2024 Water and Wastewater Master Plan

City Of Jersey Village TEXAS

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STATE OF TEXAS
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EXECUTIVE SUMMARY

The City of Jersey Village (City) wants to ensure adequate water and wastewater infrastructure is available to serve existing and future development/redevelopment. The City engaged Quiddity Engineering, LLC to develop a Water and Wastewater Master Plan (Master Plan) using generally accepted engineering and planning practices to meet the State of Texas requirements, review and evaluate current land use assumptions, and develop a Capital Improvement Plan (CIP). The Master Plan provides guidance and policies to accommodate projected growth and development within the City's jurisdiction over the next decade (2024-2034). The Master Plan evaluates the current and projected water and wastewater systems and includes recommendations for future water and wastewater system infrastructure improvements.

Projected growth and development are important components when analyzing water and wastewater systems and was based on population and land use projections within the City Limits and extraterritorial jurisdiction (ETJ). The City is approximately 3.5 square miles in area with an additional 704-acres of area in the City's ETJ.

Water System

A water model was developed for the City's existing and future water system using WaterGEMS Connect Edition by Bentley Systems, Inc. Water consumption and water plant pumpage data from January 2021 – April 2024 was used to determine the existing demand. Demands for future development / redevelopment were estimated using the land use assumptions and water demands developed as part of the Capital Improvements Plan and Impact Fee Study 2023 Update, December 2023 by Quiddity Engineering, LLC. The City currently serves an average daily demand of 1.52 million gallons per day (MGD) of water with a recorded maximum day demand of 3.7 MGD. The City is projected to serve an average daily demand of 2.3 MGD and maximum day demand of 5.7 MGD by the end of the planning period (2034).

The City's existing water system includes three (3) water plants, and approximately 47 miles of water distribution lines. Based on the water model and analysis, the existing water system is able to maintain minimum pressures for the distribution system and fire flow, meeting or exceeding Texas Commission on Environmental Quality (TCEQ) requirements. The City provides adequate fire flow per 2024 International Fire Code, Appendix B, B105 throughout the water system.

Capital improvements are identified in the Master Plan for the water system necessary to serve anticipated development / redevelopment. The improvements include construction of new waterlines, a new water plant, and a surface water interconnect. **Table ES-1** provides the proposed CIP for the water system.

Table ES-1: Water System Capital Improvements

No.	Description of Projects	Cost Estimate
W-15	City of Houston Interconnect No. 2	$2,318,000
W-16	FM 529 8" & 12" Water Line from Harms Rd to Hwy 290 – Service to ETJ	$2,825,000
W-17	Charles Rd 8" & Wright Rd 12" Water Line Loop – Service to ETJ	$1,720,000
W-18	Wright Rd 12" Water Line from Charles Rd to Hwy 290 – Service to ETJ	$1,724,000
W-19	Fairview St 12" Water Line from FM 529 to Taylor Rd – Service to ETJ	$5,121,000
W-20	Harms Rd 12" Water Line from FM 529 to Taylor Rd – Service to ETJ	$3,119,000
W-21	Musgrove Ln 8" & 12" Water Line from Taylor Rd to Jones Rd Along Hwy 290 – Service to ETJ	$1,417,000
W-22	Taylor Rd 8" & 12" Water Line Extension from Hwy 290 to Edge of ETJ – Service to ETJ	$761,000
W-23	Water Plant Facility #4 – Phase 1	$4,339,000
W-24	Water Plant Facility #4 – Phase 2	$2,220,000

Wastewater System

A hydraulic analysis of the existing and future wastewater system was performed to evaluate the existing conditions and identify capital improvements necessary to serve future development / redevelopment. Lift station runtimes and wastewater treatment plant effluent flows were used to determine demands for existing development. Demands for future development / redevelopment were estimated using the land use assumptions developed as part of the Capital Improvements Plan and Impact Fee Study 2023 Update. The City currently serves an average daily flow of 0.55 MGD accumulative between two (2) wastewater treatment plants and is projected to serve 1.5 MGD by the end of the planning period (2034).

The City's existing wastewater collection and treatment system includes one (1) Wastewater Treatment Plant (WWTP) at Castlebridge (owned by the City), one (1) WWTP at White Oak Bayou Joint Powers Board (partnership with five (5) entities), six (6) lift stations, and approximately 39 miles of wastewater collection system. The existing system has adequate capacity to treat existing development. The lift stations are operating within expected runtime ranges that closely match the anticipated flow rates based on sewer shed areas, with the exception of Rio Grande Lift Station. Based on the analysis the existing sanitary collection system is adequately sized to serve all existing development. However, more detailed investigation and evaluation, as part of the ongoing cleaning and televising services, could identify specific segments of the collection system that have inflow and infiltration issues or have been damaged and in need of replacement.

Capital improvements are identified for the wastewater system necessary to serve anticipated development / redevelopment and two (2) alternative projects, as discussed in section 5.9.4, to allow the City to maximize their ownership stake of the White Oak Bayou WWTP by rerouting flows between sewersheds in order to delay or eliminate the expansion of the Castlebridge WWTP. **Table ES-2** provides the proposed CIP of the wastewater system.

Table ES-2: Wastewater System Capital Improvements

No.	Description of Projects	Cost Estimate
S-10	Jones Rd LS & FM 529 Service Area 8" Wastewater Line - Service to ETJ	$1,555,000
S-11	FM 529 LS Service Area 8" Wastewater Lines - Service to ETJ	$3,045,000
S-12	Proposed Taylor Road Lift Station & 12" Force Main to Castlebridge WWTP - Service to ETJ	$4,808,000
S-13	Wright Rd 8" & 12” Wastewater Line from FM 529 to Hwy 290 - Service to ETJ	$1,998,000
S-14	Taylor Road 8", 15", & 18" Wastewater Line - Service to ETJ	$2,017,000
S-15	Fairview St 8" & 12” Wastewater Line from FM 529 to Taylor Rd - Service to ETJ	$3,921,000
S-16	Harms Rd 8" & 12” Wastewater Line from FM 529 to Taylor Rd - Service to ETJ	$1,867,000
S-17	Castlebridge WWTP Expansion	$20,454,000
S-18	Tahoe Lift Station Replacement	$2,484,000
S-19	Reroute Jones Road Lift Station to White Oak Bayou Service Area	$922,900

1.0 INTRODUCTION

The City of Jersey Village (City) was established in 1956, located in west-central Harris County. The City provides water and wastewater service to approximately 8,000 people within its service area and over 2,600 retail water meter connections. The City desires to develop a Water and Wastewater Master Plan to support new development and redevelopment, including new infrastructure. Development of master plans are an important tool for the City to proactively budget and plan long-term for its water and wastewater systems by identifying and prioritizing projects to help deliver appropriate water and wastewater service to the citizens.

1.1. BACKGROUND INFORMATION

Quiddity Engineering, LLC, (Quiddity) was authorized by the City to prepare a Water and Wastewater Master Plan. The goals of the master plan are to evaluate the existing water distribution and wastewater collection systems and make recommendations to serve new / existing development and redevelopment, including the City's Extraterritorial Jurisdiction.

The Capital Improvements Plan and Impact Fee Study 2023 Update completed by Quiddity Engineering, LLC, December 18, 2023, is the foundation for the assessment and evaluation. Other documents, studies, and reports were incorporated to develop the Water and Wastewater Master Plan including the City of Jersey Village Zoning Ordinance, Jersey Village Comprehensive Plan 2020 Update, and existing infrastructure records provided by the City of Jersey Village.

The City provides water and wastewater service to approximately 7,600 people within the city limits and has over 3,300 retail water meter connections. The existing service area north of Highway 290 is mostly developed and is comprised primarily of residential connections. The area south of Hwy 290 currently includes commercial and industrial users comprising 25 acres within City limits. In the 2023 Capital Improvements Plan and Impact Fee Study, this area was anticipated to redevelop into new commercial and mixed-used properties that the City would serve. Additional properties within the ETJ are projected to undergo similar development patterns which this analysis anticipates the City will serve.

Quiddity assessed the existing three (3) water plants (WPs), two (2) elevated storage tanks (ESTs), one (1) Wastewater Treatment Plant (WWTP) at Castlebridge, one (1) WWTP at White Oak Bayou Joint Powers Board, six (6) lift stations (LS), and approximately 257,000 linear feet of water distribution system and 205,000 linear feet of wastewater collection system.

This study analyzes the City's historical water and wastewater usage. System improvements necessary to serve future developments are identified based on 30 TAC, Texas Commission on Environmental Quality (TCEQ), chapters 290 and 217 requirements, water system model results, and hydraulic analysis of the wastewater system.

1.2. LIST OF ABBREVIATIONS

Table 1-1 List of Abbreviations

Abbreviation	Full Nomenclature
ADD	Average Daily Demand
ADF	Average Daily Flow
CIP	Capital Improvement Plan
City	City of Jersey Village
conn	Connections
ESFC	Equivalent Single-Family Residential Water Connections
EST	Elevated Storage Tank
ETJ	Extraterritorial Jurisdiction
gpd	Gallons Per Day
gpm	Gallons Per Minute
IFS	Impact Fee Study
LS	Lift Stations
PHF	Peak Hour Flow
MDD	Maximum Daily Demand
MGD	Million Gallons Per Day
TCEQ	Texas Commission on Environmental Quality
LGC	Texas Local Government Code
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WP	Water Plant
WWTP	Wastewater Treatment Plant

2.0 POPULATION

When the City of Jersey Village was incorporated its population was less than 100 people and an area of less than 2 square miles. Since then, the City has grown to 7,921 people, according to the 2020 census with an area of 3.5 square miles.

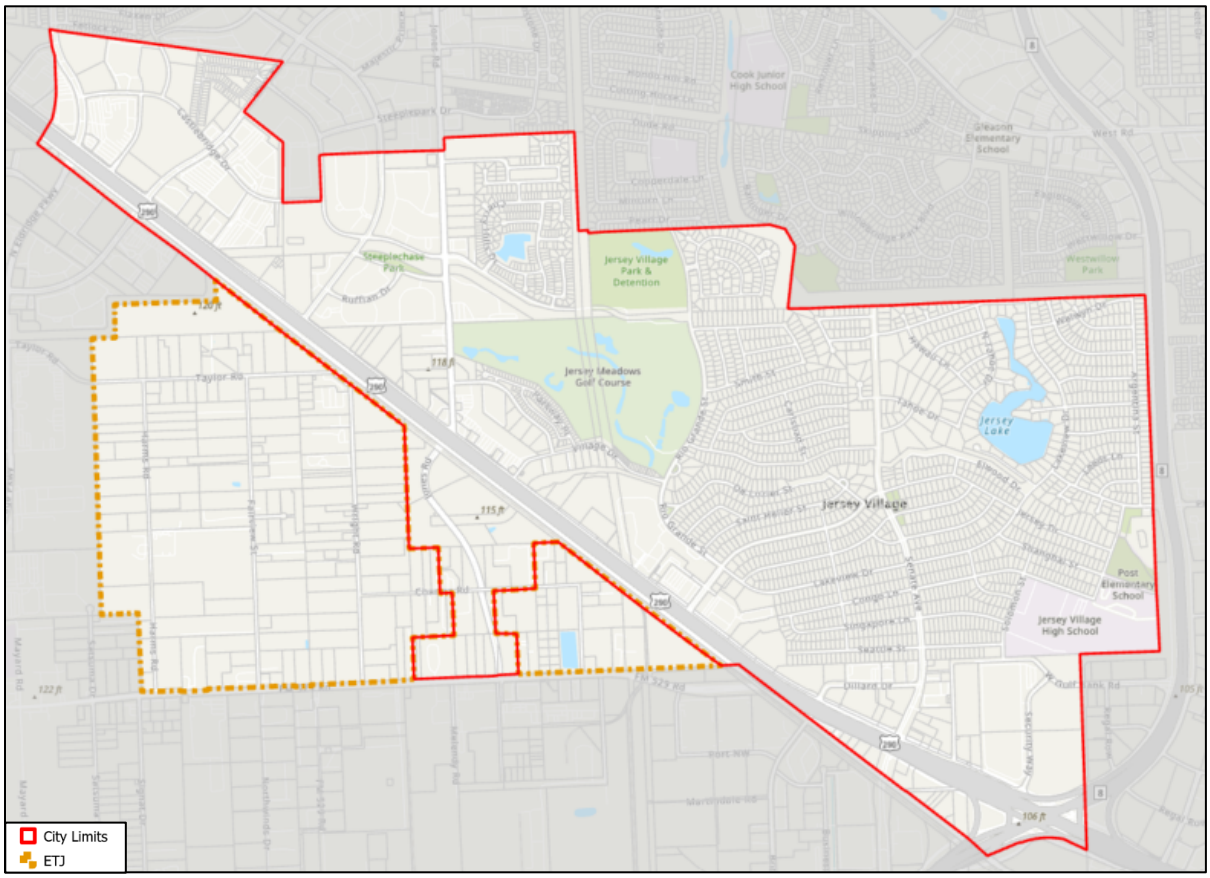
Population and land use are essential when analyzing water distribution and wastewater collection systems. Reviewing historical and developing projected populations provides the foundation for determining the demands on the infrastructure.

The City has several reports that include population projects. The documents utilize US Census Bureau and the Texas Water Development Board (TWDB) projections.

2.1. SERVICE AREA

The City's current water and wastewater service area is within the current city limits, as shown in **Figure 2.1**.

Figure 2-1 – City Limits and Extraterritorial Jurisdiction (ETJ)



2.2. HISTORICAL AND PROJECTED POPULATION

There are multiple sources that calculate or project populations for cities. The US Census Bureau and the TWDB estimate very different populations for the City of Jersey Village. The US Census Bureau is more in line with the actual population of the City but projects a negative growth rate. The TWDB has an inflated population rate in the 2026 Regional Water Plan. The City's grow rate fluctuates between -1.78% to 1.31% since 2010 based on the US Census Bureau. Based on this range it is anticipated the City will grow by 0.04% per year. **Table 2-1** presents the population for the past five years historical population and the projected population for the next 25 years based off the growth rate interpolated from the historical population.

Table 2-1: Historical and Projected Population

Year	City Limits Population	Source
2010	7,620	2010 Census, US Census Bureau
2019	7,933	America Community Survey, US Census Bureau
2020	7,921	2020 Census, US Census Bureau
2021	7,904	America Community Survey, US Census Bureau
2022	7,763	America Community Survey, US Census Bureau
2023	7,653	City and Town Population Totals: 2020-2023, US Census Bureau
2024	7,656	Calculated
2025	7,659	Calculated
2030	7,674	Calculated
2040	7,704	Calculated
2050	7,734	Calculated

While the projected population for future years shows minimal growth based on the US Census Bureau, the City ETJ is projected to encounter dynamic growth due to annexations and redevelopment. Applying a capita factor based on each projected development type yields approximately 1,368 people in 5-years and ultimately 3,930 transient population growth as referenced in the Capital Improvements Plan and Impact Fee Study, December 2023, Quiddity Engineering.

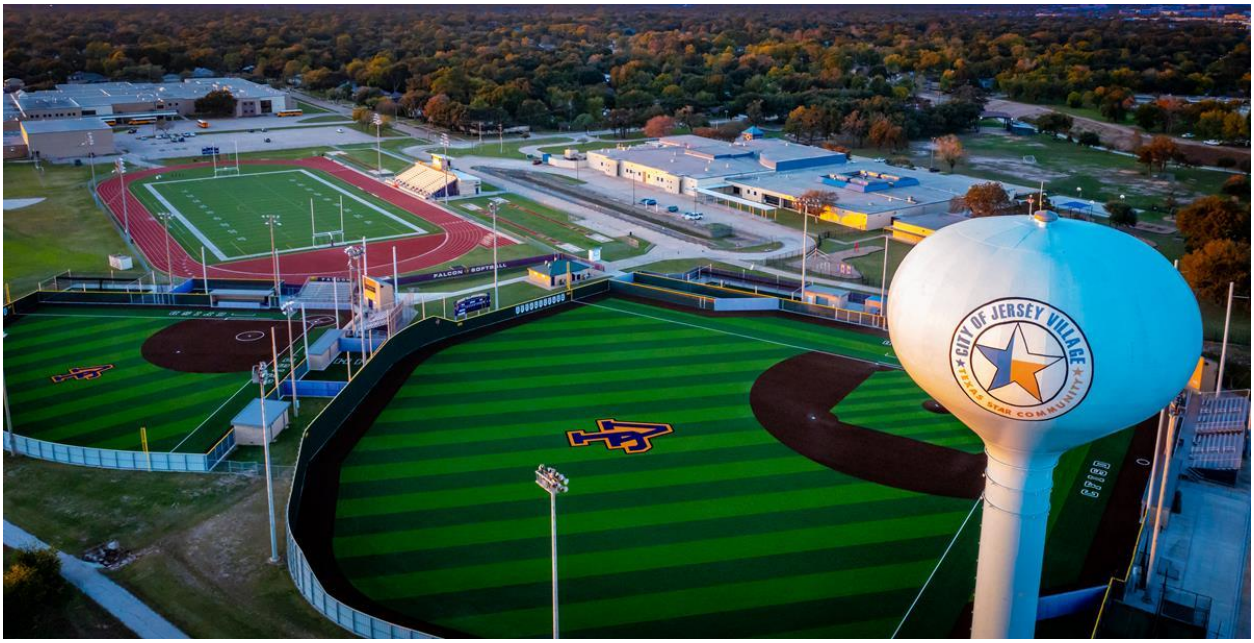
3.0 LAND USE

The City of Jersey Village is approximately 3.5 square miles in area with an additional 704-acres in the City's ETJ. Land uses within the City and its ETJ have been designated in documents adopted by the City include the Jersey Village Comprehensive Plan 2020 Update, Zoning Ordinance (Chapter 14 Building and Development, Article IV. Zoning of the Code of Ordinances), Capital Improvements Plan and Impact Fee Study 2023 Update. The Comprehensive Plan and Zoning Ordinance provide guidance for future land use within the City. There are distinct differences in both of these documents.

The Comprehensive Plan is a "well-defined as a long-range planning tool" intended to guide City Council, Boards, Commissions, Staff, and citizens for the development of the City within the next 10 to 20 years. It provides a foundation to develop regulations based on identified goals, objectives, and actions of the community. The Comprehensive Plan guides the development within the City Limits and ETJ.

The Zoning Ordinance provides the regulatory framework for development within the City Limits only. It provides control of development that allows for the land use to be cohesive with the City's vision and protect the public health, safety, and/or general welfare. Land / property is designed on a Zoning Map to promote compatible uses and separate or buffer incompatible uses.

Property within the City's ETJ is subject to Harris County regulations and the requirements of utility districts / providers and or homeowner / property association. The City has limited authority over property within the ETJ.



3.1. EXISTING LAND USE

The existing land use within the City Limits and ETJ was determined by public information available from the Harris Central Appraisal District (HCAD) records or visual observations. Some areas may not be included in the HCAD records. These areas include public right-of-way (ROW) and property owned by public entities (i.e. drainage basins and channels). It appears that all property within the City Limits and ETJ are included within the tax records, with the exception of ROW areas.

HCAD identify land use using the State Category Code (SCC). The SCC classifies properties into multiple categories and subcategories. The categories for real property are:

A. Residential, Single-Family Type
B. Residential, Multi-Family Type
C. Vacant Lots / Tracts
D. Agricultural
F. Commercial / Industrial
J. Utilities
X. Exempt

Exhibit 3-1 illustrates the City of Jersey Village City Limits and ETJ land use by SCC. **Table 3-1** presents the 2023 existing land use estimates.

Table 3-1: 2023 Existing Land Use Estimate

	Area (Acres)	Parcels	Land Use Density (Acres/ Parcel)	Population	Population Density (Persons/ Acre)	Population Density (Persons/ Parcel)
Within City Limits, Based on State Category Code						
Residential	823.15	2,212	0.372	7,653	9.30	3.50
Commercial	374.95	111	3.378	n/a	n/a	n/a
Industrial	7.80	1	7.800	n/a	n/a	n/a
Other	633.13	231	2.740	n/a	n/a	n/a
Total City	1,839.03	2,555	0.720	7,653	4.16	3.00
Within ETJ, Based on State Category Code						
Residential	22.58	12	1.88	30	1.32	2.5
Commercial	426.93	143	2.99	n/a	n/a	n/a
Industrial	104.47	14	7.46	n/a	n/a	n/a
Other	142.88	44	3.25	n/a	n/a	n/a
Total ETJ	696.85	213	3.27	30	0.04	0.14
Total City and ETJ	2,535.88	2,768	0.916	7,683	3.03	2.78

3.2. PROJECTED LAND USE

Land use projections for developed properties mostly remained unchanged based on the existing land use. The Zoning Ordinance Zoning Map and Comprehensive Plan Future Land Use Map, **Exhibits 3-2** and **3-3**, respectively, were the basis for the projected land use for undeveloped properties. Modifications to land use were made for Modeled Existing Land Use and Modeled Future Land Use, **Exhibits 3-4** and **3-5**. **Table 3-2** presents the 2023 future land use estimate and assumes property within the ETJ are annexed into the City within the next 10 years.

Table 3-2: 2034 Future Land Use Estimate

	Area (Acres)	Parcels	Land Use Density (Acres/ Parcel)	Population	Population Density (Persons/ Acre)	Population Density (Persons/ Parcel)
Within City Limits, Based on Modeled Future Land Use						
Residential	897.35	2301	0.390	7714	8.60	3.35
Commercial	511.09	255	2.004	n/a	n/a	n/a
Industrial	509.94	177	2.881	n/a	n/a	n/a
Other	581.41	85	6.840	n/a	n/a	n/a
Total City	2499.79	2818	12.12	7714	3.09	2.74

The existing service area north of Highway 290 is mostly developed and is comprised primarily of residential connections. The area south of Hwy 290 currently includes commercial and industrial users comprising 25 acres within City limits. In the 2023 Capital Improvements Plan and Impact Fee Study this area was anticipated to redevelop into new commercial and mixed used properties that would receive water and wastewater service from the City. Additional properties within the ETJ are anticipated to undergo similar development patterns which this analysis anticipates the City will serve in the future. The additional properties are located south of Highway 290, north of FM 529, and east of Harms Rd.

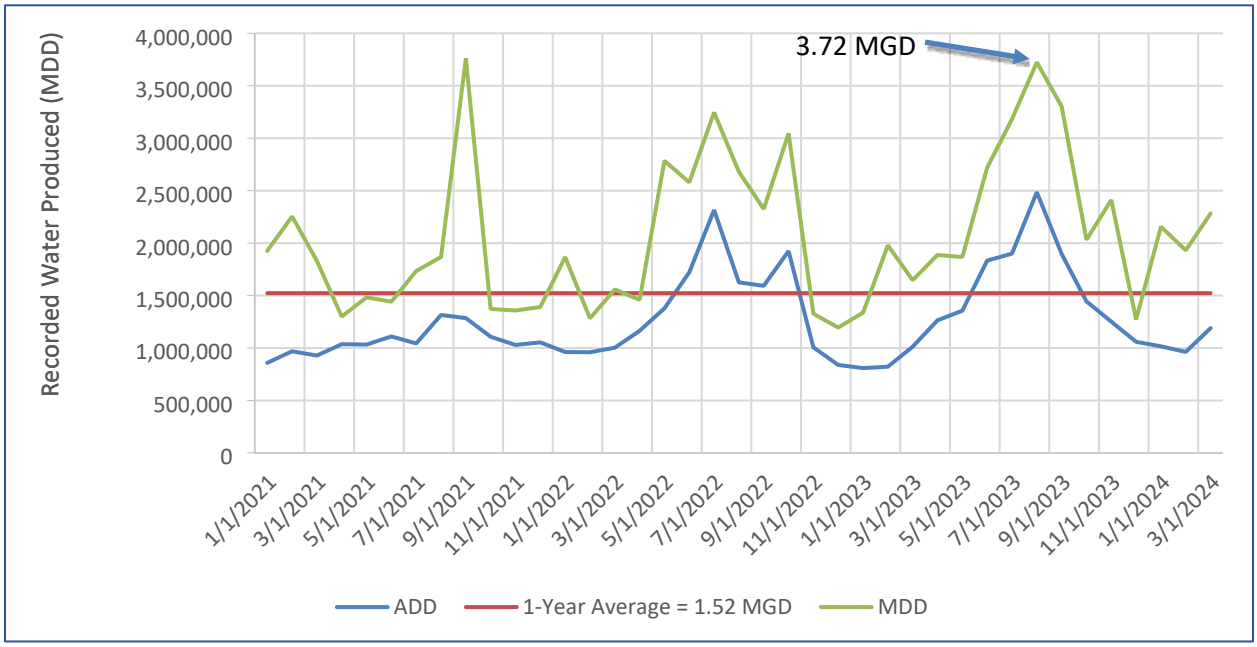
4.0 WATER SYSTEM

The City of Jersey Village's water system consists of two primary components, water supply and water distribution. The City provides water service to approximately 7,600 people within the city limits and has over 3,300 retail water meter connections. The Water System Analysis memorandum provides the results from the water system analysis in greater detail and can be found in **Appendix A.**

4.1. HISTORICAL WATER USE

The water system serves an average daily demand (ADD) of approximately 1.52 million gallons per day (MGD) with a maximum day demand (MDD) of approximately 3.7 MGD based on the last 12-months of well production and surface water data. **Figure 4-1** shows the ADD and MDD recorded for each month for the period between January 2021 and April 2024. The 1 – year average was derived for the period between April 2023 – March 2024.

Figure 4-1 - Average Daily Demand and Max Day Demand



The seasonal variation of the City's water use is typical of a public water system that serves predominately single-family usage in the south Texas region. Water usage increases during the summer months and decreases during the winter months, primarily due to irrigation demands.

The existing water system demand is made up of several types of uses, including single family residential, multi-family residential, institutional, commercial, industrial, and accountability/water loss. Per 30 TAC §290.38(18) a connection is defined as "a single-family residential unit or commercial or industrial

establishment to which drinking water is supplied from the system." Individual apartment units for multi-family residential are considered a connection.

The City of Jersey Village maintains water meter connections and monthly water consumption based on single-family residential, multi-family, commercial, public municipal, and flushed/emergency uses. The Annual Water Metered and Water Pumped/Surface Water tables (**Tables 4-1** and **4-2**, respectively) shows the average daily demand per ESFC required **263 gallons per day** (gpd) for the previous three (3) years.

Table 4-1: Annual Water Metered

Year	Residential	Commercial[1]	Public/Municipal	Total Metered
	(1,000 Gallons)			
2021	180,955	130,779	20,806	332,540
2022	245,073	153,152	35,906	434,131
2023	234,580	164,802	26,828	426,210
Average	220,203	149,578	27,847	397,627

[1] Multi-Family Connections are not accounted for as a separate meter type. Each multi-family connection coded as Commercial.

Table 4-2: Water Pumped/Surface Water

Year	Total Pumped Well Production	Total Surface Water (1,000 Gallons)	Percent Billed to Water Used	Number Active Meters	Average Equivalent Conn's	ESFC gpd/Conn
2021	80,043	308,514	85.58%	3,303	4,827	220
2022	88,569	414,352	86.32%	3,308	4,841	284
2023	191,818	316,180	83.90%	3,323	4,861	286
2024 (4 Months)	36,758	76,122	-	-	-	-
Average	120,143	346,348		3,311	4,843	263

As of December 2023, the City serves 4,861 connections as defined by 30 TAC §290.38(18). **Table 4-3** details the existing demand breakdown for the City along with the estimate demand per connection type in gpd.

Table 4-3: Service Area - Existing (2024) Demand Breakdown

User Type	Connections Per §290.38(18)	Demand Unit (gpd/conn)	Total Demand (gpd)
Single-Family Residential	2,243	250	560,800
Multi-Family	1,544	125	193,000
Commercial	158	1,500	237,000
Industrial	0	1,500	0
Mixed Use	0	375	0
Irrigation	850	300	255,000
Public	66	1,000	66,000
Est. Losses	-	16.1%[1]	211,200
Totals	4,861		1,523,000

[1] Estimated losses are based on 12 months (April 2023 – March 2024) of billed usage compared to reported well pumpage and surface water usage.

4.2. EXISTING WATER SYSTEM

The City's existing water system consists of three (3) water plants, a water distribution system, five (5) ground storage tanks, two (2) elevated storage tanks, two (2) groundwater wells, and ancillary metering and disinfection equipment. The City operates on a single pressure plane, with the majority of ADD being served by Seattle Water Plant. **Exhibit 4-1** includes the existing City of Jersey Village Water Distribution System.

4.2.1. WATER PLANT FACILITIES

The City' water plant facilities include three (3) water plants and one (1) offsite Elevated Storage Tank (EST).

Water Plant No. 1 (Seattle)
15601 Seattle Street, Houston, TX 77040

Water Plant No. 2 (Village)
16600 Village Drive, Houston, TX 77040

Water Plant No. 3 (West)
12115 West Road, Houston, TX 77040

Congo EST
15402 Congo Ln, Houston, TX 77040

Source: Google Maps 2024

4.2.2. WATER SUPPLY

The water supply is provided by groundwater and surface water from the City of Houston. The groundwater is pumped from ground water wells located at each water plant, with the exception of Seattle Water Plant where the well was abandoned in 2021.

Surface water is supplied by the City of Houston at the Seattle Water Plant by a 20-inch (20") waterline and metering station. The City is allocated to receive a minimum of 22.5 million gallons per month (750,000 gpd) from the City of Houston based on the Water Supply Contract Between the City of Houston, Texas and the City of Jersey Village, **Appendix B**. The City may request a revision to the "minimum monthly quantity no more than once per calendar year". The City of Houston does not guarantee any specific amount or pressure of water when Houston's supply is limited or when equipment is inoperative. Only during these times does the City agree to restrict peak usage to no more than 1.5 MGD, unless a higher rate is authorized by the City of Houston.

Between April 2023 and March 2024, the City used an average of 0.97 MGD surface water and supplied the remainder of the water demands through groundwater wells.

4.2.3. WATER DISTRIBUTION SYSTEM

The water distribution system is approximately 47 miles of waterlines ranging from 2-inch (2") to 16-inch (16") diameter. The system's pressure is maintained by booster pumps and elevated storage tanks. The existing transmission and distribution waterline pipe material consists of ABS composite (acrylonitrile butadiene styrene), AC (asbestos cement), and PVC (polyvinylchloride). The oldest lines in service have a documented installation date from the 1970s. The water distribution system waterline age and material are shown on **Exhibit 4-2** and the line size and type are summarized in **Table 4-4**.

Table 4-4: Existing Distribution System

Size & Type	Length (ft)[1]
2-inch	12,300
4-inch	7,800
6-inch	34,900
8-inch	84,300
12-inch	95,900
16-inch	3,900
Total Distribution System	**239,100**
Surface Water Supply	
20-inch	5,300
Total Surface Water Supply	**5,300**
GRAND TOTAL =	**244,400**

(1) All values rounded to the nearest hundred.

The existing water plant production and storage facilities are summarized in **Table 4-5**.

Table 4-5: Water System Summary

Water Plant	Well Capacity (gpm)	Surface Water Source and capacity (gpm)	Aquifer - U.S.G.S Well No	Ground Storage Tank (No. - gallons)	Elevated Storage Tank (gallons)	Booster Pumps (No. – gpm)
Seattle (WP No. 1)	Abandoned 2021	City of Houston - 1,042	-	1 - 300,000 1 - Welded Steel 500,000	N/A	3 - 1,100
Village (WP No. 2)	1,500	-	Chicot - 6504813	1 - Bolted Steel 420,000 1 - 250,000	250,000	1 - 1,100 1 - 750 1 - 500
West Rd (WP No. 3)	1,550	-	Evangeline - 6504725	1 - Welded Steel - 500,000	N/A	1 - 1,000 1 - 750 1 - 500 1 - 250
Congo (Off-site EST)	-	-	-	-	500,000	-

4.3. STATE DESIGN CRITERIA

The Texas Administrative Code (TAC) Title 30, Chapter 290(d) Rules and Regulations for Public Water Systems provides the minimum water system capacity requirements and acceptable operating practices for Public Drinking Water Systems. The criteria includes:

- Connection – A single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system.
- Maximum Daily Demand – 2.4 times average daily demand or based on three year historical maximum. **Table 4-6** calculated the MDD Multiplier (Max Day Factor), a value of 2.44 will be used for all analyses.

Table 4-6: Max Day Factor

	Flow (gpd)[1]
Maximum Daily Demand	3,724,000
Average Daily Demand	1,523,000
Max Day Factor =	**2.44**

[1] Maximum Day Flow based on data provided by the City was in August 2023. The outlier event on January 14, 2023 was excluded due to errors in well production reporting.

- Peak Hourly Demand – 1.25 times the MDD (prorated to an hourly rate) if a public water supply meets the TCEQ's minimum requirements for elevated storage capacity and 1.85 times the maximum daily demand (prorated to an hourly rate) if the system uses pressure tanks or fails to meet the TCEQ's minimum elevated storage capacity requirement. A value of 1.25 will be used for this analysis as the system has adequate elevated storage.

- Minimum Water System Capacity Requirements:
  - Wells (2 or more) – total capacity of 0.6 gallons per minute (gpm) per connection
  - Booster Pumps (the lesser of)
    - Two (2) or more pumps with total capacity of 2 gpm per connection, or
    - Minimum 1,000 gpm with capacity to meet peak hourly demands with the largest pump out of service (Firm Capacity).
  - Storage – Total capacity of 200 gallons per connection, including elevated storage of 100 gallons per connection.
  - Nominal Operating Pressure – 35 pounds per square inch (psi) throughout system, 20 psi minimum during fire flow

4.4. EVALUATION OF EXISTING SYSTEM

The City of Jersey Village's existing water system was evaluated based on the TAC, Chapter 290(d) criteria. See **Appendix C** for a detailed capacity analysis of the existing water system. The existing water system appears to meet or exceed TCEQ minimum criteria, **Table 4-7**.

Table 4-7: 2023 Existing Water System vs. State Minimum Criteria

TCEQ Criteria	Existing Capacity	Required Capacity	Meets Minimum
Wells and Surface Water (gpm)	3,492	2,917	Yes
Firm Booster Pump Capacity (gpm)	4,050	3,035	Yes
Total Storage (gallons)	2,450,000	972,200	Yes
Elevated Storage (gallons)	750,000	486,100	Yes
Nominal Operating Pressure (psi)	52	35	Yes

4.4.1. WATER MODEL DEVELOPMENT

A water model provides helpful information in determining present and future needs within the water system. The water model of the City's water distribution system was developed utilizing WaterGEMS Connect Edition by Bentley Systems, Inc. The existing City infrastructure, including waterlines and hydrants within the system, are the basis for the model coupled with the City's water plants information. The model does not include isolation valves as they were not in the City's current Geographic Information System (GIS) water system at the time of the analysis. The model includes all known 2-inch or larger distribution water lines and water facilities, including the surface water supply and transmission line from the City of Houston.

Standard curves were utilized to appropriately represent the peak hour demand for the residential, commercial/industrial, and irrigation diurnal as shown in **Figures 4-2, 4-3, and 4-4,** respectively. The diurnal curves were modified to fit the City's required peak hour factor (PHF) of 1.25 based on information provided in Advanced Water Distribution and Management provided by Bentley Institute Press, the manufacturer of WaterGEMS program. A city-wide aggregate diurnal curve was then developed based on

the relative number of connections for residential and commercial demands. Over a 24-hour period residential demand peaks from 6:30 AM to 7:30 AM and 6:00 PM to 8:00 PM time range and commercial/industrial demand peaks from 9:00 AM to 5:00 PM.

Figure 4-2

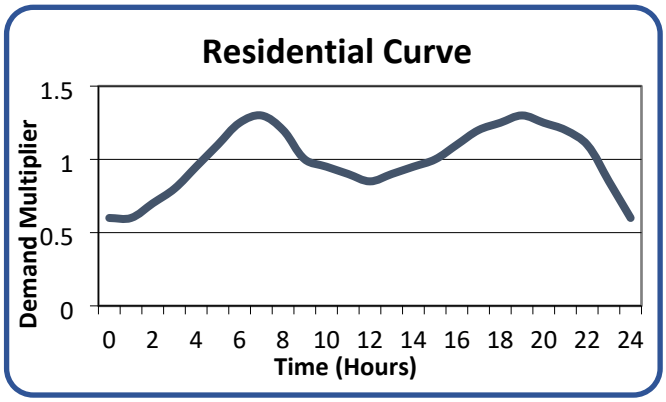


Figure 4-3

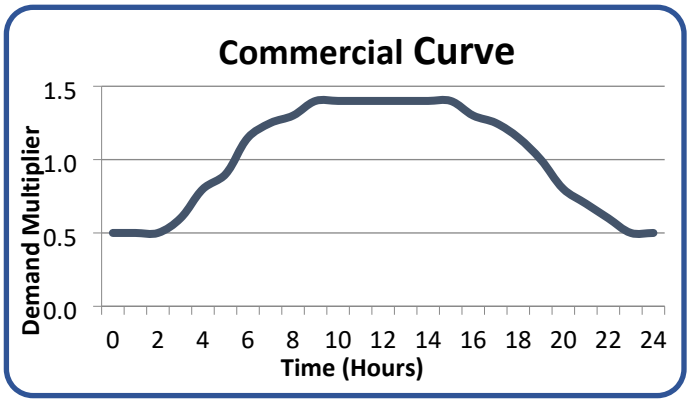
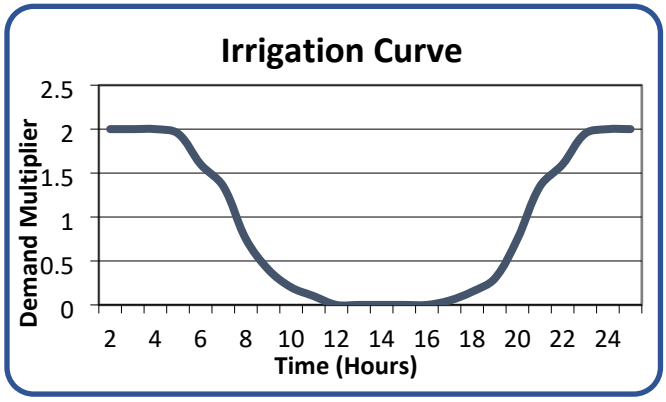


Figure 4-4



In addition to ADD and MDD, TCEQ 290.45(d) requires the system sustain 20 psi for two (2) hours during an emergency event, such as a fire flow. Per the City adopted 2024 International Fire Code, the minimum fire flow available should be 1,000 gpm for single family residential buildings 3,600 square feet and smaller and a minimum of 1,500 gpm for all buildings larger than 3,600 square feet or for uses other than single family. Larger fire flows may be required based on the occupancy type and square feet of the structure. Should a greater fire flow be required it is recommended the fire flow be verified with the model. The water analysis set 1,000 gpm as the baseline for assessing fire flow capacity throughout all designated scenarios.

The water plants were set up with water supply from both groundwater wells and the surface water connection. Well pumps and the surface water system were assumed to pump into the ground storage tanks at a constant head. The booster pumps were modeled as the major source of pressure maintenance and water supply for the system as these components pull water from the ground storage tanks, pressurize the water system, and fill the elevated storage tanks simultaneously. The ground and elevated storage tank sizes were provided by the City. The computer model was set up using the pressure settings

observed from the City's Supervisory Control and Data Acquisition (SCADA) system for the various water plants. The "if/then" statements included in the control sets of the program were used to control the well and booster pumps whose operation is dependent on the water levels inside the City's ESTs or the water pressure directly outside each water plant.

4.4.2. WATER MODEL CALIBRATION

In order to accurately represent the water system, Quiddity used hydrant flow testing data, dated January 5, 2024, to calibrate the water model. This calibration helps validate the water model by reflecting the system's ability to supply water at pressures identified during testing. Calibration was achieved by modifying the pipe roughness factor based on pipe age to increase or decrease the head loss through the pipes, thus reducing or increasing the system pressure for a set flowrate. Hazen-Williams roughness coefficients were assigned based on estimated year of construction, before and after calibration, **Table 4-8**. Based on the calibration performed, the water model is accurate to within ±5 psi of the actual field conditions.

Table 4-8: Hazen-Williams Roughness Calibration

	Pipe Installation Year	Primary Pipe Material	Hazen-Williams Coefficient
Initial	<1985	AC	130
Calibrated	<1985	AC	120
Initial	>1985	PVC	130
Calibrated	>1985	PVC	140

4.4.3. ANALYSIS

Three (3) system scenarios were evaluated for the existing conditions. The existing ADD and MDD scenarios were analyzed to determine the low pressure areas, highest velocities, and highest head loss within the system during a 24-hour period through an extended period simulation. The system should maintain a pressure greater than 35 psi during ADD and MDD scenarios, velocities less than 6 feet per second (ft/s) in the distribution system and 8 ft/s within the water plants, and a head loss under 10 ft/1,000 ft of pipe. The steady state fire flow scenario was analyzed to determine if 1,000 gpm of instantaneous fire flow is available at 10:00 AM (while maintaining above 20 psi) at every known hydrant within the system. The water system currently provides ADD, MDD, and Fire Flow throughout the City with adequate pressure.

(1) Existing Conditions (2024) - Average Daily Demand

This scenario consists of the modeled existing system ADD condition of 1,523,000 gpd with the existing water plant facilities and infrastructure.

Based on the model results, the minimum pressure in the system is 56 psi on North Eldridge Parkway (J-336), the maximum velocity in the system is 4.20 ft/s at the 8-inch waterline at West Water Plant (W-132), and head loss is below 10 ft/1,000 ft for all piping. Under ADD conditions, the existing water

distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(2) Existing Conditions (2024) – Maximum Daily Demand

This scenario consists of the modeled existing system MDD condition of 3,724,000 gpd (2.44 times the ADD) with the existing water plant facilities and infrastructure.

Based on the model results, minimum pressure in the system is 52 psi on North Eldridge Parkway (J-336), the maximum velocity in the system is 4.36 ft/s at the 8-inch waterline near West Water Plant (W-291), and head loss is below 10 ft/1,000 ft for all piping. Under MDD conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(3) Existing Conditions (2024) – Maximum Daily Demand + Fire Flow 1,000 gpm

This scenario includes the existing system at the Maximum Daily Demand condition of 3,724,000 gpd plus a 1,000 gpm fire flow condition for two (2) hours. This was applied to hydrants in the system. Based on the model results, all but 1 hydrant, located on Capri Dr, can maintain fire flow at 20 psi. This is caused by an undersized 2-inch line connecting Tahoe Dr to the north and Capri Dr. which results in poor system looping and the hydrant failing to meet 1,000 gpm at 20 psi. All nine (9) hydrants that failed flow testing according to the hydrant flow test report dated January 5, 2024, passed in the model which indicates the issue relate to the hydrants themselves or local water system issues such as closed valves. This matches the conclusions in the hydrant flow testing report.

The Existing ADD and MDD Conditions modeled maintained residual pressures above 35 psi during normal operation. The Existing Fire Flow Condition modeled maintained residual pressures above 20 psi as required in 30 TAC §290.44(d).

4.5. FUTURE WATER SYSTEM

The future water system analysis was based on 5-year and 10-year projections from the current Capital Improvements Plan and Impact Fee Study 2023 Update, dated December 2023 and were not modified as part of this analysis. The future growth projections were based on the future land use plan and the projected development timeframe. The baseline usage assumed in the Capital Improvements Plan and Impact Fee Study 2023 Update, December 2023, was 1,500 gpd per acre or 250 gpd per connections for water daily demand, which closely mirrors current water usage in the City based on connection type.

The proposed projects included in the Capital Improvements Plan and Impact Fee Study 2023 Update are sufficient to meet ADD, MDD, and Fire Flow conditions for the 5-year, and 10-year model scenarios. The ADD and MDD scenarios were analyzed to determine the lowest pressure, highest velocity, and highest head loss in the system during a 24-hour period through an extended period simulation using the same target parameters as presented for the existing system.

4.5.1. 5-YEAR PROJECTION

The growth projected within the next five (5) years is predominately anticipated to occur within the City's ETJ along Wright Road and City limits southwest of Highway 290 to FM 529 as shown in green in **Exhibit**

4-3. This includes approximately 52 acres of commercial, 38 acres of mixed-use, 82 acres of industrial, and 10 acres of irrigation tracts. **Table 4-9** lists the 5-year projected connections for each type of development.

Table 4-9: 5-Year Connection Projections

Type	Total Connections	Demand Unit (gpm/conn)	Total Demand (gpd)
Single-Family Residential	2,243	250	560,800
Multi-Family	1,544	125	193,000
Commercial	186	1,500	279,000
Industrial	51	1,500	81,000
Mixed-Use	151	375	56,600
Irrigation	871	300	261,300
Public	69	1,000	66,000
Accountability/Losses		16.1%[1]	240,888
Total	5,115		1,737,088

[1] Estimated losses are based on 12 months (April 2023 – March 2024) of billed usage compared to reported well pumpage and surface water usage.

4.5.2. 10-YEAR PROJECTION

The growth projected within the 5- to 10-year timeframe is expected to occur in the remaining properties south of Highway 290 designated as "New Development" outside the existing City limits and within the City's ETJ as shown in purple in **Exhibit 4-3**. This includes approximately 5 acres of single-family residential, 33 acres of multi-family residential, 67 acres of commercial, 25 acres of mixed-use, 2 acres of public, as well as 371 acres of industrial designated tracts.

The growth projected to occur in the remaining undeveloped tracts within the City limits north of Highway 290 is designated as "Additional Development". This includes approximately 8 acres of multi-family residential and 23 acres of commercial designated tracts resulting in population growth of approximately 292 people. Projected physical connections were calculated based on the acreage and density from the new development and additional development areas. **Table 4-10** lists the 10-year projected connections for each type of development.

Table 4-10: 10-Year Connection Projections

Type	Total Connections	Demand Unit (gpm/conn)	Total Demand (gpd)
Single-Family Residential	2,273	250	568,300
Multi-Family	1,544	125	269,000
Commercial	242	1,500	363,00
Industrial	256	1,500	384,000
Mixed-Use	251	375	94,100
Irrigation	871	300	261,300
Public	70	1,000	70,000
Accountability/Losses		16.1%[1]	323,562
Total	6,115		2,333,262

[1] Estimated losses are based on 12 months (April 2023 – March 2024) of billed usage compared to reported well pumpage and surface water usage.

4.6. EVALUATION OF FUTURE SYSTEM

The City of Jersey Village's future water system was evaluated based on the TAC, Chapter 290(d) criteria, **Table 4-11**.

Table 4-11: 2034 Existing Water System vs. State Minimum Criteria

	Existing Capacity	Future Required Capacity	Meets Minimum
Wells and Surface Water (gpm)	3,492	3,669	No
Firm Booster Pump Capacity (gpm)	4,050	4,656	No
Total Storage (gallons)	2,450,000	1,223,000	Yes
Elevated Storage (gallons)	750,000	611,500	Yes
Nominal Operating Pressure (psi)	<35	35	No

Based on the 10-year projections, the City will need to increase its water supply to meet the current TCEQ minimum criteria. Although no additional storage or distribution capacity is required to comply with current TCEQ standards, the current locations of existing water plants are insufficient to maintain adequate water system pressure during the MDD scenario. To meet the minimum operating pressure requirements, Water Project W-14 - Water Plant No. 4 was included in the 2023 Capital Improvements Plan and Impact Fee Study Update while also providing a location for a future City of Houston Interconnect No. 2 (W-15). For resiliency purposes, in the event of an outage with the surface water interconnect, the project scope for Water Plant No. 4 included a groundwater well. However, constructing a new well presents significant cost and permitting challenges due to current groundwater reduction initiatives. Moreover, building Water Plant No. 4 within the next five years to accommodate growth in the outer edges of the Extra-Territorial Jurisdiction (ETJ) imposes a substantial cost burden, dependent on future growth that may be delayed or different than the baseline assumptions.

As a result, the original concept of project W-14, constructing Water Plant No. 4, was re-evaluated and revised to more economically support future development. The construction of Water Plant No. 4 is proposed in two separate phases with a modified scope that eliminates the need for a future groundwater well and relocating along Jones Road, on City owned property.

Water Plant Facility #4 - Phase 1 (New W-23) includes a 500,000-gallon ground storage tank (GST), three 600-gpm pumps, a mobile generator hookup, and other site-related items necessary for a fully operational water plant. The water plant will serve the City with a new surface water supply from water project W-15—City of Houston Interconnect No. 2.

Water Plant Facility #4 - Phase 2 (New W-24) adds a second 500,000-gallon GST, a permanent generator, and a pressure-sustaining valve from the distribution system for demand-side storage.

These projects balance peak demands across the City's future service areas and eliminates the need for a new groundwater well at the original Water Plant No. 4 site. Additionally, Phase 2 can be postponed until development along Harms Road is anticipated or adjusted pending annexation and providing services to the projected areas.

Section 4.7.1 provides a detailed discussion of the costs and implementation of these project. The model results presented in Section 4.6.1 assume these projects are adopted and implemented. An alternative where the future City of Houston Surface Water Interconnect No. 2 was brought into West Water Plant instead of the future Water Plant No. 4 was evaluated. Ultimately this option was deemed infeasible due to the additional cost associated with tunneling under Highway 290 and the increased linear length in addition to this alternative failing to be able to support growth within the outer edges of the ETJ.

4.6.1. FUTURE SYSTEM ANALYSIS

Six (6) system scenarios were evaluated for the future conditions based on the 2023 Capital Improvements Plan and Impact Fee Study Update. The future ADD and MDD scenarios were analyzed to determine the lowest pressure, highest velocity, and highest head loss in the system during a 24-hour period through an extended period simulation. The system should maintain pressures greater than 35 psi during ADD and MDD scenarios, velocities less than 6 feet per second (ft/s) in the distribution system and 8 ft/s in water plants, and a head loss under 10 ft/1,000 ft of pipe. The steady state fire flow scenario was analyzed to determine if 1,000 gpm of instantaneous fire flow is available at normal operating condition such as 10:00 AM (while maintaining above 20 psi) at every existing hydrant, within the model, and all future nodes within the water system. Fire flows within future development were applied to all distribution nodes since future hydrants were not modeled.

Each scenario includes the existing water plant facilities and infrastructure in addition to future water facilities and infrastructure projects proposed for each planning period. Section 4.7 provides details on the scopes and locations of these projects. The J- and W- shown in each scenario are node and waterline identifications from the water model.

(1) 5 Year ADF - Average Daily Demand

This scenario consists of the modeled future system ADD condition of 1,738,000 gpd with the proposed W-15, W-16, W-17, W-18, and W-23 projects and existing water plant facilities and infrastructure.

Based on the model results, the minimum pressure in the system is 55 psi on North Eldridge Parkway (J-366), the maximum velocity in the system is 4.00 ft/s at the 8-inch waterline at West Water Plant (W-132), and head loss is below 10 ft/1,000 ft for all piping. Under ADD conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(2) 5 Year MDD – Maximum Daily Demand

This scenario consists of the modeled future system MDD condition of 4,240,700 gpd (2.44 times the ADD) with the proposed W-15, W-16, W-17, W-18, and W-23 projects and existing water plant facilities and infrastructure.

Based on the model results, minimum pressure in the system is 46 psi near the intersection of Charles Road and Wright Road (J-747), the maximum velocity in the system is 4.85 ft/s at the 12-inch waterline near West Water Plant (W-291), and head loss is below 10 ft/1,000 ft for all piping. Under MDD

conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(3) 5 Year MDD – Fire Flow

This scenario consists of the modeled future system MDD condition of 4,240,700 gpd with the proposed W-15, W-16, W-17, W-18, and W-23 projects and existing water plant facilities and infrastructure. Fire flows were applied to all existing hydrants and future distribution nodes. Based on the model results, the future Fire Flow Condition modeled maintained residual pressures above 20 psi as required in 30 TAC §290.44(d).

(4) 10 Year ADF - Average Daily Demand

This scenario consists of the modeled existing system MDD condition of 2,333,000 gpd with the proposed W-15 through W-24 projects and existing water plant facilities and infrastructure.

Based on the model results, minimum pressure in the system is 51 psi near the intersection of Castlebridge Drive and Saville Lane (J-323) and the maximum velocity in the system is 4.13 ft/s at the 16-inch waterline near West Water Plant (W-326). Under MDD conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(5) 10 Year MDD – Maximum Daily Demand

This scenario consists of the modeled existing system MDD condition of 5,692,500 gpd (2.44 times the ADF) with the proposed W-15 through W-24 projects and existing water plant facilities and infrastructure.

Based on the model results, minimum pressure in the system is 43 psi near the intersection of Taylor Road and Harms Road (J-742) and the maximum velocity in the system is 5.61 ft/s at the 12-inch waterline near West Water Plant (W-291). Under MDD conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(6) 10 Year MDD – Fire Flow

This scenario consists of the modeled future system MDD condition of 5,692,500 gpd with the proposed W-15 through W-24 projects and existing water plant facilities and infrastructure. Fire flows were applied to all existing hydrants and future distribution nodes. Based on the model results, the future Fire Flow Condition modeled maintained residual pressures above 20 psi as required in 30 TAC §290.44(d).

4.7. WATER SYSTEM IMPROVEMENT PROJECTS

Planning for the future is vital to the City of Jersey Village for growth and continued services. The proposed capital improvement projects for water plants and the distribution system allows the City to proactively budget for long-term viability of its system. The Capital Improvement Program and Operation and Maintenance Program (O&M) help prevent premature failures and ensure continued operation. The Water System Improvement Projects Opinion of Probable Construction Costs and O&M projects, including

cost estimates, identified as part of an Inspection Report dated March 2024 can be found in **Appendix D and E**, respectively.

Capital improvements are necessary to support the water system's ability to serve the projected development / redevelopment, **Table 4-12**. The cost estimates presented are based on engineering costs, construction cost, 25-40% contingencies, and inflation based on the anticipated construction year. The project numbers and cost estimates are consistent with the Impact Fee Study and Capital Improvements Fee 2023 Update. **Exhibit 4-3** illustrates the approximate location of the proposed projects in relation to the City's water system. The City should review and update the CIP list annually to reflect prioritization and market escalation.

Table 4-12: Water System Capital Improvements

No.	Description of Project	Cost Estimate
W-15	City of Houston Interconnect No. 2	$2,318,000
W-16	FM 529 8" & 12" Water Line from Harms Rd to Hwy 290 – Service to ETJ	$2,825,000
W-17	Charles Rd 8" & Wright Rd 12" Water Line Loop – Service to ETJ	$1,720,000
W-18	Wright Rd 12" Water Line from Charles Rd to Hwy 290 – Service to ETJ	$1,724,000
W-19	Fairview St 12" Water Line from FM 529 to Taylor Rd – Service to ETJ	$5,121,000
W-20	Harms Rd 12" Water Line from FM 529 to Taylor Rd – Service to ETJ	$3,119,000
W-21	Musgrove Ln 8" & 12" Water Line from Taylor Rd to Jones Rd Along Hwy 290 – Service to ETJ	$1,417,000
W-22	Taylor Rd 8" & 12" Water Line Extension from Hwy 290 to Edge of ETJ – Service to ETJ	$761,000
W-23	Water Plant Facility #4 – Phase 1	$4,339,000
W-24	Water Plant Facility #4 – Phase 2	$2,220,000

4.7.1. WATER PLANT PROJECTS

The City's existing water plant facilities have sufficient elevated storage, ground storage, and booster pump capacity to serve the projected 5-year and 10-year projections. Water supply is the limiting factor for the City. To meet the projected demands, additional water capacity is required. Due to ongoing groundwater reduction efforts, it is recommended the City increase their surface water supply. The existing City of Houston Interconnect located at Seattle Water Plant cannot support the entire City's future water system and also represents a high risk in the event of a pipeline or plant outage as the City's only surface water source.

A new water plant, Water Plant No. 4 (WP No. 4), is proposed to serve the projected water demand south of US 290. The critical need of WP No. 4 derives from a pressure maintenance requirement and is triggered when development is initiated along Harms Road. Based on the hydraulic model, the majority of the waterlines proposed along Harms Road would fail to meet the minimum pressure requirement of 35 psi during MDD conditions. Pressurization through the means of WP No. 4 would remedy and improve these conditions by allowing the water system to sustain minimum pressure requirements. In lieu of CIP No. W-14 for WP No. 4 which included a 1,500 gpm ground water well, 1,000,000 gallon GST, 3-600 gpm BPs, Generator and other site related item, it is recommended WP No. 4 be construction in two phases and relocated to City owned property along Jones Rd., which includes 2-500,000 gallon GSTs, 3-600 gpm BPs,

generator, pressure sustaining valve for demand side storage, and other site related items. Demand-side storage involves filling the GST from the distribution system during low demand/high pressure period such as nighttime which allows for the water to be utilized and pumped during moderate to high demand periods. The minimum size land area to accommodate the future water plant is approximately 1.5 acres on a 300'x200'. When determining the exact location along Jones Rd, the City should be mindful of the floodplain, specifically zone AE (100 year) and shaded X (500 year) which are located adjacent to the White Oak Bayou fork crossing Jones Rd.

Phase 1 includes 1-500,000 gallon GST, 3-600 gpm BPs, and mobile generator hook up. Phase 2 includes 1-500,000 gallon GST, permanent generator, and pressure sustaining valve for demand side storage. The proposed water plant balances peak demands across the City's future service areas and removes the need for a new ground water well at the original WP No. 4 site. Phased WP No. 4 reduced project scope represents a net savings of approximately $6M.

In the event portions of the City ETJ along Harms Rd are not annexed and redeveloped, only WP No. 4 phase 1 would be required. Phase 2 would only need to be constructed as the City begins annexing property within its ETJ along Harms Rd with the anticipation of serving the projected redevelopment discussed in this report.

Removed From CIP:

W-14: Water Facility #4 and groundwater well
Est. Total: $10,534,000

Description: New water plant with 1.0-million-gallon ground storage tank, 1,500 gpm water well, 3-600 gpm booster pumps, generator, all related piping, foundations, electrical controls, instrumentation, site work and all additional items needed for completely functional water plant.

Remain on CIP:

W-15: City of Houston Interconnect No. 2
Est. Total: $2,318,000

Description: A second interconnect with the City of Houston at Water Facility No. 4 via 12-inch waterline within ROW along Fairview Street and Taylor Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements.

Added to CIP:

W-23: Water Facility #4 – Phase 1
Est. Total: $4,339,000

Description: The project will consist of construction of a 0.5 MG ground storage tank, 3-600 GPM booster pumps, all related piping, foundations, electrical controls, instrumentation, site work and all additional items needed for completely functional water plant.

W-24: Water Facility #4 – Phase 2
Est. Total: $2,220,000

Description: The project will consist of construction of a 0.5 MG ground storage tank, permanent generator, pressure sustaining valve, all related piping, foundations, electrical controls, instrumentation, site work and all additional items needed to expand Water Plant No. 4.

4.7.2. WATER DISTRIBUTION SYSTEM PROJECTS

The water distribution system is an important part of the water system. While new waterlines are needed to serve new development or redevelopment areas, it is also critical to maintain and/or replace existing infrastructure.

The age, size, and material of the water distribution system are important factors in keeping infrastructure operational and in service. The oldest waterlines within the system should be prioritized for replacement based on the material and repair information. Asbestos concrete waterlines tend to lead to waterline breaks, especially where there is expansive soil. Waterlines within the distribution system should not be less than 8-inches in diameter to provide adequate supply while meeting fire flow requirements. It is recommended the City continue to implement waterline replacement.

Water Projects W-16 through W-22 include water system improvements necessary to extend water service south of Hwy 290 to serve new development within the existing ETJ or future city limits. Projects should be prioritized based on anticipated development within the area.

W-16: FM 529 8” & 12” Water Line from Harms Rd to Hwy 290
Est. Total: $2,825,000

Description: Extend 12-inch waterline along FM 529 from Jones Road to Charles Road, an 8-inch water line from FM 529 along Charles Road to Jones, and a 12-inch waterline from Charles Road to Highway 290, including the crossing of Highway 290 to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

W-17: Charles Rd 8” & Wright Rd 12” Water Line Loop
Est. Total: $1,720,000

Description: Extend 8-inch waterline from Jones Road west along Charles Road to Wright Road and a 12-inch waterline south along Wright Road and east along FM 529 connection to the existing 12-inch waterline to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

W-18: Wright Rd 12” Water Line from Charles Rd to Hwy 290
Est. Total: $1,724,000

Description: Extend 12-inch waterline along Wright Road from Charles Road to Hwy 290 and along Hwy 290 from Wright Road to Jones Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

W-19: Fairview St 12” Water Line from FM 529 to Taylor Rd
Est. Total: $5,121,000

Description: Extend 8-inch and 12-inch waterlines along Fairview Street from FM 529 to Taylor Road, along FM 529 from Fairview Road to Wright Road and along Taylor Road and Hwy 290 from Fairview Road to Wright Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

W-20: Harms Rd 12” Water Line from FM 529 to Taylor Rd
Est. Total: $3,119,000

Description: Extend 12-inch waterline along Harms Road from FM 529 to Taylor Road, along FM 529 from Harms Road to Fairview Road and along Taylor Road from Harms Road to Fairview Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

W-21: Musgrove Ln 8” & 12” Water Line from Taylor Rd to Jones Rd Along Hwy 290
Est. Total: $1,417,000

Description: Extend 8-inch waterline along Musgrove Lane and east to Hwy 290 and a 12-inch waterline along Hwy 290 to Taylor Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

W-22: Taylor Rd 8” & 12” Water Line Extension from Hwy 290 to Edge of ETJ
Est. Total: $761,000

Description: Extend 12-inch and 8-inch waterline along Taylor Road to the west of Harms Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

5.0 WASTEWATER SYSTEM

The City of Jersey Village's wastewater system consists of wastewater treatment and wastewater collection System.

5.1. HISTORICAL WASTEWATER FLOWS

The City's historical data regarding wastewater flows was acquired from the United States Environmental Protection Agency (EPA) Enforcement and Compliance History Online (ECHO) NPDES Monitoring Data Download website from 2019 – 2023, **Table 5-1**.

Table 5-1: Historical Wastewater Treatment Plant Flows

	2019	2020	2021	2022	2023
Castlebridge Wastewater Treatment Plant					
Annual Flow (MGD)	116.53	46.53	45.59	41.84	48.49
Average Daily Flow (MGD)	0.32	0.18	0.15	0.11	0.13
Plant Capacity (MGD)	0.8	0.8	0.8	0.8	0.8
% of Total Plant Capacity Used	39.9%	15.9%	15.6%	14.3%	16.6%
White Oak Bayou Wastewater Treatment Plant [(1)]					
Annual Flow (MGD)	315.51	317.31	356.15	341.03	341.37
Average Daily Flow (MGD)	0.86	0.87	0.98	0.93	0.94
Total Plant Capacity (MGD)	2	2	2	2	2
City Average Daily Flow based of % (MGD)	0.35	0.35	0.40	0.38	0.38
Plant Capacity Available to City (MGD)	0.81	0.81	0.81	0.81	0.81
% of Total Plant Capacity Used	43.2%	43.5%	48.8%	46.7%	46.8%
Total Average Daily Flow (MGD)	0.67	0.48	0.52	0.49	0.51

[(1)] Based on flow of entire plant multiplied by 40.63% to estimate the City of Jersey Village flow.

5.2. EXISTING WASTEWATER SYSTEM

The City's existing wastewater system consists of two (2) wastewater treatment plants, a wastewater collection system, six (6) lift stations, and ancillary treatment equipment. **Exhibit 5-1** shows the existing City of Jersey Village Wastewater Collection System.

5.2.1. WASTEWATER TREATMENT PLANTS

The wastewater system is separated into two (2) service areas which are served by two (2) wastewater treatment plants (WWTP).

Castlebridge WTTP
12103 Castlebridge, Houston, TX 77040

White Oak Bayou WWTP
15210 Philippine Street, Houston, TX 77040

The City owns, operates, and maintains Castlebridge WWTP, with a permitted average daily flow (ADF) of 800,000 gpd or 0.8 MGD and a 2-hour peak flow of 1,885 gpm, with a peaking factor of 3.4.

The City is a partner in the White Oak Bayou Joint Powers Board. This board includes West Harris County Municipal Utility District (MUD) No. 1, Harris County MUD No. 25, Windfern Forest Utility District and Baker Oil Tools (Baker Hughes). The White Oak Bayou Joint Powers Board owns White Oak Bayou WWTP, with a permitted ADF of 2,000,000 gpd or 2.0 MGD and a peak flow of 5,556 gpm (peak factor of 4.0). The City has 40.63% ownership, or a total capacity of 0.81 MGD ADF, of the White Oak Bayou WWTP and is responsible for this portion of operation, maintenance, and any improvement projects expenses.

Table 5-2 summaries the existing wastewater treatment plants key information.

Table 5-2: Existing Wastewater Treatment Plants

Wastewater Treatment Plant	Permit/Discharge Number	Plant Capacity (MGD)	Discharge Location	Lift Station (Firm gpm)
Castlebridge WWTP	WQ0012681001	0.8	White Oak Bayou	1,885
White Oak Bayou WWTP[1]	WQ0011538001	2.0[1]	White Oak Bayou	[2]

[1] 40.63% of the overall plant capacity is allocated to Jersey Village for a dedicated capacity of 0.81 MGD.
[2] Philippine Lift Station pumps to White Oak Bayou WWTP. The headworks at the plant receives flow directly from five (5) off-site lift stations with no dedicated on-site lift station.

5.2.2. LIFT STATIONS

The City owns, operates, and maintains six (6) lift stations within the wastewater collection system, **Exhibit 5-1**. Five (5) lift stations are operated within the White Oak Bayou WWTP service area and one (1) lift station within the Castlebridge WWTP service area. The current list station (LS) sewersheds, including Castlebridge WWTP LS, are as follows:

White Oak Bayou WWTP Service Area

1. Philippine Lift Station – 15201 Philippine Street, Houston, TX 77040
   Encompasses approximately 770 acres and serves mostly single-family residential. Philippine LS also receives flows from Rio Grande, 290 NW, Tahoe, and Hilcrest Lift Station service areas. Each lift station sends flows via force main into the Philippine Lift Station gravity collection system. All flows from the Philippine LS pump directly to the White Oak Bayou WWTP Headworks. Philippine LS was rehabilitated in 2023 and now operates as a triplex pump station with variable frequency drive (VFD) pumps.
2. Rio Grande Lift Station – 8501 Rio Grande, Houston, TX 77040
   Encompasses approximately 50 acres and serves mostly single-family residential. Rio Grande LS transfers flows to the Tahoe LS via 3-inch force main into an 8-inch collection line on Rio Grande St.
3. 290 North West Lift Station – 17030 Northwest Freeway, Houston, TX 77040
   Encompasses approximately 25 acres and serves mostly commercial and industrial. 290 NW LS sends flows to the Tahoe LS via 4-inch force main into a 15-inch collection line on Village Dr.
4. Tahoe Lift Station – 15810 Tahoe, Houston, TX 77040
   Encompasses approximately 430 acres and serves mostly single-family residential. Tahoe LS sends flows to the Philippine LS service area via 6-inch force main into a 27-inch collection line on Tahoe Dr. The Tahoe LS receives flows from the Rio Grande LS and 290 NW LS service areas.
5. Hilcrest Lift Station – 7302 Hilcrest, Houston, TX 77040
   Encompasses approximately 140 acres and serves mostly Commercial and Industrial. Hilcrest LS sends flows to the Philippine LS service area via 6-inch force main into an 8-inch collection line on Seattle St.

Castlebridge WWTP Service Area

1. Castlebridge WWTP – 12103 Castlebridge Drive, Houston, TX 77040
   Encompasses approximately 600 acres and serves a variety of commercial, single family residential, and multi-family residential. The sewershed receives flows from Jones Rd LS via gravity collection.
2. Jones Rd Lift Station – 7501 Jones Rd, Houston, TX 77040
   Encompasses approximately 164 acres and serves primarily industrial users. Jones Rd LS sends flows to the Castlebridge WWTP service area via 6-inch force main into a 12-inch collection line on Jones Rd.

5.2.3. WASTEWATER COLLECTION SYSTEM

The City's wastewater collection system contains approximately 192,000 LF of gravity sanitary sewer lines ranging from 6-inch (6") to 36-inch (36") in diameter and approximately 795 manholes. The sanitary sewer lines vary in age, diameter, and material. The pipe material consists of ABS composite, clay, concrete, ductile iron (DI), and PVC. The oldest lines documented are from the 1970s. **Table 5-3** shows the existing

collection system inventory by pipe size and type. The approximate age and material of the wastewater collection system is included in **Exhibit 5-2**.

Table 5-3: Existing Collection System Pipe Inventory

Size & Type	Length (ft)[1]
GRAVITY LINES	
6-inch	14,300
8-inch	88,500
10-inch	36,600
12-inch	16,900
15-inch	12,400
18-inch	4,600
24-inch	7,900
27-Inch	2,200
30-inch	1,800
36-Inch	700
Total Gravity Sewer	**185,900**
FORCE MAINS	
4-Inch (or less)	900
6-Inch	4,800
16-Inch	200
Total Force Main	**5,900**
GRAND TOTAL =	**191,800**

(1) All values rounded to the nearest hundred.

5.3. STATE DESIGN CRITERIA

TAC Title 30, Chapter 217 Design Criteria for Domestic Wastewater Systems provides the minimum wastewater system capacity requirements and acceptable operating practices. TAC Title 30, Chapter 305.126 Additional Standard Permit Conditions for Waste Discharge Permits state when a sewage treatment plant facility reaches 75% of the permitted average daily or annual average flow for three (3) consecutive months the permittee must begin design for a plant expansion, and consequently when it reaches 90% the permittee shall obtain necessary authorization to commence construction.

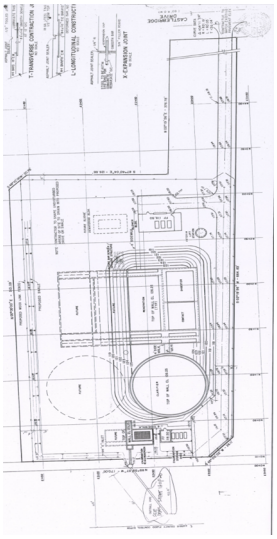
5.4. EVALUATION OF EXISTING SYSTEM

The City of Jersey Village's existing wastewater system was evaluated based on the TAC, Chapter 217 criteria.

5.4.1. CASTLEBRIDGE WASTEWATER TREATMENT PLANT

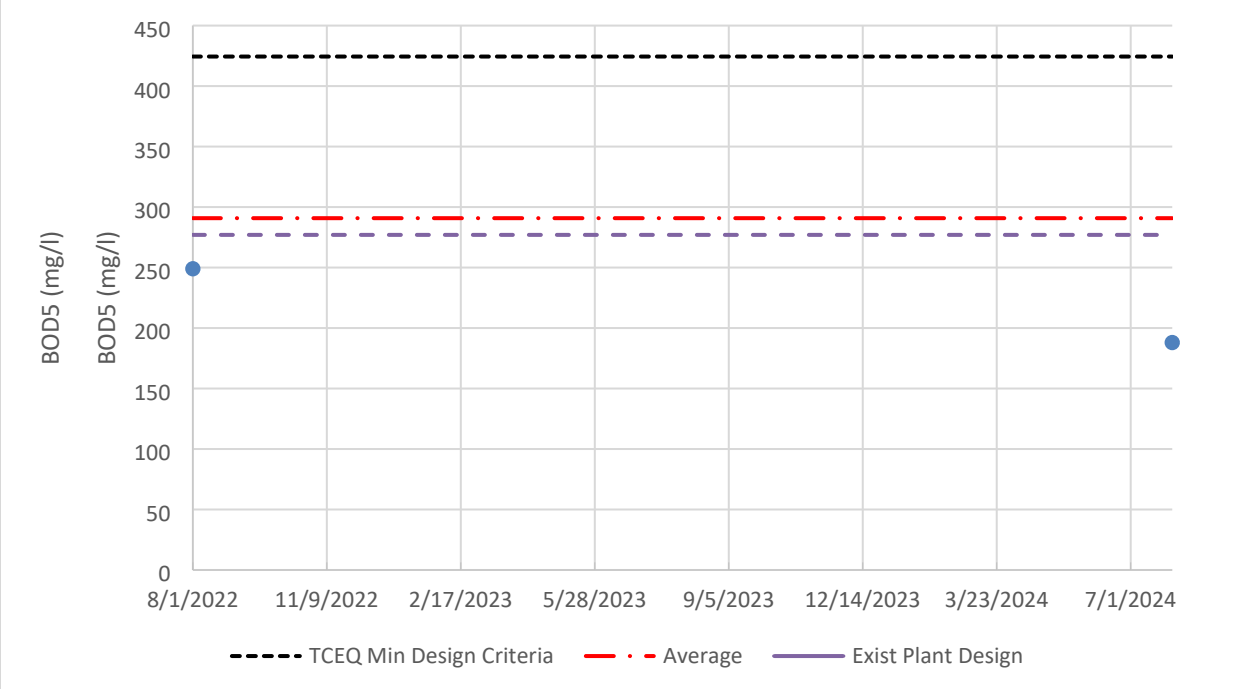
Based on the three (3) years of WWTP effluent data analyzed, the Castlebridge WWTP receives an ADF of approximately 143,200 gallons or 0.14 MGD compared to the permitted average daily flow of 800,000 gallons or 0.8 MGD. This ADF equates to 18% of the Castlebridge WWTP permitted hydraulic capacity.

Based on three (3) years of WWTP influent composite sampling data consisting of 107 samples total, the average Biological Oxygen Demand (BOD) was 291 milligram per liter (mg/l) and 424 mg/l with one standard deviation added per TCEQ 30 TAC 217.34 rules. The WWTP was designed for a BOD_5 of 266 mg/l for comparison**. Figure 5-1** shows the variation of BOD_5 over the period with average in comparison with the TCEQ minimum design level.



Source: Record Drawings 1983

Figure 5-1: Castlebridge WWTP Influent BOD_5



The influent BOD_5 indicates the plant is receiving higher biological loading than originally designed. This is common in WWTPs due to installations of low flow water fixtures (toilets, showerheads, etc.), newer pipe technology creating tighter sanitary sewer systems (which limits inflow and infiltration), and the education of water conservation. When water usage is lower it's directly correlated to lower hydraulic flow at the WWTP. The hydraulic flow at the WWTP is lower than the design assumptions based on the number of active connections. However, even though the hydraulic flow is less than anticipated, the total mass of organic pollutants is not directly correlated, which results in higher concentrations of influent organics. In

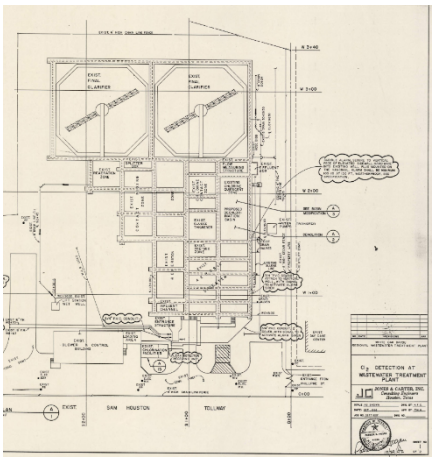
simple terms, while the WWTP may have "excess" treatment capacity in terms of hydraulic flow, the WWTP may have a shortfall in treatment capacity in terms of organic treatment. In order to comply with both the wastewater systems design criteria (TCEQ Ch. 217) and the plant's TPDES effluent discharge permit (related to TCEQ Ch. 309), it must be able to treat the design average daily flow at the increased organic loadings. In situations where increased organic loading occurs, a WWTP re-rate process should be performed to determine the rated treatment capacity of the plant based on the actual organic loading experienced by the plant as described in TAC §217.34.

Based on a preliminary analysis, using a design BOD of 424 mg/l will reduce total treatment capacity to 0.5-0.6 MGD ADF with aeration volume being the limiting factor. TAC §217.34 requires five (5) years of daily flow data and three (3) composite samples of influent wastewater per week for a period of at least one (1) year to be collected in order to perform a wastewater plant re-rate analysis. The City should consider performing composite influent sampling to verify the BOD loading at the plant. Should the BOD loading be higher than the designed BOD, then a re-rate analysis of the WWTP should be performed to understand the actual treatment capacity while also determining future WWTP improvements.

5.4.2. WHITE OAK BAYOU WWTP

Based on the three (3) years of WWTP effluent data analyzed, the White Oak Bayou WWTP receives an ADF of approximately 950,000 gallons or 0.95 MGD from all influent sources, including the City, compared to the permitted ADF of 2,000,000 gallons or 2.0 MGD. The total ADF equates to 48% of the White Oak Bayou WWTP permitted hydraulic capacity.

The flow meter at White Oak Bayou WWTP measuring the flow rate from Philippine lift station is currently out of service, which would normally measure the contribution of flows from the City. Therefore, flows from the City to White Oak Bayou WWTP are estimated based on lift station runtimes. The methodology for these estimates is discussed further in this report. The City sends White Oak Bayou WWTP an estimated ADF of approximately 380,000 gallons or 0.38 MGD compared to the City's ownership stake of 812,600 gallons or 0.81 MGD, which equates to 47% of the ADF. Based on this estimate the City is currently contributing approximately 40% of its ownership stake to White Oak Bayou WWTP based on ADF.



Source: Record Drawing 1992

At the time of this report, influent sampling data was not available for the plant. However, the service area contributing flows to White Oak Bayou WWTP is currently built out and no significant flows are anticipated in the future unless redevelopment occurs.

5.4.3. LIFT STATIONS

The City provided pump run time data for the lift stations in the form of reporting on Elapsed Time Meters (ETMs). The ETM recordings are collected daily at each lift station or are collected automatically by the City's Supervisory Control and Data Acquisition (SCADA) system which provides the pumps runtime for a

given period. The pump runtime is utilized to assess flow conditions by multiplying the runtime data by the known or estimated pump sizes equated by capacity and compared against the expected flows based on the number of connections served within a Lift Station Service Area. **Table 5-4** details the information collected and calculated for each lift station. The Philippine LS was recently rehabilitated in 2023 and now operates as a triplex pump station with variable frequency drive (VFD) pumps. Thus, instead of using runtimes, flows were estimated using pump speed only from October 2023 through March 2024.

Table 5-4: Lift Station Run Time Summary

Lift Station	No. Pumps	Pump Size (gpm)	Avg Daily Hours	Daily Average (gpd)	Max Daily Hours	Max Flow (gpd)	Max Day
Philippine	3	550	40%(1)	313,090	100%(1)	790,931	5/21/2024
Rio Grande	2	120	6.9	51,219	21.7	160,279	5/14/2023
Tahoe	2	375	7.0	157,241	38.7	872,705	1/24/2024
290 NW	2	185	1.1	11,892	10.6	117,192	4/12/2022
Hillcrest	2	320	0.7	13,960	9.4	180,480	1/4/2024
Jones Rd	2	350	0.2	5,204	2.6	54,600	1/24/2023
Total	552,605						

(1) The Philippine lift station pumps operate with a variable frequency drive and thus one pump is typically on but runs at a lower speed to maintain a constant level in the lift station wet well and minimize pump starts/stops. Thus, instead of runtime, average and maximum speed of the VFD as a percentage of the 60 Hz max is shown for this lift station in the run time summary.

The recommended target runtime for pumps based on ADF is 6 hours or less per day. Runtimes above six (6) hours per day could be an early indicator of potential issues at the lift station such as pump failure, ragging, or an overloaded lift station. Rio Grande LS and Tahoe LS both exceed this recommended target, while the remainder of the lift stations operate well below this limit. Both Rio Grande LS and Tahoe LS serve fully developed service areas while operating slightly above the recommended limits. Tahoe LS poses the biggest challenge due to site constraints and limitations for expansion. This LS is currently being evaluated to be relocated based on age, poor condition, environmental, and floodplain considerations. Rio Grande LS may require additional O&M in the form of cleaning prior to considering pump repairs or improvements to reduce pump runtimes.

The lift station flows were estimated based on the number of single-family lots, multifamily units, and total number of commercial and public connections divided by the current developed acreage by type of connection in each service area. Then the approximate water demand for each WWTP service area was divided by the WWTP average day flows to determine return factors for each WWTP service area. Irrigation water usage was ignored for this analysis as water used for irrigation does not contribute to wastewater flows. The Castlebridge WWTP service area return factor was calculated to be 0.61, which is in line with previously calculated return factors for Jersey Village in the 2020 Impact Fee Study and Capital Improvements Plan. A return factor was not calculated in the Capital Improvement Plan and Impact Fee Study Update 2023. The return factors were then applied to approximate water demands per lift station service area. **Table 5-5** presents the approximate lift station that flows alongside the total capacity of each lift station based on firm capacity.

Table 5-5: Approximate Lift Station Existing Flow and Capacity

	White Oak Bayou WWTP					Castlebridge WWTP
Lift Station	**Philippine**	**Rio Grande**	**Tahoe**	**290 NW**	**Hillcrest**	**Jones Rd**
Number of Pumps	3	2	2	2	2	2
Pump Size (gpm)	556	120	375	185	320	350
Firm Pump Station Capacity (gpm)	1,112	120	375	185	320	350
Firm Pump Station Capacity - ADF (gpd)	400,320	43,200	135,000	66,600	115,200	126,000
Actual Average Daily Flow (gpd)	380,000	31,200	123,000	6,600	21,000	5,300
Percent Ultimate Capacity	94.9%	72.2%	91.1%	9.9%	18.2%	4.2%

Comparing ADF per lift station based on runtimes **(Table 5-4)** and connections **(Table 5-5),** shows the calculated flows are similar, except for Rio Grande LS which is a result of the runtime issues.

The existing lift stations are adequately sized to serve their respective service areas. All lift stations are operating within their normal range of operation, with the exception of Tahoe LS and Rio Grande LS. After cleaning and de-ragging Rio Grande LS, the run time status of the pumps should be re-evaluated. If necessary, maintenance or replacement of the pumps may be necessary to ensure the lift station can convey received flows in all conditions. The Tahoe LS is currently being evaluated by the City for relocation and redesign. The City should clean and de-rag the Tahoe LS as a proactive measure to support longevity while the new lift station is under design and construction.

5.4.4. WASTEWATER COLLECTION SYSTEM

A hydraulic capacity analysis of the existing collection system was conducted using Geographic Information System (GIS) data provided by the City. The GIS data included collection lines, force mains, pipe diameters, manholes, invert elevations, and lift stations. Where available, pipe flow lines were established using the provided manhole invert elevations. For missing invert elevations, values were populated assuming minimum slopes as defined by the TCEQ. No surface or subsurface topographic investigations were performed as part of this evaluation.

Flows were assigned to the nearest upstream manhole and then propagated downstream in the collection system based on the connection flow analysis described in Section 5.4.3. A wet weather peaking factor of four times (4Q), the average daily flow per connection was used to establish the required design flow for each pipe in the system. The peaking factor was based on the existing permitted peaking factor at White Oak Bayou WWTP. Once the flow meter at White Oak Bayou WWTP has been restored, an analysis of actual peaking factors experienced during wet weather periods should be analyzed and used to update this analysis in future iterations of this master plan. These calculated flow rates were then compared to the full flow capacity of each pipe, which was determined based on the slope derived from GIS information.

The results of this analysis are summarized in **Table 5-6**. These results indicate the existing collection system is operating within its designed capacity. The vast majority of the system (93%) is utilizing less than

25% of its available capacity, with only 7% of pipes operating at higher utilization rates. Notably, there are no pipes currently operating above 75% capacity.

Table 5-6: Collection System Utilization

Capacity Utilization	Number of Pipes	Total Length (ft)	Percentage of System
0-25%	817	172,862	93%
26-50%	39	10,839	6%
51-75%	7	2,204	1%
>75%	-	-	-

Based on the analysis, the existing sanitary collection system is adequately sized to serve all existing flows. The results represent a theoretical hydraulic capacity of the system based on a desktop analysis, this analysis cannot account for issues such as sedimentation, clogging, and subsidence. However, they can provide a basis for an overall status of the system on a design basis and identify any areas with shortcomings. More detailed investigation and evaluation, as part of the ongoing cleaning and televising services, could identify specific segments of the collection system that have inflow and infiltration issues or been damaged and in need of repair or replacement. The CCTV evaluation on the wastewater collection system is currently underway in the City's Fiscal Years 2024 and 2025.

5.5. FUTURE WASTEWATER SYSTEM

The future wastewater system analysis was based on 5-year and 10-year projections and development assumptions from the current Capital Improvements Plan and Impact Fee Study 2023 Update, December 2023, with no modifications. The future growth projections were based on the future land use plan and the projected development timeframe. The baseline usage assumed in the Capital Improvements Plan and Impact Fee Study 2023 Update was 1,200 gpd per acre or 200 gpd per connection for wastewater ADF.

5.5.1. 5-YEAR PROJECTION

The projected 5-year ADF at the Castlebridge WWTP is based on anticipated wastewater connections from properties being developed / redeveloped and annexed into the City, **Table 5-7**. The growth projected is expected within the City's ETJ along Wright Road and City limits southwest of Highway 290 to FM 529. This area includes approximately 52 acres of commercial land, 38 acres of mixed-use land, and 82 acres of industrial land. This projected flow will require additional lift stations within the system.

Table 5-7: Projected WWTP Flows at 5-Year Projections

Classification	Average Daily Flows (gpd)
New Development 5-Year	244,080
Existing Castlebridge WWTP	143,200
Total	387,280

5.5.2. 10-YEAR PROJECTION

The projected 10-year wastewater ADF at the Castlebridge WWTP is based on the 5-year projection, and the anticipated wastewater connections from properties being developed / redeveloped and annexed into the City within the next 5-10 years, and additional development. The growth projected to occur in the remaining undeveloped tracts within the City limits north of Highway 290 is designated as "Additional Development". This includes approximately 8 acres of multi-family residential and 23 acres of commercial designated tracts resulting in population growth of approximately 292 people, identified in the Capital Improvements Plan and Impact Fee Study 2023 Update. Projected physical connections were calculated based on the acreage and density from the properties being developed / redevelopment and annexed into the City and Additional Development areas. The projected flow is assumed to be supplied by the proposed lift stations and the existing Jones Road LS via pressurized force mains and gravity flow through the existing collection system north of Highway 290, **Table 5-8**.

Table 5-8: Projected WWTP Flows at 10-Year Projections

Classification	Average Daily Flows (gpd)
New Development 5-Year	244,080
New Development 10-Year	601,897
Additional Development 10-Year	36,168
Existing Castlebridge WWTP	143,200
Total	1,025,343

5.6. EVALUATION OF FUTURE WASTEWATER SYSTEM

The City of Jersey Village's future wastewater system was evaluated based on the TAC, Chapter 217 criteria. Based on the 5-year projection Castlebridge WWTP and White Oak Bayou WWTP has sufficient capacity to serve future demands but does not have enough capacity to meet the 10-year projected demands. While the 10-year projections assume the City and the ETJ are fully developed it is unknown when this will occur. Phasing of development may speed up or delay the timing for any WWTP expansions.

The City's existing lift stations have sufficient capacity with the exception of Tahoe Lift Station. The Tahoe Lift Station is currently being evaluated to be relocated and enlarged to alleviate some of the current flows to Castlebridge WWTP. Two (2) new lift stations are proposed along with new or modified lift station sewersheds. **Exhibit 5-3** shows the proposed sewersheds.

1. Tahoe Lift Station – 15810 Tahoe Houston, TX 77040
   No change to the existing sewershed. Tahoe LS will continue to send flows to the Philippine LS. The Tahoe LS receives flows from the Rio Grande LS and 290 NW LS service areas. An alternate analysis to send Jones Rd LS service area to Tahoe LS is detailed in the next section.

2. Jones Rd Lift Station – 7501 Jones Rd Houston, TX 77040
   No change to the existing sewershed. The Jones Rd LS is proposed to receive flows from Future FM 529 LS. Potentially redirect the Jones Rd LS flows from Castlebridge WWTP to White Oak Bayou WWTP through the Tahoe LS.

3. Castlebridge WWTP – 12103 Castlebridge Drive Houston, TX 77040
   No change to the existing sewershed. The Future Taylor Rd LS will flow directly to Castlebridge WWTP. Potentially redirect flow from the Jones Rd LS to the Tahoe LS and ultimate to the White Oak Bayou WWTP. The sewershed will receive flow from the future FM 529 LS and Taylor RD LS sewersheds via gravity collection in the future.
4. Future FM 529 Lift Station – FM 529 LS (Exact location to be determined)
   The proposed service area encompasses approximately 40 acres and will serve primarily single-family residential based on the Future Land Use. Future FM 529 LS will flow to the Jones Rd LS via 4-inch force main into 8-inch collection line on Jones Rd.
5. Future Taylor Rd Lift Station – Taylor Rd. LS (Exact location to be determined)
   The proposed service area encompasses approximately 585 acres and will serve primarily mixed-use, commercial, and industrial. Taylor Rd LS will flow directly to Castlebridge WWTP via 12-inch force main to the WWTP onsite lift station.

Additional wastewater collection system lines will be necessary to serve anticipated development within the Jones Rd, FM 539, and Taylor Rd sewersheds. **Exhibit 5-1** shows the anticipated alignments and minimum required diameters to serve these developments based on the current projections. The existing collection system which conveys flow from the Jones Rd Lift Station force main outlet to the Castlebridge WWTP via gravity sewer is adequately sized to convey the additional anticipated flows without modification beyond standard O&M.

5.7. WASTEWATER SYSTEM IMPROVEMENT PROJECTS

Proposed improvement projects for the wastewater treatment plants and collection system allows the City to proactively budget for long-term viability of its systems. The Capital Improvement Program and O&M help prevent premature failures and ensure continued operation. The Wastewater System Improvement Projects Opinion of Probable Construction Costs and O&M projects, including cost estimates, identified as part of an Inspection Report dated March 2024 can be found in **Appendix G and H**, respectively.

Capital improvements are necessary to support the wastewater system's ability to serve the projected development / redevelopment, **Table 5-9**. The cost estimates are based on engineering costs, construction cost, 25-40% contingencies, and inflation based on the anticipated construction year. The project numbers and cost estimates are consistent with the Impact Fee Study and Capital Improvements Fee 2023 Update. **Exhibit 5-3** illustrates the approximate locations of proposed projects throughout the City's wastewater system. The City should review and update the CIP list annually to reflect prioritization and market escalation.

Table 5-9: Wastewater System Capital Improvements

No.	Description of Projects	Cost Estimate
S-10	Jones Rd LS & FM 529 Service Area 8" Wastewater Line - Service to ETJ	$1,555,000
S-11	FM 529 LS Service Area 8" Wastewater Lines - Service to ETJ	$3,045,000
S-12	Proposed Taylor Road Lift Station & 12" Force Main to Castlebridge WWTP - Service to ETJ	$4,808,000
S-13	Wright Rd 8" & 12" Wastewater Line from FM 529 to Hwy 290 - Service to ETJ	$1,998,000
S-14	Taylor Road 8", 15", & 18" Wastewater Line - Service to ETJ	$2,017,000
S-15	Fairview St 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ	$3,921,000
S-16	Harms Rd 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ	$1,867,000
S-17	Castlebridge WWTP Expansion	$20,454,000
S-18	Tahoe Lift Station Replacement	$2,484,000
S-19	Reroute Jones Road Lift Station into White Oak Bayou Service Area	$922,900

5.7.1. WASTEWATER TREATMENT PLANT PROJECTS

The City's existing capacity at the White Oak Bayou WWTP appears to be sufficient to serve the projected 5-year and 10-year buildout. To serve the future development anticipated south of Hwy 290, Castlebridge WWTP must be expanded within the 10-year planning period. The specific timeline for expanding the plant will depend on the results of the recommended influent sampling and re-rate analysis discussed in Section 5.6.1. Section 5.9.4 discusses an alternative method of serving flows south of Hwy 290 which may delay the need for expanding Castlebridge WWTP by transferring Jones Rd LS's service area into White Oak Bayou WWTP's service area.

S-17: Castlebridge WWTP Expansion
Est. Total: $20,454,000

Description: Expansion of existing facility from a 0.8 MGD to a 1.1 MGD permitted facility to serve the future wastewater demand from new development. The cost estimate assumes all required improvements will be constructed within the existing property, and no additional costs are included for property or buffer zone acquisition.

5.7.2. LIFT STATIONS

The following lift station projects are necessary to service future anticipated development:

S-11: FM 529 LS Service Area 8" Wastewater Lines - Service to ETJ
Est. Total: $3,045,000

Description: New 0.15 MGD lift station and 8-inch gravity sewer along FM 529 east of Jones Rd and north along Charles Road to serve projected development. This includes a lift station along FM 529 to pump the waste to the nearby collection system along Jones Road. Also upgrades to the existing Jones Road Lift Station. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

S-12: Proposed Taylor Road Lift Station & 12" Force Main to Castlebridge WWTP - Service to ETJ
Est. Total: $4,808,000

Description: New 1.1 MGD lift station (Lift Station No. 1) and 12-inch force main to serve projected development. The force main will convey the waste collected in the new development south of Hwy 290 and cross major highways, intersections, roadways, and utilities. All utilities are anticipated within the public right-of-way with no easements.

5.7.3. WASTEWATER COLLECTION SYSTEM

The wastewater collection system is an important part of the wastewater system. While new wastewater lines are needed to serve new development and redevelopment areas it is also critical to maintain and/or replace existing infrastructure.

The age, size, and material of the wastewater collection system are important factors in keeping up with infrastructure. The oldest sanitary lines within the system should be prioritized for replacement based on the material and repair information, **Exhibit 5-2**. The cleaning and televising project will help prioritize repairs and replacement within the system. Sanitary lines within the collection system should not be less than 8-inches to provide adequate capacity. It is recommended to develop a Capital Improvement Sanitary Line Replacement Plan.

The existing wastewater collection system is adequate to serve the existing developed areas, but new sanitary lines are proposed south of US 290. Projects should be prioritized based on anticipated development.

S-10: Jones Rd LS & FM 529 Service Area 8" Wastewater Line - Service to ETJ
Est. Total: $1,555,000

Description: Extend 8-inch gravity sewer along Charles Road east and west of Jones Road and an 8-inch gravity sewer from Jones Road to Wright Road in between Charles Road and FM 529 to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

S-13: Wright Rd 8" & 12” Wastewater Line from FM 529 to Hwy 290 - Service to ETJ
Est. Total: $1,998,000

Description: Extend 12-inch gravity sewer along Wright Road from Lift Station No. 1 along Hwy 290 then south along Wright Road and an 8-inch gravity sewer extending off of Wright Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

S-14: Taylor Road 8", 15", & 18" Wastewater Line - Service to ETJ
Est. Total: $2,017,000

Description: Extend 18-inch gravity sewer along Taylor Road from Hwy 290 to Fairview Street, a 15-inch gravity sewer from Fairview Street to Harms Road, an 8-inch gravity sewer along Musgrove Lane and an 8-inch gravity sewer along Taylor Road west of Harms Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

S-15: Fairview St 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ
Est. Total: $3,921,000

Description: Extend 12-inch gravity sewer along Fairview Street and 8-inch gravity sewer lines extending off of Fairview Street to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way. to serve projected development.

S-16: Harms Rd 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ
Est. Total: $1,867,000

Description: Extend 12-inch gravity sewer along Harms Road and an 8-inch gravity sewer extending off of Harms Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

5.7.4. ALTERNATIVES ANALYSIS

Alternatives for distributing future wastewater flow were developed with the goal of maximizing the City's ownership in the White Oak Bayou WWTP and delaying the need for expansion of the Castlebridge WWTP.

The alternative identified redirects the Jones Rd LS force main from the Castlebridge WWTP service area into the White Oak Bayou WWTP service area via the existing wastewater collection system and ultimately into the Tahoe LS. This would be accomplished by constructing approximately 400 linear feet of 6-inch force main to reroute the Jones Rd LS force main and tie into an existing wastewater manhole on the western right-of-way of Jones Road north of Highway 290. The diversion would remove 165,000 gpd of ultimate wastewater flow from the Castlebridge WWTP service area and transfer to the White Oak Bayou WWTP service area. Based on preliminary assumptions, the existing collection system for this area has the capacity to accommodate the additional flow. However, this option will result in downstream effects that will require the following improvements.

1. Tahoe LS will need to be expanded to a firm capacity of 800 gpm, compared to its existing 375 gpm firm capacity.
2. Philippine LS will need be expanded to a firm capacity of 1,585 gpm, compared to its current capacity of 1,100 gpm.

By performing these flow diversions, the expansion of Castlebridge WWTP can be delayed until development occurs within the Taylor Rd LS service area. In addition, the ultimate required capacity of the

WWTP would be reduced from 1.0 MGD to 0.85 MGD, by removing the Jones Rd LS and the Future FM 529 LS service areas. Should the biological loading, identified previously, remain the same or increase, it is likely the Castlebridge WWTP may still require expansion within the 10-year projected period in order to treat anticipated hydraulic flows / loading, however more testing data is needed. The current proposed and alternate arrangement are shown in Exhibit B.2 and B.3 of the Wastewater System Analysis Memorandum, July 31, 2024, **Appendix F** – Proposed Lift Station Flow Diagram and Alternate Proposed Lift Station Flow Diagram, respectively.

Relocation of the Tahoe LS is being evaluated by the City at this time. Should the City desire to redirect the flow from the Jones Rd LS to White Oak Bayou WWTP service area, the Tahoe LS's wet well should be sized for a future design flow of 800 gpm. It is recommended to consider upsizing the wet well structure as part of the upcoming Tahoe LS project, for economic reasons. This will allow the pumps and piping to be replaced in the future to accommodate the increased flows associated with Jones Road LS. To accomplish this, it is recommended to design and construct a duplex pumping operation at Tahoe LS to handle the existing flow conditions with the intent of expanding to a triplex lift station via the addition of new pumps and piping in the future. This option adds minimal capital expenses to expand the proposed lift station diameter by 25%, at this time. Increasing the size of the wet well as part of the relocation may prevent the City from replacing the entire lift station in the future to accommodate the triplex pumping station. The new Tahoe LS force main should be designed and constructed to accommodate both the existing 375 gpm and ultimate 800 gpm flow rate for economic reasons. If this is not feasible, parallel force mains could be a viable option in the future.

The Philippine LS was rehabilitated in 2023, which converted operations from a dry pit, wet well style lift station to a submersible wet well configuration and expanded to a triplex pump. The Philippine LS has the ability to be expanded to a firm capacity of 1,585 gpm through the replacement of the existing pumps. The existing 8-inch risers are adequately sized to handle the proposed flow of 792 gpm per pump. The existing force main between Philippine LS and White Oak Bayou WWTP is a 14-inch pipe which has to ability to convey 1,585 gpm at a peak velocity of 3 feet per second which is acceptable for a force main.

The following projects would be necessary for this option:

S-18 (Tahoe Rebuild): Tahoe Lift Station Replacement (Future Project for the City)
Est. Total: $2,484,000

Description: Relocate Tahoe Lift Station with a 10' diameter duplex wet well, and 1,250 LF of 8" diameter force main capable of conveying 375 gpm with a firm capacity. The lift station will be capable of expanding to an 800 gpm firm capacity lift station by converting it into a triplex pump station in a future capital improvements project.

S-19 (Jones Rd Reroute): Reroute Jones Road Lift Station into White Oak Bayou Service Area (Future Project for the City)
Est. Total: $922,900

Description: Redirect wastewater flows from the Jones Rd Lift Station from the Castlebridge WWTP service area into the White Oak Bayou WWTP Service Area. Improvements includes 400 LF of offsite 6" PVC force main, the expansion of the Tahoe Lift Station to a firm capacity of 800 gpm, and the expansion of Philippine Lift Station to a firm capacity of 1,585 gpm.

Should the City decide to move forward with this alternative, it is recommended to include the upsizing of the wet well for increased capacity and to accommodate one (1) additional pump in the future at the new Tahoe Lift Station. If wastewater flow diversion from Jones Rd LS is desired, this will require both the expansion of the Tahoe and Philippine Lift Stations in addition to the rerouting of the force main from Jones Rd LS. By implementing these projects, the Castlebridge WWTP expansion could be delayed until planning for development south of Hwy 290 initiates.

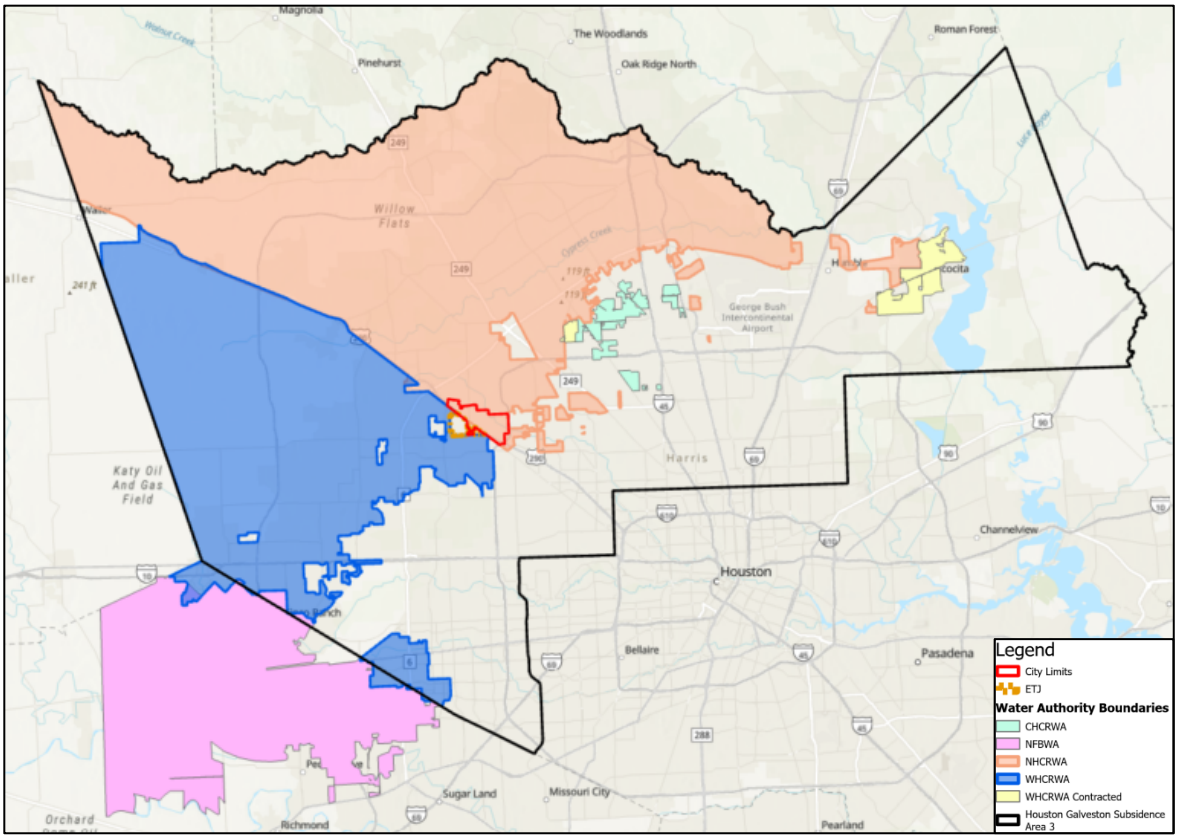
6.0 GROUNDWATER REDUCTION ASSESSMENT

Groundwater is regulated in Harris and Galveston counties to prevent subsidence by local jurisdictions created through the Texas Legislature. The main regulatory body for subsidence is the Harris-Galveston Subsidence District (HGSD). The City of Jersey Village is located in Regulatory Area 3 of the HGSD and mostly within the North Harris County Regional Water Authority (NHCRWA) boundary.

6.1. HARRIS-GALVESTON SUBSIDENCE DISTRICT (HGSD)

HGSD was created in 1975 to regulate the groundwater withdrawal in Harris and Galveston County to reduce the state of subsidence. Regulatory Area 3 is required to reduce and maintain groundwater withdrawals to no more than 20% of the annual total water demand by 2035. Regulatory Area 3 is completely within Harris County, as shown in **Figure 6-1**. The City was required to develop a groundwater reduction plan (GRP) and submit it to HGSD by January 2003 as part of the Regulatory Plan or HGSD permits entities to join together in a regional GRP.

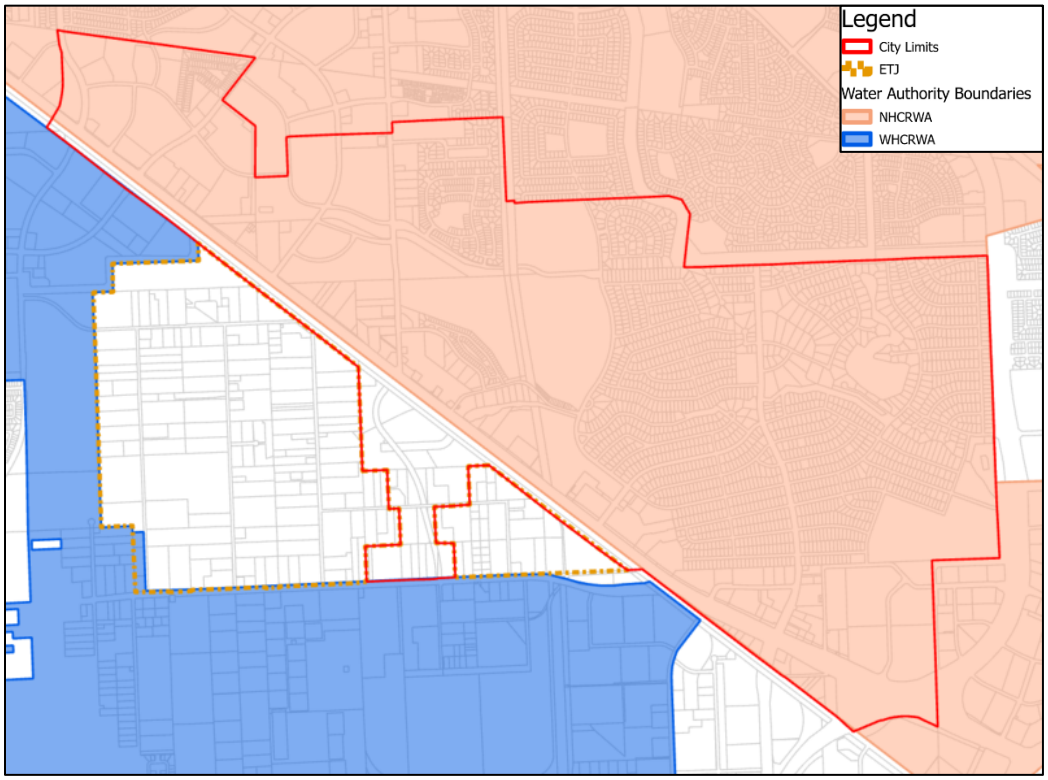
Figure 6-1 – HGSD Regulatory Area 3



6.2. NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY (NHCRWA)

The NHCRWA is a government agency created by the Texas Legislature and their "primary assignment is to develop and implement a strategy for complying with the Harris-Galveston Subsidence District's Regulatory Plan that requires a conversion from groundwater to alternate water". The requirements are to reduce groundwater usage 30% by 2010, 60% by 2025, and 80% by 2035. NHCRWA developed a GRP and the City is mostly located within the NHCRWA boundary and participates in the GRP. The part of the City and the City's ETJ southwest of US 290 are not located within NHCRWA or any other regional water authority boundaries, **Figure 6-2**.

Figure 6-2 – HGSD Regulatory Area 3



NHCRWA charges a disincentive fee or pumpage fee for groundwater produced currently. The pumpage fee is based on the gallons of groundwater produced by a municipality or jurisdiction. The fee is to discourage or incentivize the municipality or jurisdiction from using groundwater to meet water demands. In 2035 NHCRWA may charge another disincentive fee for groundwater allocations greater than 20% of the annual total water demand. "A disincentive fee shall be applied to any groundwater allocation that constitutes greater than 20% of a permittee's total water demand unless the permittee is operating under and in compliance with a certified GRP" and "if that permittee is not in compliance with their certified GRP." per HGSD's 1999 District Regulatory Plan, amended January 9, 2013. Should NHCRWA not be in compliance with the GRP or less than 20% of groundwater be used within the boundary a disincentive fee will be applied by HGSD to NHCWRA and that fee may be passed to all entities within the boundary based on the water supplies.

6.3. SURFACE WATER SUPPLY


Source: Google Maps 2024

The City entered into a water supply contract with the City of Houston to receive water until 2040 on June 29, 2000, included in **Appendix B**. This contract allowed the City to comply with the HGSD mandate for reduction of groundwater usage. Based on the contract conditions, the City is allocated a minimum amount of 22.5 million gallons per month (750,000 gpd). The City may request a revision to the "minimum monthly quantity no more than once per calendar year". The City of Houston does not guarantee any specific amount or pressure of water when Houston's supply is limited or when equipment is inoperative. Only during these times does the City agree to restrict peak usage to no more than 1.5 million gallons of water per day, unless a higher rate is authorized by the City of Houston. The surface waterline is on the west side of US 290 and feeds into the Seattle Water Plant, **Exhibit 4-1**.

6.4. WATER CONVERSION ANALYSIS

The City was included in NHCRWA service area for the 2010 conversion. The 2010 conversion included water jurisdictions that previously received surface water. It was anticipated the City would have an ADD of 1,653,986 gpd in the year 2025. Approximately 8% of the City's water source, from September 2012–August 2013, was supplied from groundwater per 2014 North Harris County Regional Water Authority Groundwater Reduction Plan Update (GRP14).

The City's average daily water demand from April 2023 – March 2024 is 1.523 MGD. Approximately 63% of water was supplied by City of Houston surface water and 36% from City of Jersey Village groundwater wells.

Houston Surface Water	0.970 MGD
Pumped Groundwater	0.553 MGD

This indicates the City exceeds the 20% threshold for groundwater usage. As long as the groundwater usage versus alternate water sources (surface water) does not exceed 20% across all permittees operating under the NHCRWA GRP, the NHCRWA is considered compliant per the Regulatory Plan. By 2035 it is recommended the City provide less than 20% of their needed water supply from groundwater sources.

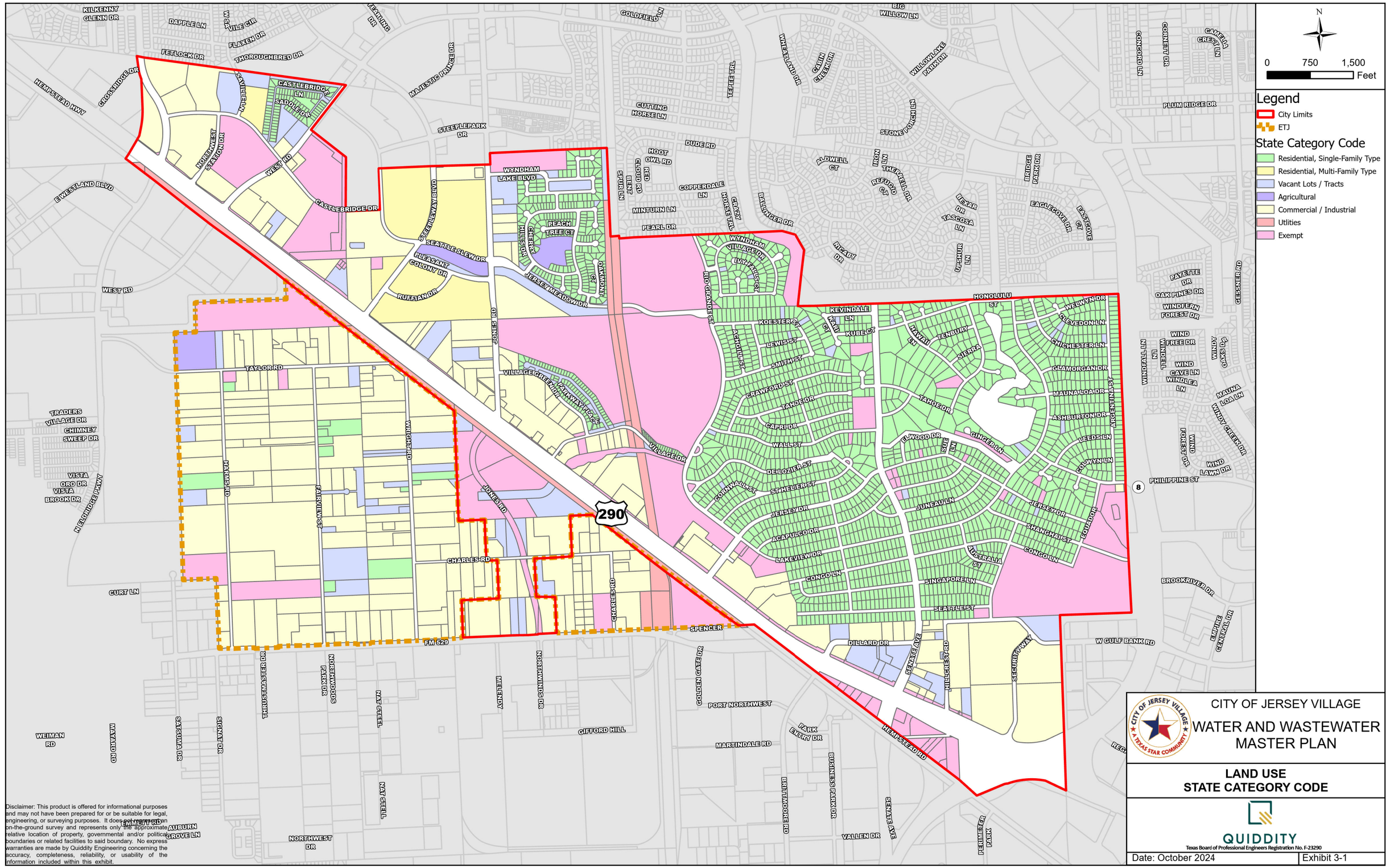
The City should consider requesting an increase to the minimum monthly quantity from the City of Houston. If the minimum monthly quantity is increased the premium over contract minimum charges should decrease resulting in a savings for the City and its citizens/customers.

While the entire City is not within NHCRWA the City may consider requesting approval to bring the portions of the City and City's ETJ into the NHCRWA boundary. If the entire City limits were within the NHCRWA boundary this would provide one regulatory body to submit permits and required reporting. This would also eliminate the potential for pumpage or disincentive fees to be charged by different jurisdictions. The City already pays NHCRWA pumpage fees for water provided outside of the NHCRWA

boundary. Adding the entire City limits would potentially clear up any concerns with these areas not being part of the conversion area within HGSD Regulatory Area 3.

The NHCRWA boundary was created by the Texas Legislation, so modification to boundary would have to be approved by the NHCRWA board of directors and go to the Texas Legislature. Should the City decide to move forward, this would need to be discussed with NHCRWA and possibly HGSD to determine the feasibility and timing.

EXHIBITS



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CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

LAND USE
STATE CATEGORY CODE

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 3-1

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\LV_W_WW_MP\LV_Water_Wastewater\GISdept1.aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce

N

0 750 1,500 Feet

Legend

City Limits

ETJ

Zoning

- A - Single Family Dwelling District
- B - Single Family & Patio Home District
- C - Patio Home & Townhouse District
- D - Jersey Village Crossing District
- F - 1st Business/Townhouse District
- G - 2nd Business District
- H - Industrial District
- J - 3rd Business District
- J-1 - 4th Business District
- K - 5th Business District
- M - Multi-Family Business District

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

ZONING MAP

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024

Exhibit 3-2

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater[GISdept].aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ

Future Land Use

- Low-Density Residential
- Multi-Family Residential
- Mixed-Use
- Office
- Retail
- Industrial
- Public/Semi-Public
- Parks/Open Space
- Water/Detention

290

8

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

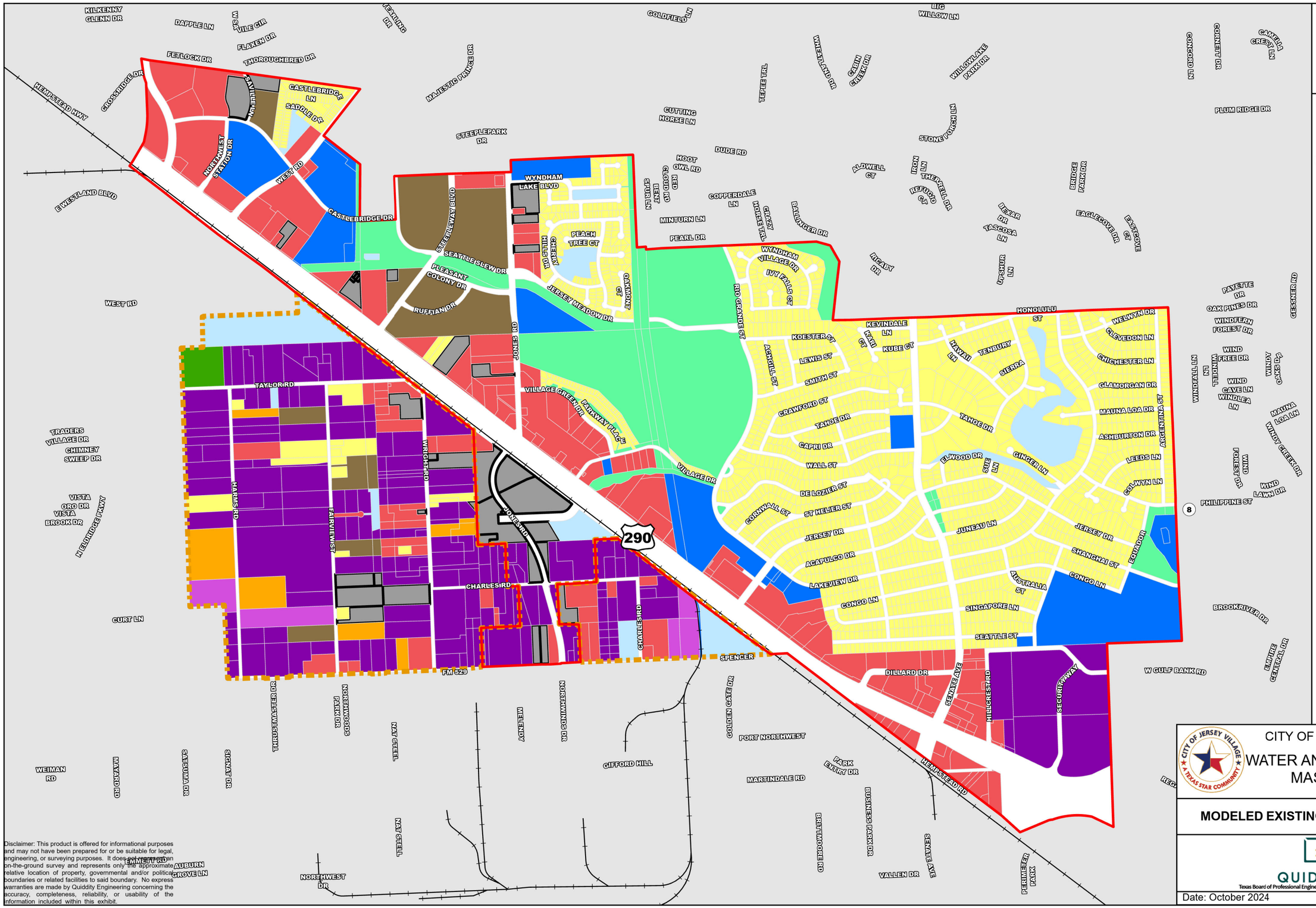
2020 COMPREHENSIVE PLAN FUTURE LAND USE MAP

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 3-3

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater(GISdept).aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce


N
0
750
1,500
Feet
Legend
City Limits
ETJ
Railroad
Modeled Existing Land Use
Undeveloped
Agriculture
Single-Family Residential
High-Density Residential
Mixed Use
Commercial
Industrial
Utilities
Public/Institutional
Parks/Open Space
Water/Detention
290
8
HEMPSTEAD HWY
E WESTLAND BLVD
WEST RD
CASTLEBRIDGE DR
CASTLEBRIDGE LN
SADDLE DR
SADDLEHILL DR
NORTHWEST STATON DR
CROSSRIDGE DR
KILKENNY GLENN DR
DAPPLE LN
FETLOCK DR
FLAXEN DR
THOROUGHBRED DR
MAJESTIC PRINCE DR
STEEPLEPARK DR
CUTTING HORSE LN
DUDE RD
HOOT OWL RD
RED BLANT SPUR LN
COPPERDALE LN
MINTURN LN
PEARL DR
WYNDHAM LAKE BLVD
STEEPLECHASE BLVD
SEATTLE SLEW DR
PLEASANT COLONY DR
RUFFIAN DR
JERSEY MEADOW DR
PEACH TREE CT
CHERRY HILLS DR
OAKMONT CT
SONES RD
VILLAGE GREEN DR
PARKWAY PLACE
VILLAGE DR
WYNDHAM VILLAGE DR
IVY FALLS CT
RIO GRANDE ST
KEVINDALE LN
KARI ST
KUBE CT
KOESTER ST
LEWIS ST
SMITH ST
CRAWFORD ST
TAHOE DR
CAPRI DR
WALL ST
DE LOZIER ST
ST HELIER ST
JERSEY DR
ACAPULCO DR
LAKEVIEW DR
CONGO LN
CORNWALL ST
ARGYLE DR
CRAZY HORSE TRL
BALLINGER DR
RIGABY DR
ALDWELL CT
IRON LN
THERRELL DR
REFUGIO CT
STONE PORCH LN
WILLOWLAKE PARK DR
WHEATLAND DR
GLEN CREEK DR
TRL
BIG WILLOW LN
GOLDFIELD LN
HONOLULU ST
HAWAII LN
TENBURY
SIERRA
WELWYN DR
CLEVEDON LN
CHICHESTER LN
GLAMORGAN DR
MAUNA LOA DR
ASHBURTON DR
LEEDS LN
GOLWYN LN
ARGENTINA ST
ELWOOD DR
GINGER LN
SUE LN
JUNEAU LN
SHANGHAI ST
JERSEY DR
EQUADOR
CONGO LN
AUSTRALIA ST
SINGAPORE LN
SEATTLE ST
DILLARD DR
SENATE AVE
HILLCREST RD
SEQUOIA WAY
W GULF BANK RD
BRIDGE PARK DR
EAGLECOVE DR
EASTGROVE CT
TASCOSA LN
UPSHUR LN
BEXAR DR
PLUM RIDGE DR
STONEHENGE LN
CORNETT DR
CAMELIA CREST LN
FAYETTE DR
OAK PINES DR
WINDFERN FOREST DR
GESSNER RD
WINDFALL LN
WINDFREE DR
WINDFALL MEADOW LN
WIND CAVE LN
WINDLEA LN
WINDY MEADOW DR
MAUNA LOA LN
FOREST DR
WIND LAWN DR
PHILIPPINE ST
BROOKRIVER DR
EMPIRE CENTRAL DR
TAYLOR RD
WRIGHT RD
HARRIS RD
FAIRVIEW ST
JONES RD
CHARLES RD
FM 529
SPENCER
HEMPSTEAD RD
CURT LN
TRADERS VILLAGE DR
CHIMNEY SWEEP DR
VISTA ORO DR
VISTA BROOK DR
N ELDRIDGE PKWY
WEIMAN RD
MAYARD DR
SATSUMA DR
SIGNAL DR
THRUSHWOOD DR
NORTHWOODS PARK DR
NAT STEEL
MELNDY
NORTHWINDS DR
GIFFORD HILL
GOLDEN GATE DR
PORT NORTHWEST
MARTINDALE RD
PARK ENTRY DR
BRITTMOORE RD
BUSINESS PARK DR
VALLEN DR
PEMBERTON PARK
NORTHWEST DR
AUBURN GROVE LN
HOLLISTER RD
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CITY OF JERSEY VILLAGE
WATER AND WASTEWATER MASTER PLAN
MODELED EXISTING LAND USE MAP
QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290
Date: October 2024
Exhibit 3-4
Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater[GISdept].aprx
Project Number: 05440-0012-01.104
Date: 10/15/2024
User Name: lsanguedolce

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- Railroad

Modeled Future Land Use

- Agriculture
- Single-Family Residential
- High-Density Residential
- Mixed Use
- Commercial
- Industrial
- Utilities
- Public/Institutional
- Parks/Open Space
- Water/Detention

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

MODELED FUTURE LAND USE MAP

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 3-5

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater(GISdept).aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce

West Rd Water Plant

Village Water Plant

Seattle Water Plant

Congo Lane EST

City of Houston Interconnect No. 1

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- City of Houston Surface Waterline
- 20" Transmission Line
- Waterlines

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

EXISTING WATER SYSTEM

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 4-1

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater[GISdep].aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- ABS Composite Waterlines
- AC Pipe
- PVC Waterlines

West Rd Water Plant

Village Water Plant

Seattle Water Plant

Congo Lane EST

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

WATER DISTRIBUTION SYSTEM AGE/MATERIAL

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 4-2

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_Water_Wastewater(GIS4dep).aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- City of Houston Surface Waterline
- Transmission Line
- Waterlines
- Proposed Waterline
- 5-Year Service Area
- 10-Year Service Area

West Rd Water Plant

Village Water Plant

Seattle Water Plant

Congo Lane EST

City of Houston Interconnect No. 1

W-15 W-16 W-17 W-18 W-19 W-20 W-21 W-22 W-23 W-24

290

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

FUTURE WATER SYSTEM

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 4-3

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N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- WWTP
- Lift Station
- Forcemain
- Wastewater Lines

Lift Station Service Area

- 290 NW
- Castlebridge WWTP
- Hilcrest
- Jones Rd
- Philippine
- Rio Grande
- Tahoe

Castlebridge WWTP

Rio Grande LS

Tahoe LS

White Oak Bayou WWTP

Philippine LS

290 NW LS

Jones Rd LS

Hillcrest LS

290

FM 529

HEMPSTEAD HWY

E WESTLAND BLVD

WEST RD

TAYLOR RD

CURT LN

HEMPSTEAD RD

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

EXISTING WASTEWATER SYSTEM

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 5-1

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MP\JV_W_WW_MP.aprx Project Number: 05440-0012-01.104 Date: 10/30/2024 User Name: lsanguedolce

Castlebridge WWTP

Rio Grande LS

Tahoe LS

White Oak Bayou WWTP

Philippine LS

Hillcrest LS

290 NW LS

Jones Rd LS

290

N

0 750 1,500 Feet

Legend

- City Limits
- ETJ
- WWTP
- Lift Station

Wastewater Line Material

- ABS Composite Pipe
- Clay
- Concrete
- Ductile Iron Pipe
- PVC
- Pipe Bursting and Liner
- Slipline Concrete
- Steel

CITY OF JERSEY VILLAGE

WATER AND WASTEWATER MASTER PLAN

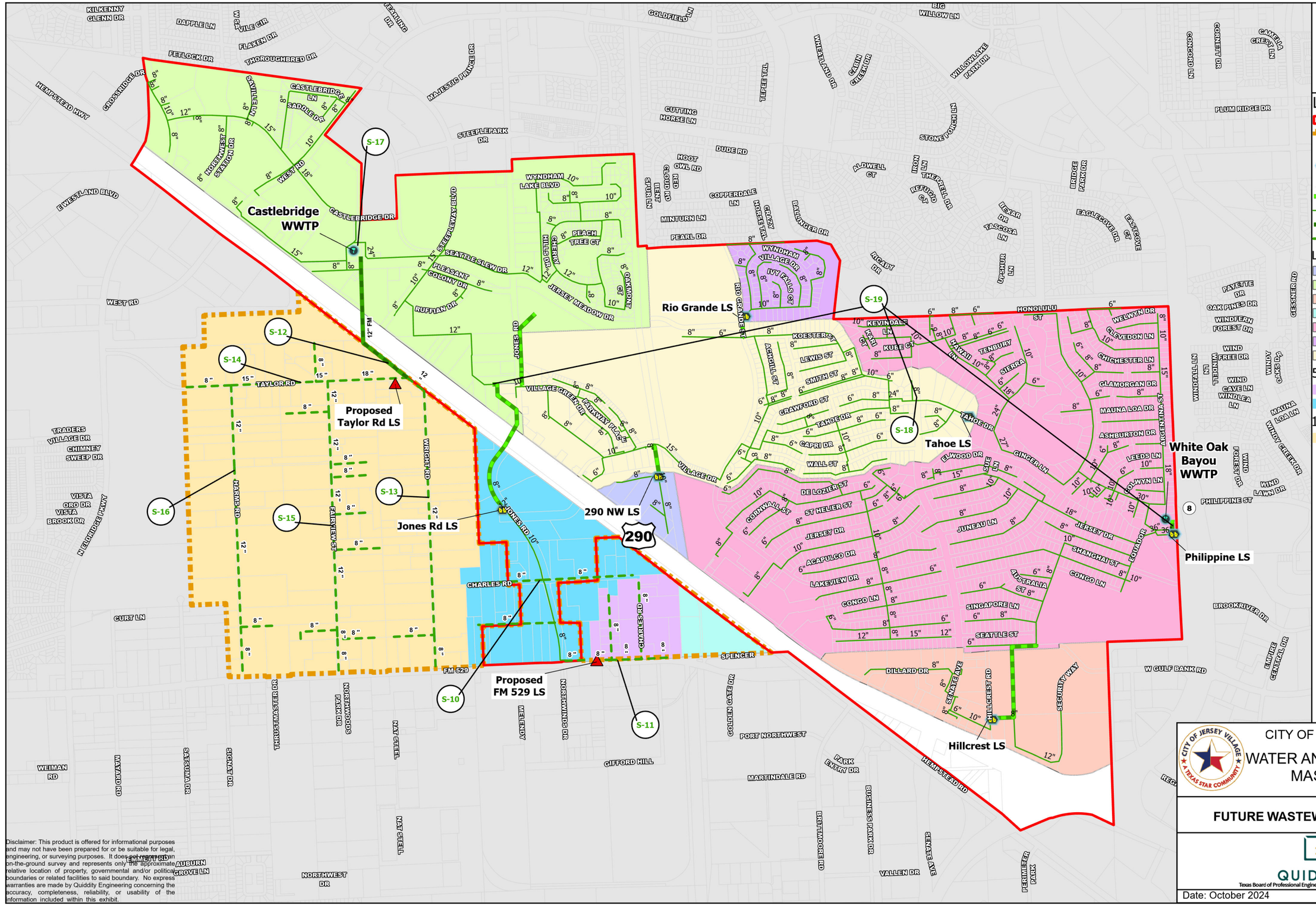
WASTEWATER COLLECTION SYSTEM AGE/MATERIAL

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Date: October 2024 | Exhibit 5-2

Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\VJ_W_WW_MP\VJ_Water_Wastewater[GISdept].aprx Project Number: 05440-0012-01.104 Date: 10/15/2024 User Name: lsanguedolce


Castlebridge WWTP
Rio Grande LS
Proposed Taylor Rd LS
Jones Rd LS
290 NW LS
Proposed FM 529 LS
Tahoe LS
White Oak Bayou WWTP
Philippine LS
Hillcrest LS
S-10
S-11
S-12
S-13
S-14
S-15
S-16
S-17
S-18
S-19
290
FM 529
CASTLEBRIDGE DR
WEST RD
JONES RD
TAYLOR RD
HARRIS RD
FAIRVIEW ST
WRIGHT RD
CHARLES RD
SPENCER
VILLAGE DR
GINGER LN
HEMPSTEAD RD
MARTINDALE RD
GIFFORD HILL
PORT NORTHWEST
W GULF BANK RD
BROOKRIVER DR
PHILIPPINE ST
0 750 1,500 Feet
Legend
City Limits
ETJ
WWTP
Lift Station
Proposed LS
Forcemain
Wastewater Lines
Proposed Force Main
Proposed Wastewater Lines
Lift Station Service Area
290 NW
Castlebridge WWTP
Hilcrest
Jones Rd
Philippine
Rio Grande
Tahoe
5-Year Projection
FM 529 LS Service Area
Jones Rd LS Service Area
10-Year Projection
Taylor Rd LS Service Area
CITY OF JERSEY VILLAGE
WATER AND WASTEWATER MASTER PLAN
FUTURE WASTEWATER SYSTEM
QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290
Date: October 2024
Exhibit 5-3
Disclaimer: This product is offered 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, governmental and/or political boundaries or related facilities to said boundary. No express warranties are made by Quiddity Engineering concerning the accuracy, completeness, reliability, or usability of the information included within this exhibit.
Path: K:\05440\05440-0012-01 Water & Wastewater System Master Plan\2 Design Phase\GIS\JV_W_WW_MPJV_W_WW_MP.aprx Project Number: 05440-0012-01.104 Date: 10/30/2024 User Name: lsanguedolce

APPENDIX A

MEMO

TO: City of Jersey Village

FROM: Bryce C. Brady, PE

DATE: July 31, 2024

RE: Water System Analysis

This summary memorandum presents the results of the Water System Analysis completed as part of the 2024 Water and Wastewater Master Plan. The purpose of this memo is to document the rules, requirements, assumptions, calculations, model results, conclusions, and recommendations for improvements to the existing and future water system.

Background and Criteria for Analysis

In January 2024, the City of Jersey Village (the "City") authorized Quiddity to develop a Water and Wastewater Master Plan to support new development and redevelopment, including new capital improvements. The Capital Improvements Plan and Impact Fee Study 2023 Update completed by Quiddity, dated December 18, 2023, is the foundation for this assessment and evaluation.

The City provides water service to approximately 7,600 people within the city limits and has over 3,300 retail water meter connections. The existing service area north of Highway 290 is mostly developed and is comprised primarily of residential connections. The area south of Hwy 290 currently includes commercial and industrial users comprising 25 acres within City limits. In the 2023 Capital Improvements Plan and Impact Fee Study this area was anticipated to redevelop into new commercial and mixed used properties that the City would serve. Additional properties within the ETJ are anticipated to undergo similar development patterns which this analysis anticipates the City will serve within the future. The additional properties are located south of Highway 290, north of FM 529, and east of Harms Rd.

The water system was analyzed based on the latest Texas Administrative Code (TAC) Title 30, Chapter 290(d), Rules and Regulations for Public Water Systems. A computer model was developed to evaluate the water system during normal operation, high usage, and emergency conditions in comparison to the Texas Commission on Environmental Quality (TCEQ) minimum requirements. Normal operation includes Average Daily Flow (ADF) and Maximum Daily Demand (MDD) while sustaining a pressure of 35 pounds per square inch (psi) within the system. Emergency conditions requires a minimum of 20 psi, such as during fire flow events, per TCEQ 290.45(d).

Existing Water System

The existing water system consists of three (3) water plants and approximately 47 miles of underground distribution waterlines ranging in diameter from 2-inches (2") to 16-inches (16"). Table No. 1 details the existing known pipe inventory of the system by pipe size.

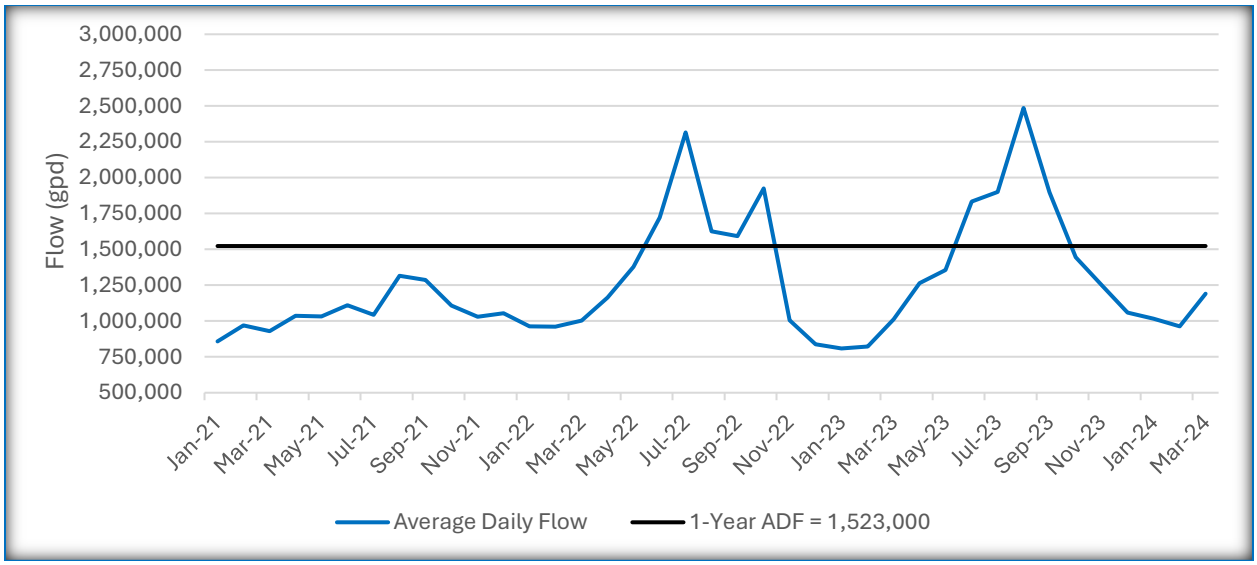
Table No. 1
Existing Distribution System Pipe Inventory

Size	Linear Feet [(1)]
2-inch or less	12,200
4-inch	7,900
6-inch	34,300
8-inch	84,800
12-inch	95,700
16-inch	3900
Total	**249,200**

Note: (1) All values rounded to the nearest hundred.

The system serves an average daily flow (ADF) of approximately 1.52 MGD with a peak day flow of approximately 2.5 MGD based on 3-years of well production and surface water interconnect data from January 2021 through April 2024 as shown in Figure No. 1.

Figure No. 1
Historical Water Demand



The existing water system demand is made up of several land uses, including single family residential, multi-family residential, institutional, commercial, industrial, and accountability/water loss. Per 30 TAC §290.38(16) a connection is quantified based on single-family residential units, each commercial or

industrial establishment, and for apartment complexes, the individual apartment units are considered a connection. As of December 2023, the City serves 4,861 connections according to 30 TAC §290.38(16). Table No. 2 below details the existing demand breakdown for the City along with the estimate demand per connection type in gallons per day (gpd)

Table No. 2
Service Area - Existing (2024) Demand Breakdown

User Type	Connections Per §290.38(18)	Demand Unit (gpd/conn)	Total Demand (gpd)
Single-Family Residential	2,243	250	560,800
Multi-Family	1,544	125	193,000
Commercial	158	1,500	237,000
Industrial	0	1,500	0
Mixed Use	0	375	0
Irrigation	850	300	255,000
Public	66	1,000	66,000
Est. Losses	-	16.1%(1)	211,200
Totals	4,861		1,523,000

Note: (1) Est. losses are based on the last 12 months of billed usage compared to reported well pumpage and surface water usage.

The City has a contract with the City of Houston (CoH) to received surface water which is delivered to the Seattle Water Plant via a 20" and 24" transmission water main. The City is allocated a minimum volume of 22.5 million gallons per month (approximately 0.75 MGD) of surface water from the City of Houston with a peak flow rate of 1,050 gallons per minute (gpm) as part of a take or pay contract. Between April 2023 and April 2024, the City used an average of 0.97 MGD from the interconnect and supplied the remainder of the water demands through groundwater.

The current water system includes three (3) water plants and one (1) offsite Elevated Storage Tank (EST).

Water Plant No. 1 (Seattle) - 15601 Seattle Street
Water Plant No. 2 (Village) - 16600 Village Drive
Water Plant No. 3 (West) - 12115 West Road.
Congo EST - 15402 Congo Lane

A summary of the Water Plant Capacity Analysis is presented in table 3.

Table No. 3
Existing Water Plant Facilities

Location	WP ID No.	Well Capacity	Surface Water Flow Rate	Ground Storage Tank Capacity	Elevated Storage Tank Capacity	Booster Pump Capacity[1]
Seattle Water Plant	1	1,800 gpm	1,050 gpm	800,000 gal	NA	3 @ 1,100 gpm
Village Water Plant	2	900 gpm	NA	420,000 gal	250,000 gal	1@ 100 gpm 1 @ 250 gpm 1 @ 500 gpm 1 @ 750 gpm
West Water Plant	3	1,550 gpm	NA	500,000 gal	NA	1 @ 250 gpm 1 @ 750 gpm 2 @ 1,000 gpm
Congo EST					500,000 gal	
Total		**4,250 gpm**	**1,050 gpm**	**1,720,000 gal**	**750,000 gal**	**7,900 gpm**

The City operates on a single pressure plane, with the majority of daily water demands being served by Seattle Water Plant. The City is located within the North Harris County Regional Water Authority (NHCRWA) service area and is included in the NHCRWA Groundwater Reduction Plan. Therefore, the City is required to pay NHCRWA a fee for every 1,000 gallons of groundwater pumped.

To evaluate the system, the peak-hour condition as set forth by the TCEQ was used as the worst-case scenario. Peak-hour conditions occur when a system experiences the highest-use hour on a Maximum Daily Demand. Historical data for the City has shown that the City has a Max Day peaking factor of 2.44 as shown in Table No. 4.

Table No. 4
Max Day Factor

	Flow (gpd)[1]
Max Day Flow	3,724,000
Average Day	1,523,000
Max Day Factor =	**2.44**

Notes: [1] Max Day Flow based on data provided by the City was in August 2023. Outlier event on January 14, 2023 was excluded due to errors in well production reporting.

Per 30 TAC §290, peak-hour flows (PHF) are determined by multiplying the Max Day by a factor of 1.25, when the public water system meets the minimum requirements for elevated storage in lieu of having

hourly demand information. A calculation of 2.44 multiplied by 1.25 yields a total PHF of 3.15 times the ADF. Table No. 5 below depicts the peak hour factor computation for existing flow conditions.

Table No. 5
Peak Hour Factor

Existing Flow Condition	Equation	Flow
Average Day	1,477,633 gpd ÷1440 min/day	1,026 gpm
Peak Hour (Max Day)	1,026 gpm × 2.44 x 1.25	3,129 gpm

Standard curves were utilized to appropriately represent the peak hour demand for the residential, commercial/industrial, and irrigation diurnal as shown in Figure Nos. 2, 3, and 4 respectively. The diurnal curves were modified to fit the City's required peak hour factor of 1.25 based on information provided in *Advanced Water Distribution and Management* provided by Bentley Institute Press, the manufacturer of WaterGems program. A city wide aggregate diurnal curve was then developed based on the relative number of connections for residential and commercial. Over a 24-hour period residential demand peaks from 6:30 AM to 7:30 AM and 6:00 PM to 8:00 PM time range and commercial/industrial demand peaks from 9:00 AM to 5:00 PM.

Figure No. 2

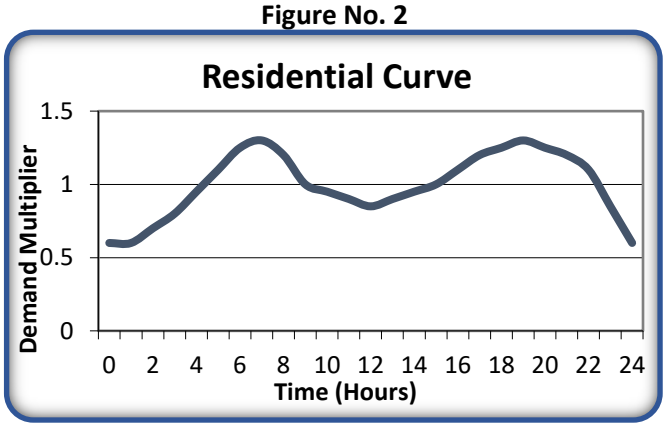
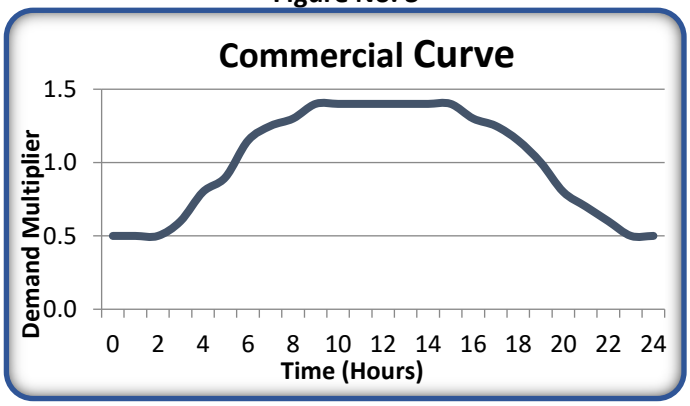


Figure No. 3



In addition to average and maximum daily demand, TCEQ 290.45(d) requires the system be able to sustain 20 psi for two (2) hours during an emergency event such as a fire flow. Per the City adopted 2018 International Fire Code, the minimum fire flow available should be 1,000 gpm for single family residential buildings 3,600 square feet and smaller and a minimum of 1,500 gpm for all buildings larger than 3,600 square feet or for uses other than single family. Larger fire flows may be required based on the occupancy type and square feet of the structure. Should a greater fire flow be required it is recommended the fire flow be verified with the model. The water analysis set 1,000 gpm as the baseline for assessing fire flow capacity throughout all designated scenarios.

The Water System Analysis is based on a computer model of the existing infrastructure and includes all waterlines and hydrants within the City limits, but does not include isolation valves as they were not in the City's current Geographic Information System (GIS) water system at the time of the analysis.

The computer water model of the City's water distribution system was created as part of this project. Utilizing WaterGEMS Connect Edition by Bentley Systems, Inc, the existing water system was created based on the City's existing GIS database coupled with the existing water plants information provided by the City. The model includes all known 2-inch or larger distribution water lines and waters facilities in the City (including the surface water transmission system).

The water plants were set up with water supply from both groundwater wells and the surface water connection. Well pumps and the surface water system were assumed to pump into the ground storage tanks at a constant head. The booster pumps were modeled as the major source of pressure maintenance and water supply for the system as these components pull water from the ground storage tanks, pressurize the water system, and fill the elevated storage tanks simultaneously. The ground and elevated storage tank sizes were provided by the City. The computer model was set up using the pressure settings observed from the City's Supervisory Control and Data Acquisition (SCADA) system during flow testing dated January 5th 2024 for the various water plants. The "if/then" statements included in the control sets of the program were used to control the well and booster pumps whose operation is dependent on the water levels inside the City's elevated tanks or the water pressure directly outside each water plant.

In order to accurately represent the water system, Quiddity used hydrant flow testing data dated January 5th, 2024 provided by the City to calibrate the water model. This calibration helps validate the water model by reflecting the system's ability to supply water at pressures identified during testing. Calibration was achieved by modifying the pipe roughness factor based on pipe age in order to increase or decrease the head loss through pipes, thus reducing or increasing the system pressure for a set flowrate. Table No. 6 presents the breakdown of pipe coefficients, based on location, and estimated year of construction, before and after calibration. Based on the calibration performed, the water model is accurate to within ±5 psi of the actual field conditions.

Table No. 6
Calibration Table

Hazen Williams Roughness Coefficients			
	Pipe Installation Year	**Primary Pipe Material**	**Coefficient**
Initial	<1985	AC	130
Calibrated	<1985	AC	120
Initial	>1985	PVC	130
Calibrated	>1985	PVC	140

Three (3) system scenarios were evaluated for the existing conditions. The existing average day and maximum day flow scenarios were analyzed to determine the lowest pressure, highest velocity, and highest head loss in the system during a 24-hour period through an extended period simulation (EPS). The

goals were to maintain pressure greater than 35 psi during ADF and MDD scenarios, to maintain velocity less than 6 feet per second (ft/s) in the distribution system and 8 ft/s in water plants or transmission waterlines, and maintain head loss under 10 ft/1,000 ft of pipe. The steady state fire flow scenario was analyzed to determine if 1,000 gpm of instantaneous fire flow is available at 10:00 AM (while maintaining above 20 psi) at every known hydrant within the system. The water system currently provides ADF, MDD, and Fire Flow throughout the City with adequate pressure.

(1) Existing Conditions (2024) - Average Daily Flow

This scenario consists of the modeled existing system ADF condition of 1,523,000 gpd with the existing water plant facilities and infrastructure.

Based on the model results, the minimum pressure in the system is 56 psi on North Eldridge Parkway (J-336) and the maximum velocity in the system is 4.20 ft/s at the 8-inch waterline at West Water Plant (W-132). Under ADF conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(2) Existing Conditions (2024) – Maximum Daily Flow

This scenario consists of the modeled existing system MDD condition of 3,724,000 gpd (2.44 times the ADF) with the existing water plant facilities and infrastructure.

Based on the model results, minimum pressure in the system is 52 psi on North Eldridge Parkway (J-336) and the maximum velocity in the system is 4.36 ft/s at the 8-inch waterline near West Water Plant (W-291). Under MDD conditions, the existing water distribution system and water plant facilities are sufficient to maintain 35 psi as stated in 30 TAC §290.44(d).

(3) Existing Conditions (2024) – Max Day + Fire Flow 1,000 gpm

This scenario includes the existing system at the Maximum Daily Demand flow condition of 3,724,000 gpd plus a 1,000 gpm fire flow condition for two (2) hours. This was applied to hydrants in the system. Based on the model results, all but 1 hydrants, located on Capri Dr, can maintain fire flow at 20 psi. This is caused by an undersized 2-inch line connecting Tahoe Dr to the north and Capri Dr. which results in poor system looping and the hydrant failing to meet 1,000 gpm at 20 psi.

The Existing ADF and MDD Conditions modeled maintained residual pressures above 35 psi during normal operation. The Existing Fire Flow Condition modeled maintained residual pressures above 20 psi as required in 30 TAC §290.44(d).

Future Water System

The future water system analysis was based on 5-year and 10-year projections from the current Capital Improvements Plan (CIP) and Impact Fee Study (IFS) dated December 18, 2023 and were not modified as part of this analysis. The future growth projections were based on the future land use plan and the projected development timeframe. The baseline usage predicted in the IFS was 1,500 gpd per acre or 250 gpd per connections for water daily demand, which closely mirrors current water usage in the City based on connection type.

The growth projected within the next five (5) years is predominately anticipated to occur within the City's ETJ along Wright Road, surrounding the future Village Center, and City limits southwest of Highway 290 to FM 529 as shown in green in Exhibit A. This includes approximately 52 acres of commercial, 38 acres of mixed-use, 82 acres of industrial, and 10 acres of irrigation tracts. The City's 5-year population projection resulting from this growth is 1,368 people. Table No. 7 lists the 5-year projected connections for each type of development.

Table No. 7: 5-Year Connection Projections

Type	Total Connections	Demand Unit (gpm/conn)	Total Demand (gpd)
Single-Family Residential	2,243	250	560,800
Multi-Family	1,544	125	193,000
Commercial	186	1,500	279,000
Industrial	54	1,500	81,000
Mixed-Use	151	375	56,600
Irrigation	871	300	261,300
Public	66	1,000	66,000
Accountability/Losses		16.1%(1)	241,100
Total	5,115		1,738,800

Note: (1) Est. losses are based on the last 12 months of billed usage compared to reported well pumpage and surface water usage.

The growth projected within the 5- to 10-year timeframe is predicted to occur in the remaining properties south of Highway 290 designated as "New Development" outside the existing City limits and within the City's ETJ as shown in purple in Exhibit A. This includes approximately 5 acres of single-family residential, 33 acres of multi-family residential, 67 acres of commercial, 25 acres of mixed-use, 2 acres of public, as well as 371 acres of industrial designated tracts.

The growth projected to occur in the remaining undeveloped tracts within the City limits north of Highway 290 is designated as "Additional Development". This includes approximately 8 acres of multi-family residential and 23 acres of commercial designated tracts resulting in population growth of approximately 292 people. Projected physical connections were calculated based on the acreage and density from the

new development and additional development areas. Table No. 8 lists the 10-year projected connections for each type of development.

Table No. 8: 10-Year Connection Projections

Type	Connections	Demand Unit (gpm/conn)	Additional Development Connections
Single-Family Residential	2,273	250	568,300
Multi-Family Residential	2,152	125	269,000
Commercial	242	1,500	363,000
Industrial	259	1,500	388,500
Mixed-Use	251	375	94,100
Irrigation	871	300	261,300
Public	67	1,000	67,000
Accountability/Losses	-	16.1%(1)	323,800
Total	6,115		2,335,000

Note: (1) Est. losses are based on the last 12 months of billed usage compared to reported well pumpage and surface water usage.

The projected 5-year and 10-year developments were modeled with the proposed infrastructure identified in the City's Capital Improvements Plan. The proposed projects included in the Capital Improvements Plan and Impact Fee Study 2023 Update should be sufficient in meeting ADF, MDD, and Fire Flow conditions for the 5-year, and 10-year model scenarios. The ADF and MDD scenarios were analyzed to determine the lowest pressure, highest velocity, and highest head loss in the system during a 24-hour period through an extended period simulation (EPS) using the same target parameters as presented for the existing system.

Table No. 9 documents the water model results for the 5-year and 10-year development scenarios. The results show that the proposed lines are adequately sized to maintain minimum pressures at acceptable pipeline velocities. The system can meet fire flow conditions in all future model scenarios with the exception of the hydrants identified in the existing model assessment section. The lowest pressures were observed at the intersection of Spencer and Harms roads in the southwest corner of the system, however they remain well above the 35 psi minimum.

Table No. 9: Future Model Scenario Results

	Min Pressure	Junction	Max Velocity	Waterline
5 Year ADF	55	J-366	3.16	W-7
5 Year MDD	47	J-213	5.75	W-7
10 Year ADF	51	J-742	3.72	W-291

10 Year MDD	44	J-213	5.78	W-7

The proposed 5-year and 10-year ADF and MDD conditions modeled maintained residual pressures above 35 psi during normal operation. The proposed 5-year and 10-year fire flow condition modeled maintained residual pressures above 20 psi as required in 30 TAC §290.44(d). Table No. 10 lists the infrastructure proposed as part of the water capital improvements plan, and Exhibit A presents an overview of the locations of the proposed projects throughout the City's water system. We recommend implementing all water projects as development progresses and needs arise.

Projects W-14 and W-15 include a new water plant and surface water interconnect with the City of Houston. These projects are not anticipated until 2029 or beyond based on pressure maintenance requirements to support development. However, the City may choose to accelerate these projects to create a second surface water source within the city, improving system robustness through redundancy and reducing groundwater disincentive fee costs. Water Plant No. 4 is critical to maximum day demands in the southwest portion of the future development south of Highway 290. It is therefore recommended to include a groundwater well on this future plant site in order to provide redundancy in cases where the surface water interconnect cannot provide water to the plant necessary to meet maximum day demands. The system can operate at adequate pressures without Water Plant No. 4 during ultimate average day demands.

Table No. 10: Water Capital Improvements Plan

No.	Description of Project
Proposed Projects	
W-14	Proposed Water Facility #4 **and groundwater well**
W-15	City of Houston Interconnect No. 2
W-16	FM 529 8" & 12" Water Line from Harms Rd to Hwy 290 – Service to ETJ
W-17	Charles Rd 8" & Wright Rd 12" Water Line Loop – Service to ETJ
W-18	Wright Rd 12" Water Line from Charles Rd to Hwy 290 – Service to ETJ
W-19	Fairview St 12" Water Line from FM 529 to Taylor Rd – Service to ETJ
W-20	Harms Rd 12" Water Line from FM 529 to Taylor Rd – Service to ETJ
W-21	Musgrove Ln 8" & 12" Water Line from Taylor Rd to Jones Rd Along Hwy 290 – Service to ETJ
W-22	Taylor Rd 8" & 12" Water Line Extension from Hwy 290 to Edge of ETJ – Service to ETJ

In addition to the capital projects listed in the above table, operation and maintenance improvements were identified as part of an inspection report dated March 1, 2024. The capital improvements plan and estimates for the O&M projects identified during the inspections are included as Exhibit B. These projects should be implemented to prevent premature failures and ensure continued operation of existing water facilities.

Alternative Analysis

An alternative was investigated to potentially meet peak day demands without requiring a future groundwater well at Water Plant No. 4. This alternative involves constructing a new 250,000-gallon elevated storage tank south of Highway 290 near the proposed Water Plant No. 4 site.

The key benefits of this alternative include:

- Reduced criticality of Water Plant No. 4 for meeting peak day demands
- Ability for existing water plants to supply water south of Highway 290 during low demand periods and peak off the new elevated storage tank during high demand periods.
- Improved system resiliency if the surface water connection is unavailable
- Reduced pressure variability in the future development area south of Highway 290

With this alternative, Water Plant No. 4 would still be required to meet TCEQ capacity requirements to serve as a new surface water source for the city. However, elevated storage would provide additional operational flexibility and reliability.

A detailed cost comparison between this alternative and the current proposed capital improvement plan will be included in the final Water and Wastewater Master Plan.

Summary of Assessment

The City of Jersey Village anticipates growth and redevelopment within the City's ETJ south of Highway 290. Future waterlines, water supplies, and pressure maintenance facilities will be necessary to serve these new connections.

The City's existing water production and distribution system are able to provide sufficient pressure during Average Daily Flow, Maximum Daily Flow, and Fire Flow Conditions per TCEQ TAC 30 §290.45 minimum requirements until 2029.

We recommend the implementation of all water projects as identified in Table No. 10 as development progresses and the needs arise.

Exhibit A

West Road Water Plant

Musgrove Ln 8" & 12" Water Line

Taylor Rd 8" & 12" Water Line

City of Houston Interconnect No. 2

Fairview St 8" & 12" Water Line

Harms Rd 12" Water Line

City of Houston Water Plant

Proposed Water Facility No. 4

Village Drive Water Plant

Wright Rd 12" Water Line

FM 529 8" & 12" Water Line

Charles Rd 8" & 12" Water Line Loop

Congo Lane EST Site

Seattle Water Plant

City of Houston Interconnect No. 1

VICINITY MAP

Scale: 1 inch equals 10 miles

LEGEND

- Existing Fire Hydrant
- Existing Waterline
- Proposed Waterline
- City of Jersey Village City Limits
- City of Jersey Village City ETJ
- HCAD Parcels

5-Year Projection

- Service Area

10-Year Projection

- Service Area

WATER DISTRIBUTION SYSTEM LAYOUT

CITY OF JERSEY VILLAGE

HARRIS COUNTY, TEXAS

0 750 1,500 Feet

1 inch equals 1,500 feet

Disclaimer: This product is offered 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, governmental and/or political boundaries or related facilities to said boundary. No express warranties are made by Quiddity Engineering concerning the accuracy, completeness, reliability, or usability of the information included within this exhibit.

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Path: V:\Practice Workspace\Corporate Services\GIS\Projects\0_Individuals\C_Jinks\JerseyVillage\05440-0004-00\WaterSystem_11x17.mxd Project Number: 05440-0004-00 Date: 10/25/2023 User Name: ada1

Exhibit B

WATER PLANT FACILITIES
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Seattle St. Water Plant (No. 1)													
Ground Storage Tank No. 1 (300,000 gal - Welded Steel)(54'Ø x 17' H)	Unknown												
Recoating (Interior)		2020	12									$ 60,000	
Recoating (Exterior)		2020	12									$ 55,000	
Replacement			40										
Miscellaneous Repair Items			-									$ 30,000	
Ground Storage Tank No. 2 (500,000 gal - Welded Steel)(74'Ø x 17' H)	2001												
Recoating (Interior)			12	$ 80,000									
Recoating (Exterior)		Unknown	12	$ 75,000									
Replacement			40										
Miscellaneous Repair Items				$ 20,000									
Water Well No. 1 - ABANDONED													
Booster Pump No. 1 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump No. 2 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump No. 3 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump Piping													
Recoat			12		$ 10,000								
Replace			35										
Supply Water Metering Station	2000												
Recoat Piping			15		$ 25,000								
Sump Pump			15		$ 15,000								
Piping Replacement			40										
Magnetic Meter Replacement			25										
Control Building	Unknown												
Miscellaneous Repair Items													
Replace MCC			30				$ 1,000,000						
Phosphate Storage Tank			15										
Phosphate Metering Pump (x1)			15										
Replace Building			50				$ 550,000						
Site SCADA													
Chlorine Room	Unknown												
Miscellaneous Repair Items													
Equipment Replacement			15				$ 50,000						
LAS Room													
LAS Storage Tank			15										
Metering Pumps (x1)			15										
Miscellaneous Repair Items													
Generator (230 KW)	2016												
Miscellaneous Repair Items													
Replacement			25										
Site Work													
Yard Piping Replacement													
Miscellaneous Repair Items													
		SEATTLE WATER PLANT TOTAL:		**$ 175,000**	**$ 50,000**	**$ -**	**$ 1,600,000**	**$ -**	**$ -**	**$ 24,000**	**$ -**	**$ 145,000**	**$ -**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 175,000	$ 50,000	$ -	$ 1,600,000	$ -	$ -	$ 24,000	$ -	$ 145,000	$ -
Contingencies (20%)	$ 35,000	$ 10,000	$ -	$ 320,000	$ -	$ -	$ 5,000	$ -	$ 29,000	$ -
Inflation (4% Per Year)	$ 17,000	$ 7,000	$ -	$ 416,000	$ -	$ -	$ 11,000	$ -	$ 84,000	$ -
Engineering	$ 45,000	$ -	$ -	$ 467,000	$ -	$ -	$ -	$ -	$ 52,000	$ -
TOTAL PROJECT COST	$ 272,000	$ 67,000	$ -	$ 2,803,000	$ -	$ -	$ 40,000	$ -	$ 310,000	$ -

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Village Dr. Water Plant (No. 2)	1978												
Water Well (1,500 GPM)	1978												
Rework		Unknown	15										
Replacement			50										$ 2,000,000
Ground Storage Tank No. 1 (440,000 gal, Bolted Steel)(55'Ø x 24' H)	1979												
Recoating (Interior)		2020	12										
Recoating (Exterior)		2020	12										
Replacement			40									$ 660,000	
Miscellaneous Repair Items													
Elevated Storage Tank (250,000 gal)	1979												
Recoating (Interior)		2021	15										
Recoating (Exterior)		2021	15										
Replacement			50										
Miscellaneous Repair Items								$ 8,000					
Booster Pumps No. 1 (750 gpm)	1979												
Recoat			12		$ 1,000								
Repair			7		$ 8,000								
Replacement			15										$ 20,000
Booster Pumps No. 2 (100 gpm)	1979												
Recoat			12			$ 1,000							
Repair			7			$ 8,000							
Replacement			15										
Booster Pumps No. 3 (250 gpm)	1979												
Recoat			12				$ 1,000						
Repair			7				$ 8,000						
Replacement			15										
Booster Pumps No. 4 (500 gpm)	1979												
Recoat			12	$ 1,000									
Repair			7	$ 8,000									
Replacement			15									$ 20,000	
Booster Pump Piping													
Recoat			12		$ 10,000								
Replace			35										
Control Building	1979												
Replace MCC	1979		30		$ 750,000								
Phosphate Storage Tank			15										
Phosphate Metering Pump (x1)			15										
Miscellaneous Repair Items													
Replace Building			50										
Site SCADA													
Chlorine Room	1979												
Chlorination Equipment			15		$ 25,000								
Miscellaneous Repair Items													
LAS Building	Unknown												
LAS Storage Tank			15										
Peristaltic Pumps (x2)			15										
Miscellaneous Repair Items													
Generator	2022												
Replace Generator			25	$ 275,000									
Recoat Fuel Tank and Panel Replacements			12										
Site Work													
Miscellaneous Repair Items					$ 8,000						$ 8,000		
		VILLAGE WATER PLANT TOTAL:		**$ 284,000**	**$ 802,000**	**$ 9,000**	**$ 9,000**	**$ 8,000**	**$ -**	**$ -**	**$ 8,000**	**$ 680,000**	**$ 2,020,000**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 284,000	$ 802,000	$ 9,000	$ 9,000	$ 8,000	$ -	$ -	$ 8,000	$ 680,000	$ 2,020,000
Contingencies (20%)	$ 57,000	$ 160,000	$ 2,000	$ 2,000	$ 2,000	$ -	$ -	$ 2,000	$ 136,000	$ 404,000
Inflation (4% Per Year)	$ 28,000	$ 120,000	$ 2,000	$ 2,000	$ 3,000	$ -	$ -	$ 4,000	$ 392,000	$ 1,308,000
Engineering	$ -	$ 216,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 242,000	$ 746,000
TOTAL PROJECT COST	$ 369,000	$ 1,298,000	$ 13,000	$ 13,000	$ 13,000	$ -	$ -	$ 14,000	$ 1,450,000	$ 4,478,000

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
West Rd Water Plant (No. 3)	1984												
Water Well No. 3 (1,500 GPM)	1984												
Rework		Unknown	15										
Replacement			50										$ 2,000,000
Ground Storage Tank No. 1 (500,000 gal, Welded Steel)(53'Ø X 'H)	1984												
Recoating (Interior)		Unknown	12	$ 80,000									
Recoating (Exterior)		Unknown	12	$ 75,000									
Replacement			40									$ 750,000	
Miscellaneous Repair Items			-	$ 20,000									
Hydropneumatic Tank No. 1 (25,000 gal)(10'Ø x 42' L) (NOT ASME)	1984												
Recoating (Interior)		Unknown	12	$ 20,000									
Recoating (Exterior)		Unknown	12	$ 20,000									
Replacement			35									$ 160,000	
Miscellaneous Repair Items													
Booster Pumps No. 1 (100 gpm)	1984												
Recoat			12			$ 500							
Repair			7			$ 6,000							
Replacement			15										
Booster Pumps No. 2 (750 gpm)													
Recoat	1984		12	$ 1,000									
Repair			7	$ 8,000									
Replacement			15									$ 20,000	
Booster Pumps No. 3 (1000 gpm)	1984												
Recoat			12		$ 1,000								
Repair			7		$ 8,000								
Replacement			15										$ 20,000
Booster Pumps No. 4 (1000 gpm)	1984												
Recoat			12				$ 1,000						
Repair			7				$ 8,000						
Replacement			15										
Booster Pump Piping													
Recoat			12	$ 20,000									
Replace			35										
Control Building	1984												
Air Compressor			15										
Replace MCC	1984		30			$ 800,000							
Miscellaneous Repair Items						$ 20,000							
Replace Building			50										
Site SCADA													
Chlorine Room	1984												
Chlorination Equipment			15			$ 25,000							
Miscellaneous Repair Items													
LAS Building	Unknown												
LAS Storage Tank			15										
Peristaltic Pumps (x2)			15										
Miscellaneous Repair Items													
Generator	Unknown												
Replace Generator			25										
Recoat Fuel Tank and Panel Replacements			12										
Site Work	Unknown												
Miscellaneous Repair Items					$ 8,000						$ 8,000		
		WEST WATER PLANT TOTAL:		**$ 244,000**	**$ 17,000**	**$ 851,500**	**$ 9,000**	**$ -**	**$ -**	**$ -**	**$ 8,000**	**$ 930,000**	**$ 2,020,000**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 244,000	$ 17,000	$ 851,500	$ 9,000	$ -	$ -	$ -	$ 8,000	$ 930,000	$ 2,020,000
Contingencies (20%)	$ 49,000	$ 3,000	$ 170,000	$ 2,000	$ -	$ -	$ -	$ 2,000	$ 186,000	$ 404,000
Inflation (4% Per Year)	$ 24,000	$ 2,000	$ 174,000	$ 2,000	$ -	$ -	$ -	$ 4,000	$ 536,000	$ 1,308,000
Engineering	$ 63,000	$ -	$ 239,000	$ -	$ -	$ -	$ -	$ -	$ 330,000	$ 746,000
TOTAL PROJECT COST	$ 380,000	$ 22,000	$ 1,434,500	$ 13,000	$ -	$ -	$ -	$ 14,000	$ 1,982,000	$ 4,478,000

STATE OF TEXAS
K. GRADY TURNER, III
117234
LICENSED PROFESSIONAL ENGINEER

03/05/2024

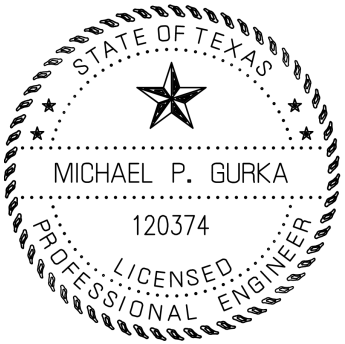
QUIDDITY ENGINEERING

Texas Board of Professional Engineers Registration No. F-23290 | Texas Board of Professional Land Surveying Registration No. 10046100

WATER DISTRIBUTION SYSTEM
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Material	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Water Distribution System													
Replace Waterlines, 2" - 16" (approx. 50,000 LF)	1970s	AC / PVC				$ 7,500,000							
Replace Waterlines, 2" - 16" (approx. 48,000 LF)	1980s	AC / PVC							$ 7,200,000				
Replace Waterlines, 2" - 6" (approx. 19,000 LF)	Multi Yr	AC / PVC										$ 2,850,000	
				2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Construction Cost				$ -	$ -	$ 7,500,000	$ -	$ -	$ 7,200,000	$ -	$ -	$ 2,850,000	$ -
Contingencies (20%)				$ -	$ -	$ 1,500,000	$ -	$ -	$ 1,440,000	$ -	$ -	$ 570,000	$ -
Inflation (4% Per Year)				$ -	$ -	$ 1,529,000	$ -	$ -	$ 2,730,000	$ -	$ -	$ 1,642,000	$ -
Engineering				$ -	$ -	$ 2,106,000	$ -	$ -	$ 2,388,000	$ -	$ -	$ 1,012,000	$ -
TOTAL PROJECT COST				$ -	$ -	$ 12,635,000	$ -	$ -	$ 13,758,000	$ -	$ -	$ 6,074,000	$ -



3/5/2024

Michael P Gurka

QUIDDITY ENGINEERING

Texas Board of Professional Engineers Registration No. F-23290 | Texas Board of Professional Land Surveying Registration No. 10046100

APPENDIX B

WATER SUPPLY CONTRACT BETWEEN THE CITY OF HOUSTON, TEXAS AND THE CITY OF JERSEY VILLAGE

00-0498

51680

THIS WATER SUPPLY CONTRACT ("Contract") is made by and between the **CITY OF HOUSTON** ("Houston"), and the **CITY OF JERSEY VILLAGE** ("Jersey Village") .

WITNESSETH:

Recitals

Houston is a municipal corporation and home-rule city, principally located in Harris County, Texas. Houston owns a water distribution system and desires to sell water to Jersey Village.

Houston has authority to enter into this contract pursuant to its Home Rule Charter and Section 402.021 of the Texas Local Government Code.

Jersey Village has authority to enter into this contract pursuant to Section 791.026 of the Texas Government Code.

Jersey Village is a Texas Municipal corporation located in Harris County. Jersey Village currently obtains it supply of water from wells located in Regulatory Area Three of the Harris-Galveston Coastal Subsidence District ("Subsidence District") and is subject to the Subsidence District's requirements of submitting a ground water reduction plan (GRP) to the District by January 2003.

Subsidence District regulations permit groups of entities to join together in a regional ground water reduction plan (Regional Plan) in which all participants will be co-permittees. Houston and other entities within Area Three are in the process of developing a Regional Plan.

Jersey Village desires to purchase water from Houston for distribution and use for domestic and commercial purposes.

The parties to this Contract have determined that all obligations to expend money arising out of this Contract can be fully satisfied out of monies on hand and available for expenditure for the purposes stated herein. Such charges are an operating expense of Jersey Village's water system and shall be paid out of funds on hand at the time such charges are incurred.

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants and agreements herein contained, the parties hereto do mutually agree as follows:

ARTICLE I.

Definitions

Unless the context requires otherwise, the following terms as used in this Contract shall have meanings as follows:

"Area Three" means Regulatory Area Three of the Harris-Galveston Coastal Subsidence District's 1999 Regulatory Plan.

"Jersey Village System" means all facilities necessary to enable Jersey Village to receive Water from the Houston System, including without limitation, inter-connection lines, storage facilities, meter vaults, casings, air gap and other backflow prevention controls, valves and flow control devices as may be reasonably required by the Utility Official.

"Houston System" means Houston's treated water system, including groundwater and surface water plants, transmission and distribution mains, storage facilities, valves and flow control devices.

"Ordinances" means the Code of Ordinances of Houston, as amended from time to time.

"Points of Delivery" means the output flanges of the taps on Houston's Water lines that will serve Jersey Village under the provisions of this Contract, as more particularly identified and described on Exhibit "B" attached hereto.

"Points of Measurement" means the locations of the meters at which Jersey Village's consumption of water is measured, as more particularly described on Exhibit "B" attached hereto.

"Regional Plan" means a plan sponsored by Houston for compliance with the District's regulations pertaining to Area Three and which establishes provisions for co-permitting, water usage and water rate development.

"Utility Official" means the Director of the Department of Public Works and Engineering of Houston or his or her designee, and any other person (or that person's designee) who may hereafter exercise the functions of the said Utility Official under the Ordinances

"Water" means treated Water from Houston's domestic waterworks system.

ARTICLE II.

Construction of Facilities; Ground Water Reduction Plan

2.01--Construction by Jersey Village of Certain Facilities.

Jersey Village agrees to construct, or cause to be constructed, all facilities necessary to enable it to receive Water from Houston at the Points of Delivery, including without limitation, interconnection lines,

meter vaults, casings, airgap or other backflow prevention controls, valves, and flow control devices as required by the Utility Official.

2.02--Tap and Meter.

Jersey Village shall construct, at its sole cost, taps on the Houston water main at the Points of Delivery and set the Water meters at the Points of Measurement under the approval and inspection of the Utility Official. Jersey Village also agrees to provide telephone and electronic connections accessible at the Points of Measurement and allow Houston to connect remote meter reading equipment to such telephone lines.

The Jersey Village distribution system shall be chlorinated in accordance with requirements approved by the Utility Official before the connection is made.

2.03--Ground Water Reduction Plan.

Houston shall include Jersey Village in its Ground Water Reduction Plan for Area Three in accordance with the regulations and rules of the Harris-Galveston Coastal Subsidence District.

ARTICLE III.

Sale and Delivery of Water

3.01--Delivery of Water.

Subject to the terms and conditions of this Contract, Houston agrees to sell and deliver (or cause to be delivered) Water to the Points of Delivery established under the provisions of Article II, and Jersey Village agrees to purchase Water at such Points of Delivery during the term of this Contract.

3.02--Billing and Payment.

All Water delivered to Jersey Village shall be metered, and Houston shall read the meters and bill Jersey Village on a monthly basis. Billing shall not begin until commencement of delivery of Water to Point of Delivery No. 1. (Water delivered to point of Delivery No. 2 prior to commencement of delivery to No. 1 will be billed at codified non-contract Houston rates.)

Initially monthly payments shall be calculated in accordance with the formula given in Subsection 47-61(f) of the Ordinances for contract treated Water customers that do not receive surface Water only. A copy of the current codification of this Subsection is attached hereto as Exhibit "A". Although Houston intends that contracts for wholesale Water for domestic and commercial purposes have stable prices, it is recognized that Houston retains the right to change rates for customers by amending or superseding the rates set out in the Ordinances. In the event that a Regional Plan is adopted for Area Three and codified by

City ordinance, the rates and usage requirements of the Regional Plan shall apply to Jersey Village. However, if Houston gives any similarly situated wholesale customer served in Area Three a lower wholesale rate for Water than the then-existing rate applicable to Jersey Village under the Regional Plan, such lower rate shall apply to Water delivered to Jersey Village.

Jersey Village's initial minimum monthly quantity for which it must pay whether taken or not is 22.5 million gallons per month. Jersey Village is authorized to revise its minimum monthly quantity no more than once each calendar year by providing written notice thereof to the Utility Official. Any revision resulting in an increase in excess of 10% of the current minimum monthly quantity is not effective until approved in writing by the Utility Official.

At the end of each billing period, Houston shall send a statement of charges to Jersey Village showing Water used at each meter and the appropriate monthly charges.

During any month in which Houston is unable to deliver to Jersey Village the minimum specified, whether as a result of curtailments or suspensions under Sections 5.04 and 3.03 hereof, or of a Force Majeure as provided in Sections 5.01 and 5.02 hereof, Jersey Village shall be obligated to pay Houston only for the quantity of Water delivered to Jersey Village under this Contract during such month.

Payment of such statements shall be due and payable at P.O. Box 4863, Houston, Harris County, Texas 77210-4863, on or before the thirtieth (30th) day after receipt of such statement. If Houston changes the location at which payment is to be made, Houston shall notify Jersey Village in writing at the address shown in Section 7.08 hereof.

Jersey Village covenants and agrees to assess user charges or taxes to its customers that will produce revenues sufficient to discharge its obligations under this Contract.

3.03--Failure to Pay when Due.

Should Jersey Village fail to tender payment of any amount when due, interest thereon shall accrue at the rate of ten percent (10%) per annum from the date when due until paid. In the event Jersey Village fails to timely tender payment of any amount within the thirty (30) day period established in Section 3.02 hereof, and such failure continues for thirty (30) days after the notice to Jersey Village of such default, Houston may suspend delivery of Water, but the exercise of such right shall be in addition to any other remedy available to Houston.

3.04--Title to and Responsibility for Water.

Title to, possession, and control of Water shall remain in Houston until it passes through the Points of Delivery, where title to, possession, and control of the Water shall pass from Houston to Jersey Village.

ARTICLE IV.

Term and Related Provisions

4.01--Term.

This Contract shall be in force and effect from and after the date of countersignature by Houston's Controller and shall expire at noon on the fortieth (40th) anniversary of the date of countersignature by Houston's Controller unless sooner terminated pursuant to the terms of this Contract.

ARTICLE V.

Performance by the Parties

5.01--Force Majeure.

In the event either party is rendered unable, wholly or in part, by Force Majeure, to carry out any of its obligations under this Contract, it is agreed that upon such party's giving notice and full particulars of such Force Majeure in writing to the other party as soon as possible after the occurrence of the Force Majeure, the obligations of the party giving such notice, to the extent it is affected by Force Majeure and to the extent that due diligence is being used to resume performance, shall be suspended for the duration of the Force Majeure. Such cause shall, as far as possible, be remedied with all reasonable dispatch.

5.02--Force Majeure Defined.

The term "Force Majeure", as used herein, shall include, but not be limited to, acts of God, strikes, lockouts or other industrial disturbances, acts of the public enemy, war, blockades, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, droughts, tornadoes, hurricanes, arrests and restraints of government and people, explosions, breakage or damage to machinery, pipelines or canals, and any other inabilities of either party, whether similar to those enumerated or otherwise, and not within the control of the party claiming such inability, which by the exercise of due diligence and care such party could not have avoided.

5.03--Construction and Maintenance of Certain Facilities between the Points of Delivery and Points of Measurement.

With respect to all Water handling facilities located between the Points of Delivery and the Points of Measurement shown in Exhibit "B", Jersey Village and Houston specifically agree:

(1) That all such facilities, other than the measurement equipment itself, shall be and remain

the property of Jersey Village;

(2) That Jersey Village shall take all responsible steps to maintain such facilities and to prevent leaks or discharges from such facilities and shall not suffer, permit, cause or allow any Water to be taken or used from such facilities, except through the measuring equipment;

(3) That Jersey Village shall repair any such leak or discharge at once upon receiving notice thereof and pay Houston the cost of any Water lost by reason of such a leak or discharge;

(4) That Jersey Village shall correct or repair any damage caused by any such leak or discharge.

5.04--Delivery Limitations

Jersey Village is not guaranteed any specific quantity or pressure of Water whenever Houston's Water supply is limited or when Houston's equipment may become inoperative because of unforeseen breakdown or scheduled maintenance and repairs. Houston is in no case to be held to any liability for failure to furnish any specific amount or pressure of Water. Jersey Village agrees to restrict its peak usage to no more than 1.5 million gallons of Water per day (or MGD) unless a higher rate is authorized by the Utility Official.

Houston may reduce the supply of Water only in accordance with the laws of the State of Texas, particularly Section 11.039(a) of the Texas Water Code.

ARTICLE VI.
Measuring Equipment

6.01--In General.

At Jersey Village's own cost and expense, Jersey Village shall install at the Points of Measurement measuring equipment properly sized and able to measure the quantity of Water delivered within the accuracy tolerance of 2%. The measuring equipment must be approved jointly by Jersey Village and the Utility Official prior to delivery of Water, and shall become the property of Houston after installation.

6.02--Access.

During any reasonable hours, Houston and Jersey Village shall have access to the measuring equipment. Jersey Village shall have access to Houston's records pertinent to determining the measurement and quantity of Water actually delivered, but Houston will read the meters for the purpose of

billing.

6.03--Maintenance and Testing of Meter.

Houston shall maintain the measuring equipment within the accuracy tolerance specified in Section 6.04 by periodic tests. Houston shall conduct such tests at least once every twelve (12) months and shall notify Jersey Village at least forty-eight (48) hours in advance of the time and location at which tests are to be made. If Jersey Village requests an additional test within twelve (12) months, Houston shall charge Jersey Village an amount equal to Houston's cost to perform such test, unless the test reveals that the equipment registers more than one hundred and two (102%) percent for a given flow rate. In addition, Jersey Village shall have the right to independently check, at its own cost, said measuring equipment at any time upon forty-eight (48) hours notification to the Utility Official and opportunity for the Utility Official to witness such tests.

6.04--Billing Adjustments for Inaccurate Meters.

Should the test of the measuring equipment in question show that the equipment registers either more than one hundred two percent (102%) or less than ninety-five percent (95%) of the Water delivered for a given flow rate of flow, the total quantity of Water delivered to Jersey Village will be deemed to be the average daily consumption as measured by the measuring equipment when in working order, and Houston shall calibrate the meter to the manufacturer's specifications (in the case of Venturi meters) or the AWWA specifications (for all other types of meters) for the given rate of flow, or replace the meter with accurate measuring equipment that is tested by Houston before it is placed in service.

Any billing adjustment under this Section shall be for a period extending back to the time when the inaccuracy began, if such time is ascertainable; and if such time is not ascertainable, for a period extending back to the last test of the measuring equipment or one hundred twenty (120) days, whichever is shorter.

As used in this paragraph, the expression "given rate of flow" means one of the following selected by the Utility Official for each calibration or test:

1) the total quantity of Water delivered during the preceding period (usually a calendar month) as reflected by the totalizer, converted to gallons per minute;

2) high, low, and intermediate rates of flow in the flow range, as reflected by the flow recording devices;

3) the applicable minimum monthly quantity converted to gallons per minute; or

4) AWWA-specified test flow rates for that size and type of meter.

6.05--Disputes as to Testing

In the event of dispute between Houston and Jersey Village as to the accuracy of the testing equipment used by Houston to conduct the accuracy test, an independent check may be mutually agreed upon between Jersey Village and the Utility Official to be conducted by an independent measuring equipment company suitable to both Jersey Village and the Utility Official. The cost of such test will be at Jersey Village's sole expense.

The Utility Official shall accept the test results of the independent measuring equipment company, provided that the calibration procedure and test equipment are mutually agreeable to Jersey Village and to the Utility Official.

6.06--Check Meters

Jersey Village may install, at its own cost and expense, such check meters as it deems appropriate in Jersey Village's pipe line, but Houston shall have the right of ingress and egress to such check meters during all reasonable hours; provided, however, that billing computations shall be on the basis of the results of the measuring equipment set forth above.

ARTICLE VII.

Miscellaneous Provisions

7.01--Quality of Water.

Houston shall provide contract treated Water meeting all applicable Texas and Federal regulations regarding Water quality, including the Safe Drinking Water Act.

EXCEPT AS PROVIDED IN THIS SECTION 7.01, HOUSTON MAKES NO WARRANTY EXPRESSED OR IMPLIED, REGARDING THE QUALITY OR DELIVERY PRESSURE OF THE WATER, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

JERSEY VILLAGE HEREBY RELEASES AND DISCHARGES HOUSTON FROM ANY AND ALL FINES, DEMANDS, JUDGEMENTS, LIABILITIES OR CLAIMS ARISING BY REASON OF OR IN CONNECTION WITH THE DELIVERY OF WATER WHICH MEETS THE REQUIREMENTS OF THIS SECTION 7.01.

7.02--Ingress and Egress.

During the term of this Contract, Houston shall have the right of ingress and egress in, upon under and over any and all land, easements and rights-of-way of Jersey Village on which Houston, with Jersey Village's consent, constructs facilities to deliver Water to Jersey Village.

7.03--Assignments.

This Contract shall bind and benefit the respective parties and their legal successors, but shall not otherwise be assignable, in whole or in part, by either party without first obtaining written consent of the other. "Assignment" as used herein means assignment in law or otherwise.

Provided, however, Houston reserves the right to assign this Contract to a successor on the condition the such successor agrees in the assignment agreement to honor the the rate covenants described in Section 3.02.

7.04--Subject to Laws and Regulations.

(a) This Contract shall be subject to all present and future valid laws, orders, rules and regulations of the United States of America, the State of Texas, any regulatory body having jurisdiction, and the Charter and Ordinances of the City of Houston, Texas. In order to protect Houston's System it is specifically agreed that Jersey Village's System shall be constructed and operated to comply with the rules promulgated by the Texas Natural Resources Conservation Commission, the Houston Plumbing Code, and the policy of requirements of the Utility Official regarding backflow prevention and cross connections. Should a condition in violation of these requirements be discovered, Jersey Village shall promptly cure same. On or before the date of initial delivery of Water under this Contract, Jersey Village must install an air gap or other backflow prevention device at its interconnect, in accordance with the specifications approved by Utility Official.

(b) On or before one year from the effective date of this Contract, Jersey Village shall approve and implement a Water conservation program as required by the Texas Natural Resource Conservation Commission pursuant to 30 T.A.C. '288, as may be amended from time to time.

7.05--No Additional Waiver Implied.

The failure of either party hereto to insist, in any or more instances upon performance of any of the terms, covenants or conditions of this Contract, shall not be construed as a waiver or relinquishment of the future performance of any such term, covenant or condition by the other party hereto, but the obligation of such other party with respect to such future performance shall continue in full force and effect.

7.06--Inspections.

Jersey Village agrees that Houston may conduct inspections from time to time to determine that no

conditions exist in Jersey Village's System and connections to its customers' premises which would or might adversely affect Houston's System.

7.07--Merger.

This instrument contains all the agreements made between the parties.

7.08--Notices.

Until Jersey Village is otherwise notified in writing by Houston, the address of Houston is and shall remain as follows:

City of Houston
Utility Official of Public Works and Engineering Department
P.O. Box 1560
Houston, Texas 77251-1560

Until Houston is otherwise notified in writing by Jersey Village, the address of Jersey Village is and shall remain as follows:

City of Jersey Village
C/o City Manager
16501 Jersey Dr.
Houston, Texas 77040-1999

All written notices, statements and payments required or permitted to be given under this Contract from one party to the other shall be deemed given by the deposit in a United States Postal Service mailbox or receptacle of certified or registered mail, with proper postage affixed thereto, addressed to the respective other party at the address set forth above or at such other address as the parties respectively shall designate by written notice.

7.09--Authorship.

The parties agree that this Contract shall not be construed in favor of or against either party on the basis that the party did or did not author this Contract.

7.10--Parties in Interest.

This Contract shall be for the sole and exclusive benefit of the parties hereto and shall not be construed to confer any rights upon any third party. Houston shall never be subject to any liability in damages to any customer of Jersey Village for any failure to perform under this Contract.

7.11--Sale of Water Outside Boundaries.

In entering into this Contract the parties contemplate that Jersey Village will sell the Water principally to inhabitants of Jersey Village. Therefore, the parties agree that subject to the quantity

limitations of Section 5.04 Jersey Village may sell Water purchased hereunder outside its boundaries only if such sale is approved in writing by the Utility Official. The Utility Official shall grant any such request if he or she determines that the area is outside Houston's city limits and is not provided water service by Houston. Notwithstanding the foregoing, Houston agrees that Jersey Village may resell water in its extraterritorial jurisdiction as well as to Harris County Municipal Utility Districts Nos. 1, 25, 130 and 168.

7.12--Captions.

The captions appearing at the first of each numbered section in this Contract are inserted and including solely for convenience and shall never be considered or given any effect in construing this Contract, or any provisions hereof, or in connection with the duties, obligations, or liabilities of the respective parties hereto or in ascertaining intent, if any questions of intent should arise.

7.13--Enforcement

The city attorneys, or their designees, for both Houston and Jersey Village shall have the right to enforce all legal rights and obligations under this Contract without further authorization.

7.14--Approvals.

Unless otherwise provided for herein, any consent or approval of the parties shall be made by the governing body of each party.

7.15--Default and Remedies.

Default shall occur only in the event either party fails to adhere to its respective obligations hereunder. In such event, the non-defaulting party shall give the defaulting party written notice describing such default and the proposed date of termination. Such date may not be sooner than the 30th day following receipt of the notice. The non-defaulting party, at its sole option, may extend the proposed date of termination to a later date. If prior to the proposed date of termination the defaulting party cures the default, then the proposed termination shall not occur. If the defaulting party fails to cure such default prior to the proposed date of termination, then the non-defaulting party may terminate its performance under this Contract as of such date. This Section shall not be considered as specifying the exclusive remedy for any default, and all remedies existing at law and in equity are available to either party.

IN WITNESS WHEREOF, the parties hereto have executed this Contract in multiple copies, each of which shall be deemed to be an original, effective on the date of countersignature indicated below.

"HOUSTON"

CITY OF HOUSTON, TEXAS

By: _____
Mayor

ATTEST/SEAL:

_____
City Secretary

APPROVED:

_____
Director, Department of Public Works
and Engineering

APPROVED AS TO FORM:

_____
Sr. Assistant City Attorney
L.D. File No.

COUNTERSIGNED BY:

_____
City Controller

DATE COUNTERSIGNED: June 29, 2000

"JERSEY VILLAGE"

CITY OF JERSEY VILLAGE

By: _____
Mayor

ATTEST/SEAL:

By: Deborah L. Loessin
City Secretary

pay any rates or charges within the time allowed or if the customer fails to comply with the other terms of service applicable to such customer. Upon such termination, the connection shall be permanently closed, locked and disconnected, and the rates and charges shall cease accruing.

(f) *Contract treated water service:*

(1) *Eligibility and Applications.* Any customer or potential customer is eligible for contract treated water service under this subsection if either:

a. Such customer is a municipality or conservation and reclamation district organized under article XVI, section 59 of the Texas Constitution which proposes to resell water purchased from the city to its customers; or

b. A customer that would otherwise be a commercial customer having a minimum water consumption equal to at least one hundred fifty million (150,000,000) gallons per month.

Applications for contract treated water services shall be made or forms prescribed by the director. Each application shall be accompanied by a nonrefundable processing fee equal to fifty dollars ($50.00).

(2) *Contract Requirements.* Upon receipt of a completed application, the director shall secure a written agreement from the applicant, which shall include:

a. The term of the agreement;

b. The minimum monthly quantity of water to be taken by the customer. This minimum for customers other than municipalities or conservation and reclamation districts shall be at least one hundred fifty million (150,000,000) gallons per month.

Any customer shall be permitted to redesignate the minimum monthly quantity no more than once every twelve (12) months;

c. The designation of the point or points of delivery;

d. Rates and charges based on subsection (f);

e. Any special requirements regarding metering or facilities desired by the parties.

No agreement for contract treated water service shall be valid unless approved by the city council.

(3) *Rates and Charges.*

a. For contract treated water customers receiving treated surface water only, the monthly charge shall equal:

$$P \times \$1.13$$

Plus:

$$(P-M) \times [((P/M)-1) \times \$0.33]$$

Where: P is the total water delivery to such customer during the month expressed in units of one thousand (1,000) gallons, except if the minimum monthly amount of water specified in the customer's contract is greater than P, P shall equal M; and
M is the minimum monthly amount of water specified in the customer's contract expressed in units of one thousand (1,000) gallons.

b. For contract treated water customers that do not receive only surface water from the city, the monthly charge shall equal:

$$P \times \$1.26$$

Plus:

$$(P-M) \times [((P/M)-1) \times \$0.32]$$

Where: P is the total water delivery to such customer during the month expressed in units of one thousand (1,000) gallons, except if the minimum monthly amount of water specified in the customer's contract is greater than P, P shall equal M; and
M is the minimum monthly

count of water Specified in the customer's contract expressed in units of one thousand (1,000) gallons.

(In the event a billing period is longer or shorter than thirty (30) days, a daily charge shall be determined using the formula specified above, but "P" defined as to average daily amount of water delivered during the billing period and "M" defined as the monthly minimum divided by thirty (30). Such daily charge shall then be multiplied by the number of days in the billing period.)

(Code 1968, § 49-52; Ord. No. 69-291, § 1, 2-17-69; Ord. No. 71-598, § 1, 3-24-71; Ord. No. 72-622, § 1, 4-18-72; Ord. No. 74-220, § 1, 2-6-74; Ord. No. 75-22, § 1, 1-7-75; Ord. No. 76-1847, § 1, 10-20-76; Ord. No. 77-154, § 1, 1-25-77; Ord. No. 78-631, § 3, 3-29-78; Ord. No. 79-2336, § 1, 12-26-79; Ord. No. 83-19, § 5, 1-11-83; Ord. No. 86-1663, §§ 1—3, 9-17-86; Ord. No. 87-1326, §§ 1—3, 8-5-87; Ord. No. 88-1194, §§ 1, 2, 7-6-88; Ord. No. 89-1048, § 2, 7-5-89; Ord. No. 90-15, §§ 1—3, 1-10-90; Ord. No. 90-635, § 153, 5-23-90; Ord. No. 90-861, §§ 1—9, 7-11-90; Ord. No. 92-113, §§ 1, 2, 2-5-92; Ord. No. 93-314, §§ 1—4, 3-24-93; Ord. No. 94-1268, § 4, 11-22-94)

Sec. 47-62. Reserved.

Editor's note—Former § 47-62, which pertained to water service charges for premises outside the city limits, was repealed by § 4 of Ord. No. 87-1326, enacted Aug. 5, 1987. The repealed provisions derived from § 49-53 of the 1968 Code, as amended by the following:

Ord. No.	Date	Section
71-598	3-24-71	1
72-662	4-18-72	2
74-220	2- 6-74	2, 3
75-22	1- 7-75	2
76-1847	10-20-76	2
77-154	1-25-77	2
78-631	3-29-78	4
79-2336	12-26-79	1
83-19	1-11-83	6
84-933	6-13-84	1
85-1191	7-17-85	1
86-1663	9-17-86	4
87-538	4-21-87	3

Sec. 47-63. Minimum monthly charges generally.

(a) Wherever meters are connected to the city's water distribution system, the minimum monthly charges called for in section 47-61 of this Code shall apply (except as otherwise specifically provided in this chapter), regardless of whether or not any water is actually used or consumed and regardless of whether or not the premises to which connection is made have water service from another source. There more than one (1) meter is used to serve the premises, the total charge for water service shall be computed as if each were connected to separate premises, except a multi-family residential customer that has established an umbrella account shall pay the minimum monthly charge based on the size of its largest meter only.

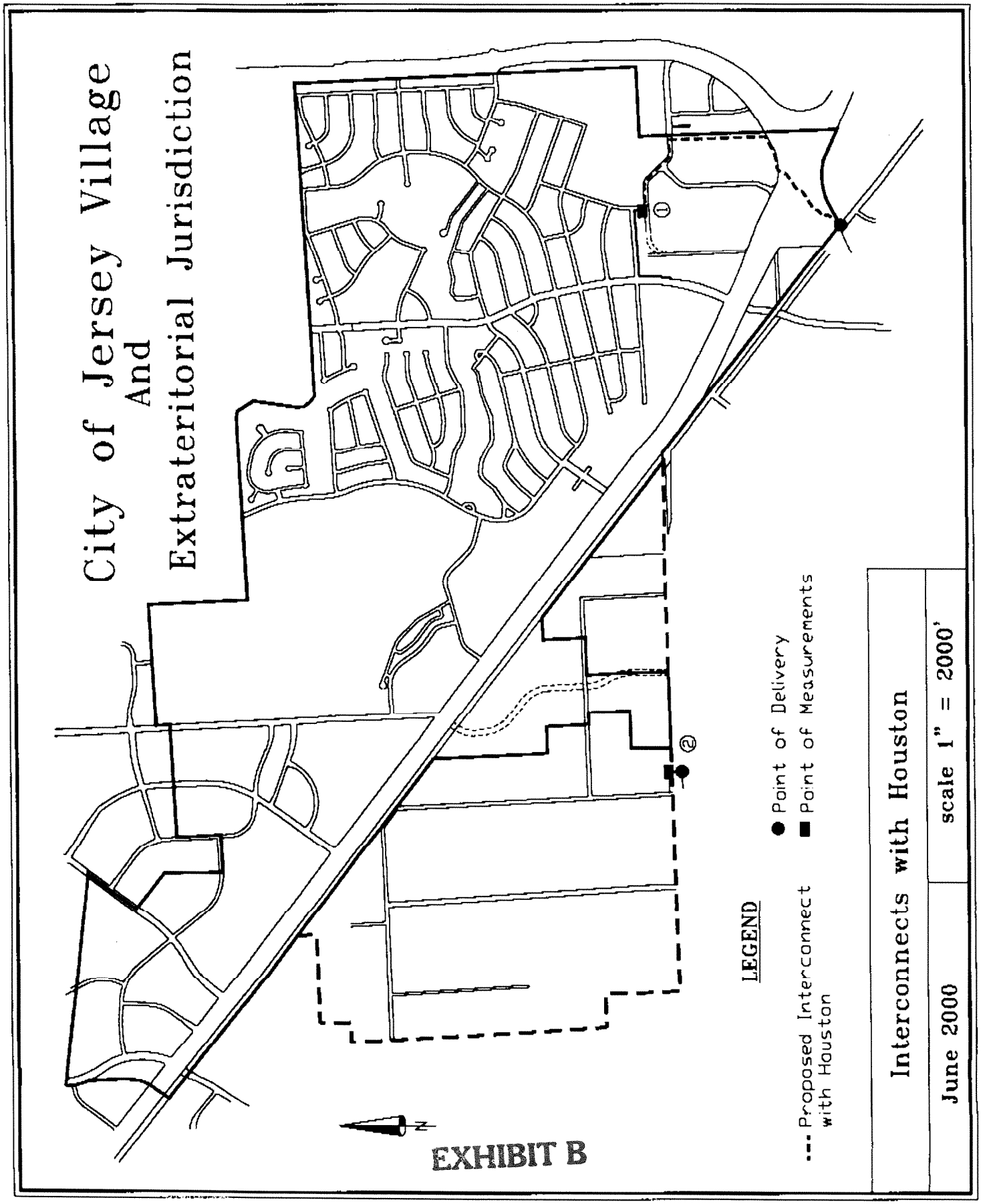
(b) The minimum charges called for in section 47-61 of this Code shall be in addition to and not credited against the charges made for installation of the meter and making connections as provided elsewhere in this Code.

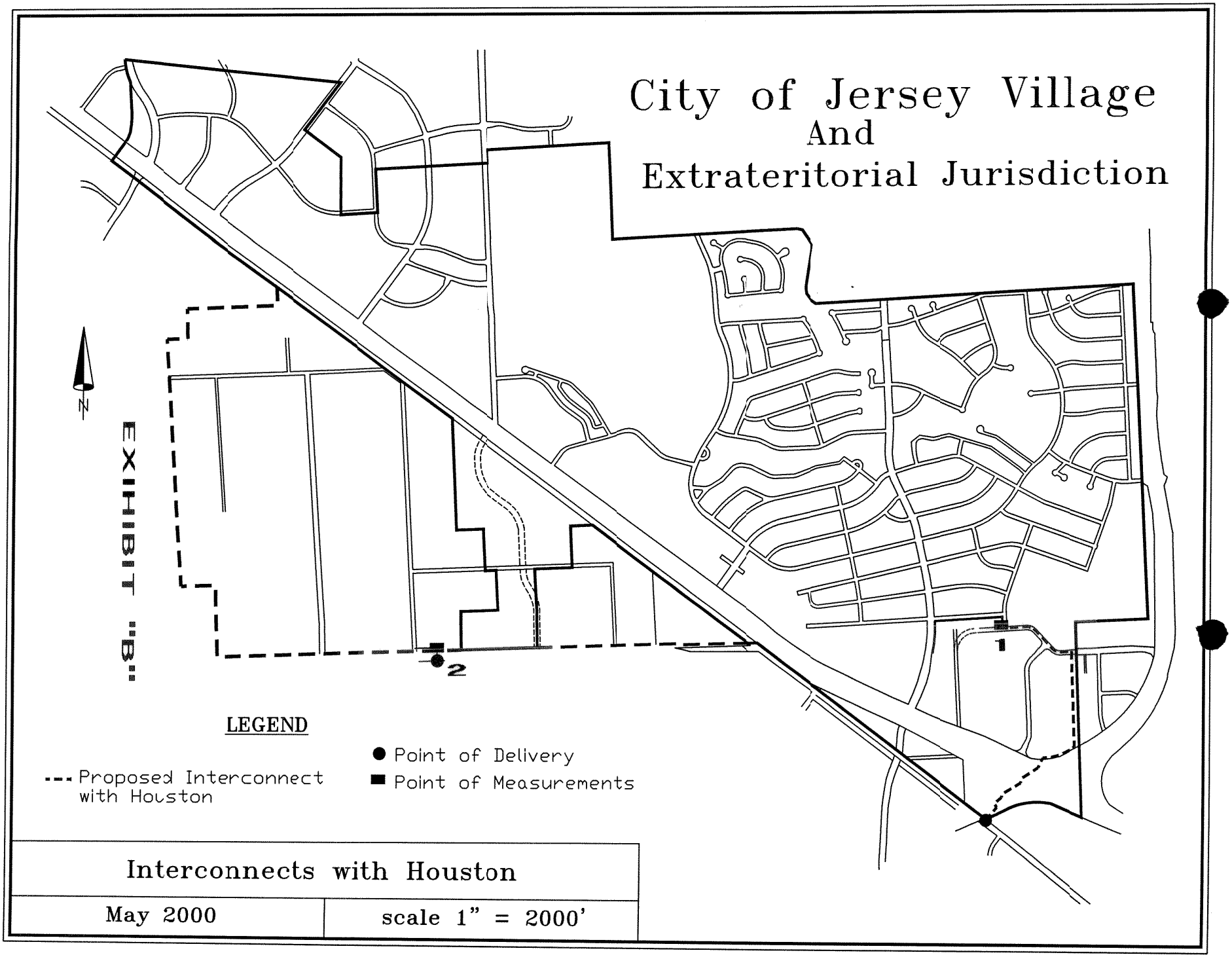
(Code 1968, § 49-54; Ord. No. 76-1847, § 3, 10-20-76; Ord. No. 79-2336, § 1, 12-26-79; Ord. No. 93-314, § 7, 3-24-93)

Sec. 47-64. Minimum charges for unmetered connection for fire sprinkling systems.

(a) Each person with an unmetered connection serving an automatic sprinkling system under the provisions of section 47-4 shall pay the following monthly service charge for the corresponding size of the diameter of the service line connected to the city's water main:

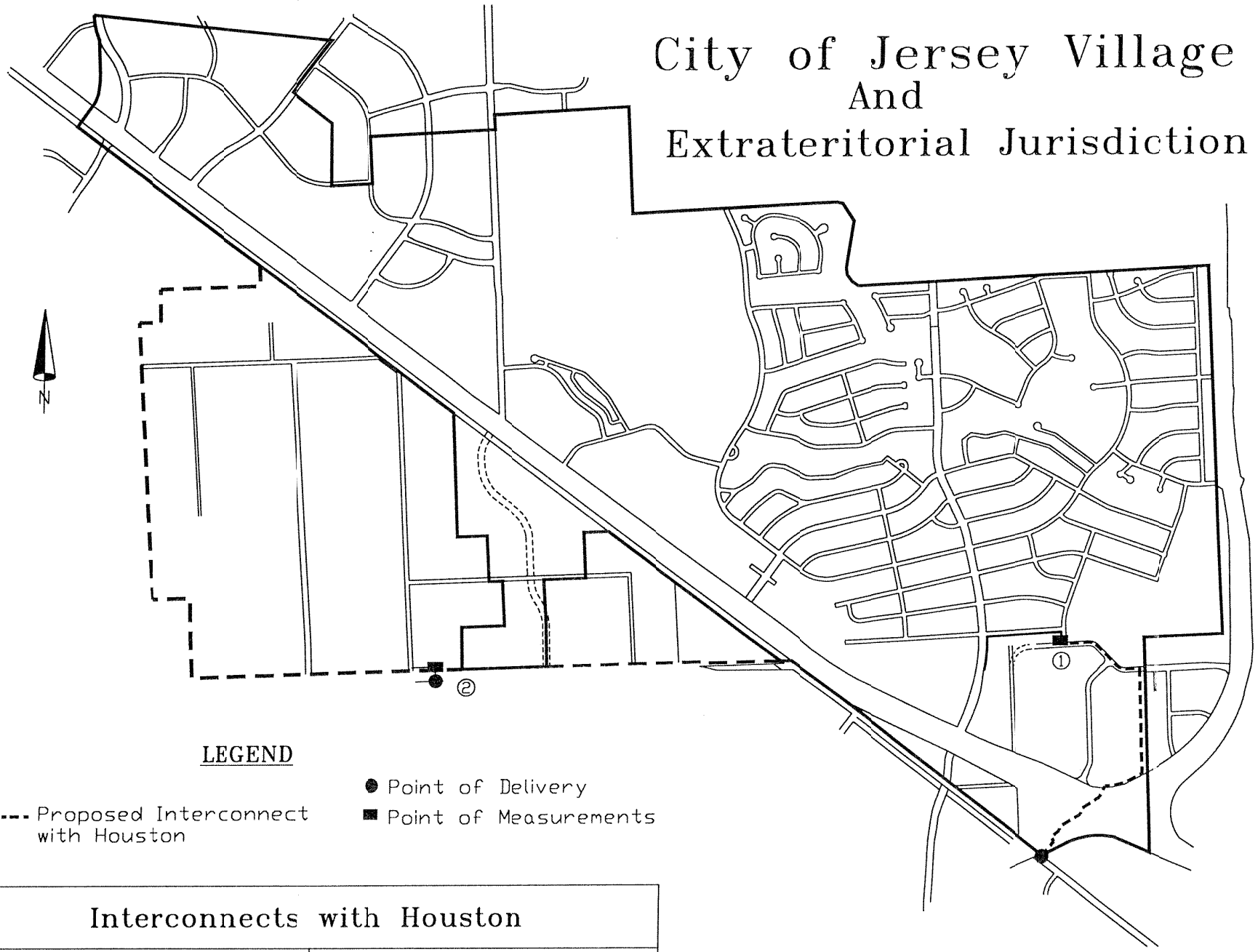
Service Line Diameter (inches)	*Monthly Service Charge*
5/8, 3/4	$ 0.44
1	1.10
1½	2.20
2	3.52
3	7.70
4	13.20
6	27.50
8	39.60


City of Jersey Village
And
Extraterritorial Jurisdiction
LEGEND
Point of Delivery
Point of Measurements
Proposed Interconnect with Houston
Interconnects with Houston
June 2000
scale 1" = 2000'
EXHIBIT B



Interconnects with Houston	
May 2000	scale 1" = 2000'

City of Jersey Village
And
Extrateritorial Jurisdiction



Interconnects with Houston	
June 2000	scale 1" = 2000'

APPENDIX C

EXISTING WATER PLANT CAPACITY ANALYSIS
CITY OF JERSEY VILLAGE
OCTOBER 2024

1. Demand Conditions

Type	Connections	Unit Flowrate		Total Average Daily Flow
SF Residential	2,243	250 gpd/conn		560,800 gpd
MF Residential	1,544	125 gpd/conn		193,000 gpd
Commercial	158	1,500 gpd/conn		237,000 gpd
Industrial	0	1,500 gpd/conn		0 gpd
Mixed Use	0	375 gpd/conn		0 gpd
Irrigation	850	300 gpd/conn		255,000 gpd
Public	66	1,000 gpd/conn		66,000 gpd
Accountability/Losses			16.1%	211,200 gpd
Total	**4,861**			**1,523,000 gpd**

Effective Unit Flowrate Per Connection = 313 gpd/conn

2. Supply Capacity {TAC §290.45(b)(1)(D)(i)}

	Capacity	Flowrate
TCEQ Minimum Required = (0.6 gpm/conn)(4,861 conn) =	2,917 gpm	
Existing Well No. 1 @ Village Water Plant : 1 @ 900 gpm =	900 gpm	
Existing Well No. 1 @ West Water Plant : 1 @ 1,550 gpm =	1,550 gpm	
Surface Water Supply @ Seattle Water Plant : 1,042 gpm =	1,042 gpm	
	3,492 gpm	
(3,492 gpm)(1,440 min/day)/(2.4) =		2,095,000 gpd

3. Total Storage Capacity {TAC §290.45(b)(1)(D)(ii)}

TCEQ Minimum Required = (200 gal/conn)(4,861 conn) =	972,200 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 300,000 gallons =	300,000 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Ground Storage Tank @ Village Water Plant = 1 @ 420,000 gallons =	420,000 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Ground Storage Tank @ West Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	2,470,000 gal

4. Elevated Storage Tank Capacity {TAC §290.45(b)(1)(D)(iv)}

TCEQ Minimum Required = (100 gal/conn)(4,861 conn) =	486,100 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	750,000 gal
Existing Pressure Tank @ Village Water Plant = 1 @ 25,000 gallons =	25,000 gal

5. Booster Pump Capacity {TAC §290.45(b)(1)(D)(iii)}

TCEQ Minimum Required = (2 gpm/conn)(4,861 conn) =	9,722 gpm	
or (1,523,000 gpd)*(2.4*1.25)/(1,440 min/day) =	3,173 gpm	
Existing Pumps @ Seattle Water Plant = 2 @ 1,100 gpm =	2,200 gpm	
Existing Pumps @ Village Water Plant = 1 @ 100 gpm =	100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ Village Water Plant = 1 @ 500 gpm =	500 gpm	
Existing Pumps @ West Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ West Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
	5,050 gpm	
Existing Pumps @ Seattle Water Plant = 1 @ 1,100 gpm =	1,100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
(5,050 gpm)(1,440 min/day)/(1.25)/(2.4) =		2,424,000 gpd
Total Plant Capacity =		**2,095,000 gpd**

NOTES: (Corresponding to the numbered items)

1. Existing connection counts are based on billing data provided by the City for August 2023. Daily flow rates are based on well and surface water meter data provided by the City for September 2020 through August 2023. Projected connection counts are based on the currently undeveloped lots within the City's system being developed, as well as the developments in the City's ETJ where new service is to be installed. A value of 2.4 for the maximum daily demand factor was utilized as established by 30 TAC 290.38 (43) in lieu of 3 years of daily flow data.

2. The values presented for the water wells are based on the 2023 Inspection Report. The flow of 0.6 gpm/conn is referenced from the TCEQ's Chapter 290 criteria.The factor of 2.4 shown in the Quiddity calculations was utilized as the ratio of Maximum Daily Flow (MDF) to Average Daily Flow (ADF). Quiddity's criteria is based on being able to pump the MDF with the well running 24 hrs/day and back calculating the ADF. (24 hr run time)/2.4 = 10 hrs on an average day (600 min). Surface water supply is not included in the supply capacity because no amount of water supply is guaranteed by the City of Houston in the supply contract. Since the City of Houston cannot guarantee a minimum of 0.35 gpm/connection, Jersey Village is required to have a total well capacity of 0.6 gpm/connection.

3. The total storage capacity required by the TCEQ is 200 gpd/conn. Because the GST does not produce any water, it should not be considered in the calculation of the system capacity in terms of flow.

4. Elevated storage tank (EST) capacity must be at least 100 gallons per connection to meet the requirements of 30 TAC 290.45(b). Since the EST capacity is sufficient, the Hydropneumatic tank capacity is not used in calculating the maximum number of connections allowed.

5. The TCEQ's minimum requirement for booster pumps is 2 gpm/conn or the ability to meet Peak Hourly Flow (PHF) with the largest unit at each pump station out of service, whichever is lesser. The pumps and sizes not utilized in the calculation are shown for reference. The PHF is calculated by using the TCEQ's factor of 1.25 for the ratio of PHF to MDF, for systems that meet the EST capacity rules of greater than 100 gpd/connection. Multiplying the PHF by the MDF as defined in Note No. 1 gives us the ratio of PHF to ADF and is equal to 2.4.

PROJECTED 2029 WATER PLANT CAPACITY ANALYSIS
CITY OF JERSEY VILLAGE
OCTOBER 2024

1. Demand Conditions

Type	Connections	Unit Flowrate		Total Average Daily Flow
SF Residential	2,243	250 gpd/conn		560,800 gpd
MF Residential	1,544	125 gpd/conn		193,000 gpd
Commercial	186	1,500 gpd/conn		279,000 gpd
Industrial	51	1,500 gpd/conn		76,500 gpd
Mixed Use	151	375 gpd/conn		56,600 gpd
Irrigation	871	300 gpd/conn		261,300 gpd
Public	69	1,000 gpd/conn		69,000 gpd
Accountability/Losses			16.1%	240,888 gpd
Total	**5,115**			**1,737,088 gpd**

Effective Unit Flowrate Per Connection = 340 gpd/conn

2. Supply Capacity {TAC §290.45(b)(1)(D)(i)}

	Capacity	Flowrate
TCEQ Minimum Required = (0.6 gpm/conn)(5,115 conn) =	3,069 gpm	
Existing Well No. 1 @ Village Water Plant : 1 @ 900 gpm =	900 gpm	
Existing Well No. 1 @ West Water Plant : 1 @ 1,550 gpm =	1,550 gpm	
Surface Water Supply @ Seattle Water Plant : 1,042 gpm =	1,042 gpm	
	3,492 gpm	
(3,492gpm)(1,440 min/day)/(2.4) =		2,095,000 gpd

3. Total Storage Capacity {TAC §290.45(b)(1)(D)(ii)}

TCEQ Minimum Required = (200 gal/conn)(5,115 conn) =	1,023,000 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 300,000 gallons =	300,000 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Ground Storage Tank @ Village Water Plant = 1 @ 420,000 gallons =	420,000 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Ground Storage Tank @ West Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	2,470,000 gal

4. Elevated Storage Tank Capacity {TAC §290.45(b)(1)(D)(iv)}

TCEQ Minimum Required = (100 gal/conn)(5,115 conn) =	511,500 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	750,000 gal
Existing Pressure Tank @ Village Water Plant = 1 @ 25,000 gallons =	25,000 gal

5. Booster Pump Capacity {TAC §290.45(b)(1)(D)(iii)}

TCEQ Minimum Required = (2 gpm/conn)(5,115 conn) =	10,230 gpm	
or (1,737,088 gpd)*(2.4*1.25)/(1,440 min/day) =	3,619 gpm	
Existing Pumps @ Seattle Water Plant = 2 @ 1,100 gpm =	2,200 gpm	
Existing Pumps @ Village Water Plant = 1 @ 100 gpm =	100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ Village Water Plant = 1 @ 500 gpm =	500 gpm	
Existing Pumps @ West Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ West Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
	5,050 gpm	
Existing Pumps @ Seattle Water Plant = 1 @ 1,100 gpm =	1,100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
(5,050 gpm)(1,440 min/day)/(1.25)/(2.4) =		2,424,000 gpd
Total Plant Capacity =		**2,095,000 gpd**

NOTES: (Corresponding to the numbered items)

1. Existing connection counts are based on billing data provided by the City for August 2023. Daily flow rates are based on well and surface water meter data provided by the City for September 2020 through August 2023. Projected connection counts are based on the currently undeveloped lots within the City's system being developed, as well as the developments in the City's ETJ where new service is to be installed. A value of 2.4 for the maximum daily demand factor was utilized as established by 30 TAC 290.38 (43) in lieu of 3 years of daily flow data.

2. The values presented for the water wells are based on the 2023 Inspection Report. The flow of 0.6 gpm/conn is taken from the TCEQ's Chapter 290 criteria. The factor of 2.4 shown in the JC calculations was utilized as the ratio of Maximum Daily Flow (MDF) to Average Daily Flow (ADF). Quiddity's criteria is based on being able to pump the MDF with the well running 24 hrs/day and back calculating the ADF. (24 hr run time)/2.4 = 10 hrs on an average day (600 min). Surface water supply is not included in the supply capacity because no amount of water supply is guaranteed by the City of Houston in the supply contract. Since the City of Houston cannot guarantee a minimum of 0.35 gpm/connection, Jersey Village is required to have a total well capacity of 0.6 gpm/connection. Additionally, a new 1,500 gpm well will be required at Future Water Plant 4.

3. The total storage capacity required by the TCEQ is 200 gpd/conn. Because the GST does not produce any water, it should not be considered in the calculation of the system capacity in terms of flow.

4. Elevated storage tank (EST) capacity must be at least 100 gallons per connection to meet the requirements of 30 TAC 290.45(b). Since the EST capacity is sufficient, the Hydropneumatic tank capacity is not used in calculating the maximum number of connections allowed.

5. The TCEQ's minimum requirement for booster pumps is 2 gpm/conn or the ability to meet Peak Hourly Flow (PHF) with the largest unit at each pump station out of service. The PHF is calculated by using the TCEQ's factor of 1.25 for the ratio of PHF to MDF, for systems that meet the EST capacity rules of greater than 100 gpd/connection. Multiplying the PHF by the MDF as defined in Note No. 1 gives us the ratio of PHF to ADF and is equal to 2.4.

PROJECTED 2034 WATER PLANT CAPACITY ANALYSIS
CITY OF JERSEY VILLAGE
OCTOBER 2024

1. Demand Conditions

Type	Connections	Unit Flowrate		Total Average Daily Flow
SF Residential	2,273	250 gpd/conn		568,300 gpd
MF Residential	2,152	125 gpd/conn		269,000 gpd
Commercial	242	1,500 gpd/conn		363,000 gpd
Industrial	256	1,500 gpd/conn		384,000 gpd
Mixed Use	251	375 gpd/conn		94,100 gpd
Irrigation	871	300 gpd/conn		261,300 gpd
Public	70	1,000 gpd/conn		70,000 gpd
Accountability/Losses			16.1%	323,562 gpd
Total	**6,115**			**2,333,262 gpd**

Effective Unit Flowrate Per Connection = 382 gpd/conn

2. Supply Capacity {TAC §290.45(b)(1)(D)(i)}

	Capacity	Flowrate
TCEQ Minimum Required = (0.6 gpm/conn)(6,115 conn) =	3,669 gpm	
Existing Well No. 1 @ Village Water Plant : 1 @ 900 gpm =	900 gpm	
Existing Well No. 1 @ West Water Plant : 1 @ 1,550 gpm =	1,550 gpm	
Surface Water Supply @ Seattle Water Plant : 1,042 gpm =	1,042 gpm	
New Surface Water Supply @ Future Water Plant 4: 1 @ 1,500 gpm =	**1,500 gpm**	
	4,992 gpm	
(4,992 gpm)(1,440 min/day)/(2.4) =		2,995,000 gpd

3. Total Storage Capacity {TAC §290.45(b)(1)(D)(ii)}

TCEQ Minimum Required = (200 gal/conn)(6,115 conn) =	1,223,000 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 300,000 gallons =	300,000 gal
Existing Ground Storage Tank @ Seattle Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Ground Storage Tank @ Village Water Plant = 1 @ 420,000 gallons =	420,000 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Ground Storage Tank @ West Water Plant = 1 @ 500,000 gallons =	500,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	2,470,000 gal

4. Elevated Storage Tank Capacity {TAC §290.45(b)(1)(D)(iv)}

TCEQ Minimum Required = (100 gal/conn)(6,115 conn) =	611,500 gal
Existing Elevated Storage Tank @ Village Water Plant = 1 @ 250,000 gallons =	250,000 gal
Existing Elevated Storage Tank @ Congo Ln = 1 @ 500,000 gallons =	500,000 gal
	750,000 gal
Existing Pressure Tank @ Village Water Plant = 1 @ 25,000 gallons =	25,000 gal

5. Booster Pump Capacity {TAC §290.45(b)(1)(D)(iii)}

TCEQ Minimum Required = (2 gpm/conn)(6,115 conn) =	12,230 gpm	
or (2,333,262 gpd)*(2.4*1.25)/(1,440 min/day) =	4,861 gpm	
Existing Pumps @ Seattle Water Plant = 2 @ 1,100 gpm =	2,200 gpm	
Existing Pumps @ Village Water Plant = 1 @ 100 gpm =	100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ Village Water Plant = 1 @ 500 gpm =	500 gpm	
Existing Pumps @ West Water Plant = 1 @ 250 gpm =	250 gpm	
Existing Pumps @ West Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
New Pump @ Future Water Plant 4 = 1 @ 600 gpm =	600 gpm	
New Pumps @ Future Water Plant 4 = 2 @ 600 gpm =	1,200 gpm	
	6,850 gpm	
Existing Pumps @ Seattle Water Plant = 1 @ 1,100 gpm =	1,100 gpm	
Existing Pumps @ Village Water Plant = 1 @ 750 gpm =	750 gpm	
Existing Pumps @ West Water Plant = 1 @ 1,000 gpm =	1,000 gpm	
New Pump @ Future Water Plant 4 = 1 @ 600 gpm =	600 gpm	
(6,850 gpm)(1,440 min/day)/(1.25)/(2.4) =		3,288,000 gpd
	Total Plant Capacity =	**2,995,000 gpd**

NOTES: (Corresponding to the numbered items)

1. Existing connection counts are based on billing data provided by the City for August 2023. Daily flow rates are based on well and surface water meter data provided by the City for September 2020 through August 2023. Projected connection counts are based on the currently undeveloped lots within the City's system being developed, as well as the developments in the City's ETJ where new service is to be installed. A value of 2.4 for the maximum daily demand factor was utilized as established by 30 TAC 290.38 (43) in lieu of 3 years of daily flow data.

2. The values presented for the water wells are based on the 2020 JC Impact Fee Study.The flow of 0.6 gpm/conn is taken from the TCEQ's Chapter 290 criteria. The factor of 2.4 shown in the JC calculations was utilized as the ratio of Maximum Daily Flow (MDF) to Average Daily Flow (ADF). Quiddity's criteria is based on being able to pump the MDF with the well running 24 hrs/day and back calculating the ADF. (24 hr run time)/2.4 = 10 hrs on an average day (600 min). Surface water supply is not included in the supply capacity because no amount of water supply is guaranteed by the City of Houston in the supply contract. Since the City of Houston cannot guarantee a minimum of 0.35 gpm/connection, Jersey Village is required to have a total well capacity of 0.6 gpm/connection.

3. The total storage capacity required by the TCEQ is 200 gpd/conn. Because the GST does not produce any water, it should not be considered in the calculation of the system capacity in terms of flow.

4. Elevated storage tank (EST) capacity must be at least 100 gallons per connection to meet the requirements of 30 TAC 290.45(b). Since the EST capacity is sufficient, the Hydropneumatic tank capacity is not used in calculating the maximum number of connections allowed.

5. The TCEQ's minimum requirement for booster pumps is 2 gpm/conn or the ability to meet Peak Hourly Flow (PHF) with the largest unit at each pump station out of service. The PHF is calculated by using the TCEQ's factor of 1.25 for the ratio of PHF to MDF, for systems that meet the EST capacity rules of greater than 100 gpd/connection. Multiplying the PHF by the MDF as defined in Note No. 1 gives us the ratio of PHF to ADF and is equal to 3.0. To meet pumping requirements with the largest pump out of service, a total of four new 600 gpm pumps are required at Future Water Plant 4.

APPENDIX D

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
CITY OF HOUSTON INTERCONNECT No. 2
CAPITAL IMPROVEMENTS PROJECT No. W-15
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of a second interconnect with the City of Houston at the Water Facility No. 4 via 12-inch waterline within ROW along Fairview Street and Taylor Road to serve the projected development. Easement aquisition is included.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 62,000	$ 62,000	
2.	12" Waterline Extension	L.F.	5,000	$ 130	$ 650,000	
3.	City of Houston Interconnect No. 2 Plant Piping and 12" Meter Station	L.S.	1	$ 300,000	$ 300,000	(2)
4.	Trench Safety Systems	L.F.	5,000	$ 2	$ 10,000	
5.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
6.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
7.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
8.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
9.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 1,237,000	(3)
				Contingencies (20%)	$ 247,000	
				7 Yr Inflation @ 3.5%/Yr	$ 404,000	
				Land Acquisition	$ 90,000	
				Engineering & Testing	$ 340,000	
				TOTAL	**$ 2,318,000**	(4)

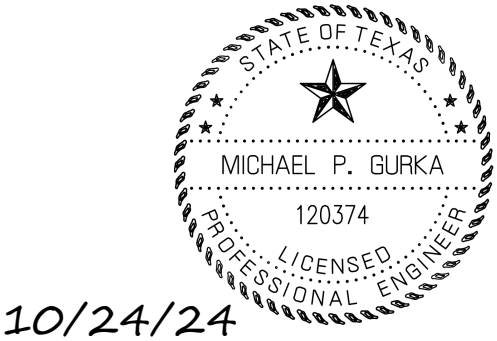
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate assumes the City of Houston will provide water service from the ground water facility and repump station located at 7180 Fairview St.

(3) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



10/24/24

Michael P Gurka

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
FM 529 8-INCH & 12-INCH WATER LINE FROM HWY 290 TO JONES RD - SERVICE IN ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-16
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of a 12-inch waterline along FM 529 from Jones Road to Charles Road, an 8-inch water line from FM 529 along Charles Road to Jones and a 12-inch waterline from Charles Road to Highway 290, including the crossing of Highway 290 to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 85,000	$ 85,000	
2.	8" Waterline	L.F.	2,800	$ 90	$ 252,000	
3.	12" Waterline	L.F.	4,000	$ 130	$ 520,000	
4.	12" Waterline with 24-inch Steel Casing for Highway Crossing	L.F.	500	$ 750	$ 375,000	
5.	Fire Hydrants	EA.	20	$ 5,000	$ 100,000	
6.	8" Gate Valves	EA.	4	$ 3,000	$ 12,000	
7.	12" Gate Valves	EA.	5	$ 4,000	$ 20,000	
8.	Air Release Valve in Manhole	EA.	1	$ 12,000	$ 12,000	
9.	Trench Safety Systems	L.F.	6,800	$ 2	$ 14,000	
10.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
11.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
12.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
13.	Pavement Replacement	S.Y.	1,000	$ 100	$ 100,000	
14.	Site Restoration	L.S.	1	$ 125,000	$ 125,000	
			Engineering		$ 1,680,000	(2)
				Contingencies (20%)	$ 336,000	
				5 Yr Inflation @ 3.5%/Yr	$ 378,000	
				Engineering & Testing	$ 431,000	(3)
				TOTAL	**$ 2,825,000**	(4)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may

(3) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
CHARLES ROAD 8-INCH & WRIGHT ROAD 12-INCH WATER LINE LOOP - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-17
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of an 8-inch waterline from Jones Road west along Charles Road to Wright Road and a 12-inch waterline south along Wright Road and east along FM 529 connection to the existing 12-inch waterline to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 51,000	$ 51,000	
2.	8" Waterline	L.F.	2,000	$ 90	$ 180,000	
3.	12" Waterline	L.F.	3,500	$ 130	$ 455,000	
4.	Fire Hydrants	EA.	17	$ 5,000	$ 85,000	
5.	8" Gate Valves	EA.	2	$ 3,000	$ 6,000	
6.	12" Gate Valves	EA.	5	$ 4,000	$ 20,000	
7.	Trench Safety Systems	L.F.	5,500	$ 2	$ 11,000	
8.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
9.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
10.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
11.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
12.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 1,023,000	(2)
				Contingencies (20%)	$ 205,000	
				5 Yr Inflation @ 3.5%/Yr	$ 230,000	
				Engineering & Testing	$ 262,000	(3)
				TOTAL	**$ 1,720,000**	(4)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
WRIGHT ROAD 12-INCH WATER LINE FROM CHARLES ROAD TO HWY 290 - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-18
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of an 12-inch waterline along Wright Road from Charles Road to Hwy 290 and along Hwy 290 from Wright Road to Jones Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 51,000	$ 51,000	
2.	12" Waterline	L.F.	5,000	$ 130	$ 650,000	
3.	Fire Hydrants	EA.	15	$ 5,000	$ 75,000	
4.	12" Gate Valves	EA.	6	$ 4,000	$ 24,000	
5.	Trench Safety Systems	L.F.	5,000	$ 2	$ 10,000	
6.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
7.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
8.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
9.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
10.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 1,025,000	(2)
				Contingencies (20%)	$ 205,000	
				5 Yr Inflation @ 3.5%/Yr	$ 231,000	
				Engineering	$ 263,000	(3)
				TOTAL	**$ 1,724,000**	(4)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
FAIRVIEW STREET 12-INCH WATER LINE FROM FM 529 TO TAYLOR ROAD - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-19
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of 8-inch and 12-inch waterlines along Fairview Street from FM 529 to Taylor Road, along FM 529 from Fairview Road to Wright Road and along Taylor Road and Hwy 290 from Fairview Road to Wright Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 106,000	$ 106,000	
2.	8" Waterline	L.F.	4,200	$ 90	$ 378,000	
3.	12" Waterline	L.F.	8,200	$ 130	$ 1,066,000	
4.	Fire Hydrants	EA.	41	$ 5,000	$ 205,000	
5.	8" Gate Valves	EA.	6	$ 3,000	$ 18,000	
6.	12" Gate Valves	EA.	10	$ 4,000	$ 40,000	
7.	Trench Safety Systems	L.F.	12,400	$ 2	$ 25,000	
8.	Traffic Control Plan	L.S.	1	$ 30,000	$ 30,000	
9.	Dewatering/Well Pointing	L.S.	1	$ 20,000	$ 20,000	
10.	Storm Water Pollution Prevention	L.S.	1	$ 30,000	$ 30,000	
11.	Pavement Replacement	S.Y.	750	$ 100	$ 75,000	
12.	Site Restoration	L.S.	1	$ 125,000	$ 125,000	
			SUBTOTAL		$ 2,118,000	(2)
				Contingencies (20%)	$ 424,000	
				10 Yr Inflation @ 3.5%/Yr	$ 1,044,000	
				Land Acquisition	$ 890,000	(3)
				Engineering & Testing	$ 645,000	
				TOTAL	**$ 5,121,000**	(4)

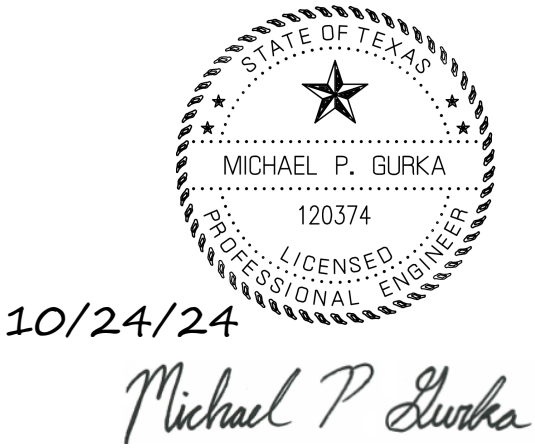
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5%

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
HARMS ROAD 12-INCH WATER LINE FROM FM 529 TO TAYLOR ROAD - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-20
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of an 12-inch waterline along Harms Road from FM 529 to Taylor Road, along FM 529 from Harms Road to Fairview Road and along Taylor Road from Harms Road to Fairview Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 78,000	$ 78,000	
2.	12" Waterline	L.F.	8,100	$ 130	$ 1,053,000	
3.	Fire Hydrants	EA.	24	$ 5,000	$ 120,000	
4.	12" Gate Valves	EA.	10	$ 4,000	$ 40,000	
5.	Trench Safety Systems	L.F.	8,100	$ 2	$ 16,000	
6.	Traffic Control Plan	L.S.	1	$ 30,000	$ 30,000	
7.	Dewatering/Well Pointing	L.S.	1	$ 20,000	$ 20,000	
8.	Storm Water Pollution Prevention	L.S.	1	$ 30,000	$ 30,000	
9.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
10.	Site Restoration	L.S.	1	$ 125,000	$ 125,000	
			SUBTOTAL		$ 1,562,000	(2)
				Contingencies (20%)	$ 312,000	
				10 Yr Inflation @ 3.5%/Yr	$ 769,000	
				Engineering	$ 476,000	(3)
				TOTAL	**$ 3,119,000**	(4)

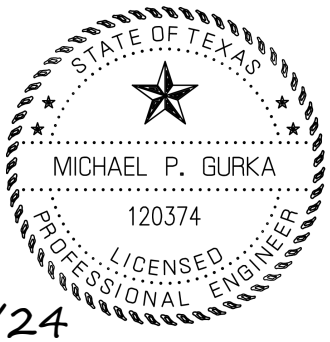
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



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Michael P Gurka

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
MUSGROVE LANE 8-INCH & 12-INCH WATER LINE
FROM TAYLOR ROAD TO JONES ROAD ALONG HWY 290
CAPITAL IMPROVEMENTS PROJECT No. W-21
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of an 8-inch waterline along Musgrove Lane and east to Hwy 290 and a 12-inch waterline along Hwy 290 to Taylor Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 27,000	$ 27,000	
2.	12" Waterline	L.F.	1,100	$ 130	$ 143,000	
3.	8" Waterline	L.F.	1,500	$ 90	$ 135,000	
4.	Fire Hydrants	EA.	8	$ 5,000	$ 40,000	
5.	12" Gate Valves	EA.	2	$ 4,000	$ 8,000	
6.	8" Gate Valves	EA.	2	$ 3,000	$ 6,000	
7.	Trench Safety Systems	L.F.	2,600	$ 2	$ 5,000	
8.	Traffic Control Plan	L.S.	1	$ 20,000	$ 20,000	
9.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
10.	Storm Water Pollution Prevention	L.S.	1	$ 20,000	$ 20,000	
11.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
12.	Site Restoration	L.S.	1	$ 75,000	$ 75,000	
				SUBTOTAL	$ 544,000	(2)
				Engineering		
				Contingencies (20%)	$ 109,000	
				10 Yr Inflation @ 3.5%/Yr	$ 268,000	
				Land Acquisition	$ 330,000	(3)
				Engineering & Testing	$ 166,000	
				TOTAL	**$ 1,417,000**	(4)

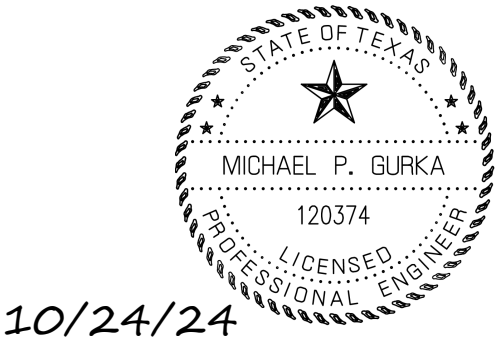
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall

(3) Cost assumes 20-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
TAYLOR ROAD 8-INCH & 12-INCH WATER LINE EXTENSION FROM HWY 290 TO ETJ -SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. W-22
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of design and construction of a 12-inch and 8-inch waterline along Taylor Road to the west of Harms Road to serve the projected development. All utilities are anticipated within the public right-of-way with no easements.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 14,000	$ 14,000	
2.	12" Waterline	L.F.	200	$ 130	$ 26,000	
3.	8" Waterline	L.F.	800	$ 90	$ 72,000	
4.	Fire Hydrants	EA.	4	$ 5,000	$ 20,000	
5.	12" Gate Valves	EA.	1	$ 4,000	$ 4,000	
6.	8" Gate Valves	EA.	1	$ 3,000	$ 3,000	
7.	Trench Safety Systems	L.F.	1,000	$ 2	$ 2,000	
8.	Traffic Control Plan	L.S.	1	$ 15,000	$ 15,000	
9.	Dewatering/Well Pointing	L.S.	1	$ 10,000	$ 10,000	
10.	Storm Water Pollution Prevention	L.S.	1	$ 15,000	$ 15,000	
11.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
12.	Site Restoration	L.S.	1	$ 50,000	$ 50,000	
			SUBTOTAL		$ 281,000	(2)
				Contingencies (20%)	$ 56,000	
				10 Yr Inflation @ 3.5%/Yr	$ 138,000	
				Land Acquisition	$ 200,000	(3)
				Engineering & Testing	$ 86,000	(4)
				TOTAL	**$ 761,000**	(5)

Notes:

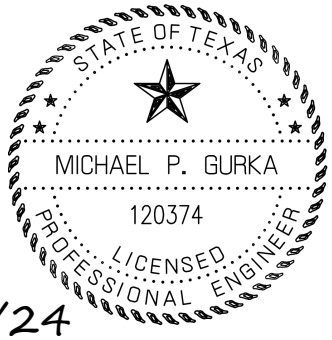
(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall

(4) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(5) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



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Michael P Gurka

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
PROPOSED WATER FACILITY No. 4 - Phase 1
CAPITAL IMPROVEMENTS PROJECT No. W-23
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of construction of a 0.5 MG ground storage tank, 3-600 GPM booster pumps, all related piping, foundations, electrical controls, instrumentation, site work and all additional items needed for completely functional water plant.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 130,000	$ 130,000	
2.	One (1) 500,000 gallon Bolted Steel Ground Storage Tank	L.S.	1	$ 625,000	$ 625,000	
3.	Three (3) 600 GPM Booster Pumps & Concrete Pad	L.S.	1	$ 250,000	$ 250,000	
4.	Electrical Control & Chemical Building	L.S.	1	$ 650,000	$ 650,000	
5.	Plant Piping, Valves, Fittings, Thrust Blocks and Pipe Supports Including Protective Coatings	L.S.	1	$ 475,000	$ 475,000	
6.	Site Work (Including Fencing, Gate, Restoration)	L.S.	1	$ 325,000	$ 325,000	
7.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
8.	Power Extension & Service Meter	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 2,580,000	(2)
				Contingencies (20%)	$ 516,000	(3)
				5 Yr Inflation @ 3.5%/Yr	$ 581,000	
				Engineering & Testing	$ 662,000	(4)
				TOTAL	**$ 4,339,000**	(5)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This cost estimate assumes the water plant site is not located within the 1% annual chance floodplain or within existing wetlands. This estimate does not include any costs for wetland mitigation, detention basins, mitigation basins, or any other work related to compensating for wetlands or floodplain impact. This estimate assumes the property currently owned by the City of Jersey Village can be utilized to support the water plant facilities. The estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way; platting; or aesthetic upgrades.

STATE OF TEXAS
BRYCE C. BRADY
149348
LICENSED PROFESSIONAL ENGINEER
10/25/2024

(3) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(4) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(5) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
PROPOSED WATER FACILITY No. 4 - Phase 2
CAPITAL IMPROVEMENTS PROJECT No. W-24
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project will consist of construction of a 0.5 MG ground storage tank, permanent generator, pressure sustaining valve, all related piping, foundations, electrical controls, instrumentation, site work and all additional items needed to expand Water Plant No. 4.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 75,000	$ 75,000	
2.	One (1) 500,000 gallon Bolted Steel Ground Storage Tank	L.S.	1	$ 625,000	$ 625,000	
3.	One (1) Standby Diesel Generator with Fuel Tank	L.S.	1	$ 200,000	$ 200,000	
4.	Electrical Control & Chemical Building	L.S.	1	$ 100,000	$ 100,000	
5.	Plant Piping, Valves, Fittings, Thrust Blocks and Pipe Supports Including Protective Coatings	L.S.	1	$ 125,000	$ 125,000	
6.	Site Work (Including Fencing, Gate, Restoration)	L.S.	1	$ 15,000	$ 15,000	
7.	Storm Water Pollution Prevention	L.S.	1	$ 10,000	$ 10,000	
			SUBTOTAL		$ 1,150,000	(2)
				Contingencies (20%)	$ 230,000	(3)
				9 Yr Inflation @ 3.5%/Yr	$ 501,000	
				Engineering & Testing	$ 339,000	(4)
				TOTAL	**$ 2,220,000**	(5)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This cost estimate assumes the water plant site is not located within the 1% annual chance floodplain or within existing wetlands. This estimate does not include any costs for wetland mitigation, detention basins, mitigation basins, or any other work related to compensating for wetlands or floodplain impact. This estimate assumes the property currently owned by the City of Jersey Village can be utilized to support the water plant facilities. The estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way; platting; or aesthetic upgrades.

STATE OF TEXAS
BRYCE C. BRADY
149348
LICENSED PROFESSIONAL ENGINEER
10/25/2024

(3) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(4) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way.

(5) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

APPENDIX E

APPENDIX E

WATER PLANT FACILITIES
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Seattle St. Water Plant (No. 1)													
Ground Storage Tank No. 1 (300,000 gal - Welded Steel)(54'Ø x 17' H)	Unknown												
Recoating (Interior)		2020	12									$ 60,000	
Recoating (Exterior)		2020	12									$ 55,000	
Replacement			40										
Miscellaneous Repair Items			-									$ 30,000	
Ground Storage Tank No. 2 (500,000 gal - Welded Steel)(74'Ø x 17' H)	2001												
Recoating (Interior)			12	$ 80,000									
Recoating (Exterior)		Unknown	12	$ 75,000									
Replacement			40										
Miscellaneous Repair Items				$ 20,000									
Water Well No. 1 - ABANDONED													
Booster Pump No. 1 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump No. 2 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump No. 3 (1,100 gpm)	2023												
Recoat		2023	12										
Repair		2023	7							$ 8,000			
Replacement		2023	15										
Booster Pump Piping													
Recoat			12		$ 10,000								
Replace			35										
Supply Water Metering Station	2000												
Recoat Piping			15		$ 25,000								
Sump Pump			15		$ 15,000								
Piping Replacement			40										
Magnetic Meter Replacement			25										
Control Building	Unknown												
Miscellaneous Repair Items													
Replace MCC			30				$ 1,000,000						
Phosphate Storage Tank			15										
Phosphate Metering Pump (x1)			15										
Replace Building			50				$ 550,000						
Site SCADA													
Chlorine Room	Unknown												
Miscellaneous Repair Items													
Equipment Replacement			15				$ 50,000						
LAS Room													
LAS Storage Tank			15										
Metering Pumps (x1)			15										
Miscellaneous Repair Items													
Generator (230 KW)	2016												
Miscellaneous Repair Items													
Replacement			25										
Site Work													
Yard Piping Replacement													
Miscellaneous Repair Items													
		SEATTLE WATER PLANT TOTAL:		**$ 175,000**	**$ 50,000**	**$ -**	**$ 1,600,000**	**$ -**	**$ -**	**$ 24,000**	**$ -**	**$ 145,000**	**$ -**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 175,000	$ 50,000	$ -	$ 1,600,000	$ -	$ -	$ 24,000	$ -	$ 145,000	$ -
Contingencies (20%)	$ 35,000	$ 10,000	$ -	$ 320,000	$ -	$ -	$ 5,000	$ -	$ 29,000	$ -
Inflation (4% Per Year)	$ 17,000	$ 7,000	$ -	$ 416,000	$ -	$ -	$ 11,000	$ -	$ 84,000	$ -
Engineering	$ 45,000	$ -	$ -	$ 467,000	$ -	$ -	$ -	$ -	$ 52,000	$ -
TOTAL PROJECT COST	$ 272,000	$ 67,000	$ -	$ 2,803,000	$ -	$ -	$ 40,000	$ -	$ 310,000	$ -

Village Dr. Water Plant (No. 2)	1978												
Water Well (1,500 GPM)	1978												
Rework		Unknown	15										
Replacement			50										$ 2,000,000
Ground Storage Tank No. 1 (440,000 gal, Bolted Steel)(55'Ø x 24' H)	1979												
Recoating (Interior)		2020	12										
Recoating (Exterior)		2020	12										
Replacement			40									$ 660,000	
Miscellaneous Repair Items													
Elevated Storage Tank (250,000 gal)	1979												
Recoating (Interior)		2021	15										
Recoating (Exterior)		2021	15										
Replacement			50										
Miscellaneous Repair Items								$ 8,000					
Booster Pumps No. 1 (750 gpm)	1979												
Recoat			12		$ 1,000								
Repair			7		$ 8,000								
Replacement			15										$ 20,000
Booster Pumps No. 2 (100 gpm)	1979												
Recoat			12			$ 1,000							
Repair			7			$ 8,000							
Replacement			15										
Booster Pumps No. 3 (250 gpm)	1979												
Recoat			12				$ 1,000						
Repair			7				$ 8,000						
Replacement			15										
Booster Pumps No. 4 (500 gpm)	1979												
Recoat			12	$ 1,000									
Repair			7	$ 8,000									
Replacement			15									$ 20,000	
Booster Pump Piping													
Recoat			12		$ 10,000								
Replace			35										
Control Building	1979												
Replace MCC	1979		30		$ 750,000								
Phosphate Storage Tank			15										
Phosphate Metering Pump (x1)			15										
Miscellaneous Repair Items													
Replace Building			50										
Site SCADA													
Chlorine Room	1979												
Chlorination Equipment			15		$ 25,000								
Miscellaneous Repair Items													
LAS Building	Unknown												
LAS Storage Tank			15										
Peristaltic Pumps (x2)			15										
Miscellaneous Repair Items													
Generator	2022												
Replace Generator			25	$ 275,000									
Recoat Fuel Tank and Panel Replacements			12										
Site Work													
Miscellaneous Repair Items					$ 8,000						$ 8,000		
		VILLAGE WATER PLANT TOTAL:		**$ 284,000**	**$ 802,000**	**$ 9,000**	**$ 9,000**	**$ 8,000**	**$ -**	**$ -**	**$ 8,000**	**$ 680,000**	**$ 2,020,000**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 284,000	$ 802,000	$ 9,000	$ 9,000	$ 8,000	$ -	$ -	$ 8,000	$ 680,000	$ 2,020,000
Contingencies (20%)	$ 57,000	$ 160,000	$ 2,000	$ 2,000	$ 2,000	$ -	$ -	$ 2,000	$ 136,000	$ 404,000
Inflation (4% Per Year)	$ 28,000	$ 120,000	$ 2,000	$ 2,000	$ 3,000	$ -	$ -	$ 4,000	$ 392,000	$ 1,308,000
Engineering	$ -	$ 216,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 242,000	$ 746,000
TOTAL PROJECT COST	$ 369,000	$ 1,298,000	$ 13,000	$ 13,000	$ 13,000	$ -	$ -	$ 14,000	$ 1,450,000	$ 4,478,000

West Rd Water Plant (No. 3)	1984												
Water Well No. 3 (1,500 GPM)	1984												
Rework		Unknown	15										
Replacement			50										$ 2,000,000
Ground Storage Tank No. 1 (500,000 gal, Welded Steel)(53'Ø X 'H)	1984												
Recoating (Interior)		Unknown	12	$ 80,000									
Recoating (Exterior)		Unknown	12	$ 75,000									
Replacement			40									$ 750,000	
Miscellaneous Repair Items			-	$ 20,000									
Hydropneumatic Tank No. 1 (25,000 gal)(10'Ø x 42' L) (NOT ASME)	1984												
Recoating (Interior)		Unknown	12	$ 20,000									
Recoating (Exterior)		Unknown	12	$ 20,000									
Replacement			35									$ 160,000	
Miscellaneous Repair Items													
Booster Pumps No. 1 (100 gpm)	1984												
Recoat			12			$ 500							
Repair			7			$ 6,000							
Replacement			15										
Booster Pumps No. 2 (750 gpm)													
Recoat	1984		12	$ 1,000									
Repair			7	$ 8,000									
Replacement			15									$ 20,000	
Booster Pumps No. 3 (1000 gpm)	1984												
Recoat			12		$ 1,000								
Repair			7		$ 8,000								
Replacement			15										$ 20,000
Booster Pumps No. 4 (1000 gpm)	1984												
Recoat			12				$ 1,000						
Repair			7				$ 8,000						
Replacement			15										
Booster Pump Piping													
Recoat			12	$ 20,000									
Replace			35										
Control Building	1984												
Air Compressor			15										
Replace MCC	1984		30			$ 800,000							
Miscellaneous Repair Items						$ 20,000							
Replace Building			50										
Site SCADA													
Chlorine Room	1984												
Chlorination Equipment			15			$ 25,000							
Miscellaneous Repair Items													
LAS Building	Unknown												
LAS Storage Tank			15										
Peristaltic Pumps (x2)			15										
Miscellaneous Repair Items													
Generator	Unknown												
Replace Generator			25										
Recoat Fuel Tank and Panel Replacements			12										
Site Work	Unknown												
Miscellaneous Repair Items					$ 8,000						$ 8,000		
		WEST WATER PLANT TOTAL:		**$ 244,000**	**$ 17,000**	**$ 851,500**	**$ 9,000**	**$ -**	**$ -**	**$ -**	**$ 8,000**	**$ 930,000**	**$ 2,020,000**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 244,000	$ 17,000	$ 851,500	$ 9,000	$ -	$ -	$ -	$ 8,000	$ 930,000	$ 2,020,000
Contingencies (20%)	$ 49,000	$ 3,000	$ 170,000	$ 2,000	$ -	$ -	$ -	$ 2,000	$ 186,000	$ 404,000
Inflation (4% Per Year)	$ 24,000	$ 2,000	$ 174,000	$ 2,000	$ -	$ -	$ -	$ 4,000	$ 536,000	$ 1,308,000
Engineering	$ 63,000	$ -	$ 239,000	$ -	$ -	$ -	$ -	$ -	$ 330,000	$ 746,000
TOTAL PROJECT COST	$ 380,000	$ 22,000	$ 1,434,500	$ 13,000	$ -	$ -	$ -	$ 14,000	$ 1,982,000	$ 4,478,000

STATE OF TEXAS
K. GRADY TURNER, III
117234
LICENSED PROFESSIONAL ENGINEER

03/05/2024

QUIDDITY ENGINEERING

Texas Board of Professional Engineers Registration No. F-23290 | Texas Board of Professional Land Surveying Registration No. 10046100

APPENDIX F

MEMO

TO: City of Jersey Village

FROM: Bryce C. Brady, PE

DATE: July 31, 2024

RE: Wastewater Water System Analysis

This summary memorandum presents the results of the Wastewater System Analysis completed as part of the 2024 Water and Wastewater Master Plan. The purpose of this memo is to document the rules, requirements, assumptions, calculations, model results, conclusions, and recommendations for improvements to the existing and future water system.

BACKGROUND AND CRITERIA FOR ANALYSIS

In January 2024, the City of Jersey Village (City) authorized Quiddity to develop a Water and Wastewater Master Plan to support new development and redevelopment, including new capital improvements. The Capital Improvements Plan and Impact Fee Study 2023 Update completed by Quiddity, dated December 18, 2023, is the foundation for this assessment and evaluation.

The City provides water and wastewater service to approximately 7,600 people within the city limits and has over 3,300 retail water meter connections. The existing service area north of US Highway 290 (Hwy 290) is mostly developed and comprised primarily of residential connections. The area south of Hwy 290 currently includes commercial and industrial users comprising 25 acres within City limits. In the 2023 Capital Improvements Plan and Impact Fee Study this area was anticipated to redevelop into new commercial and mixed used properties that the City would serve. Additional properties within the ETJ are anticipated to undergo similar development patterns which this analysis anticipates the City will serve within the future. The additional properties are located south of Hwy 290, north of FM 529, west of Wright Rd and east of Harms Rd.

EXISTING WASTEWATER SYSTEM

Wastewater Treatment Plants

There are two (2) wastewater treatment plants (WWTP) that serve the City. The City owns, operates, and maintains Castlebridge WWTP, located at 12103 Castlebridge Drive, with a permitted average daily flow (ADF) of 800,000 gallons per day (gpd) or 0.8 million gallons per day (MGD) and a 2-hour peak flow of 1,885 gallons per minute (gpm), with a peaking factor of 3.4. The City is a partner in the White Oak Bayou Joint Powers Board. This board includes West Harris County Municipal Utility District (MUD) No. 1, Harris County MUD No. 25, Windfern Forest Utility District and Baker Oil Tools (Baker Hughes). The White Oak Bayou Joint Powers Board owns White Oak Bayou WWTP, located at 15201 Philippine Street, with a permitted ADF of 2,000,000 gpd or 2.0 MGD and a peak flow of 5,556 gpm (peak factor of 4.0). The City has 40.63% ownership, or a total capacity of 0.81 MGD ADF, of the White Oak Bayou WWTP and is responsible for this portion of operation, maintenance, and any improvement projects expenses. The flow meter at White Oak

Bayou WWTP measuring the flow rate from Philippine lift station is currently out of service. Therefore, flows from the City to White Oak Bayou WWTP are estimated based on lift station runtimes. The methodology for these estimates is discussed further in this report, the estimated ADF to White Oak Bayou WWTP is shown in Table No. 1.

Wastewater flows were determined by analyzing the Castlebridge WWTP ADF, provided by EPA – Enforcement and Compliance History Online (ECHO) database, for the prior three (3) years of monthly data, April 2022 through April 2024, shown in Table No. 1.

Table No. 1 Existing Wastewater Flows

Service Area	Average Daily Flow (GPD)
White Oak Bayou WWTP	380,000
Castlebridge WWTP	143,200

Based on the WWTP effluent data, Castlebridge WWTP receives an ADF of approximately 143,200 gallons or 0.14 MGD compared to the permitted average daily flow of 800,000 gallons or 0.8 MGD. However, based on limited influent grab sampling collected during 2022, the average Biological Oxygen Demand (BOD) was 304 milligram per liter (mg/l) and 361 mg/l with one standard deviation added per TCEQ 30 TAC 217.34 rules. The WWTP was designed for a BOD of 266 mg/l for comparison. This indicates the average biological loading is higher than designed. Using the average BOD of 361 mg/l will reduce total treatment capacity to 0.5-0.6 MGD ADF with aeration volume being the limiting factor. TCEQ §217.34 requires five (5) years of daily flow data and three (3) composite samples of influent wastewater per week for a period of at least one (1) year to be collected in order to perform a wastewater plant re-rate analysis. The City should consider performing composite influent sampling to verify the BOD loading at the plant. Should the BOD loading turn out to be higher than the designed BOD, then a rerate analysis of the plant should be performed to understand the actual treatment capacity of the WWTP while also determining future WWTP improvements.

Wastewater Collection System

The City owns, operates, and maintains six (6) lift stations (LS) within the wastewater collection system including Philippine LS, Hillcrest LS, Tahoe LS, Rio Grande LS, 290 NW LS, and the Jones Rd LS. The wastewater collection system contains approximately 192,000 LF of gravity sanitary sewers ranging in size between six-inch (6”) diameter to thirty six-inch (36”) diameter and approximately 795 manholes based on records provided by the City. See Exhibit A for the existing wastewater collection system layout and service areas.

The wastewater collection system is comprised of sanitary sewer pipes of varying ages, diameters, and materials. Table No. 2 shows the existing collection system inventory by pipe size.

Table No. 2
Existing Collection System Pipe Inventory

Size & Type	Length (ft)[(1)]
GRAVITY LINES	
6-inch	14,300
8-inch	88,500
10-inch	36,600
12-inch	16,900
15-inch	12,400
18-inch	4,600
24-inch	7,900
27-Inch	2,200
30-inch	1,800
36-Inch	700
Total Gravity Sewer	**185,900**
FORCE MAINS	
4-Inch (or less)	900
6-Inch	4,800
16-Inch	200
Total Force Main	**5,900**
GRAND TOTAL =	**191,800**

Note: (1) All values rounded to the nearest hundred.

The City's current LS sewersheds, including the Castlebridge WWTP sewershed are listed below:

1. Philippine Lift Station – 15201 Philippine Street
   Encompasses approximately 770 acres and serves mostly single-family residential. Philippine LS also receives flows from Rio Grande, 290 NW, Tahoe, and Hilcrest Lift Station service areas. Each lift station sends flows via force main into the Philippine Lift Station gravity collection system. All flows from the Philippine LS pump directly to the White Oak Bayou WWTP Headworks.
2. Rio Grande Lift Station – 8501 Rio Grande
   Encompasses approximately 50 acres and serves mostly single-family residential. Rio Grande LS transfers flows to the Tahoe LS via 3-inch force main into an 8-inch collection line on Rio Grande St.
3. 290 North West Lift Station – 17030 Northwest Freeway
   Encompasses approximately 25 acres and serves mostly commercial and industrial. 290 NW LS

sends flows to the Tahoe LS via 4-inch force main into a 15-inch collection line on Village Dr.

4. Tahoe Lift Station – 15810 Tahoe
   Encompasses approximately 430 acres and serves mostly single-family residential. Tahoe LS sends flows to the Philippine LS service area via 6-inch force main into a 27-inch collection line on Tahoe Dr. The Tahoe LS receives flows from the Rio Grande LS and 290 NW LS service areas.
5. Hilcrest Lift Station – 7302 Hilcrest
   Encompasses approximately 140 acres and serves mostly Commercial and Industrial. Hilcrest LS sends flows to the Philippine LS service area via 6-inch force main into an 8-inch collection line on Seattle St.
6. Jones Rd Lift Station – 7501 Jones Rd
   Encompasses approximately 164 acres and serves primarily industrial users. Jones Rd LS sends flows to the Castlebridge WWTP service area via 6-inch force main into a 12-inch collection line on Jones Rd.
7. Castlebridge WWTP – 12103 Castlebridge Drive
   Encompasses approximately 600 acres and serves a variety of commercial, single family residential, and multi-family residential. The sewershed receives flows from Jones Rd LS via gravity collection.

The City provided pump run time data for the lift stations in the form of reporting on Elapsed Time Meters (ETMs). The ETM recordings are collected daily at each lift station or are collected automatically by the City's Supervisory Control and Data Acquisition (SCADA) system which provides the pumps runtime during a given period. The pump runtime is utilized to assess flow conditions by multiplying the runtime data by the known or estimated pump sizes equated by capacity and compared against the expected flows based on the number of connections served within a Lift Station Service Area. Table No. 3 details the information collected and calculated for each lift station.

Table No. 3 – Lift Station Run Time Summary

LS Run Time Summary							
Lift Stations	**No. Pumps**	**Pump Size (gpm)**	**Avg Daily Hours**	**Daily Average (gpd)**	**Max Daily Hours**	**Max Flow (gpd)**	**Max Day**
Philippine	3	550	40%(1)	313,090	100%(1)	790,931	5/21/2024
Rio Grande	2	120	6.9	51,219	21.7	160,279	5/14/2023
Tahoe	2	375	7.0	157,241	38.7	872,705	1/24/2024
290 NW	2	185	1.1	11,892	10.6	117,192	4/12/2022
Hillcrest	2	320	0.7	13,960	9.4	180,480	1/4/2024
Jones Rd	2	350	0.2	5,204	2.6	54,600	1/24/2023
Total				552,605			

Notes:
(1) The Philippine lift station pumps operate with a variable frequency drive and thus one pump is typically on but runs at a lower speed to maintain a constant level in the lift station wet well and minimize pump starts/stops. Thus, instead of runtime, average and max speed of the VFD as a percentage of the 60 Hz max is shown for this lift station in the run time summary.

The recommended target runtime for pumps based on ADF is 6 hours or less per day. Runtimes above 6 hours or higher per day could be an early indicator of potential issues at the lift station such as pump failure, ragging, or an overloaded lift station. Rio Grande LS and Tahoe LS both exceed this recommended

target, while the remainder of the lift stations operate well below this limit. Both Rio Grande LS and Tahoe LS serve fully developed service areas and thus are only operating slightly above recommended limits. Tahoe LS poses the biggest challenge due to site constraints and limitations for expansion. This LS is currently being evaluated to be relocated based on age, poor condition, environmental and floodplain considerations. Rio Grande LS may require additional O&M in the form of cleaning prior to considering pump repairs or improvements to reduce pump runtimes. The Philippine LS was recently rehabilitated and now operates as a triplex pump station with VFD pumps. Thus, instead of using runtimes, flows were estimated using pump speed only from October 2023 through March 2024.

Figures 1 through 6 present the ADF and the total rainfall per month for each lift station. With the rehabilitation of the Philippine LS only data following October 2023 was considered. The figures show little correlation between rainfall and lift station flows. The City is currently undertaking cleaning, televising, and a condition assessment of the gravity wastewater collection system to help assess the extent of inflow and infiltration (I&I) in the system.

Figure No. 1 – Philippine Lift Station 2023-2024 Flow vs Rainfall

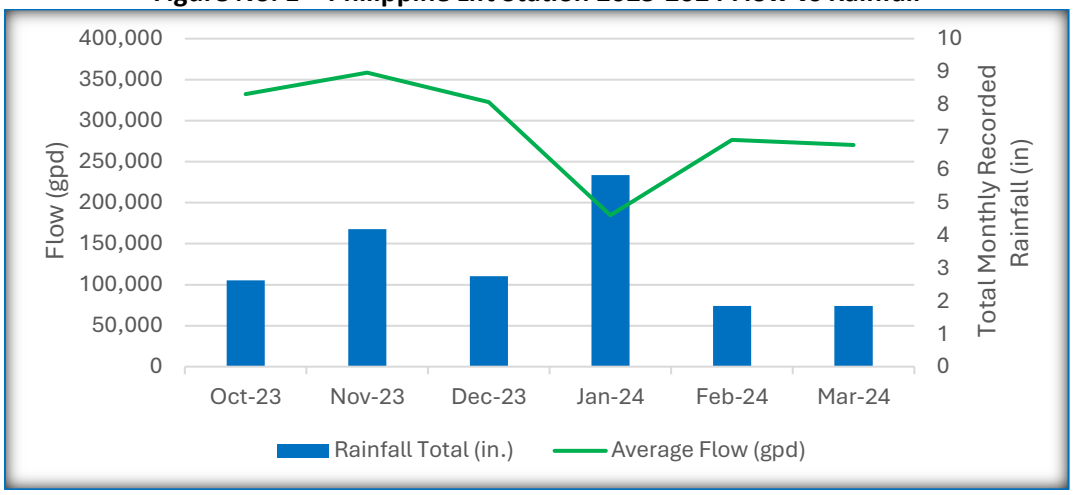


Figure No. 2 – Rio Grande Lift Station 2023-2024 Flow vs Rainfall

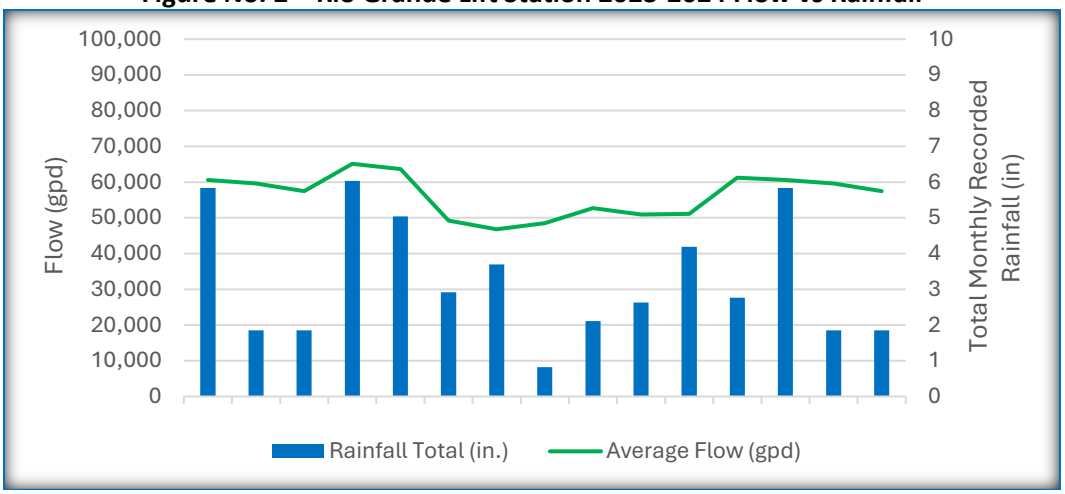


Figure No. 3 – Tahoe Lift Station 2023-2024 Flow vs Rainfall

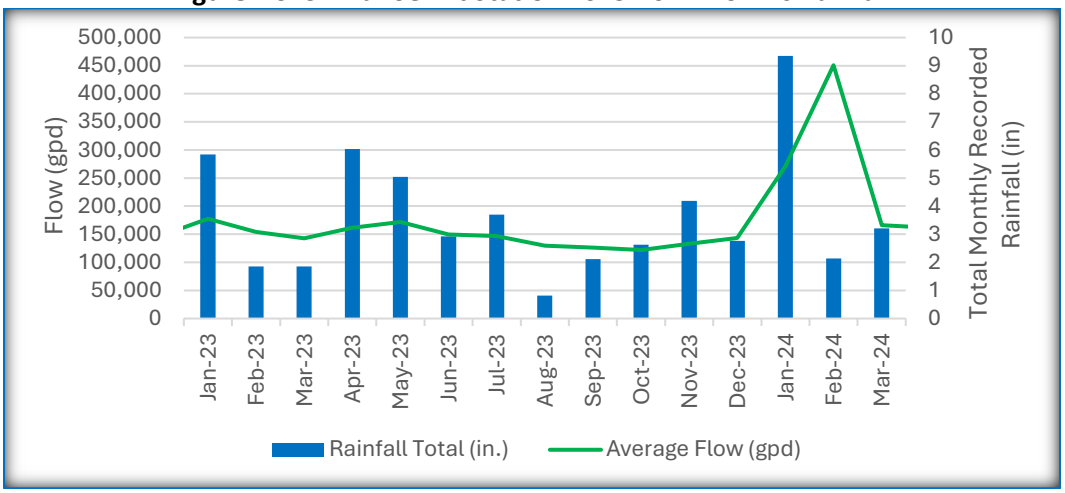


Figure No. 4 – 290 NW Lift Station 2023-2024 Flow vs Rainfall

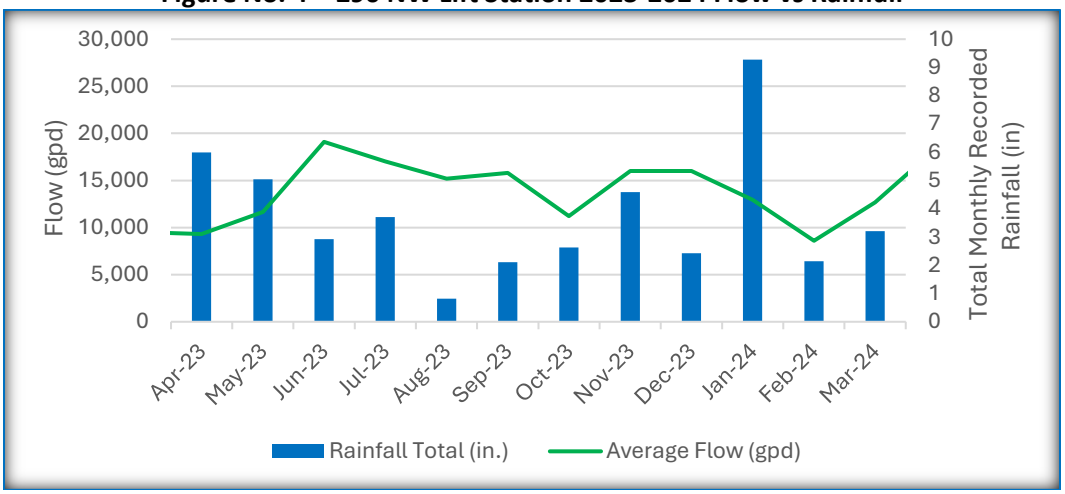


Figure No. 5 – Hillcrest Lift Station 2023-2024 Flow vs Rainfall

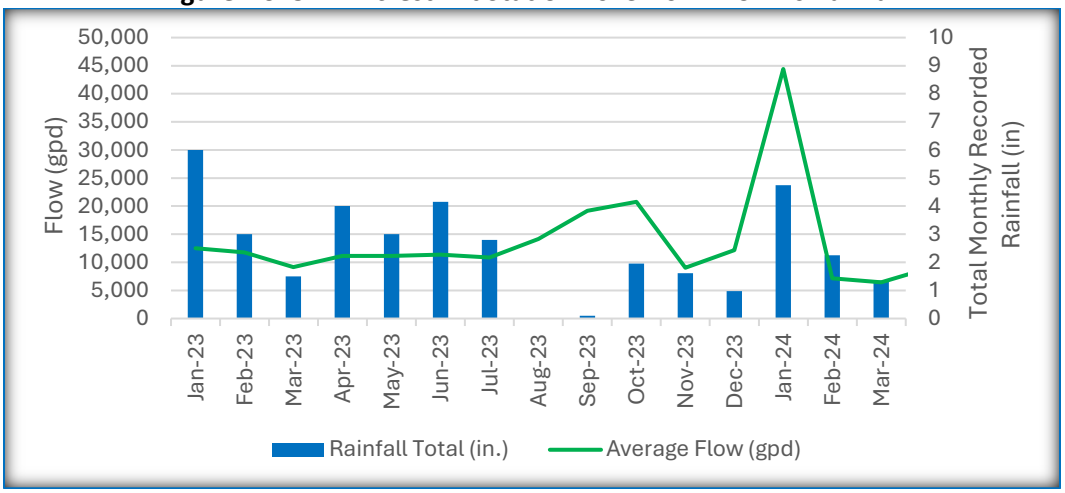
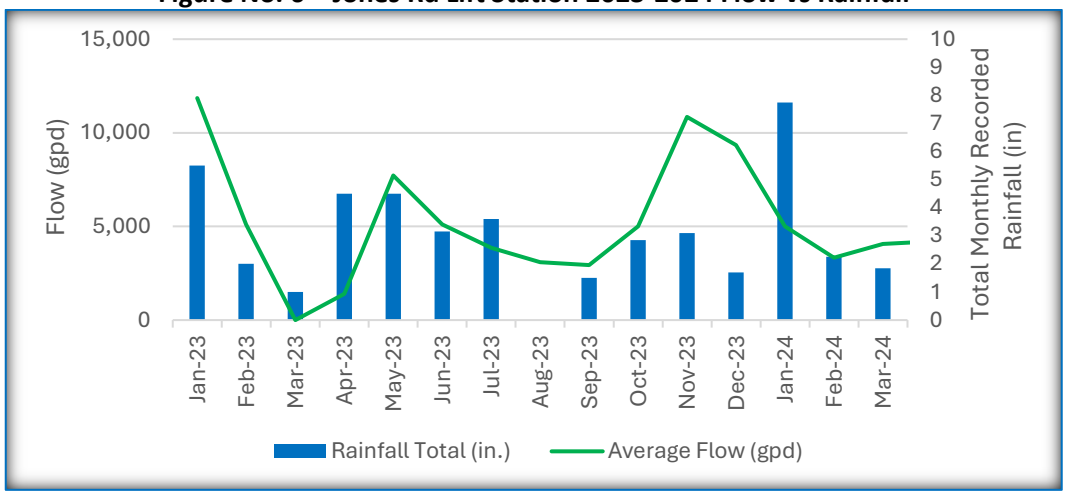


Figure No. 6 – Jones Rd Lift Station 2023-2024 Flow vs Rainfall



The lift station flows were estimated based on the number of single-family lots, multifamily units, and total number of commercial and public connections divided by the current developed acreage by type of connection in each service area. Then the approximate water demand for each WWTP service area was divided by the WWTP average day flows to determine return factors for each WWTP service area. Irrigation water usage was ignored for this analysis as water used for irrigation does not contribute to wastewater flows. The Castlebridge WWTP service area return factor was calculated to be 0.61, which is in line with previously calculated return factors for Jersey Village in the 2020 Impact Fee Study and Capital Improvements Plan. The return factors were then applied to approximate water demands per lift station service area. Table No. 4 presents the approximate lift station flows along side the total capacity of each lift station based on firm capacity.

Table No. 4 - Approximate Lift Station Existing Flow and Capacity

	White Oak Bayou WWTP					Castlebridge WWTP
Lift Station	**Philippine**	**Rio Grande**	**Tahoe**	**290 NW**	**Hillcrest**	**Jones Rd**
Number of Pumps	3	2	2	2	2	2
Pump Size (gpm)	556	120	375	185	320	350
Firm Pump Station Capacity (gpm)	1,112	120	375	185	320	350
Firm Pump Station Capacity - ADF (gpd)	400,320	43,200	135,000	66,600	115,200	126,000
Actual Average Daily Flow (gpd)	380,000	31,200	123,000	6,600	21,000	5,300
Percent Ultimate Capacity	94.9%	72.2%	91.1%	9.9%	18.2%	4.2%

Comparing ADF per lift station based on runtimes (Table No. 3) and connections (Table No. 4), shows the calculated flows are similar, except for Rio Grande LS which is a result from the runtime issues identified

previously. Exhibit B.1 – Existing Lift Station Flow Diagram schematically shows the capacities and arrangements of each lift station service area according to these estimated flows from Table No. 4.

Lift Station	**Philippine**	**Rio Grande**	**Tahoe**	**290 NW**	**Hillcrest**	**Jones Rd**
Number of Pumps	3	2	2	2	2	2
Pump Size (gpm)	556	120	375	185	320	350
Firm Pump Station Capacity (gpm)	1,112	120	375	185	320	350
Firm Pump Station Capacity - ADF (gpd)	400,320	43,200	135,000	66,600	115,200	126,000
Actual Average Daily Flow (gpd)	380,000	31,200	123,000	6,600	21,000	5,300
Percent Ultimate Capacity	94.9%	72.2%	91.1%	9.9%	18.2%	4.2%

Based on the analysis the existing sanitary collection system is adequately sized to serve all existing flows. Little evidence of systemwide I&I problems were identified. However, more detailed investigation and evaluation, as part of the ongoing cleaning and televising services, could identify specific segments of the collection have I&I issues. Most lift stations are operating within the anticipated normal range of operation except for Tahoe LS, which is in the process of being evaluated to be relocated and expanded, and Rio Grande LS, which may require rehabilitation of the pumps following increased cleaning of the wet well. However, the Rio Grande LS service area is fully developed, and no future flows are anticipated to impact the lift station.

FUTURE WASTEWATER SYSTEM

The future wastewater system analysis was based on 5-year and 10-year projections and development assumptions from the current Capital Improvements Plan (CIP) and Impact Fee Study (IFS) dated December 18, 2023 and were not modified. The future growth projections were based on the future land use plan and the projected development timeframe. The baseline usage predicted in the IFS was 1,200 gpd per acre or 200 gpd per connections for wastewater daily demand.

Future Wastewater Collection System

In order to accurately assess the system, Quiddity split the collection system into nine (9) sewersheds, based on gravity mains and lift station service areas. Exhibit A presents an overall map of these sewersheds. Here are the proposed new or modified LS sewersheds:

1. Philippine Lift Station – 15201 Philippine Street – No change proposed.
2. Rio Grande Lift Station – 8501 Rio Grande – No change proposed.
3. 290 North West Lift Station – 17030 Northwest Freeway – No change proposed.

4. Tahoe Lift Station – 15810 Tahoe
   No change to the existing sewershed. Tahoe LS will continue to send flows to the Philippine LS. The Tahoe LS receives flows from the Rio Grande LS and 290 NW LS service areas. An alternate analysis to send Jones Rd LS service area to Tahoe LS is detailed in the next section.
5. Hilcrest Lift Station – 7302 Hilcrest – No change proposed.
6. Jones Rd Lift Station – 7501 Jones Rd
   No change to the existing sewershed. The Jones Rd LS is proposed to receive flows from Future FM 529 LS. Potentially redirect the Jones Rd LS flows from Castlebridge WWTP to White Oak Bayou WWTP through the Tahoe LS.
7. Castlebridge WWTP – 12103 Castlebridge Drive
   No change to the existing sewershed. The Future Taylor Rd LS will flow directly to Castlebridge WWTP. Potentially redirect flow from the Jones Rd LS to the Tahoe LS and ultimate to the White Oak Bayou WWTP. The sewershed will receive flow from the future FM 529 LS and Taylor RD LS sewersheds via gravity collection in the future.
8. Future FM 529 Lift Station – FM 529 LS (Address TBD)
   The proposed service area encompasses approximately 40 acres and will serve primarily single-family residential based on the Future Land Use. Future FM 529 LS will flow to the Jones Rd LS via 4-inch force main into 8-inch collection line on Jones Rd.
9. Future Taylor Rd Lift Station – Taylor Rd. LS (Address TBD)
   The proposed service area encompasses approximately 585 acres and will serve primarily mixed-use, commercial, and industrial. Taylor Rd LS will flow directly to Castlebridge WWTP via 12-inch force main to the WWTP onsite lift station.

Wastewater Treatment Plant

The projected 5-year ADF at the Castlebridge WWTP is based on anticipated wastewater connections from properties being developed / redeveloped and annexed into the City, Table No. 5. The growth projected is predominately anticipated within the City's ETJ along Wright Road, surrounding the future Village Center, and City limits southwest of Highway 290 to FM 529. This area includes approximately 52 acres of commercial land, 38 acres of mixed-use land, and 82 acres of industrial land. The City's 5-year population projection resulting from this growth is 1,368 people. This projected flow will be handled by the proposed FM 529 LS and existing Jones Road LS via force mains to the Castlebridge WWTP.

Table No. 5: Projected WWTP Flows at 5-Year Projections

Classification	Average Daily Flows (gpd)
New Development 5-Year	244,680
Existing Castlebridge WWTP	143,200
Total	387,880

Table No. 6 presents the projected 10-year wastewater ADF at the Castlebridge WWTP based on the 5-year projection, the anticipated wastewater connections from properties being developed / redeveloped and annexed into the City within the next 5-10 years, and Additional Development. The growth projected to occur in the remaining undeveloped tracts within the City limits north of Highway 290 is designated as "Additional Development". This includes approximately 8 acres of multi-family residential and 23 acres of

commercial designated tracts resulting in population growth of approximately 292 people, identified in the CIP and IFS. Projected physical connections were calculated based on the acreage and density from the properties being developed / redevelopment and annexed into the City and Additional Development areas. This projected flow is assumed to be supplied by the Future Taylor Road LS, Future FM 529 LS, and Existing Jones Road LS via pressurized force mains and gravity flow via existing collection system north of Highway 290.

Table No. 6: Projected WWTP Flows at 10-Year Projections

Classification	Average Daily Flows (gpd)
New Development 5-Year	244,680
New Development 10-Year	601,897
Additional Development 10-Year	36,168
Existing Castlebridge WWTP	143,200
Total	1,025,945

TCEQ §305.126 requires a WWTP permit holder, the City, to initiate engineering and financial planning for expansion for the WWTP when the wastewater flows reach 75% or 0.6 MGD of permitted average daily flows for Castlebridge WWTP for 3 consecutive months. Based on current projections, this is anticipated to occur within 7 years. The City must also obtain the necessary authorization to commence construction for additional facilities when the flows reach 90% or 0.72 MGD of the permitted average daily flows for the Castlebridge WWTP. This WWTP flow should monitored and construction is anticipated within 8 years based on the projections for future development. However, as discussed in the existing wastewater system section, Castlebridge WWTP is experiencing higher than designed levels of biological loading which means the actual treatment capacity of the plant may be lower than the permitted capacity and expansion or rehabilitation may be required prior to reaching the standard TCEQ expansion criteria.

The wastewater capital improvements plan necessary to serve future flows, Table No. 7, and Exhibit A presents an overview of the locations of the proposed projects throughout the City's wastewater collection system. It is recommended to implement all wastewater projects as development progresses.

Table No. 7: Wastewater Capital Improvements Plan

No.	Description of Projects
Proposed Projects	
S-10	Jones Rd LS & FM 529 Service Area 8" Wastewater Line - Service to ETJ
S-11	FM 529 LS Service Area 8" Wastewater Lines - Service to ETJ
S-12	Proposed Taylor Road Lift Station & 12" Force Main to Castlebridge WWTP - Service to ETJ
S-13	Wright Rd 8" & 12" Wastewater Line from FM 529 to Hwy 290 - Service to ETJ
S-14	Taylor Road 8", 15", & 18" Wastewater Line - Service to ETJ
S-15	Fairview St 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ[(2)]
S-16	Harms Rd 8" & 12" Wastewater Line from FM 529 to Taylor Rd - Service to ETJ[(2)]
S-17	Castlebridge WWTP Expansion

In addition to the capital projects listed, operation and maintenance improvements were identified as part of the 2024 Utility Fund CIP Report with Exhibits dated March 2024. The capital improvements plan and estimates for the O&M projects identified during the inspections are included as Exhibit C. These

projects should be implemented to prevent premature failures and maintain continued operation of existing wastewater facilities.

Castlebridge Expansion Alternatives Analysis

Alternatives for distributing future wastewater flow were developed with the goal of maximizing the City's ownership in the White Oak Bayou WWTP and delaying the need for expansion of the Castlebridge WWTP.

The alternative identified redirects the Jones Rd LS force main from the Castlebridge WWTP service area into the White Oak Bayou WWTP service area via the existing wastewater collection system and ultimately into the Tahoe LS. This would be accomplished by constructing approximately 400 linear feet of 6-inch force main to reroute the Jones Rd LS forcemain and tie into an existing wastewater manhole on the western right-of-way of Jones Road north of Highway 290. This diversion would remove 165,000 gpd of ultimate wastewater flow from the Castlebridge WWTP service area and transfer to the White Oak Bayou WWTP service area. The existing collection system in this area has the capacity to handle the additional flow. However, this option will result in downstream effects that will require the following improvements.

1. Tahoe LS will need to be expanded to a firm capacity of 800 gpm, compared to its existing 375 gpm firm capacity.
2. Philippine LS will need be expanded to a firm capacity of 1,585 gpm, compared to its current capacity of 1,100 gpm.

By performing these flow diversions, the expansion of Castlebridge WWTP can be delayed until development occurs within the Taylor Rd LS service area. In addition, the ultimate required capacity of the WWTP would be reduced from 1.0 mgd to 0.85 mgd, by removing the Jones Rd LS and the Future FM 529 LS service areas. Should the biological loading, identified previously, remain the same or increase, it is likely the Castlebridge WWTP may still require expansion within the 10-year projected period in order to treat anticipated flows / loading however more testing data is needed. The current proposed and alternate arrangement are shown in Exhibit B.2 and B.3 – Proposed Lift Station Flow Diagram and Alternate Proposed Lift Station Flow Diagram respectively.

Relocation of the Tahoe LS is being evaluated by the City at this time. Should the City desire to redirect the flow from the Jones Rd LS to White Oak Bayou WWTP service area, the Tahoe LS's wet well should be sized for a future design flow of 800 gpm. This will allow the pumps to be replaced to accommodate the increased flows in the future. To accomplish this, it is recommended to design and construct a duplex lift station to handle the existing flow conditions that can be expanded into a triplex lift station via the addition of a new pump in the future. This option adds minimal expense to expand the proposed lift station diameter by 25-30%, at this time. Increasing the size of the wet well as part of the relocation will avoid replacing the entire lift station in the future to accommodate the required pumps. The new Tahoe LS force main may be constructed to handle the ultimate 800 gpm flow or construct a future parallel force main along the same alignment.

The Philippine LS was rehabilitated in 2023, which converted operations from a dry pit, wet well style lift station to a submersible wet well configuration and expanded to a triplex pump. The Philippine LS can be expanded to a firm capacity of 1,585 gpm through the replacement of the existing pumps. The existing 8-inch risers are adequately sized to handle the proposed flow of 792 gpm per pump. The existing force main

between Philippine LS and White Oak Bayou WWTP is a 14-inch pipe and can convey 1,585 gpm at a peak velocity of 3 feet per second which is acceptable for a force main.

Should the City which to move forward with this alternative, it is recommended to include the upsizing of the wet well for the capacity and additional pump when designing the new Tahoe Lift Station.. If the flow diversion from Jones Rd LS is desired, it will require the expansion of the Tahoe and Philippine lift stations and the rerouting of the force main from Jones Rd LS. A detailed cost comparison between this alternative and the current proposed capital improvement plan will be included in the final Water and Wastewater Master Plan.

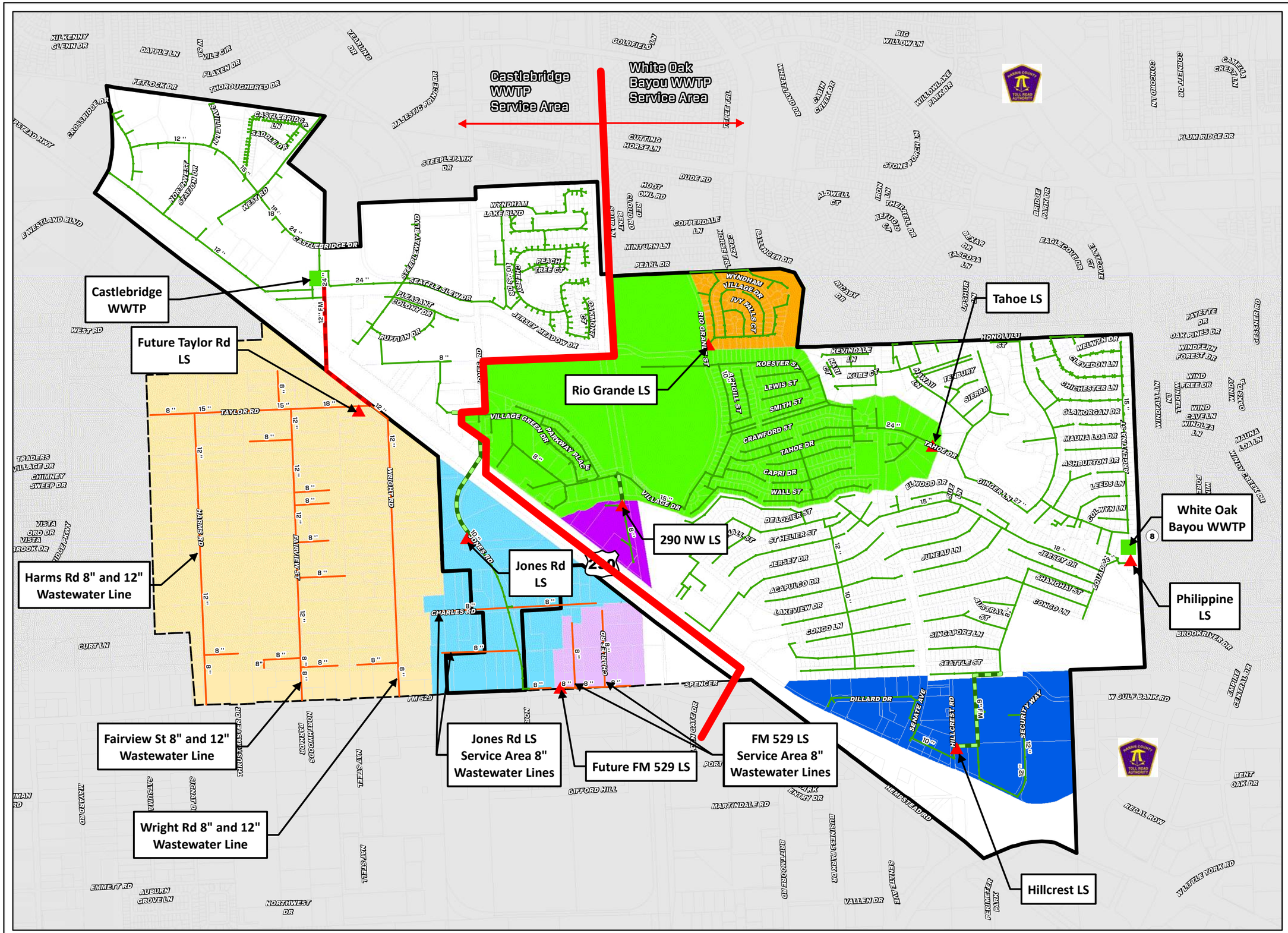
SUMMARY OF ASSESSMENT

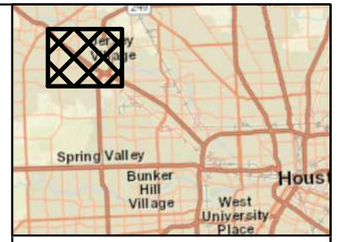
The City of Jersey Village anticipates growth and redevelopment within the City's ETJ south of Highway 290. Future gravity sewer lines, lift stations, and treatment facilities will be necessary to service these area.

The City's existing wastewater collection system is adequate to serve existing demands.

It is recommended the City implement all wastewater projects as identified in Table No. 7 as development progresses and the needs arise and to implement operation and maintenance improvements as identified as part of the 2024 Utility Fund CIP Report with Exhibits dated March 2024.

Exhibit A





VICINITY MAP

Scale: 1 inch equals 10 miles

LEGEND

- Lift Station (LS)
- Wastewater Treatment Plant (WWTP)
- WWTP Service Area
- Existing Force Main
- Proposed Force Main
- Existing Gravity Main
- Proposed Gravity Main
- City of Jersey Village City Limits
- City of Jersey Village City ETJ
- HCAD Parcels
- Tahoe LS Service Area
- Rio Grande LS Service Area
- 290 NW LS Service Area
- Hilcrest LS Service Area

5-Year Projection

- FM 529 LS Service Area
- Jones Rd LS Service Area

10-Year Projection

- Taylor Rd LS Service Area

WASTEWATER COLLECTION SYSTEM LAYOUT

CITY OF JERSEY VILLAGE

HARRIS COUNTY, TEXAS

0 750 1,500 Feet

1 inch equals 1,500 feet

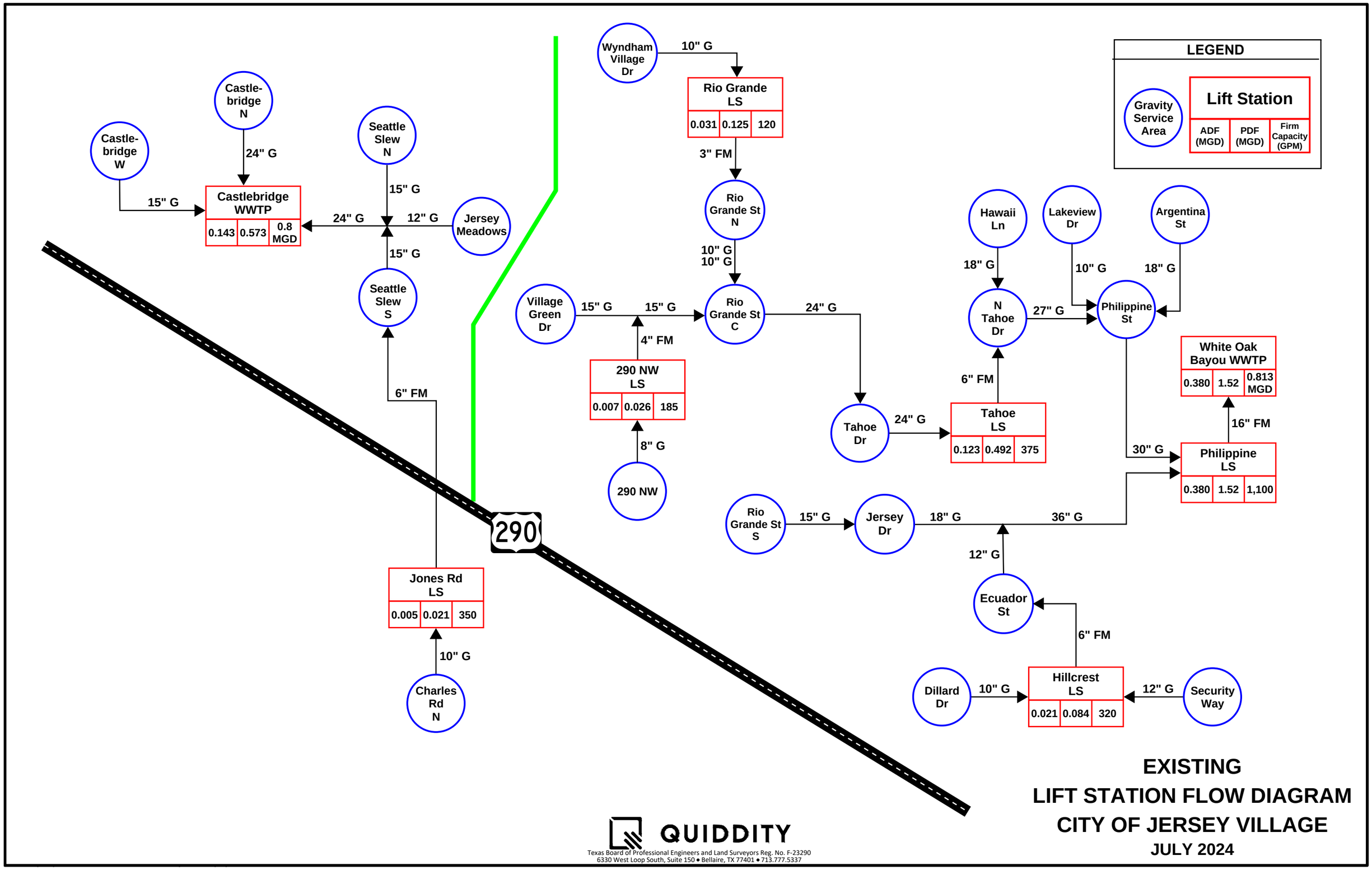
N W E S

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Path: V:\Practice Workspace\Corporate Services\GIS\Projects\0_Individual\C_Jinks\JerseyVillage\05440-0004-00\WastewaterSystem_11x17.mxd Project Number: 05440-0004-00 Date: 10/20/2023 User Name: ada1

Exhibit B



EXISTING
LIFT STATION FLOW DIAGRAM
CITY OF JERSEY VILLAGE
JULY 2024

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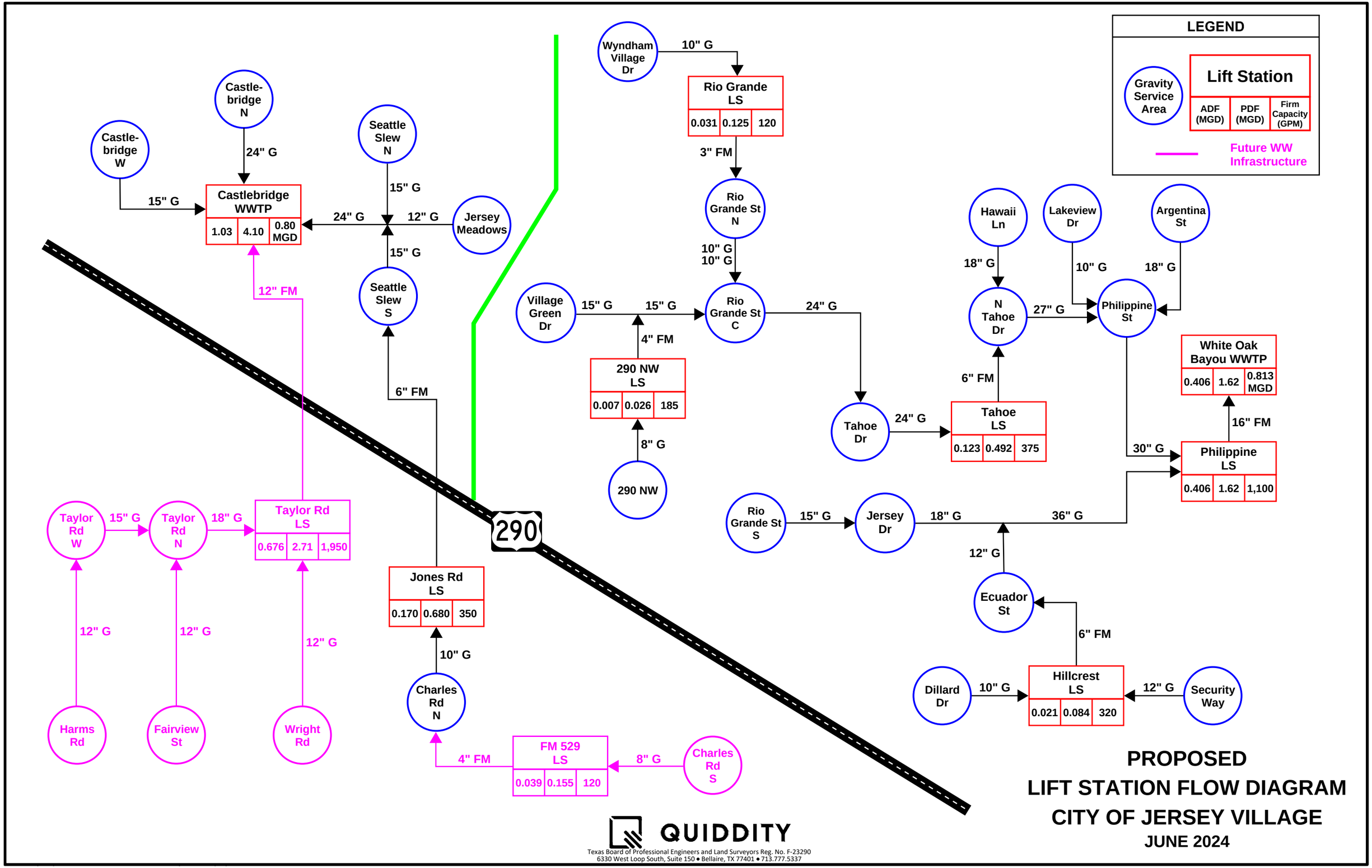
LEGEND
Gravity Service Area
Lift Station
ADF (MGD)
PDF (MGD)
Firm Capacity (GPM)
Future WW Infrastructure
Castle-bridge N
Castle-bridge W
24" G
15" G
Castlebridge WWTP
1.03
4.10
0.80 MGD
Seattle Slew N
15" G
24" G
12" G
Jersey Meadows
15" G
Seattle Slew S
6" FM
12" FM
Wyndham Village Dr
10" G
Rio Grande LS
0.031
0.125
120
3" FM
Rio Grande St N
10" G
10" G
Village Green Dr
15" G
15" G
Rio Grande St C
24" G
4" FM
290 NW LS
0.007
0.026
185
8" G
290 NW
290
Hawaii Ln
Lakeview Dr
Argentina St
18" G
10" G
18" G
N Tahoe Dr
27" G
Philippine St
6" FM
Tahoe Dr
24" G
Tahoe LS
0.123
0.492
375
White Oak Bayou WWTP
0.406
1.62
0.813 MGD
16" FM
30" G
Philippine LS
0.406
1.62
1,100
Rio Grande St S
15" G
Jersey Dr
18" G
36" G
12" G
Ecuador St
6" FM
Dillard Dr
10" G
Hillcrest LS
0.021
0.084
320
12" G
Security Way
Taylor Rd W
15" G
Taylor Rd N
18" G
Taylor Rd LS
0.676
2.71
1,950
12" G
12" G
12" G
Harms Rd
Fairview St
Wright Rd
Jones Rd LS
0.170
0.680
350
10" G
Charles Rd N
4" FM
FM 529 LS
0.039
0.155
120
8" G
Charles Rd S
PROPOSED
LIFT STATION FLOW DIAGRAM
CITY OF JERSEY VILLAGE
JUNE 2024
QUIDDITY
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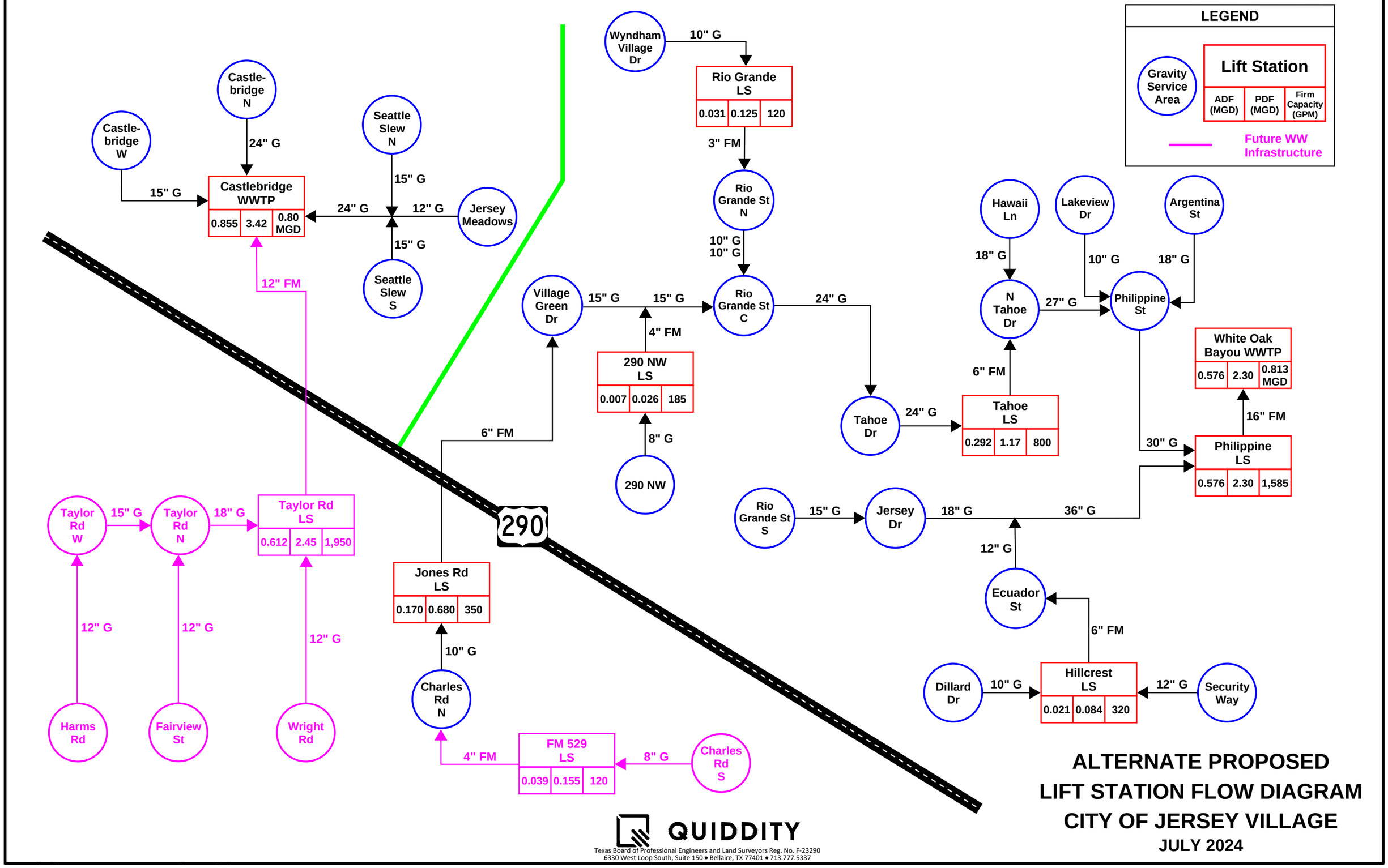

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Exhibit C

CASTLEBRIDGE WWTP
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Castlebridge WWTP	1984												
On-Site Lift Station	1984												
Wet Well Rehabilitation		Unknown	15		$ 35,000								
Repair Pumps (3 - 860 or 1,400 GPM, 15 or 25 HP)		Unknown	10		$ 45,000								
Replace Pumps (3 - 860 or 1,400 GPM, 15 or 25 HP)		Unknown	20										
Recoat Riser Piping/Valves		Unknown	10										
Replace Riser Piping/Valves		Unknown	20		$ 20,000								
Recoat Discharge Piping/Valves		Unknown	10										
Replace Discharge Piping/Valves		Unknown	35		$ 15,000								
Replace Force Main		Unknown	40										
Bypass Pumping		Unknown	-		$ 45,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)		Unknown	20		$ 15,000								
Electrical/Controls		Unknown	20		$ 125,000								
Miscellaneous Site Work			-										
Headworks	2020												
Replace Piping		-	20			$ 30,000							
Replace Manual Screen		-	15			$ 35,000							
Construct New Mechanical Screen and Structure	-	-	35			$ 750,000							
Rehabilitate Mechanical Screen/Controls	-	-	10										
Influent and RAS Channel	1984												
Replace Grating		Unknown	20			$ 25,000							
Replace RAS Piping		Unknown	50										
Replace Aeration Diffusers		Unknown	20			$ 30,000							
Concrete Rehabilitation		Unknown	20			$ 30,000							
Aeration Basin No. 1	1984												
Replace Handrail		Unknown	20					$ 50,000					
Replace Air Header		Unknown	30					$ 100,000					
Rehabilitate Aeration Diffusers (Fine Bubble)		2023	12										
Replace Aeration Diffusers (Fine Bubble)		2020	20					$ 40,000					
Replace Slidge Gates		Unknown	30					$ 75,000					
Concrete Rehabilitation		Unknown	20					$ 45,000					
Degritting of Basin		2023	-					$ 50,000					
Aeration Basin No. 2	1984												
Replace Handrail		Unknown	20					$ 30,000					
Replace Air Header		Unknown	30					$ 25,000					
Rehabilitate Aeration Diffusers (Fine Bubble)		2023	12										
Replace Aeration Diffusers (Fine Bubble)		2020	20					$ 50,000					
Replace Slidge Gates		Unknown	30					$ 40,000					
Concrete Rehabilitation		Unknown	20					$ 20,000					
Degritting of Basin		2023	-					$ 20,000					
Clarifier Feed Channel	1984												
Replace Grating		Unknown	20										
Rehabiliation Aeration Diffusers		Unknown	20										
Replace Slide Gates		Unknown	30										
Clarifier No. 1	1984												
Rehabilitate Clarifier Mechanism & Drive		2022	10									$ 50,000	
Replace Clarifier Mechanism & Drive		2022	30										
Recoat Weirs, Launders, Bridge		2022	15										
Replace Effluent Weirs, Scum Baffle & Launders		2022	20										
Replace Weir Washing System		2022	10									$ 25,000	
Miscellaneous Clarifier Electrical		2022	20										
Scum Pump Replacement		N/A	15										
Clarifier No. 2	2018												
Rehabilitate Clarifier Mechanism & Drive		2021	10								$ 50,000		
Replace Clarifier Mechanism & Drive		2021	30										
Recoat Weirs, Launders, Bridge		2021	15										
Replace Effluent Weirs, Scum Baffle & Launders		2021	20										
Replace Weir Washing System		2021	10								$ 25,000		
Miscellaneous Clarifier Electrical		2021	20										
Scum Pump Replacement		2021	15										
Sludge Return Channel	1984												
Replace Grating		2020	20										
Rehabiliation Aeration Diffusers		2020	20										
Replace Slide Gates		2020	30										
Concrete Rehabilitation		Unknown	20										
Chlorine Contact Basin	Unknown												
Replace Induction Pump		Unknown	15					$ 50,000					
Weir Replacement		Unknown	20										
Instrument Replacement		Unknown	10					$ 25,000					
Install Flow Baffles		Unknown	-					$ 50,000					
Replace Handrail and Grating		Unknown	20					$ 25,000					
Digester Basin No. 1	1984												
Concrete Rehabilitation		Unknown	20			$ 20,000							
Replace WAS Airlift		Unknown	20			$ 35,000							
Replace Decant Mechanism		Unknown	15			$ 25,000							
Slide Gate Replacement		Unknown	30										
Degritting of Basin			-			$ 45,000							
Blower System	1984												
Rehabilitation Blower No. 1		-	10										
Replace Blower No. 1		-	20	$ 125,000									
Rephabilitate Blower No. 2		-	10										
Replace Blower No. 2		-	20	$ 125,000									
Rehabilitation Blower No. 3		-	10			$ 45,000							
Replace Blower No. 3		-	20										
Rehabilitation Blower No. 4	2021		10								$ 45,000		
Replace Blower No. 4	2021		20										
Rehabilitation Blower No. 5	2021		10									$ 45,000	
Replace Blower No. 5	2021		20										
Air Piping Replacement		2021	30										
Control and Blower Building	1984												
Structure Rehabilitation			15										
Structure Replacement			50										
MCC Replacement	1984		30			$ 1,000,000							
Automatic Transfer Switch Replacement			20			$ 50,000							
New MCC Building						$ 650,000							
Site SCADA													
Chemical Storage and Feed Area	1984												
Chemical Piping Replacement		Unknown	10		$ 30,000								
Chemical Equipment Replacement		2024	10										
Miscellaneous Electrical		Unknown	10										
Structure Rehabilitation		2022	15										
Structure Replacement			50										
Generator	2015												
Replace Generator			25										
Recoat Fuel Tank and Panel Replacements			12				$ 35,000						
FUTURE WWTP CONSIDERATIONS													
Convert Digester to Aeration Basin								$ 900,000					
Construct New Multi-Stage Digester								$ 1,300,000					
Conversion to Chlorine Gas Ejectors						$ 350,000							
Blower Replacement								$ 900,000					
Construct Non-Potable Water Station					$ 500,000								
Construct Sludge Draw Off Basin					$ 55,000								
WWTP Expansion											$ 12,000,000		
CASTLEBRIDGE WASTEWATER TREATMENT PLANT TOTAL:				**$ 250,000**	**$ 885,000**	**$ 3,120,000**	**$ 35,000**	**$ 3,795,000**	**$ -**	**$ -**	**$ 12,120,000**	**$ 120,000**	**$ -**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 250,000	$ 885,000	$ 3,120,000	$ 35,000	$ 3,795,000	$ -	$ -	$ 12,120,000	$ 120,000	$ -
Contingencies (20%)	$ 50,000	$ 177,000	$ 624,000	$ 7,000	$ 759,000	$ -	$ -	$ 2,424,000	$ 24,000	$ -
Inflation (4% Per Year)	$ 24,000	$ 133,000	$ 636,000	$ 9,000	$ 1,208,000	$ -	$ -	$ 6,157,000	$ 69,000	$ -
Engineering	$ 65,000	$ 239,000	$ 876,000	$ 10,000	$ 1,152,000	$ -	$ -	$ 4,140,000	$ 43,000	$ -
TOTAL PROJECT COST	$ 389,000	$ 1,434,000	$ 5,256,000	$ 61,000	$ 6,914,000	$ -	$ -	$ 24,841,000	$ 256,000	$ -

STATE OF TEXAS
K. GRADY TURNER, III
117284
LICENSED PROFESSIONAL ENGINEER

03/05/2024

QUIDDITY ENGINEERING

WASTEWATER LIFT STATIONS
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Rio Grande Lift Station (8501 Rio Grande St)		Unknown											
Wet Well Rehabilitation			15			$ 35,000							
Repair Pumps (2 - 123 GPM, Unknown HP)			10			$ 15,000							
Replace Pumps (2 - 123 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10			$ 6,000							
Replace Riser Piping/Valves			20										
Recoat Discharge Piping/Valves			10			$ 5,000							
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-			$ 35,000							
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20			$ 15,000							
Electrical/Controls			20			$ 115,000							
Miscellaneous Site Work			-			$ 20,000							
SCADA Panel			-										
Generator	N/A	N/A											
			-										
Tahoe Lift Station (15810 Tahoe)	1974	2002											
Wet Well Rehabilitation			15	$ 25,000									
Repair Pumps (2 - 375 GPM, 5 HP)			10	$ 15,000									
Replace Pumps (2 - 375 GPM, 5 HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20	$ 35,000									
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35	$ 20,000									
Replace Force Main			50										
Bypass Pumping			-	$ 45,000									
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls		2020	20										
Miscellaneous Site Work			-	$ 50,000									
Install Odor Control			-	$ 50,000									
SCADA Panel			-										
Generator	N/A	N/A	-										
Replacement Lift Station													$ 900,000
			-										
Philippine Lift Station	1980	2024											
Wet Well Rehabilitation			15										
Repair Pumps (2 - 375 GPM, Unknown HP)			10										
Replace Pumps (2 - 375 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20										
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-										
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls			20										
Miscellaneous Site Work			-										
SCADA Panel			-										
Generator	Unknown	Unknown	25										
			-										
Hilcrest Lift Station (7302 Hillcrest)	1996	Unknown											
Wet Well Rehabilitation			15		$ 40,000								
Repair Pumps (2 - 320 GPM, 7.5 HP)			10		$ 15,000								
Replace Pumps (2 - 320 GPM, 7.5 HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20		$ 50,000								
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-		$ 45,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20		$ 15,000								
Electrical/Controls			20										
Miscellaneous Site Work			-	$ 25,000	$ 30,000								
SCADA Panel			-										
Generator	Unknown	Unknown	-										
			-										
290 NW Lift Station	1984	Unknown											
Wet Well Rehabilitation			15		$ 25,000								
Repair Pumps (2 - 185 GPM, Unknown HP)			10		$ 15,000								
Replace Pumps (2 - 185 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20		$ 35,000								
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-		$ 30,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls			20		$ 100,000								
Miscellaneous Site Work			-		$ 10,000								
SCADA Panel			-										
Generator	N/A	N/A											
			-										
Jones Rd Lift Station	2010												
Wet Well Rehabilitation		-	15				$ 45,000						
Repair Pumps (3 - 350 GPM, 15 HP)		-	10				$ 25,000						
Replace Pumps (3 - 350 GPM, 15 HP)		-	20										
Recoat Riser Piping/Valves		-	10				$ 15,000						
Replace Riser Piping/Valves		-	20										
Recoat Discharge Piping/Valves		-	10				$ 6,000						
Replace Discharge Piping/Valves		-	35										
Replace Force Main		-	50										
Bypass Pumping		-	-				$ 55,000						
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)		-	20				$ 5,000						
Electrical/Controls		-	20										
Miscellaneous Site Work		-	-										
SCADA Panel		-	-										
Generator	N/A	N/A											
			-										
				2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost				$ 265,000	$ 410,000	$ 246,000	$ 151,000	$ -	$ -	$ -	$ -	$ -	$ 900,000
Contingencies (20%)				$ 53,000	$ 82,000	$ 49,000	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ 180,000
Inflation (4% Per Year)				$ 26,000	$ 61,000	$ 50,000	$ 39,000	$ -	$ -	$ -	$ -	$ -	$ 583,000
Engineering				$ 69,000	$ 111,000	$ 69,000	$ 44,000	$ -	$ -	$ -	$ -	$ -	$ 333,000
TOTAL PROJECT COST				$ 413,000	$ 664,000	$ 414,000	$ 264,000	$ -	$ -	$ -	$ -	$ -	$ 1,996,000

STATE OF TEXAS
K. GRADY TURNER, III
117234
LICENSED PROFESSIONAL ENGINEER

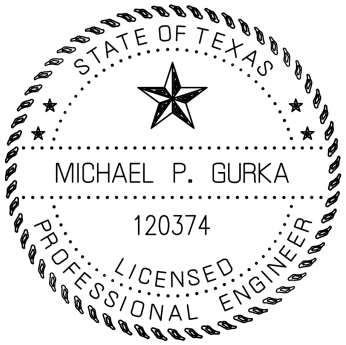
03/05/2024

QUIDDITY ENGINEERING

WASTEWATER COLLECTION SYSTEM
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Material	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Wastewater Collection System													
Replace Wastewater Lines, 2" - 30" (approx. 101,000 LF)	1970s	AC / Clay / PVC / Concrete			$ 15,655,000								
Replace Wastewater Lines, 2" - 36" (approx. 25,000 LF)	1980s	AC / PVC / Concrete						$ 4,420,000					
Replace Wastewater Lines, 2" - 6" (approx. 1,100 LF)	Multi Yr	AC / PVC						$ 170,500					
				2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Construction Cost				$ -	$ 15,655,000	$ -	$ -	$ 4,590,500	$ -	$ -	$ -	$ -	$ -
Contingencies (20%)				$ -	$ 3,131,000	$ -	$ -	$ 918,000	$ -	$ -	$ -	$ -	$ -
Inflation (4% Per Year)				$ -	$ 2,346,000	$ -	$ -	$ 1,462,000	$ -	$ -	$ -	$ -	$ -
Engineering				$ -	$ 4,226,000	$ -	$ -	$ 1,394,000	$ -	$ -	$ -	$ -	$ -
TOTAL PROJECT COST				$ -	$ 25,358,000	$ -	$ -	$ 8,364,500	$ -	$ -	$ -	$ -	$ -



3/5/2024

Michael P Gurka

QUIDDITY ENGINEERING

Texas Board of Professional Engineers Registration No. F-23290 | Texas Board of Professional Land Surveying Registration No. 10046100

APPENDIX G

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
JONES RD LS & FM 529 SERVICE AREA 8-INCH WASTEWATER LINES - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-10
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of 8-inch gravity sewer along Charles Road east and west of Jones Road and an 8-inch gravity sewer from Jones Road to Wright Road in between Charles Road and FM 529 to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 36,000	$ 36,000	
2.	8-inch Gravity Sewer	L.F.	4,400	$ 90	$ 396,000	
3.	48-inch Diameter Manhole	EA.	11	$ 5,000	$ 55,000	
4.	Trench Safety Systems	L.F.	4,400	$ 2	$ 9,000	
5.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
6.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
7.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
8.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
9.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 711,000	(2)
				Contingencies (20%)	$ 142,000	
				5 Yr Inflation @ 3.5%/Yr	$ 160,000	
				Land Acquisition	$ 390,000	(3)
				Engineering & Testing	$ 152,000	
				TOTAL	**$ 1,555,000**	(4)

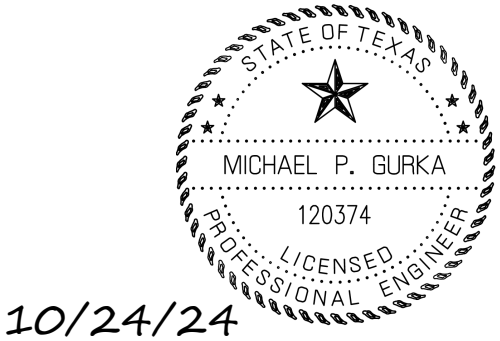
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of tract estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



10/24/24

Michael P Gurka

QUIDDITY

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
FM 529 LS SERVICE AREA 8-INCH WASTEWATER LINES - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-11
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of an 8-inch gravity sewer along FM 529 east of Jones Rd and north along Charles Road to serve projected development. One (1) new lift station is proposed along FM 529 (exact location to be determined) to pump the waste to the nearby collection system along Jones Road. Improvements are necessary to the existing Jones Road Lift Station. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 83,000	$ 83,000	
2.	Lift Station at FM 529	L.S.	1	$ 850,000	$ 850,000	(2)
3.	Lift Station at Jones Road	L.S.	1	$ 170,000	$ 170,000	(3)
4.	8-inch Gravity Sewer	L.F.	3,400	$ 90	$ 306,000	
5.	48-inch Diameter Manhole	EA.	12	$ 5,000	$ 60,000	
6.	Trench Safety Systems	L.F.	3,400	$ 2	$ 7,000	
7.	Traffic Control Plan	L.S.	1	$ 20,000	$ 20,000	
8.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
9.	Storm Water Pollution Prevention	L.S.	1	$ 20,000	$ 20,000	
10.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
11.	Site Restoration	L.S.	1	$ 75,000	$ 75,000	
			SUBTOTAL		$ 1,656,000	(4)
				Contingencies (20%)	$ 331,000	
				5 Yr Inflation @ 3.5%/Yr	$ 373,000	
				Land Acquisition	$ 260,000	(5)
				Engineering & Testing	$425,000	
				TOTAL	**$3,045,000**	(6)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

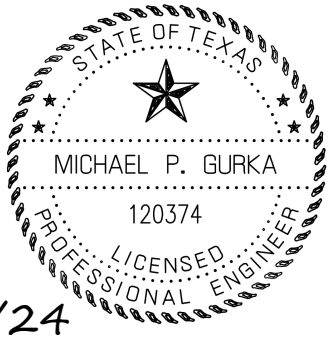
(2) This cost includes a 6' diameter precast wet well with precast valve vault with below ground piping and valves. Assumes the depth of the proposed lift station finish floor will not exceed 20-feet (20') from finished grade elevation and is not located in any flood hazard areas, 1% annual chance floodplain or within existing wetlands. This estimate does not include any costs for wetland mitigation, detention basins, mitigation basins, or any other work related to compensating for wetlands or floodplain impact. The mechanical equipment assumes two (2) 5-HP pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm single pump capacity of 107 gpm pumping through ~100 linear feet of 4" diameter PVC force main. This includes on-site electrical equipment, Diesel Generator, Automatic Transfer Switch, NEMA 4X utility service rack; NEMA 4X stainless steel control panel, transducer controls, cellular auto dialer, duct bank, conduit and wire. Site security assumes 8-ft tall wood fence. Minimal site restoration is anticipated and cost does not include driveway or access road. City should use neighboring driveway for access. This estimate assumes no mitigation basins or detention basin are necessary and site drainage can be discharged via sheet flow off the site boundary. This estimate does not include a storm water outfall or storm water drainage system of any kind.

(3) This cost includes replacement of three (3) 10-HP pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm single pump capacity of 575 gpm pumping through 6" diameter PVC force main. This assumes the existing hatches are large enough to accommodate the new larger pumps and replacement of hatch is not needed. No modifications were assumed to electrical components, controls, header piping, valves, protective coating, or any other repairs or improvements to the lift station.

(4) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(5) Cost assumes 55-ft by 55-ft footprint is necessary for Lift Station site. Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(6) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



10/24/24

Michael P Gurka

QUIDDITY

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
PROPOSED TAYLOR ROAD LIFT STATION
& 12-INCH FORCE MAIN TO CASTLEBRIDGE WWTP - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-12
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of 1.1 MGD lift station (Lift Station No. 1) and 12-inch diameter force main to serve projected development. The force main will convey the waste collected in the new development south of Hwy 290 and cross major highways, intersections, roadways and utilites. All utilities are anticipated within the public right-of-way with no easements. Easement is anticipated for the lift station site.

Item No.	Description	Unit	Qty.		Unit Price		Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$	138,000	$	138,000	
2.	Lift Station	L.S.	1	$	1,400,000	$	1,400,000	(2)
3.	12-inch Force Main	L.F.	3,100	$	120	$	372,000	
4.	12-inch Force Main with 24-inch Steel Casing for Highway Crossing	L.F.	425	$	750	$	319,000	
5.	Air Release Valves in Manholes	EA.	3	$	12,000	$	36,000	
6.	Trench Safety Systems	L.F.	3,525	$	2	$	7,000	
7.	Traffic Control Plan	L.S.	1	$	100,000	$	100,000	
8.	Dewatering/Well Pointing	L.S.	1	$	30,000	$	30,000	
9.	Storm Water Pollution Prevention	L.S.	1	$	30,000	$	30,000	
10.	Pavement Replacement	S.Y.	2,000	$	100	$	200,000	
11.	Site Restoration	L.S.	1	$	120,000	$	120,000	
			SUBTOTAL			$	2,752,000	(3)
					Contingencies (20%)	$	550,000	
					10 Yr Inflation @ 3.5%/Yr	$	620,000	
					Land Acquisition	$	180,000	(4)
					Engineering & Testing		$706,000	(5)
					TOTAL		**$4,808,000**	(6)

Notes:

(1) All Totals have been rounded to the nearest $1,000.

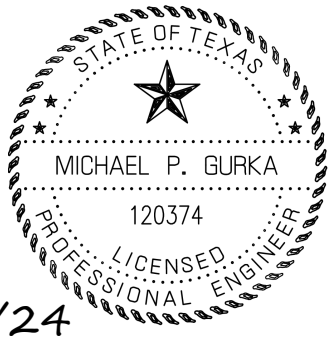
(2) This cost includes a 12-ft (12') diameter precast wet well with precast valve vault with below ground piping and valves. Assumes the depth of the proposed lift station finish floor will not exceed 27-feet (27') from finished grade elevation and is not located in any flood hazard areas, 1% annual chance floodplain or within existing wetlands. This estimate does not include any costs for wetland mitigation, detention basins, mitigation basins, or any other work related to compensating for wetlands or floodplain impact. The mechanical equipment assumes three (3) 25-HP pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm single pump capacity of 1,700 gpm pumping through ~3,500 linear feet of 12" diameter PVC force main. This includes on-site electrical equipment, Diesel Generator, Automatic Transfer Switch, NEMA 4X utility service rack; NEMA 4X stainless steel control panel, transducer controls, cellular auto dialer, duct bank, conduit and wire. Site security assumes 8-ft tall wood fence. Minimal site restoration is anticipated and cost includes driveway or access road. This estimate assumes no mitigation basins or detention basin are necessary and site drainage can be discharged via sheet flow off the site boundary. This estimate does not include a storm water outfall or storm water drainage system of any kind.

(3) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(4) Cost assumes 75-ft by 75-ft footprint is necessary for Lift Station site. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(5) This estimate does not include costs for determination, dedication, or acquisition of easements or right-of-way for utilities.

(6) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



10/24/24

Michael P Gurka

QUIDDITY

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
WRIGHT ROAD 8-INCH AND 12-INCH
WASTEWATER LINE FROM FM 529 TO HWY 290 - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-13
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of a 12-inch gravity sewer along Wright Road from Lift Station No. 1 along Hwy 290 then south along Wright Road and an 8-inch gravity sewer extending off of Wright Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 52,000	$ 52,000	
2.	8-inch Gravity Sewer	L.F.	1,600	$ 90	$ 144,000	
3.	12-inch Gravity Sewer	L.F.	4,200	$ 130	$ 546,000	
4.	48-inch Diameter Manhole	EA.	14	$ 5,000	$ 70,000	
5.	Trench Safety Systems	L.F.	5,800	$ 2	$ 12,000	
6.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
7.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
8.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
9.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
10.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 1,039,000	(2)
				Contingencies (20%)	$ 208,000	
				10 Yr Inflation @ 3.5%/Yr	$ 234,000	
				Land Acquisition	$ 250,000	(3)
				Engineering & Testing	$ 267,000	
				TOTAL	**$1,998,000**	(4)

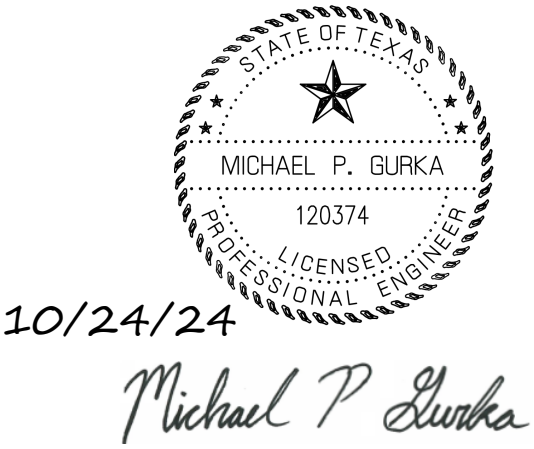
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



QUIDDITY

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
TAYLOR ROAD 8-INCH, 15-INCH, & 18-INCH WASTEWATER LINE - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-14
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of a 18-inch gravity sewer along Taylor Road from Hwy 290 to Fairview Street, a 15-inch gravity sewer from Fairview Street to Harms Road, an 8-inch gravity sewer along Musgrove Lane and an 8-inch gravity sewer along Taylor Road west of Harms Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 48,000	$ 48,000	
2.	8-inch Gravity Sewer	L.F.	1,500	$ 90	$ 135,000	
3.	15-inch Gravity Sewer	L.F.	1,600	$ 150	$ 240,000	
4.	18-inch Gravity Sewer	L.F.	1,400	$ 180	$ 252,000	
5.	48-inch Diameter Manhole	EA.	12	$ 5,000	$ 60,000	
6.	Trench Safety Systems	L.F.	3,000	$ 2	$ 6,000	
7.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
8.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
9.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
10.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
11.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 956,000	(2)
				Contingencies (20%)	$ 191,000	
				10 Yr Inflation @ 3.5%/Yr	$ 215,000	
				Land Acquisition	$ 410,000	(3)
				Engineering & Testing	$245,000	
				TOTAL	**$2,017,000**	(4)

(1)

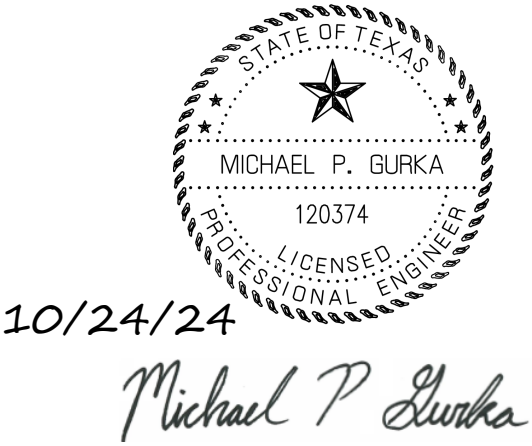
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



QUIDDITY

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CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
FAIRVIEW STREET 8-INCH AND 12-INCH
WASTEWATER LINE FROM FM 529 TO TAYLOR ROAD -SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-15
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of a 12-inch gravity sewer along Fairview Street and 8-inch gravity sewer lines extending off of Fairview Street to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way. to serve projected development.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 78,000	$ 78,000	
2.	8-inch Gravity Sewer	L.F.	5,800	$ 90	$ 522,000	
3.	12-inch Gravity Sewer	L.F.	4,000	$ 130	$ 520,000	
4.	48-inch Diameter Manhole	EA.	29	$ 5,000	$ 145,000	
5.	Trench Safety Systems	L.F.	9,800	$ 2	$ 20,000	
6.	Traffic Control Plan	L.S.	1	$ 30,000	$ 30,000	
7.	Dewatering/Well Pointing	L.S.	1	$ 20,000	$ 20,000	
8.	Storm Water Pollution Prevention	L.S.	1	$ 30,000	$ 30,000	
9.	Pavement Replacement	S.Y.	750	$ 100	$ 75,000	
10.	Site Restoration	L.S.	1	$ 125,000	$ 125,000	
			SUBTOTAL		$ 1,565,000	(2)
				Contingencies (20%)	$ 313,000	
				10 Yr Inflation @ 3.5%/Yr	$ 352,000	
				Land Acquisition	$ 1,290,000	(3)
				Engineering & Testing	$ 401,000	
				TOTAL	**$3,921,000**	(4)

(1) applies to all totals.

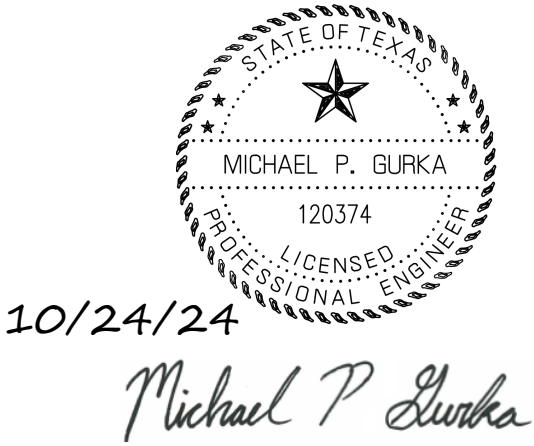
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



QUIDDITY

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
HARMS ROAD 8-INCH AND 12-INCH
WASTEWATER LINE FROM FM 529 TO TAYLOR ROAD - SERVICE TO ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-16
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of a 12-inch gravity sewer along Harms Road and an 8-inch gravity sewer extending off of Harms Road to serve the projected development. The majority of utilities are anticipated within the public right-of-way with minimal easements in order to serve tracts not adjacent to public right-of-way.

Item No.	Description	Unit	Qty.	Unit Price	Total	(1)
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 50,000	$ 50,000	
2.	8-inch Gravity Sewer	L.F.	1,400	$ 90	$ 126,000	
3.	12-inch Gravity Sewer	L.F.	4,000	$ 130	$ 520,000	
4.	48-inch Diameter Manhole	EA.	14	$ 5,000	$ 70,000	
5.	Trench Safety Systems	L.F.	5,400	$ 2	$ 11,000	
6.	Traffic Control Plan	L.S.	1	$ 25,000	$ 25,000	
7.	Dewatering/Well Pointing	L.S.	1	$ 15,000	$ 15,000	
8.	Storm Water Pollution Prevention	L.S.	1	$ 25,000	$ 25,000	
9.	Pavement Replacement	S.Y.	500	$ 100	$ 50,000	
10.	Site Restoration	L.S.	1	$ 100,000	$ 100,000	
			SUBTOTAL		$ 992,000	(2)
				Contingencies (20%)	$ 198,000	
				10 Yr Inflation @ 3.5%/Yr	$ 223,000	
				Land Acquisition	$ 200,000	(3)
				Engineering & Testing	$ 254,000	
				TOTAL	**$1,867,000**	(4)

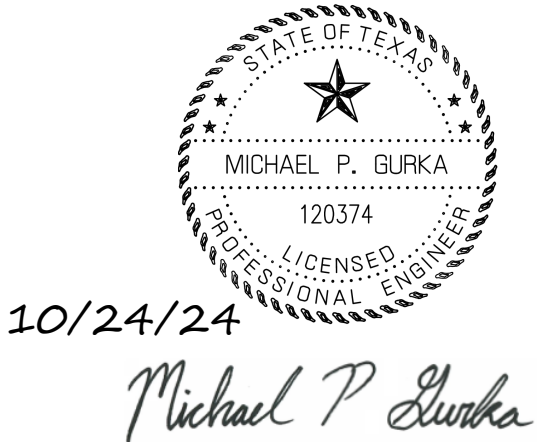
Notes:

(1) All Totals have been rounded to the nearest $1,000.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) Cost assumes 25-ft easement is necessary to serve tracts not adjacent to public right-of-way. Unit cost of track estimated from HCAD 2023 Appraised Valuation and includes estimated soft costs for survey metes and bounds with exhibit and typical land acquisition process. Does not assume condemnation, contested hearing or litigation.

(4) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
CASTLEBRIDGE WWTP EXPANSION - SERVICE IN CITY LIMITS & ETJ
CAPITAL IMPROVEMENTS PROJECT No. S-17
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of facility improvements and expansion at the Castlebridge WWTP to serve the projected demand from new development.

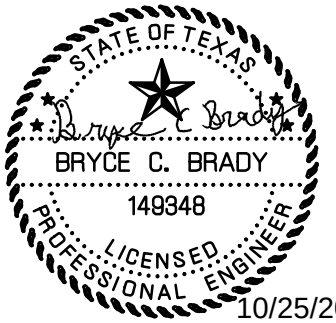
Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance, Permits	L.S.	1	$ 350,000	$ 350,000	
2.	Lift Station	L.S.	1	$ 1,500,000	$ 1,500,000	
3.	Headworks	L.S.	1	$ 1,000,000	$ 1,000,000	
4.	Aeration Basin	L.S.	1	$ 1,200,000	$ 1,200,000	
5.	Aerobic Digesters	L.S.	1	$ 1,800,000	$ 1,800,000	
6.	Chlorine Contact Basin, Dechlorination, and Flow Measurement	L.S.	1	$ 1,200,000	$ 1,200,000	
7.	Blowers & Accessories	L.S.	1	$ 1,200,000	$ 1,200,000	
8.	Non-Potable Water Pumping Station	L.S.	1	$ 350,000	$ 350,000	
9.	Chemical Building	L.S.	1	$ 500,000	$ 500,000	
10.	Control Building	L.S.	1	$ 1,000,000	$ 1,000,000	
11.	Yard Piping, Fittings, Valves, Supports, etc.	L.S.	1	$ 800,000	$ 800,000	
12.	Site Electrical Work	L.S.	1	$ 500,000	$ 500,000	
13.	Site work	L.S.	1	$ 250,000	$ 250,000	
			SUBTOTAL		$ 11,650,000	(2)
				Contingencies (20%)	$ 2,330,000	
				7 Yr Inflation @ 3.5%/Yr	$3,806,000	
				Engineering & Testing	$2,668,000	
				TOTAL	**$20,454,000**	(3)

Notes:

(1) This estimate is prepared for preliminary cost planning purposes for an expansion of the Castlewood WWTP from a 0.8 MGD permitted facility to a 1.1 MGD permitted facility. Grab sampling from the City was used as a preliminary determination of influent loading, and those samples exceeded the design loading of the prior design. The City shall conduct composite influent sampling in accordance with the TCEQ Rules and Regulations to determine the appropriate influent pollutant design basis for this WWTP. This cost also assumes that all of the required facilities will be constructed on the existing property, and no additional costs are included for property or buffer zone aquisition.

(2) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(3) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



10/25/2024

CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
TAHOE LIFT STATION REPLACEMENT
CAPITAL IMPROVEMENTS PROJECT No. S-18
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of the replacement of Tahoe Lift Station with a 10' diameter duplex wet well, and 1,250 LF of 8" diameter PVC forcemain capable of conveying 375 gpm with a firm capacity. The lift station will be capable of expanding to an 800 gpm firm capacity lift station by converting it into a triplex pump station in a future capital improvements project.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance	L.S.	1	$ 90,000	$ 90,000	
2.	Lift Station	L.S.	1	$ 810,000	$ 810,000	(1), (2), (3
3.	Off-Site Utilities	L.S.	1	$ 360,000	$ 360,000	(4)
4.	Electrical	L.S.	1	$ 540,000	$ 540,000	(5)
			SUBTOTAL		$ 1,800,000	(6)
				Contingencies (20%)	$ 360,000	
				Engineering & Testing	$ 324,000	
				TOTAL	**$ 2,484,000**	(7)

Notes:

(1) This cost includes a 10' diameter wet well with high solids epoxy coating and aboveground piping and valves. This estimate assumes the depth of the proposed lift station finish floor will not exceed 25-vertical feet (25') from finished grade elevation. The top slab will be located approximately 4-feet above the current 100-year base flood elevation, approximately 7-feet above the existing grade. These elevations are subject to change

(2) This cost includes two (2) submersible pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm single pump capacity of 375-gpm pumping through ~1,250 linear feet (1,250') of 8" diameter PVC force main.

(3) This cost includes 8' cedar fencing, access drive, landscaping, site grading, and on-site influent sanitary sewer with a hydraulically sealed manhole. This estimate assumes no mitigation basins or detention basin are necessary and site drainage can be discharged via sheet flow off the site boundary. This estimate does not include a storm water outfall or storm water drainage system of any kind. This estimate assumes the access road and on-site piping are no longer than 25 feet (25') from the R.O.W.

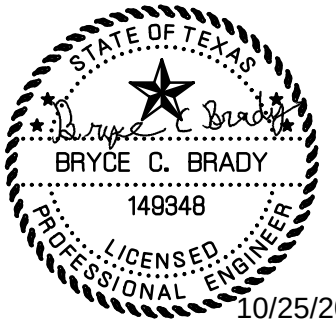
(4) This cost includes construction of the off-site 8-inch PVC force main and off-site influent sanitary sewer gravity line and manholes, new service connections to existing properties, site restoration, and traffic control for all off-site construction items.

(5) This cost includes all on-site electrical, NEMA 4X utility service rack; NEMA 4X stainless steel control panel, transducer controls, and cellular auto dialer. No on-site Generator will be provided for this site with this project, but the control panel will include installation of a portable generator quick connect and a manual transfer switch.

(6) This estimate does not include any costs for wetland mitigation, detention basins, mitigation basins, or any other work related to compensating for wetlands or floodplain impact.

(7) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(8) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.



CLASS 3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
FOR CONSTRUCTION OF
REROUTE JONES ROAD LIFT STATION INTO WHITE OAK BAYOU SERVICE AREA
CAPITAL IMPROVEMENTS PROJECT No. S-19
CITY OF JERSEY VILLAGE
OCTOBER 2024

Scope:

The project consists of design and construction of system improvements necessary to redirect wastewater flows from the Jones Rd Lift Station from the Castlebridge WWTP service area into the White Oak Bayou WWTP Service Area. Improvements includes 400 LF of 6" PVC forcemain, the expansion of the Tahoe Lift Station to a firm capacity of 800 gpm, and the expansion of Phillipine Lift Station to a firm capcacity of 1575 gpm.

Item No.	Description	Unit	Qty.	Unit Price	Total	
1.	Mobilization, Bonds & Insurance	L.S.	1	$ 25,000	$ 25,000	
2.	6-inch Force Main by Trenchless Construction	L.F.	400	$ 120	$ 48,000	(3)
3.	Trench Safety System	L.F.	400	$ 2	$ 800	
3.	Tahoe Lift Station Expansion	L.S.	1	$ 200,000	$ 200,000	(4)
4.	Phillipine Lift Station Expansion	L.S.	1	$ 250,000	$ 250,000	(5)
5.	Traffic Control	L.S.	1	$ 20,000	$ 20,000	
6.	Pavement Replacement	S.Y.	400	$ 100	$ 100	
7.	Site Restoration	L.S.	1	$ 75,000	$ 75,000	
				SUBTOTAL	$ 618,900	(1)
				Contingencies (20%)	$ 124,000	
				1 Yr Inflation @ 3.5%/Yr	$ 26,000	
				Engineering	$ 154,000	
				TOTAL	**$ 922,900**	(2)

Notes:

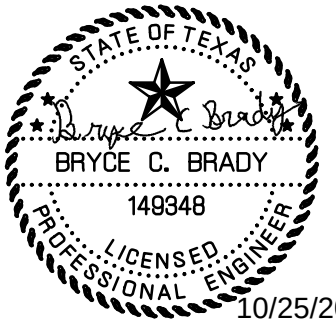
(1) This estimate represents my best judgment as a design professional familiar with the construction industry. Quiddity Engineering, LLC has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Accordingly, we cannot and do not guarantee that bids will not vary from this cost estimate.

(2) This estimate does not include inflation or escalation. Market conditions remain volatile due to, but not limited to, labor shortages, material shortages, and supply chain disruptions since the start of the COVID-19 pandemic. More recently, market conditions are experiencing an added strain due to recent and ongoing global conflicts. The U.S. Bureau of Labor Statistics Consumer Index reported an average overall inflation of 3.5% over the last 12 months. The unknown decisions of federal government monetary policy, in connection with the events noted above, may increase or decrease the current inflation rates. In addition to inflation, Quiddity has seen a significant market escalation, on the order of 30-40%, over the past 36 months due to the significant deficit in supply versus demand in the local construction industry in connection with the events noted above. It is recommended the Client take these items in consideration when preparing the budget for the project.

(3) This cost includes construction of the off-site 6-inch PVC force main, site restoration, and traffic control for all off-site construction items.

(4) This cost includes removal of existing duplex pumps and replacement with three (3) submersible pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm two-pump capacity of 800-gpm pumping through ~1,250 linear feet (1,250') of 8" diameter PVC force main. This is under the assumption that a new Tahoe Lift Station will be constructed prior to the initiation of this project. The cost includes all electrical improvements necessary at Tahoe Lift Station to expand capacity.

(5) This cost includes the removal of existing triplex pumps and replacement with three (3) submersible pumps complete with base elbows, guide rails, power cables, and lifting chains with a firm two-pump capacity of 1575-gpm pumping through the existing 14" diameter force main to White Oak Bayou WWTP. This cost includes all electrical improvements necessary at Philippine Lift Station to expand capacity.



10/25/2024

APPENDIX H

CASTLEBRIDGE WWTP
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Castlebridge WWTP	1984												
On-Site Lift Station	1984												
Wet Well Rehabilitation		Unknown	15		$ 35,000								
Repair Pumps (3 - 860 or 1,400 GPM, 15 or 25 HP)		Unknown	10		$ 45,000								
Replace Pumps (3 - 860 or 1,400 GPM, 15 or 25 HP)		Unknown	20										
Recoat Riser Piping/Valves		Unknown	10										
Replace Riser Piping/Valves		Unknown	20		$ 20,000								
Recoat Discharge Piping/Valves		Unknown	10										
Replace Discharge Piping/Valves		Unknown	35		$ 15,000								
Replace Force Main		Unknown	40										
Bypass Pumping		Unknown	-		$ 45,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)		Unknown	20		$ 15,000								
Electrical/Controls		Unknown	20		$ 125,000								
Miscellaneous Site Work			-										
Headworks	2020												
Replace Piping		-	20			$ 30,000							
Replace Manual Screen		-	15			$ 35,000							
Construct New Mechanical Screen and Structure	-	-	35			$ 750,000							
Rehabilitate Mechanical Screen/Controls	-	-	10										
Influent and RAS Channel	1984												
Replace Grating		Unknown	20			$ 25,000							
Replace RAS Piping		Unknown	50										
Replace Aeration Diffusers		Unknown	20			$ 30,000							
Concrete Rehabilitation		Unknown	20			$ 30,000							
Aeration Basin No. 1	1984												
Replace Handrail		Unknown	20					$ 50,000					
Replace Air Header		Unknown	30					$ 100,000					
Rehabilitate Aeration Diffusers (Fine Bubble)		2023	12										
Replace Aeration Diffusers (Fine Bubble)		2020	20					$ 40,000					
Replace Slidge Gates		Unknown	30					$ 75,000					
Concrete Rehabilitation		Unknown	20					$ 45,000					
Degritting of Basin		2023	-					$ 50,000					
Aeration Basin No. 2	1984												
Replace Handrail		Unknown	20					$ 30,000					
Replace Air Header		Unknown	30					$ 25,000					
Rehabilitate Aeration Diffusers (Fine Bubble)		2023	12										
Replace Aeration Diffusers (Fine Bubble)		2020	20					$ 50,000					
Replace Slidge Gates		Unknown	30					$ 40,000					
Concrete Rehabilitation		Unknown	20					$ 20,000					
Degritting of Basin		2023	-					$ 20,000					
Clarifier Feed Channel	1984												
Replace Grating		Unknown	20										
Rehabiliation Aeration Diffusers		Unknown	20										
Replace Slide Gates		Unknown	30										
Clarifier No. 1	1984												
Rehabilitate Clarifier Mechanism & Drive		2022	10									$ 50,000	
Replace Clarifier Mechanism & Drive		2022	30										
Recoat Weirs, Launders, Bridge		2022	15										
Replace Effluent Weirs, Scum Baffle & Launders		2022	20										
Replace Weir Washing System		2022	10									$ 25,000	
Miscellaneous Clarifier Electrical		2022	20										
Scum Pump Replacement		N/A	15										
Clarifier No. 2	2018												
Rehabilitate Clarifier Mechanism & Drive		2021	10								$ 50,000		
Replace Clarifier Mechanism & Drive		2021	30										
Recoat Weirs, Launders, Bridge		2021	15										
Replace Effluent Weirs, Scum Baffle & Launders		2021	20										
Replace Weir Washing System		2021	10								$ 25,000		
Miscellaneous Clarifier Electrical		2021	20										
Scum Pump Replacement		2021	15										
Sludge Return Channel	1984												
Replace Grating		2020	20										
Rehabiliation Aeration Diffusers		2020	20										
Replace Slide Gates		2020	30										
Concrete Rehabilitation		Unknown	20										
Chlorine Contact Basin	Unknown												
Replace Induction Pump		Unknown	15					$ 50,000					
Weir Replacement		Unknown	20										
Instrument Replacement		Unknown	10					$ 25,000					
Install Flow Baffles		Unknown	-					$ 50,000					
Replace Handrail and Grating		Unknown	20					$ 25,000					
Digester Basin No. 1	1984												
Concrete Rehabilitation		Unknown	20			$ 20,000							
Replace WAS Airlift		Unknown	20			$ 35,000							
Replace Decant Mechanism		Unknown	15			$ 25,000							
Slide Gate Replacement		Unknown	30										
Degritting of Basin			-			$ 45,000							
Blower System	1984												
Rehabilitation Blower No. 1		-	10										
Replace Blower No. 1		-	20	$ 125,000									
Rephabilitate Blower No. 2		-	10										
Replace Blower No. 2		-	20	$ 125,000									
Rehabilitation Blower No. 3		-	10			$ 45,000							
Replace Blower No. 3		-	20										
Rehabilitation Blower No. 4	2021		10								$ 45,000		
Replace Blower No. 4	2021		20										
Rehabilitation Blower No. 5	2021		10									$ 45,000	
Replace Blower No. 5	2021		20										
Air Piping Replacement		2021	30										
Control and Blower Building	1984												
Structure Rehabilitation			15										
Structure Replacement			50										
MCC Replacement	1984		30			$ 1,000,000							
Automatic Transfer Switch Replacement			20			$ 50,000							
New MCC Building						$ 650,000							
Site SCADA													
Chemical Storage and Feed Area	1984												
Chemical Piping Replacement		Unknown	10		$ 30,000								
Chemical Equipment Replacement		2024	10										
Miscellaneous Electrical		Unknown	10										
Structure Rehabilitation		2022	15										
Structure Replacement			50										
Generator	2015												
Replace Generator			25										
Recoat Fuel Tank and Panel Replacements			12				$ 35,000						
FUTURE WWTP CONSIDERATIONS													
Convert Digester to Aeration Basin								$ 900,000					
Construct New Multi-Stage Digester								$ 1,300,000					
Conversion to Chlorine Gas Ejectors						$ 350,000							
Blower Replacement								$ 900,000					
Construct Non-Potable Water Station					$ 500,000								
Construct Sludge Draw Off Basin					$ 55,000								
WWTP Expansion											$ 12,000,000		
CASTLEBRIDGE WASTEWATER TREATMENT PLANT TOTAL:				**$ 250,000**	**$ 885,000**	**$ 3,120,000**	**$ 35,000**	**$ 3,795,000**	**$ -**	**$ -**	**$ 12,120,000**	**$ 120,000**	**$ -**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost	$ 250,000	$ 885,000	$ 3,120,000	$ 35,000	$ 3,795,000	$ -	$ -	$ 12,120,000	$ 120,000	$ -
Contingencies (20%)	$ 50,000	$ 177,000	$ 624,000	$ 7,000	$ 759,000	$ -	$ -	$ 2,424,000	$ 24,000	$ -
Inflation (4% Per Year)	$ 24,000	$ 133,000	$ 636,000	$ 9,000	$ 1,208,000	$ -	$ -	$ 6,157,000	$ 69,000	$ -
Engineering	$ 65,000	$ 239,000	$ 876,000	$ 10,000	$ 1,152,000	$ -	$ -	$ 4,140,000	$ 43,000	$ -
TOTAL PROJECT COST	$ 389,000	$ 1,434,000	$ 5,256,000	$ 61,000	$ 6,914,000	$ -	$ -	$ 24,841,000	$ 256,000	$ -

STATE OF TEXAS
K. GRADY TURNER, III
117284
LICENSED PROFESSIONAL ENGINEER

03/05/2024

QUIDDITY ENGINEERING

WASTEWATER LIFT STATIONS
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Year Rehab	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Rio Grande Lift Station (8501 Rio Grande St)		Unknown											
Wet Well Rehabilitation			15			$ 35,000							
Repair Pumps (2 - 123 GPM, Unknown HP)			10			$ 15,000							
Replace Pumps (2 - 123 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10			$ 6,000							
Replace Riser Piping/Valves			20										
Recoat Discharge Piping/Valves			10			$ 5,000							
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-			$ 35,000							
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20			$ 15,000							
Electrical/Controls			20			$ 115,000							
Miscellaneous Site Work			-			$ 20,000							
SCADA Panel			-										
Generator	N/A	N/A											
			-										
Tahoe Lift Station (15810 Tahoe)	1974	2002											
Wet Well Rehabilitation			15	$ 25,000									
Repair Pumps (2 - 375 GPM, 5 HP)			10	$ 15,000									
Replace Pumps (2 - 375 GPM, 5 HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20	$ 35,000									
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35	$ 20,000									
Replace Force Main			50										
Bypass Pumping			-	$ 45,000									
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls		2020	20										
Miscellaneous Site Work			-	$ 50,000									
Install Odor Control			-	$ 50,000									
SCADA Panel			-										
Generator	N/A	N/A	-										
Replacement Lift Station													$ 900,000
			-										
Philippine Lift Station	1980	2024											
Wet Well Rehabilitation			15										
Repair Pumps (2 - 375 GPM, Unknown HP)			10										
Replace Pumps (2 - 375 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20										
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-										
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls			20										
Miscellaneous Site Work			-										
SCADA Panel			-										
Generator	Unknown	Unknown	25										
			-										
Hilcrest Lift Station (7302 Hillcrest)	1996	Unknown											
Wet Well Rehabilitation			15		$ 40,000								
Repair Pumps (2 - 320 GPM, 7.5 HP)			10		$ 15,000								
Replace Pumps (2 - 320 GPM, 7.5 HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20		$ 50,000								
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-		$ 45,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20		$ 15,000								
Electrical/Controls			20										
Miscellaneous Site Work			-	$ 25,000	$ 30,000								
SCADA Panel			-										
Generator	Unknown	Unknown	-										
			-										
290 NW Lift Station	1984	Unknown											
Wet Well Rehabilitation			15		$ 25,000								
Repair Pumps (2 - 185 GPM, Unknown HP)			10		$ 15,000								
Replace Pumps (2 - 185 GPM, Unknown HP)			20										
Recoat Riser Piping/Valves			10										
Replace Riser Piping/Valves			20		$ 35,000								
Recoat Discharge Piping/Valves			10										
Replace Discharge Piping/Valves			35										
Replace Force Main			50										
Bypass Pumping			-		$ 30,000								
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)			20										
Electrical/Controls			20		$ 100,000								
Miscellaneous Site Work			-		$ 10,000								
SCADA Panel			-										
Generator	N/A	N/A											
			-										
Jones Rd Lift Station	2010												
Wet Well Rehabilitation		-	15				$ 45,000						
Repair Pumps (3 - 350 GPM, 15 HP)		-	10				$ 25,000						
Replace Pumps (3 - 350 GPM, 15 HP)		-	20										
Recoat Riser Piping/Valves		-	10				$ 15,000						
Replace Riser Piping/Valves		-	20										
Recoat Discharge Piping/Valves		-	10				$ 6,000						
Replace Discharge Piping/Valves		-	35										
Replace Force Main		-	50										
Bypass Pumping		-	-				$ 55,000						
Miscellaneous Metals (Supports, Hatches, Guiderails, etc.)		-	20				$ 5,000						
Electrical/Controls		-	20										
Miscellaneous Site Work		-	-										
SCADA Panel		-	-										
Generator	N/A	N/A											
			-										
				2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Cost				$ 265,000	$ 410,000	$ 246,000	$ 151,000	$ -	$ -	$ -	$ -	$ -	$ 900,000
Contingencies (20%)				$ 53,000	$ 82,000	$ 49,000	$ 30,000	$ -	$ -	$ -	$ -	$ -	$ 180,000
Inflation (4% Per Year)				$ 26,000	$ 61,000	$ 50,000	$ 39,000	$ -	$ -	$ -	$ -	$ -	$ 583,000
Engineering				$ 69,000	$ 111,000	$ 69,000	$ 44,000	$ -	$ -	$ -	$ -	$ -	$ 333,000
TOTAL PROJECT COST				$ 413,000	$ 664,000	$ 414,000	$ 264,000	$ -	$ -	$ -	$ -	$ -	$ 1,996,000

STATE OF TEXAS
K. GRADY TURNER, III
117234
LICENSED PROFESSIONAL ENGINEER

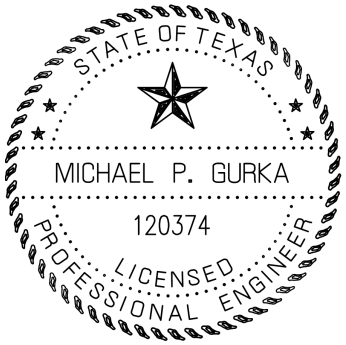
03/05/2024

QUIDDITY ENGINEERING

WASTEWATER COLLECTION SYSTEM
CITY OF JERSEY VILLAGE
CAPITAL IMPROVEMENT PLAN
MARCH 2024

Estimated Fiscal Years from October 1 - September 30

Improvement	Year Installed	Material	Life Expectancy	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Wastewater Collection System													
Replace Wastewater Lines, 2" - 30" (approx. 101,000 LF)	1970s	AC / Clay / PVC / Concrete			$ 15,655,000								
Replace Wastewater Lines, 2" - 36" (approx. 25,000 LF)	1980s	AC / PVC / Concrete						$ 4,420,000					
Replace Wastewater Lines, 2" - 6" (approx. 1,100 LF)	Multi Yr	AC / PVC						$ 170,500					
				2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Construction Cost				$ -	$ 15,655,000	$ -	$ -	$ 4,590,500	$ -	$ -	$ -	$ -	$ -
Contingencies (20%)				$ -	$ 3,131,000	$ -	$ -	$ 918,000	$ -	$ -	$ -	$ -	$ -
Inflation (4% Per Year)				$ -	$ 2,346,000	$ -	$ -	$ 1,462,000	$ -	$ -	$ -	$ -	$ -
Engineering				$ -	$ 4,226,000	$ -	$ -	$ 1,394,000	$ -	$ -	$ -	$ -	$ -
TOTAL PROJECT COST				$ -	$ 25,358,000	$ -	$ -	$ 8,364,500	$ -	$ -	$ -	$ -	$ -



3/5/2024

Michael P Gurka

QUIDDITY ENGINEERING

Texas Board of Professional Engineers Registration No. F-23290 | Texas Board of Professional Land Surveying Registration No. 10046100