by Article 16 until it requests or takes deliveries of water from the System that exceed the approved Emergency use.

ARTICLE 8. Effective Date

The effective date and time of this Agreement for all purposes is January 1, 2011 at 12:01 a.m. Upon the Effective date, the wholesale water service agreement then in effect between Fort Worth and the Customer is terminated and superseded by this Agreement.

ARTICLE 9. Term

This Agreement expires on September 30, 2031. It may be renewed on terms mutually agreeable to the Parties.

ARTICLE 10. Rights-of-Way

Customer shall grant, without charge to Fort Worth, such easements and rights-of-way along public highways or other property owned by Customer, as requested by Fort Worth, in order to construct or maintain mains or facilities within the Customer's Service Area to provide water to Customer and to other areas. Upon notice from Customer and at Fort Worth's expense incurred as a System Cost, Fort Worth will move such water mains or facilities located in such street rights-of-way, or other property owned by Customer when reasonably necessary to the performance of essential governmental duties by Customer. Fort Worth shall grant, without charge to Customer, such easements and rights-of-way along public highways or other property owned by Fort Worth, as requested by Customer, in order to construct and maintain water mains or facilities within Fort Worth to provide water to Customer. Upon notice from Fort Worth and at Customer's expense, Customer will move such water mains or facilities when located in such street rights-of-way or other property owned by Fort Worth when reasonably necessary to

performance of essential governmental duties by Fort Worth. All work done by or on behalf of Fort Worth under this paragraph will be performed in accordance with specifications equal to those applying to work of a similar nature performed within Fort Worth, and the applicable Party will use its best efforts to restore the others property to as near original condition as feasible unless otherwise mutually agreed in writing. Fort Worth and Customer agree to coordinate the location of the mains and/or facilities in the other's easements and rights-of-way in order to prevent further conflicts insofar as is reasonably practicable.

ARTICLE 11. TCEQ Public Water Supply Approval

The Customer System shall be approved by the TCEQ during the life of this Agreement. If, at any time, the Customer System is not approved by the TCEQ, or if Customer does not have an active cross-connection control program, there shall not be any direct physical connection between the Fort Worth System and the Customer System unless an approved backflow prevention device has been provided and installed and this installation has been approved by the TCEQ. All expenses to provide and install backflow prevention device(s) will be borne by Customer.

ARTICLE 12. Resale of Water

12.1 Outside Service Area. Customer agrees that it will not share facilities for water system use with any other governmental or corporate entity outside of Customer's Service Area without the express written consent of Fort Worth, which consent shall not be unreasonably withheld. Fort Worth neither recognizes nor approves any existing agreements entered into by Customer with other governmental or corporate entities outside of Customer's Service Area, unless expressly approved in writing by the Director before the Effective Date.

12.2 Exceptions. Only those existing connections outside of the Customer's Service Area shown in **Exhibit E** may continue. Customer agrees that it will not enter into any resale or transportation agreement other than as a part of its normal offering and supply of water to existing and future subscribers to its Customer System without the recommendation of the Wholesale Customer Advisory Committee and express written consent of Fort Worth.

ARTICLE 13. Sanitary Sewer Facilities

The Customer agrees that it will require all of its customers, who are provided water from the Fort Worth System, to have adequate sanitary sewage facilities meeting TCEQ requirements.

ARTICLE 14. Additional Wholesale Customers

Fort Worth will use its best efforts to provide an adequate water supply for all of its customers. Prior to the approval of additional wholesale customers, Fort Worth will obtain in writing reasonable assurances from the Tarrant Regional Water District that the projected ten (10) year water demands of the then-existing wholesale customers being served and any proposed additional customers can be fulfilled, and will charge the new customer an appropriate connection fee pursuant to § **3.3**. Fort Worth will consult with the Wholesale Customer

Advisory Committee and the Tarrant Regional Water District before contracting with additional new wholesale water customers.

ARTICLE 15. Wholesale Customer Advisory Committee

Customer's governing body shall annually appoint a representative to be a voting member of the Wholesale Customer Advisory Committee, whose purpose shall be to consult with and advise Fort Worth, through the Director, on matters pertaining to conservation, wholesale planning, improvements, grants, wholesale rate studies, administration, budgets, and additional wholesale customers, whether same be wholesale customers of Customer or Fort Worth. The Wholesale Customer Advisory Committee may establish bylaws governing the election of officers, meeting dates and other matters pertinent to its functioning.

ARTICLE 16. Impact Fees

16.1 Calculation and Payment of Impact Fees. On a quarterly basis, Customer agrees to pay to Fort Worth an Impact Fee for each new or enlarged connection for water service made within Customer's Service Area served by the Fort Worth System. The Impact Fee to the Customer for each such connection shall be based upon the size of water meter and shall be equal to the Impact Fee adopted by Fort Worth and collected for the same size water meter and type of connection within the jurisdiction of Fort Worth. The calculation of the Impact Fee shall be consistent with the Fort Worth ordinance adopting the Impact Fee in accordance with all applicable state and federal regulations, including Chapter 395, and shall include only those costs allowed under § 395.012 (or its amended or successor statute) that are associated with Capital Improvements necessary to provide service to new development. Nothing within this Agreement shall be deemed to prevent either Fort Worth or Customer from charging their own retail customers' Impact Fees in excess of the Impact Fee authorized by this Agreement.

16.2 Multiple Surface Water Providers. If Customer receives surface water from more than one water provider for use by potable water customers within its Service Area, then the Customer's impact fees due to Fort Worth shall be proportionately reduced. The charge will be a fractional part of the Impact Fee imposed within Fort Worth for the same size of meter based on the ratio of the annual amounts of water purchased from Fort Worth to the total annual combined amount of surface water purchased from Fort Worth and the Customer's other surface water provider(s). For purposes of calculating this fractional part, this ratio will be the greater of the most recent prior annual ratio or the most recent 3 year average ratio occurring after the first Fiscal Year after the Effective Date.

16.3 Use of Impact Fees. As required by Chapter 395, Fort Worth agrees that all money remitted to it pursuant to this **Article 16** will be placed in an interest bearing account to pay only for the cost of constructing Capital Improvements included in the Chapter 395 capital improvements plan, and will not be used for operation and maintenance expenses. Once expended, such funds and all interest earned thereon will be considered a "contribution" for rate setting purposes only. To the extent that the cost of any Capital Improvement is recovered through Impact Fees, it shall not be included in the System Cost.

16.4 Impact Fee Report. Customer shall provide to Fort Worth information that relates to the making of new and/or enlarged connections within its jurisdiction as may be requested by the Director, including building permits, with each quarterly payment required in this **Article 16**.

16.5 No Waiver. Neither Fort Worth nor Customer shall waive any Impact Fee due from new or enlarged connections to its respective system within its jurisdiction. However, either Fort Worth or Customer may pay such Impact Fee into the interest bearing Impact Fee account required by **§ 16.3**.

16.6 CIFC. The Wholesale Customer Advisory Committee created pursuant to **Article 15** shall select five (5) of its members to a subcommittee to be known as the Customer Impact Fee Committee ("CIFC"). As required by Texas Local Government Code § 395.052, at least every five (5) years, beginning June, 2014, or sooner, Fort Worth will update the land use assumptions and capital improvements plan upon which the Fort Worth Impact Fees are based, or make the determination under Chapter 395 that no update is required. Fort Worth shall submit a copy of the annual report of Fort Worth Impact Fee projects and expenditures to the Wholesale Customer Advisory Committee Rate Subcommittee. In June 2014 and at least every five years thereafter, the CIFC shall submit a list of five qualified engineers or planning consultants to the Director. The Director shall select a consultant from such list to assist Fort Worth in developing land use assumptions, identifying capital improvements, and formulating capital improvement plans and Impact Fees. The consultant shall be responsible to Fort Worth and its citizen's advisory committee, but shall also report to the CIFC. The cost of the consultant shall be deemed a System Cost, except to the extent that such cost is recovered through Impact Fees. If the CIFC fails to submit a list of five consultants to Fort Worth, Fort Worth shall select the consultant.

16.7 Capital Improvements Plan. Fort Worth agrees that only the Capital Improvements as defined in **§ 1.4** shall be included in the capital improvements plan for the purpose of determining Impact Fees; provided however, Fort Worth may include other capital improvements for the purpose of determining Impact Fees to its own retail customers. Fort Worth shall not be required to include all of its capital improvements in its Chapter 395 capital improvements plan. The CIFC shall be responsible for working with Fort Worth and its consultants to determine the Capital Improvements to be included in the calculation of any Impact Fees. The CIFC shall recommend to the Wholesale Customer Advisory Committee which Capital Improvements should be included in the calculation of any Impact Fees. The CIFC shall also meet with Fort Worth's citizen advisory committee as such citizen's advisory committee reviews and considers land use assumptions, the capital improvements plan and Impact Fees.

16.8 Dissemination of Documents. Prior to the adoption of any land use assumptions, capital improvements plan, or Impact Fees assessed by Fort Worth, the CIFC shall be furnished a copy of the proposed land use assumptions, capital improvement plans or Impact Fees at least thirty (30) days prior to any scheduled hearing thereon. Any revised Impact Fee adopted pursuant to such updated capital improvements plan shall not take effect for a period of at least ninety (90) days after adoption by Fort Worth.

16.9 Audited Financial Statement. Upon request, Fort Worth shall make available to the Wholesale Customer Advisory Committee the most recent audited financial statement of the Fort Worth Water Department's records.

16.10 Current Impact Fees. Customer agrees to pay Impact Fees in the amounts determined pursuant to this **Article 16**. On the Effective Date, those impact fees are the Impact Fees most recently adopted by the Fort Worth City Council before the Effective Date. Thereafter the Impact Fees are those in effect by Fort Worth ordinance at the time the new or enlarged connection is made.

16.11 Changes to Chapter 395. Fort Worth and Customer agree that the methodology for the calculation of Impact Fees required by this Agreement shall be consistent with the methodology prescribed by Chapter 395. If that statutory methodology is amended or replaced by a new statute, the Wholesale Customer Advisory Committee may engage legal counsel to work with Fort Worth to propose amendments to this Agreement to conform it to such amendment or new statute. The reasonable cost of such legal counsel shall be a System Cost.

ARTICLE 17. Breach, Termination and Other Remedies

17.1 Termination by Mutual Consent. This Agreement may be terminated in whole or in part by the mutual consent of Customer and Fort Worth. Fort Worth's decision on whether to consent to termination remains within it's sole discretion; however, before consenting to termination, Fort Worth shall consult with WCAC regarding the circumstances of the proposed termination.

17.2 Termination for Material Breach. Notwithstanding anything in this Agreement to the contrary, any material breach by either Party to perform any of its duties or obligations under this Agreement, or to faithfully keep and perform any of the terms, conditions and provisions of this Agreement, shall be cause for termination of this Agreement by the non-breaching Party in the manner set forth in this **§ 17.2**. Upon such breach, the non-breaching Party may notify the breaching Party of the non-breaching Party's intention to terminate this Agreement if the breaching Party fails to cure such breach within ninety (90) days from the date of the notice. The notice must include a reasonable description of the breach. The non-breaching Party shall notify the breaching Party in writing upon acceptance of the cure of any breach. If by the ninetieth (90th) day the breaching Party fails or refuses to cure such breach pursuant to the terms and conditions of this Agreement, then the non-breaching Party shall have the right to terminate this Agreement with six months additional notice to the breaching Party.

17.3 Termination for Repeated Breach. Upon a second (or any repeated) breach of a similar nature by a Party and irrespective of any cure of such breach, the non-breaching Party may, after six (6) months notice to the breaching Party, terminate this Agreement. That notice must be provided within a reasonable time after the repeated breach that is the basis for the termination.

17.4 Material Breach. The following breach, default or failure to perform a duty or obligation under this Agreement is a material breach:

a. Failure to comply with **§§ 2.5 or 2.6** requirements regarding rationing, conservation measures or restrictions;
b. Failure to pay any bill, charge, or fee as required by this Agreement, including fees required under **Article 16**;
c. Making any connection to the Fort Worth System at any point except as provided in **§ 3.2**;
d. Failure to correct any potentially hazardous connection in accordance with the terms of **Article 11**, after notice delivered by certified mail;
e. Failure to provide Fort Worth ingress and egress for purposes of operation and maintenance of any metering facility;
f. Failure to provide Fort Worth rights-of-way as required herein; or
g. Failure to provide Fort Worth an Impact Fee report as required in **Article 16**.

All other breaches are deemed to be non-material.

17.5 Notice and Cure. In the event of a material or non-material breach, default or failure to perform a duty under this Agreement, the non-breaching Party may send a notice of such default to the breaching Party. The notice must include a reasonable description of the breach. If the breaching Party fails to cure the breach, default or failure within 60 days of that notice, then the non-breaching Party may give the breaching Party a second notice of its failure to cure the breach. Failure to cure the breach within 30 days after the second notice shall constitute a repeated breach, and may result in termination of this Agreement as provided in **§ 17.3** for repeated breach. Fort Worth may, upon breach by a Customer, surcharge the Customer an amount developed and calculated by Fort Worth intended to reimburse Fort Worth for any damages each month, including 10% interest, until Customer cures that breach. Because failure to perform obligations under this Agreement cannot be adequately compensated in money damages alone, the Parties shall have available to them the equitable remedy of specific performance in addition to any other legal or equitable remedy as may be provided by law.

17.6 Notice and Cure for Nonpayment of Impact Fees. If the breach is based on the non-payment or underpayment of Impact Fees, then the Customer shall pay Fort Worth the amount of the non-payment or under-payment within 60 days of the notice required by **§§ 17.2 or 17.5**, plus interest at a rate of 10% of the amount owed, accruing from the time at which the payment was due. An additional charge of $500.00 will be added if no Impact Fee report was filed.

17.7 Notice and Cure for Breach of Water Use Restrictions and Conservation. If Customer breaches **§§ 2.5 or 2.6**, then the **§ 17.2** notice provisions do not apply and the Director, in his sole discretion, may, in writing, set such time in which the Customer shall cure the breach. If Customer fails or refuses to cure the breach within the stated time, then Fort Worth shall have the right to declare this Agreement terminated after six (6) months additional notice to Customer.

17.8 Failure to Provide Notice of Withdrawal Rate under § 7.2. Failure to provide **§ 7.2** notice, provided the Director did not waive notice requirements, will be considered a non-material breach of the Agreement and, in addition to other remedies available under this Agreement, shall result in an automatic surcharge in the amount specified in **§ 17.5** for such non-material breaches of the Agreement, without further notice requirements.

17.9 Effect of Termination. Upon termination of this Agreement under this **Article 17**, all rights, powers, and privileges of Customer and Fort Worth under this Agreement shall cease and terminate, and neither Party shall make any claim of any kind whatsoever against the other Party, its agents or representatives, by reason of termination or any act incident to termination, if the terminating Party acted reasonably and the termination was not unreasonable, or arbitrary and capricious. If this Agreement is not renewed before it expires, and the Parties are negotiating in good faith regarding the provisions of a new agreement, then the Parties may extend the date for termination, in writing that refers to this **§ 17.9** and is signed by both Parties. If this Agreement is not renewed, or if the Agreement is terminated by one of the Parties pursuant to this **Article 17**, then, as authorized by Texas Water Code § 11.036, this Agreement requires the Customer to develop alternative or replacement supplies before the expiration or termination of this Agreement; this requirement may be enforced by the equitable remedy of specific performance, sought by court order, in addition to any other legal or equitable remedy as may be provided by law. No continuation of the service obligation exists or will be implied after expiration or termination.

17.10 No Waiver by Fort Worth. Any failure by Fort Worth to terminate this Agreement, or the acceptance by Fort Worth of any benefits under this Agreement, for any period of time after a material breach, default or failure by Customer shall not be determined to be a waiver by Fort Worth of any rights to terminate this Agreement for any subsequent material breach, default or failure.

17.11 No Waiver by Customer. Any failure by Customer to terminate this Agreement, or the acceptance by Customer of any benefits under this Agreement, for any period of time after a material breach, default or failure by Fort Worth shall not be determined to be a waiver by Customer of any rights to terminate this Agreement for any subsequent material breach, default or failure.

ARTICLE 18. Ownership and Liability

18.1 No Joint Venture. No provision of this Agreement shall be construed to create any type of joint or equity ownership of any property, any partnership or joint venture, nor shall same create any other rights or liabilities and Customer payments (whether past, present, or future) shall not be construed as granting Customer partial ownership of, pre-paid capacity in, or equity in the Fort Worth System.

18.2 Liabilities. Liabilities for damages arising from the proper treatment, transportation and delivery for all water provided hereunder shall remain with Fort Worth to the point of delivery and, upon passing through the meter, liability for such damages shall pass to the Customer, save and except that Fort Worth's sole responsibility is to provide to Customer water of a quality which meets state and federal drinking water standards. Each Party agrees to save, release and hold harmless the other Party from all claims, demands, and causes of action which may be asserted by anyone on account of the quality, transportation and delivery while water is in the control of such Party. This covenant is not made for the benefit of any third party. Fort Worth takes the responsibility as between the Parties for the proper treatment, quality, transportation, and delivery of all such water provided by it to the point of delivery.

18.3 Contractors. Agreements made and entered into by either Customer or Fort Worth for the construction, reconstruction or repair of any Delivery Facility shall include the requirement that the independent contractor(s) must provide adequate insurance protecting both the Customer and Fort Worth as co-insured. Such Agreement must also provide that the independent contractor(s) covenant to indemnify, hold harmless and defend both the Customer and Fort Worth against any and all suits or claims for damages of any nature arising out of the performance of such Agreement.

ARTICLE 19. Force Majeure

19.1 Notice and Suspension. If by any reason of force majeure either Party shall be rendered unable, wholly or in part, to carry out its obligations under this Agreement, other than the obligation of the Customer to make payments required under the terms hereof, then if such Parties shall give notice and full particulars of such force majeure in writing to the other Party within a reasonable time after the occurrence of the event or cause relied on, the obligation of the Party giving such notice, so far as it is affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such Party shall endeavor to remove or overcome such inability with all reasonable dispatch.

19.2 Definition. The term "force majeure," as employed herein, shall mean acts of God, strikes, lockouts or other industrial disturbances, acts of public enemy, orders of any kind of the government of the United States or the State of Texas, or any civil or military authority, insurrection, riots, epidemics, landslides, lightning, earthquake, fires, hurricanes, storms, floods, washouts, droughts, arrests, restraints of government and people, civil disturbances, explosions, breakage or accidents to machinery, pipelines or canals, partial or entire failure of water supply, and inability on the part of Fort Worth to deliver water hereunder or the Customer to receive water hereunder on account of any other cause not reasonably in the control of the Party claiming such inability.

ARTICLE 20. Notices

20.1 Required Notice. Except in the case of an Emergency, any notice or other communication that is required, given or provided for under this Agreement shall be in writing, and addressed as follows:

To Fort Worth:
Water Director
City of Fort Worth
1000 Throckmorton Street
Fort Worth, TX 76102

To Customer:
Mayor Walter Bowen
City of Lake Worth
Address 3805 Adam Grubb
Lake Worth, Texas 76135

With an additional copy to be given to a Customer representative, if designated in writing by Customer.

20.2 Delivery and Receipt. Notice shall be either (a) delivered personally, (b) sent by United States certified mail, postage prepaid, return receipt requested, (c) placed in the custody of a nationally recognized overnight carrier for next day delivery, or (d) sent via telecopy or facsimile (fax) transmission. Notice shall be deemed given when received if delivered personally or sent via telecopy or facsimile transmission with written confirmation of receipt; forty-eight (48) hours after deposit if sent by mail; and twenty-four (24) hours after deposit if sent by nationally recognized overnight carrier for next day delivery.

20.3 Change of Address Notices. Each Party shall provide notice in writing, as provided in § 20.1 of any change in its address.

ARTICLE 21. Inspection and Audit

Complete records and accounts required to be maintained by each Party shall be kept for a period of five (5) years. Each Party shall at all times, upon notice, have the right at reasonable times to examine and inspect said records and accounts during normal business hours; and further, if required by any law, rule or regulation, make said records and accounts available to federal and/or state auditors. The responding Party shall make the records available promptly upon request.

ARTICLE 22. Miscellaneous

22.1 Favored Nations. Fort Worth and Customer agree that if Fort Worth should enter into any future Agreement for supplying treated water to any municipality under more favorable terms or conditions than set forth herein, this Agreement shall be amended to provide the same terms and conditions with respect to the sale of treated water to Customer.

22.2 Suspension of Rate of Use Charges. During an Emergency it may be necessary that water be withdrawn from the Fort Worth System at a rate of usage in excess of the Customer's contractually established Maximum Daily Demand and Maximum Hour Demand. It is agreed that extra Rate of Use Charges that would normally be applicable shall not apply for such bona fide emergency withdrawals provided that Fort Worth is notified in writing within forty-eight (48) hours of the occurrence of the Emergency. In any event, the normally applicable Rate of Use Charges the Customer would have incurred had it not been an Emergency, plus the Volume Charges for all water delivered, shall be due and payable as described elsewhere in this Agreement.

22.3 Water to Adjacent Areas. At the request of the Director, Customer agrees to furnish water to areas and premises situated adjacent to the boundary of Customer and within the boundaries of Fort Worth, subject to the Texas Water Code and TCEQ regulations regarding service areas. The metered quantity of water used in this area each month by Fort Worth shall be the total of all individual customer meter readings. At the option of Customer or Fort Worth, a master meter may be installed where practicable at the expense of Fort Worth to meter all water used by Fort Worth under the terms of this **§ 22.3**. The metered quantity of water furnished by

Customer to Fort Worth shall be deducted from the total quantity of water withdrawn from the Fort Worth System by Customer before the charge for water service to Customer is computed in accordance with the payment computations set forth and based on the Volume Charge, the quantity of water so withdrawn from the Fort Worth System and, if the meter serving those customers has been equipped to measure it, Maximum Day Demand and Maximum Hour Demand.

22.4 Subject to Laws and Permits. This Agreement is subject to all applicable federal and state laws and any applicable permits, amendments, orders, or regulations of any state or federal governmental authority having or asserting jurisdiction, but nothing contained herein shall be construed as a waiver of any right to question or contest any such law, order, rule or regulation in any forum having jurisdiction. Customer agrees to abide by any changes in this Agreement made necessary by any new, amended, or revised state or federal regulation; however the Parties may not enact rules or laws that conflict with this Agreement.

22.5 Entry on Customer's Premises. Upon prior notice by the Director, Customer shall allow any duly authorized employee of Fort Worth who presents proper credentials to access any premises located within Customer's Service Area or served by Customer as may be necessary for the purpose of inspections and observation, measurements, sampling and testing and/or auditing, in accordance with the provisions of this Agreement. Customer may elect to accompany the Fort Worth representative. To the extent permitted by law, Fort Worth agrees to be responsible to Customer for any damage or injury to person or property caused by the negligence of such duly authorized employee while such employee is in the course and scope of their employment.

22.6 Alternative Dispute Resolution.

22.6.1 The parties shall endeavor, but only to the extent permitted by applicable law and at no additional cost to Customer, to settle all disputes arising out of or relating to this Agreement by amicable negotiations.

22.6.2 Any and all disputes arising out of or relating to this Agreement that cannot be resolved informally will be submitted to mediation. The place of mediation shall be in Tarrant County, Texas. A mediator shall be jointly agreed to by both Parties, and the mediator selected shall have expertise in the sale and supply of treated water. Either Party may apply for injunctive relief until the mediation decision is rendered or the controversy is otherwise resolved. Either party may, without waiving any remedy under this Agreement, seek from any court having jurisdiction any interim or provisional relief that is necessary to protect the rights or property of that Party, pending the mediator's determination of the merits of the controversy. Each Party shall initially bear its own costs and expenses; however, unless otherwise agreed in mediation, Fort Worth's costs in mediation, including expenses, reasonable attorneys' fees and other costs, shall be a System Cost. Nothing occurring during mediation shall be considered evidence in court.

22.6.3 If mediation is not successful, either Party may commence litigation to resolve the dispute. Fort Worth's litigation costs shall be a System Cost.

22.7 Information. If requested by the Director, Customer shall provide quarterly the following data or information:

22.7.1 Actual number of customer accounts consuming directly or indirectly from the Customer System within Customer's Service Area;

22.7.2 Classification of domestic and nondomestic accounts within its Customer's Service Area by number and percentage of accounts consuming directly or indirectly from Customer System within its Customer's Service Area;

22.7.3 Customer water usage from all sources other than the Fort Worth System, including ground water, other surface water, and water supply agreements with other entities; and

22.7.4 Additional data which may assist Fort Worth and/or Customer in developing methodology for cost of service studies, planning studies for analyzing federal grants, and Impact Fees; provided, however, that neither Party shall request data that will require either Party to incur unreasonable expenses in providing such data.

22.8 Assignment. Customer may not assign this Agreement without the prior written consent of Fort Worth. Fort Worth may not assign this Agreement without the prior written consent of Customer, except that if Fort Worth's water utility is designated as a regional water agency by a duly authorized regulatory body, or if Fort Worth elects to contract with or assign this Agreement to a regional water authority or utility to provide all or part of the services covered by this Agreement, the Customer hereby agrees and grants Fort Worth the right to assign this Agreement under the following conditions. The regional water authority or utility shall assume and receive the same obligations, responsibilities and benefits as Fort Worth, and Fort Worth or the regional authority or utility will notify the Customer of such assignment at least ninety (90) days prior to its effective date.

22.9 No Waiver. No waiver by either Party of any term or condition of this Agreement, or failure to give notice of any breach, shall be deemed or construed to be a waiver of any other term or condition or subsequent waiver of the same term or condition.

22.10 VENUE. THE PARTIES AGREE THAT THIS AGREEMENT IS PERFORMABLE IN TARRANT COUNTY, TEXAS AND THAT THE COURTS OF TARRANT COUNTY ARE A PROPER FORUM FOR THE DETERMINATION OF ANY DISPUTE ARISING UNDER THIS AGREEMENT.

22.11 Construction. As used in this Agreement, the term "including" means "including without limitation," the words "shall" and "will" are mandatory and the word "may" is permissive, and the term "days" means calendar days, not business days. Wherever required by the context, the singular shall include the plural, and the plural shall include the singular.

22.12 Severability. If any term or provision in this Agreement is held to be invalid or unenforceable by any legislative act or court of competent jurisdiction, and the extent of such invalidity or unenforceability does not cause substantial deviation from the underlying intent of the parties as expressed in this Agreement, then such invalid or unenforceable provision shall be

deemed severed from this Agreement without invalidating the remainder of this Agreement, and a new provision shall be deemed substituted in lieu of the provision severed, which new provision shall, to the extent possible, accomplish the intent of the parties as evidenced by the provision severed, and without affecting any other term or provision in this Agreement.

22.13 Use of Return Water. Customer agrees that Fort Worth has the right to own and to use or sell any Return Water. Customer will not seek or receive any compensation, credit, or offset from Fort Worth for making the Return Water available to Fort Worth through discharges into Fort Worth's wastewater collection and treatment system(s), and agrees that it will not provide water service under any ordinance or agreement that conflicts with Fort Worth's rights under this **§ 22.13**.

22.14 System Regulatory Actions. Customer agrees, upon the request of Fort Worth, to give reasonable consideration to supporting Fort Worth, and shall not oppose Fort Worth, on any permit applications or governmental approvals related to the Fort Worth System.

22.15 Additional Contract Terms. Additional contract terms that apply to the Customer, but not Fort Worth's other wholesale customers, are contained in **Exhibit F** "Additional Terms."

22.16 Exhibits. All exhibits attached to this Agreement are incorporated into this Agreement by reference, for all intents and purposes of this Agreement, as follows:

Exhibit A	Customer Service Area and mutually agreed point(s) of delivery on the Effective Date.
Exhibit B	Stand-by Charge (Example Calculation)
Exhibit C	Example of the Annual Bill Calculation
Exhibit D	Calculation of PILOT and Cost of Service Revenue Requirement to Recover the Cost of Pilot
Exhibit E	Map of Existing Connections Outside Customer's Service Area [if any].
Exhibit F	Additional Terms [if any]

[THIS SPACE INTENTIONALLY BLANK]

IN TESTIMONY WHEREOF, after proper action by the respective governing bodies of the Parties, this Agreement has been executed in quadruplicate copies, each of which is considered to be an original.

ATTEST:

City Secretary, City of Fort Worth

CITY OF FORT WORTH

By: _____
Assistant City Manager
City of Fort Worth

APPROVED AS TO FORM AND LEGALITY:

City Attorney, City of Fort Worth
Date: 11/18/10

APPROVAL RECOMMENDED:

Director
City of Fort Worth Water Department

C-24541
Contract Authorization
10/12/10
Date

ATTEST:

Secretary, Linda Rhodes
City Secretary, City of Lake Worth

CUSTOMER City of Lake Worth
Council approved: July 13, 2010
By: _____
Walter Bowen, Mayor

APPROVED AS TO FORM AND LEGALITY:

Attorney
Date: 9-14-10

APPROVAL RECOMMENDED:

Print Name: BRETT E. McGUIRE
Title: CITY MANAGER

EXHIBIT A

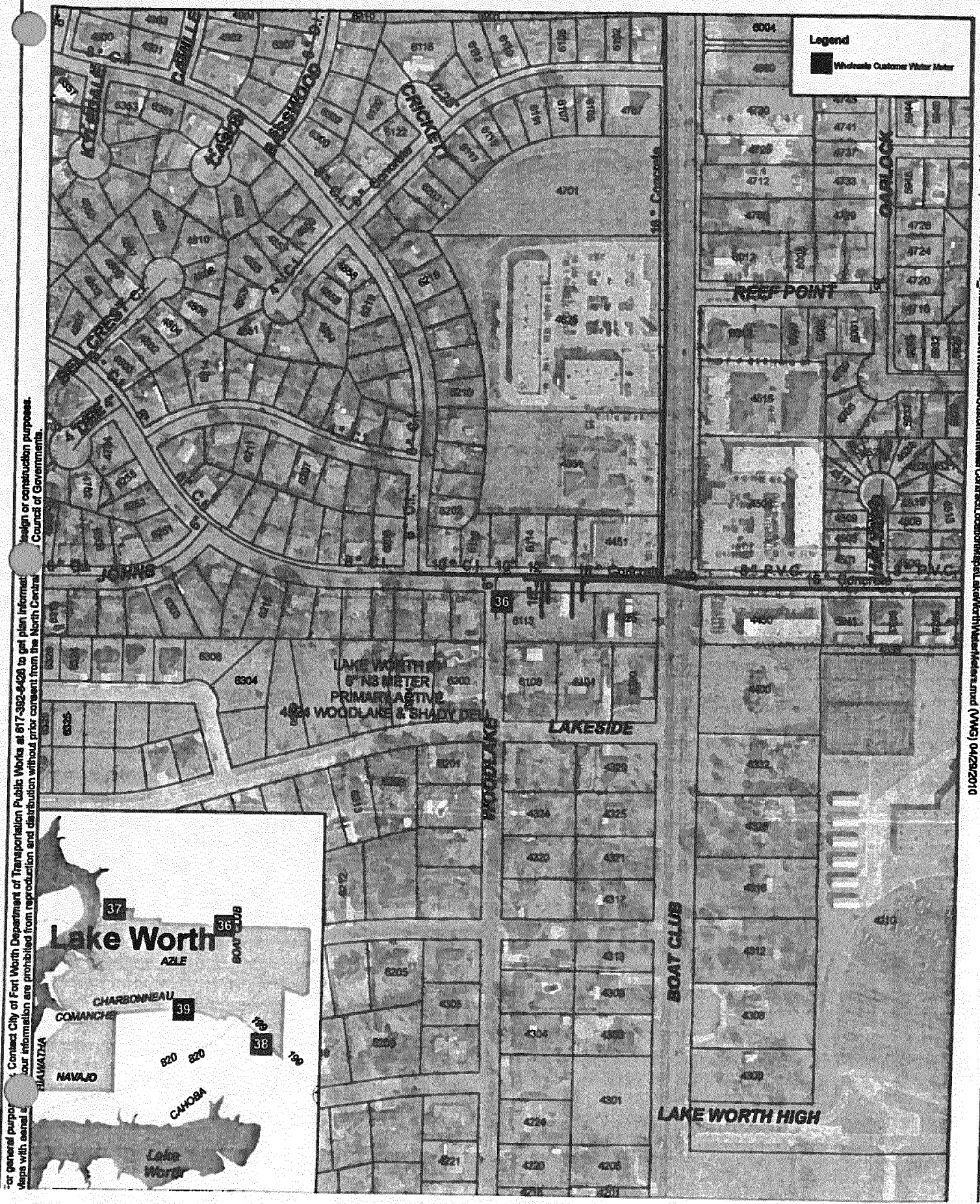
SERVICE AREA AND POINTS OF CONNECTION

EXHIBIT A
CUSTOMER METERS

Customer	Meter ID	Address	Meter Size In.	Pressure Plane	Comment	Primary	Standby
Lake Worth							
	Lake Worth #1	4524 Woodlake (intersection with Shadydell Dr.)	6	NS3	n/a	1	
	Lake Worth #3	3000 Old Mill Creek	2	NS2	Pressure plane mods		
	Lake Worth #4	3699 N.W. Centre Dr.	6	NS2	n/a	1	
	Lake Worth #2	4700 Williams Springs Rd	6	NS2	n/a		
Lake Worth Total						2	

FORT WORTH WATER

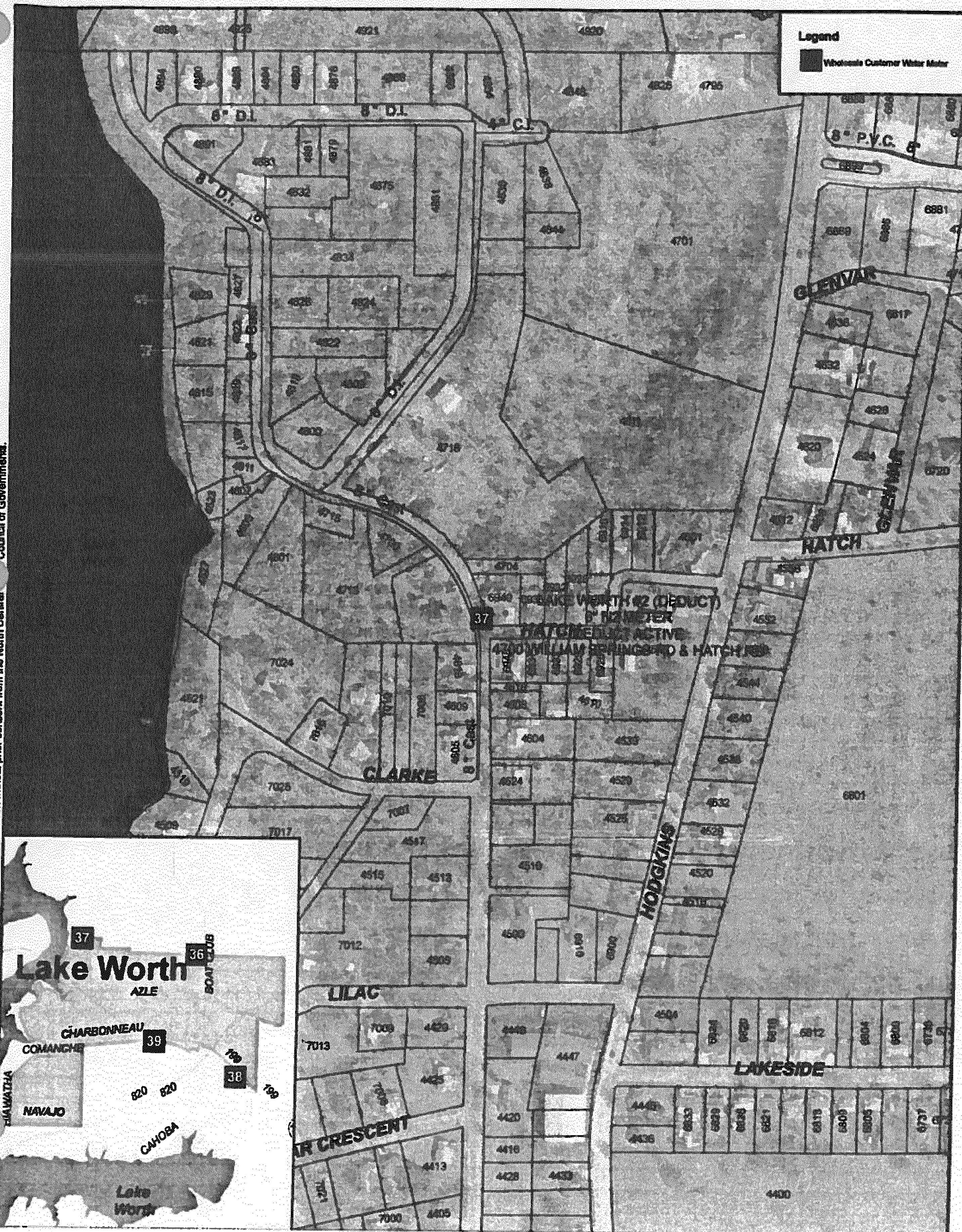
Wholesale Customer Meters For Lake Worth



Wholesale Customer Meters For Lake Worth

FORT WORTH WATER

N

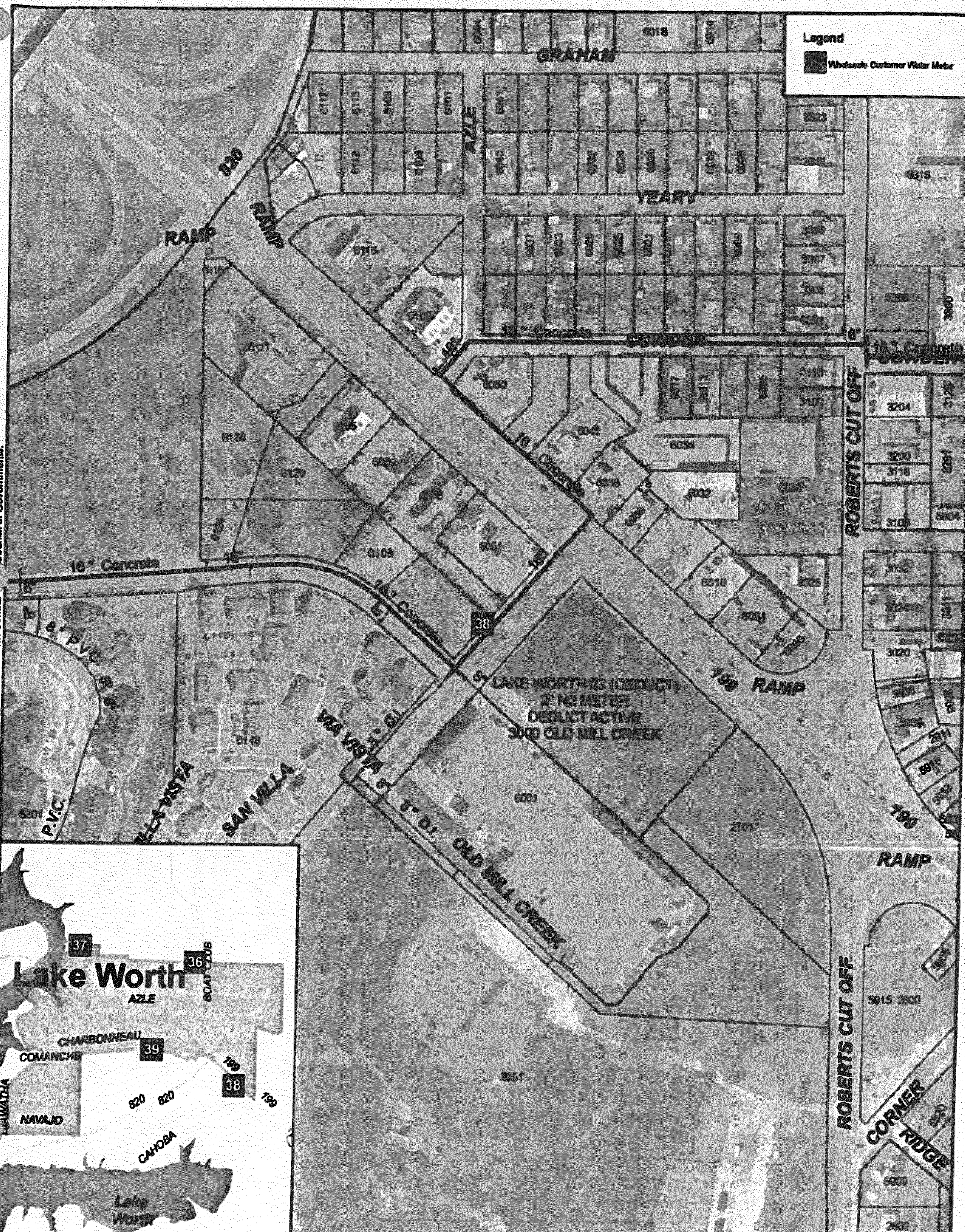


For general purposes ... Contact City of Fort Worth Department of Transportation Public Works at 817-392-8428 to get plan information ... design or construction purposes. Maps with aerial ... your information are prohibited from reproduction and distribution without prior consent from the North Central Council of Governments.

\\wcfs01\water\Groups\GIS\projects\production\facilities_maintenance\WholesaleCustomerMeterContract\LocationMaps\LakeWorthWaterMeters.mxd (VWG) 04/29/2010

FORT WORTH
WATER

Wholesale Customer Meters For Lake Worth



For general purposes ... Contact City of Fort Worth Department of Transportation Public Works at 817-392-8426 to get plan information or construction purposes. Maps with aerial ... our information are prohibited from reproduction and distribution without prior consent from the North Central Council of Governments.

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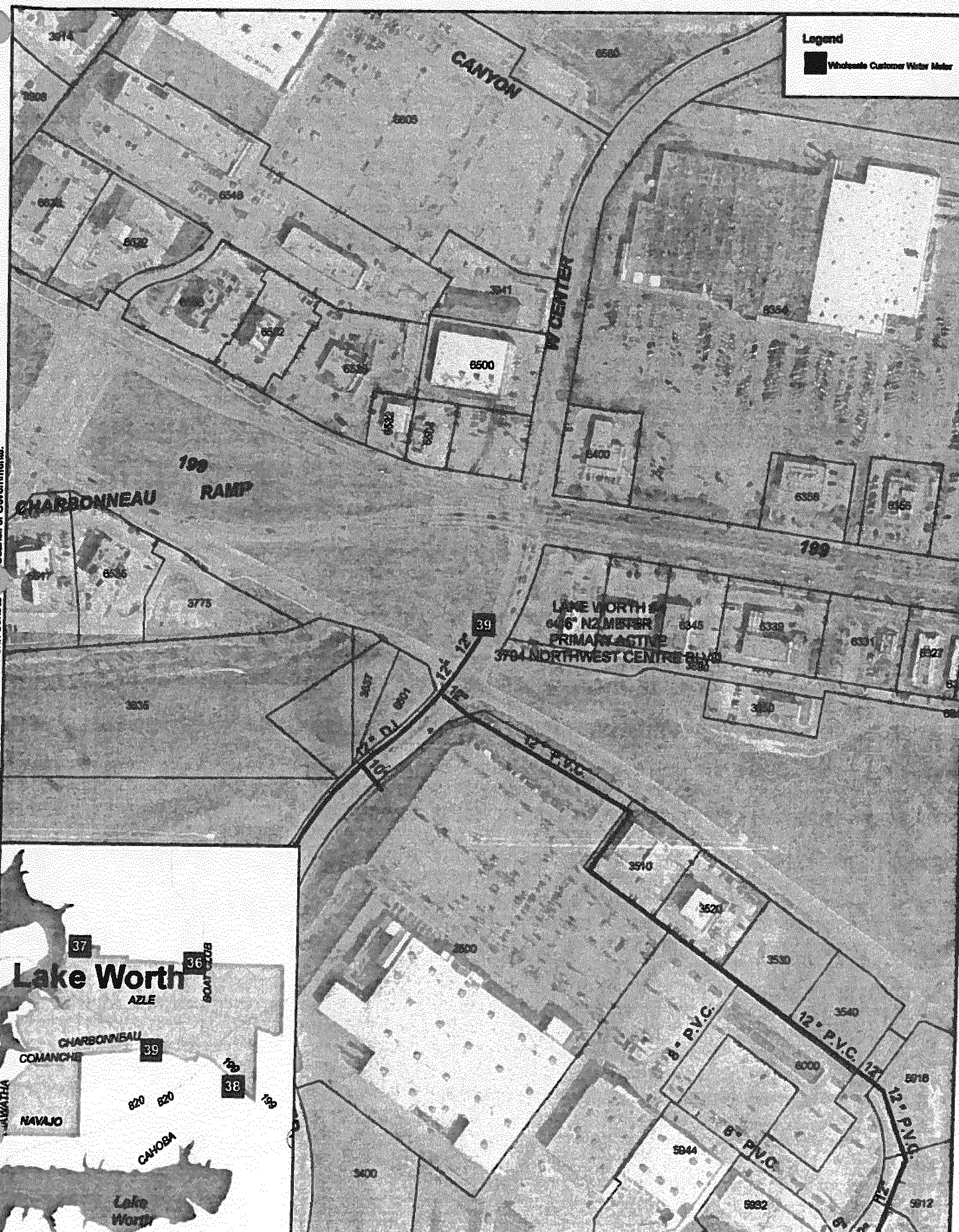
FORT WORTH
WATER

Wholesale Customer Meters For Lake Worth



For general purpose[...] Contact City of Fort Worth Department of Transportation Public Works at 817-392-8426 to get plan informat[...]sign or construction purposes. Maps with aerial [...]ur information are prohibited from reproduction and distribution without prior consent from the North Central Council of Governments.

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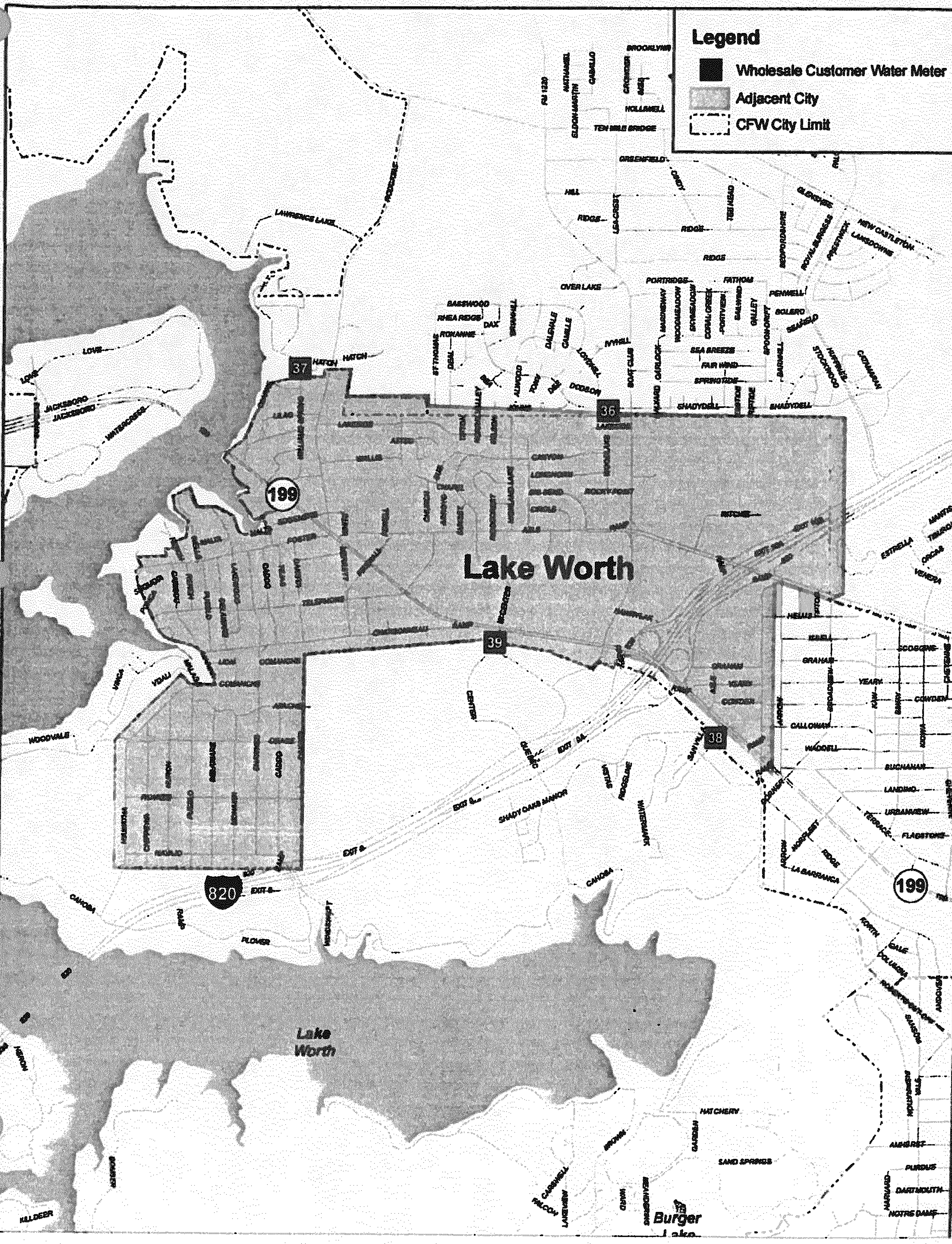
FORT WORTH WATER

Wholesale Customer Meters For Lake Worth



\\fwcfs01\water\Groups\GIS\projects\production\facilities_maintenance\WholesaleCustomerMeterContract\LocationMaps\Overview\LakeWorthWaterMeters.mxd (VWG) 08/10/2010

EXHIBIT B

SECTION 7.1.3
Stand-by Charge Example Calculation

1) Stand-by Charge Calculation Inputs:

- 10 inch meter = 210 EMs
- 1 EM = 20 Gal per Minute X 60 Minutes per Hour X 24 Hours per Day or 28,800 Gallons per Day
- Does not include Cost of Raw Water

3-Year Average Treatment, Pumping and Transmission Charge ($/1,000 Gals) Calculation:

FY05	FY06	FY07
$0.5398	$0.6829	$0.6291

Three Year Average $0.6173

2) Stand-by Charge Calculation:

Monthly Standby Charge = 28,800 Gallons per Day X 210 EM X $0.6173 per 1,000 Gallons or $3,733 per Month.

Annual Standby Charge = 12 Months X $3,733 per Month or $44,801.

STANDBY CHARGE

ASSUMPTION AND DEFINITIONS:

The Minimum Standby Charge is based on the maximum amount of water a connection could draw in a 24-hour period.

The calculation assumes that any usage would be temporary and of an emergency basis.

The calculation is also based on the number and size of each connection.

The Transmission Charge is the 3-year average for that charge as calculated in the most recent independent cost-of-service study.

Reserved Capacity is defined as the maximum amount of water a connection could draw in a 24-hour period.

"Equivalent Meters" or "EM" is a means of relating a large-use customer with a base (residential) use customer. Fort Worth uses 5/8 x 3/4 inch meter capacity as an EM. The ratio of larger meter's capacity to the 5/8 x 3/4 inch meter capacity is the number of

EMs for each meter. The ratios can be found in the AWWA Standard C700-02.

1 EM delivers 20 Gallons per Minute.

1 EM delivers 28,800 Gallons per Day (20 GPM * 60 Minutes/Hour * 24 Hours/Day).

Maximum Reserved Emergency Usage equals EM * 28,800

EXHIBIT C

SECTION 7.4 Total Annual, Monthly and Rate of Use Example Calculations

The calculations shown below assume a customer drawing water from one metering station. **The volumes, peaks, rates and charges in this Exhibit C are for demonstration purposes only and are not based on adopted rates or on actual usage for the Customer.**

The annual Volume Rate is charged as a rate per 1,000 gallons. The Annual Payment also includes the monthly service charge.

Month	Gallons	Volume Rate $/1,000 Gallons	Volume Charges	Service Charges	Rate of Use Charges*	Total
Oct	1,000,000	$1.43	$1,430	$25	$2,209	$3,664
Nov	1,000,000	$1.43	$1,430	$25	$2,209	$3,664
Dec	1,000,000	$1.43	$1,430	$25	$2,209	$3,664
Jan	1,000,000	$1.43	$1,430	$25	$2,209	$3,664
Feb	1,000,000	$1.43	$1,430	$25	$2,209	$3,664
Mar	2,000,000	$1.43	$2,860	$25	$2,209	$5,094
Apr	3,000,000	$1.43	$4,290	$25	$2,209	$6,524
May	3,000,000	$1.43	$4,290	$25	$2,209	$6,524
Jun	3,000,000	$1.43	$4,290	$25	$2,209	$6,524
Jul	3,000,000	$1.43	$4,290	$25	$2,209	$6,524
Aug	4,000,000	$1.43	$5,720	$25	$2,209	$7,954
	23,000,000		$32,890	$275	$24,299	$57,464
Sep	3,000,000	$1.43	$4,290	$25	$7,021	$11,336
	26,000,000		$37,180	$300	$31,320	$68,800

* Example calculation for Rate of Use Charges is on Page 2 of 4.

EXHIBIT C

SECTION 7.4 Total Annual Payment Example Calculation (con't)

Example Calculation for monthly Rate of Use Charges

	Gallons
Average Daily Use for the prior year	60,000
Maximum Day Demand for the prior year	175,000
Maximum Hour Demand for the prior year (converted to gallons per day)	480,000
Maximum Day Demand above Average Daily Use (Max Day - Avg Day)	115,000
Maximum Hour Demand above Maximum Day Demand (Max Hour - Max Day)	305,000

Monthly Excess Maximum Day and Excess Maximum Hour Payment Calculation:

	MGD	Excess Max Charges/MGD*	Total
Max Day Above Avg Day	0.115	$135,000	$15,525
Max Hour Above Max Day	0.305	$36,000	$10,980
			$26,505
Monthly Rate of Use Charge Payment (Total Divided by 12)			$2,209

*The Excess Max Charges/MGD are the Excess Max Day Charge and the Excess Max Hour Charge, each in $/MGD, taken from the current Fiscal Year annual cost-of-service rate study

As shown, the monthly Rate of Use Charges are calculated using the prior year's Average Daily Use, Maximum Day Demand and Maximum Hour Demand, times the current Fiscal Year Excess Max Charges/MGD. The final Annual Payment required by **Article 7** is calculated using the current Fiscal Year Average Daily Use, and the Maximum Day Demand and Maximum Hour Demand for the current Fiscal Year or for the average of the most recent three (3) Fiscal Years, whichever is greater (as provided in § **7.1** and shown in the following Examples 1 and 2), times the current Fiscal Year Excess Max Charges/MGD.

EXHIBIT C

SECTION 7.4 Total Annual Payment Example Calculation (con't)

Example 1 – Current year exceeds the average of the most recent three Fiscal Years

	Gallons
Average Daily Use for the year	71,233
Maximum Day Demand for the current year	215,000
Maximum Hour Demand for the current year (converted to gallons per day)	545,000
Maximum Day Demand above Average Daily Use	143,767
Maximum Hour Demand above Maximum Day Demand	330,000

Fiscal Year Average of Most Recent Three Years

	Average	**Current FY**	FY 2008	FY 2007
Max Day Above Avg Day (MG)	129,178	**143,767**	115,000	128,766
Max Hour Above Max Day (MG)	318,333	**330,000**	305,000	320,000

Annual Payment Calculation

Gallons		Volume Rate $/1,000 Gallons		Total
26,000,000	x	$1.43	=	$37,180

Service Charge		Months		
$25	x	12	=	$300

Max Day Above Avg Day (MGD)		Excess Max Charges/MGD		
0.144	x	$135,000	=	$19,440

Max Hour Above Max Day (MGD)		Excess Max Charges/MGD		
0.330	x	$36,000	=	$11,880

Total Annual Payment Due	$68,800
Previous Billings for October through August Usage	$57,464
October Billing for September Usage	$11,336

EXHIBIT C

SECTION 7.4 Total Annual Payment Example Calculation (con't)

Example 2 – The average of the most recent three Fiscal Years exceeds Current year.

	Gallons
Average Daily Use for the year	71,233
Maximum Day Demand for the current year	190,000
Maximum Hour Demand for the current year (converted to gallons per day)	500,000
Maximum Day Demand above Average Daily Use	118,767
Maximum Hour Demand above Maximum Day Demand	310,000

Fiscal Year Average of Most Recent Three Years

	Average	CURRENT FY	FY 2008	FY 2007
Max Day Above Avg Day (MG)	120,844	118,767	115,000	128,766
Max Hour Above Max Day (MG)	311,667	310,000	305,000	320,000

Annual Payment Calculation

Gallons		Volume Rate $/1,000 Gallons		Total
26,000,000	x	$1.43	=	$37,180
Service Charge		Months		
$25	x	12	=	$300
Max Day Above Avg Day (MGD)		Excess Max Charges/MGD		
0.121	x	$135,000	=	$16,335
Max Hour Above Max Day (MGD)		Excess Max Charges/MGD		
0.312	x	$36,000	=	$11,232

Total Annual Payment Due	$65,047
Previous Billings for October through August Usage	$57,464
October Billing for September Usage	$7,583

EXHIBIT D

Calculation of PILOT and Cost of Service Revenue Requirement to Recover the Utility's Cost of PILOT

DESCRIPTION

A payment in lieu of taxes ("PILOT") assessed against the Water Operating Fund is an annual assessment to offset the ad valorem taxes lost, due to the non-profit status of the Water System. The Water Operating Fund pays the amount of the assessment into the General Fund.

PILOT assessed against the Water Operating Fund is calculated by applying the most recently adopted property tax rate per $100 assessed value to the net book value of the applicable assets. These assets are limited to the assets classified as Plant and Property (in the specific NARUC accounts listed on the next page), and do not include Transmission Mains, Connections, Collection Structures and Meters.

The PILOT is a component of the Water Operating Fund Cost of Service. The Cost of Service Revenue Requirement that is necessary to recover PILOT is allocated between Retail and Wholesale customer classes according to the volume usage in the most recently completed fiscal year, prorated between the two customer classes.

The Wholesale Cost of Service component of PILOT is then allocated amongst the wholesale customers according to each wholesale customer's percentage of the wholesale customer class's volume usage in the most in the most recently completed fiscal year.

EXAMPLE

The following example further explains the calculation of the City's PILOT, the related revenue requirement, and its recovery through rates. The methodology applied in this example will remain in effect for the life of the Agreement; however, the specific dollar figures, volumes and other numerical values used in the following example will be updated from the sources identified below for each fiscal year that the contract is in effect.

NET BOOK VALUE CALCULATION FOR PILOT ASSESSMENT

PILOT assessed against the Water Operating Fund is calculated by applying the most recently adopted property tax rate per $100 assessed value to the net book value of the applicable assets, calculated as:

Historical Cost of Water System Assets at most recent audited year end;

LESS Historical Cost of Non-Plant and Non-Property Water System assets defined by NARUC (National Association of Regulatory Utility Commissioners) codes:

316	Raw Water Conduit and Valves
343	Transmission Mains
345	Service Connections
346	Meters
347	Meter Installation
348	Hydrant
372	Structures & Improvements / Collection

(If any of these account codes are amended, the equivalent code will be substituted.)

LESS Accumulated Depreciation on Plant and Property at most recent audited year end;

PLUS Construction Work in Progress on Plant and Property at most recent audited year end;

Example calculation:

NET BOOK VALUE CALCULATION

Total Historical Cost of Water System	LESS Historical Cost of Non-Plant and Non-Property Assets	LESS Life-to-Date Accumulated Depreciation	PLUS Construction Work In Progress	EQUALS NET BOOK VALUE
$982,385,273	($655,261,618)	($105,793,316)	$26,990,180	$248,320,519

(Dollar figures from most recent Cost of Service Study.)

Appendix L – City of Fort Worth Wholesale Supply Confirmation

FORT WORTH®

February 5, 2018

Mr. Sean Densmore
Director of Public Works
City of Lake Worth
3805 Adam Grubb
Lake Worth, TX 76135

RE: Available Potable Water Supply to City of Lake Worth

Dear Mr. Densmore:

The TCEQ performed an inspection of the Lake Worth water system on December 14, 2017. It was noted by the TCEQ investigator that "the water system was operating at approximately 92% of its minimum required production capacity", based on the projected demand from the current number of water system connections (2,248) compared to the available supply from Lake Worth's water wells and the wholesale purchase water contract with Fort Worth.

The TCEQ has requested Lake Worth to provide a report showing it has adequate water supply to meet the system demands. Table 1 shows the FY 11 max day demand from the City of Lake Worth was 1.59 MGD, though more recent years max day demands have dropped significantly due to the effects of water conservation initiatives as well as milder summers. The uniform wholesale contract between the City of Fort Worth and Lake Worth states that "the maximum rate of withdrawal shall be controlled so that the maximum rate shall not exceed 1.35 times the maximum day demand experienced during the previous year ***unless Customer has notified the Director***".

TABLE 1 – HISTORICAL WATER USAGE – CITY OF LAKE WORTH

Fiscal Year	Average Day (MGD)	Max Day (MGD)	Max Hour (MGD)
FY 09	0.663	1.226	1.808
FY 10	0.596	1.274	1.726
FY 11	0.754	1.590	1.854
FY 12	0.728	1.585	1.769
FY 13	0.718	1.170	1.603
FY 14	0.698	1.078	1.373
FY 15	0.659	1.293	1.672
FY 16	0.618	1.356	1.808
FY 17	0.573	1.001	1.853

The City of Lake Worth notified the Fort Worth Water Department of the TCEQ's concerns regarding the adequacy of their water supply. The City of Fort Worth does have adequate system capacity to provide the City of Lake Worth with a water supply based on their FY 11 max day usage, compared to lower max day demands recently experienced.

Sincerely,

Kenneth Morgan
Water Director

Water Department
The City of Fort Worth * 200 Texas Street * Fort Worth, Texas 76102
Tel: 817-392-8240 * Fax: 817-392-8195

Appendix M – Azle Avenue and Stadium Well Field Pump Station Manufacturer Pump Curves

GRUNDFOS

Stadium Pump Station

SUBMITTAL

PACO Series KP - Horizontal Split Case Pump

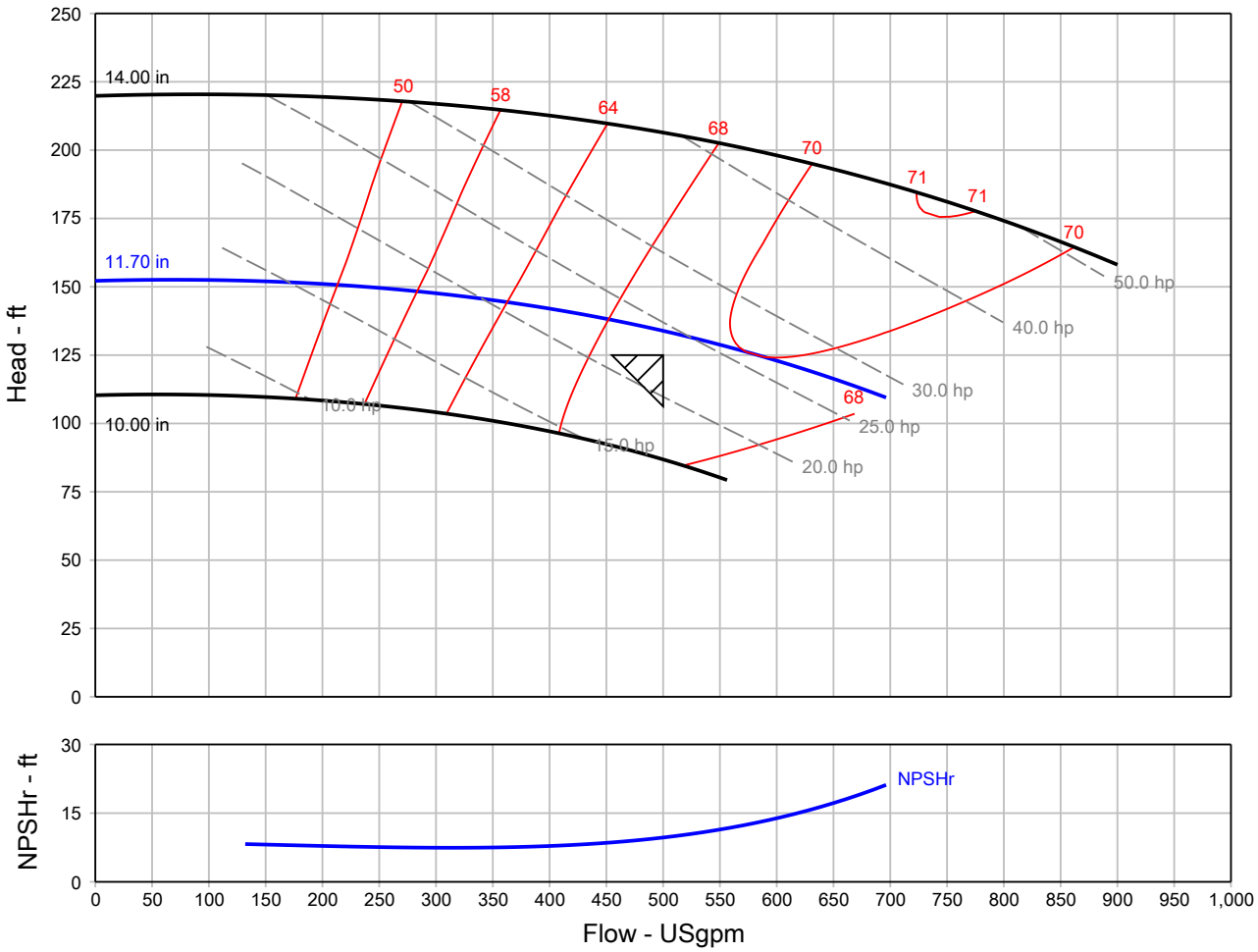
PROJECT 703498	**UNIT TAG 001**	**QUANTITY 1**
	SERVICE	
REPRESENTATIVE	**SUBMITTED BY**	**DATE**
ENGINEER	**APPROVED BY**	**DATE**
CONTRACTOR	**ORDER #**	**DATE**

KP 3014-7/8

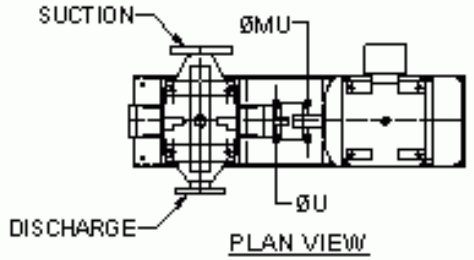
1780 rpm

Part Number N/A

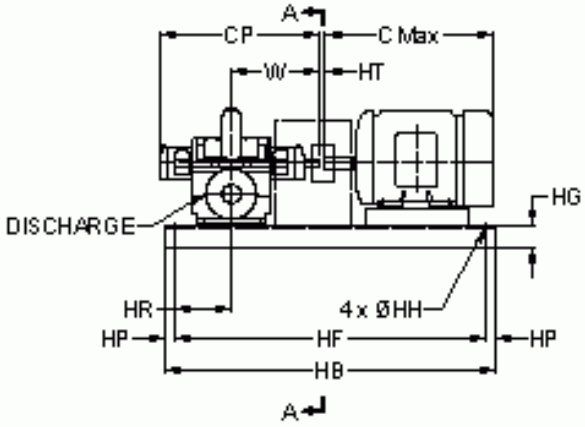
Conditions of Service		Pump Data		Motor Data	
Flow	500.0 USgpm	Impeller Diameter	11.70 in	Motor HP	30.00 hp
Head	125.0 ft	Max. Imp. Dia.	14.00 in	BHP	24.42 hp
Liquid	Cold Water	Min. Imp. Dia.	10.00 in	Enclosure	ODP
Temperature	68.00 deg F	Efficiency	69.22 %	Voltage	208-230/460 V
NPSHr	9.67 ft	Suction	4 in.	Phase	3 Phase
Viscosity	1.00 cP	Discharge	3 in.	Cycle	60 Hz
Specific Gravity	1.000 SG	Configuration	Horizontal	Frame Size	286T



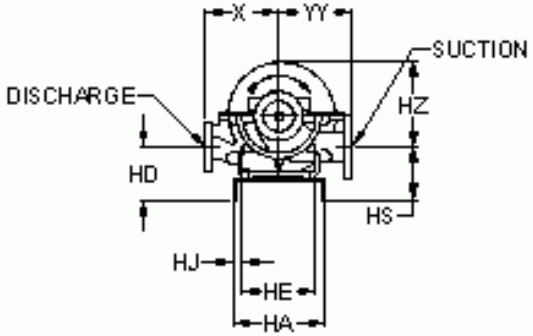
PACO Series KP - Horizontal Split Case Pump



PLAN VIEW



SIDE VIEW



END VIEW
SECTION A - A

NOT FOR CONSTRUCTION, unless certified and referenced on order

Units	Frame	Suct	Disch	C	CP	HA	HB	HD	HE	HF	HG	HH	HJ	HP	HR	HS	HT	HZ	MU	N	U	W	WB	WS	X	YY	Weight
inches	286	4	3	29.00	26.25	15.00	54.00	8.63	12.00	51.00	3.50	0.63	1.50	1.50	9.38	8.63	0.75	16.63	1.88	2.75	1.50	14.50	20.00	9.88	12.00	12.00	TBD

GRUNDFOS

Azle Ave. Pump Station

SUBMITTAL

PACO Series VL - In-Line Centrifugal Pump, Close Coupled

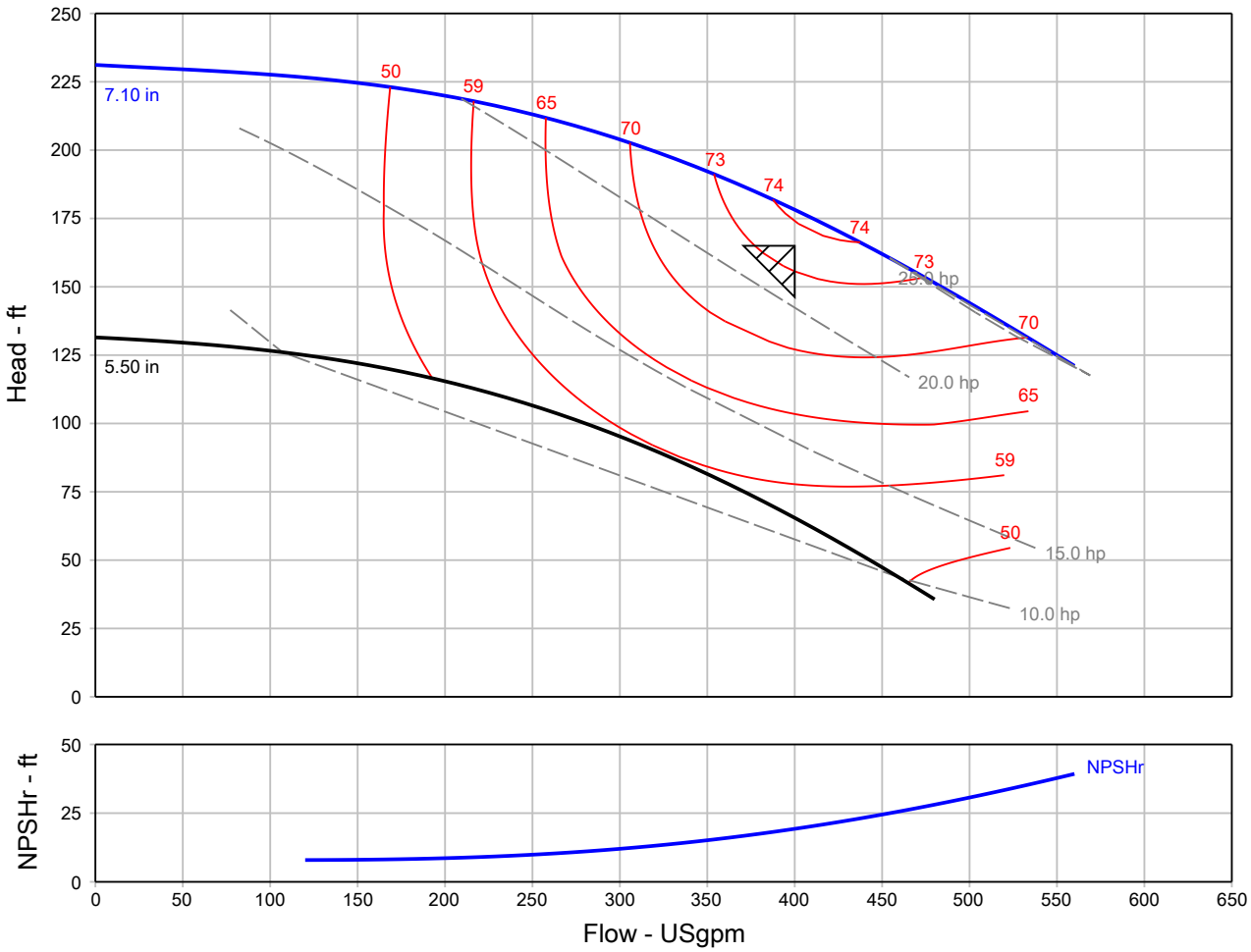
PROJECT 703498	**UNIT TAG 002**	**QUANTITY 1**
	SERVICE	
REPRESENTATIVE	**SUBMITTED BY**	**DATE**
ENGINEER	**APPROVED BY**	**DATE**
CONTRACTOR	**ORDER #**	**DATE**

VL 30707

3530 rpm

Part Number N/A

Conditions of Service		Pump Data		Motor Data	
Flow	400.0 USgpm	Impeller Diameter	7.10 in	Motor HP	30.00 hp
Head	165.0 ft	Max. Imp. Dia.	7.10 in	BHP	24.26 hp
Liquid	Cold Water	Min. Imp. Dia.	5.50 in	Enclosure	ODP
Temperature	68.00 deg F	Efficiency	74.16 %	Voltage	208-230/460 V
NPSHr	19.29 ft	Suction	3 in.	Phase	3 Phase
Viscosity	1.00 cP	Discharge	3 in.	Cycle	60 Hz
Specific Gravity	1.000 SG	Configuration	Vertical	Frame Size	284JM

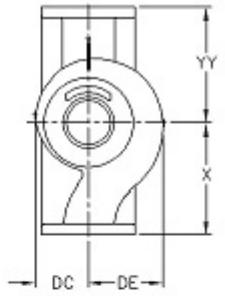


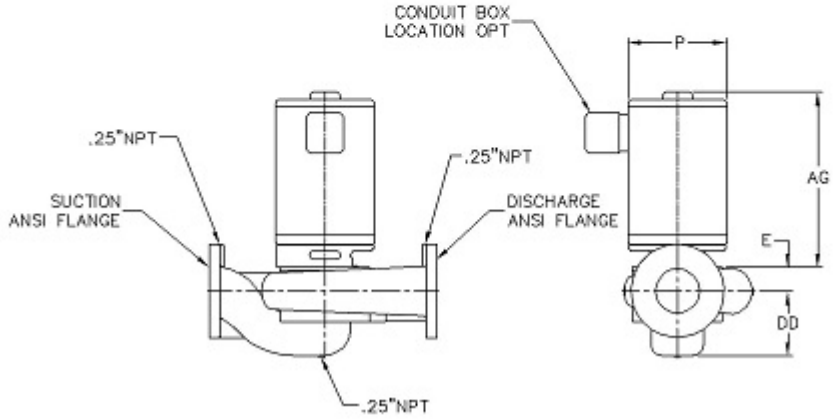
PACO Series VL - In-Line Centrifugal Pump, Close Coupled

Do not install pump larger than 215JM in vertical piping.

Pressure and drain tap locations are approximate.

Suction and discharge flanges, are cast per 250# ANSI thickness and diameter. All flanges are flat face. Some holes may be threaded because of nut clearances.



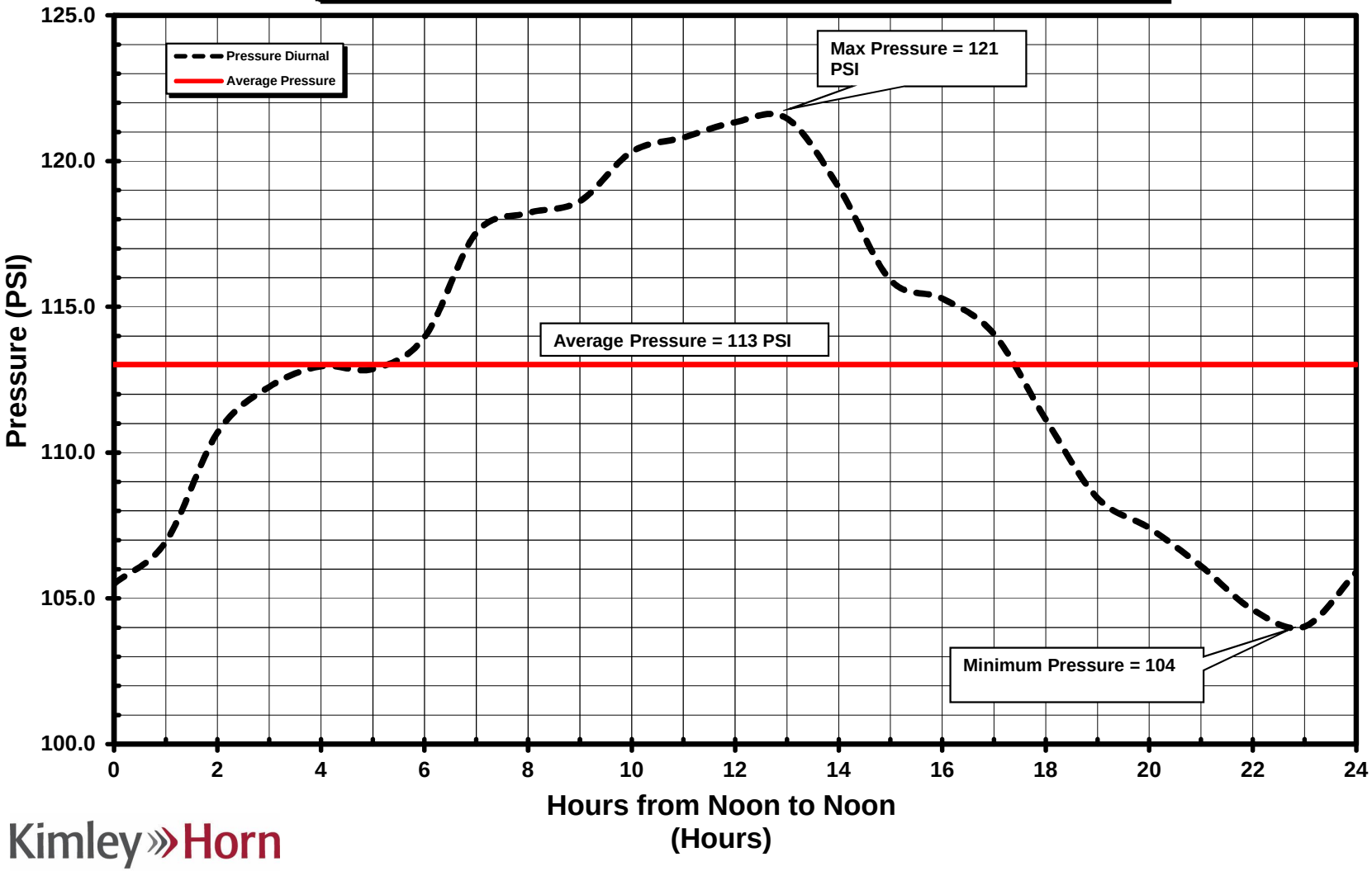


NOT FOR CONSTRUCTION, unless certified and referenced on order

Units	Frame	S x D	AG (Max)	DC	DD	DE	E	P (Max)	X	YY	Weight
inches	284JM	3 X 3	26.00	5.94	6.25	6.94	2.13	15.00	9.00	9.00	TBD

Appendix N – Northwest Centre Meter 24-hr Delivery Pressure

Northwest Centre Pressure Dirunal Curve (November 9-10)



Kimley»Horn

Appendix O – Distribution Replacement Example Cost

Kimley-Horn & Associates, Inc. **Opinion of Probable Construction Cost**

Client:	**City of Lake Worth**	**Date:**	**12/14/2017**
Project:	**Water System Master Plan**	**Prepared By:**	**AWS**
KHA No.:	**061060050**	**Checked By:**	**RJJ**

Distribution Replacement Example Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization	1	LS	$30,000	$30,000
2	Traffic Control	1	LS	$2,500	$2,500
3	Erosion Control	1	LS	$2,500	$2,500
4	6" AWWA C900 DR-18 PVC Water Pipe	1,000	LF	$50.00	$50,000
5	Water Line Trench Safety	1,000	LF	$2.00	$2,000
6	6-inch AWWA Gate Valve	4	EA	$2,500.00	$10,000
7	Connect to Existing Water Line	2	EA	$5,000.00	$10,000
8	Fire Hydrant Assembly	3	EA	$5,000.00	$15,000
9	Water Meter and Service	20	EA	$2,000.00	$40,000
10	Ductile Iron Fittings	2	TON	$5,000.00	$10,000
11	Hydromulch	100	SY	$3.00	$1,000
12	Asphalt Pavement Repair	900	SY	$45.00	$41,000
13	Curb and Gutter Repair	200	LF	$50.00	$10,000

Basis for Cost Projection:

- [x] No Design Completed
- [ ] Preliminary Design
- [ ] Final Design

Subtotal:		$224,000
Conting. (%,+/-)	20	$45,100
Professional Services (%,+/-)	15	$33,900
Total:		**$303,000**

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.