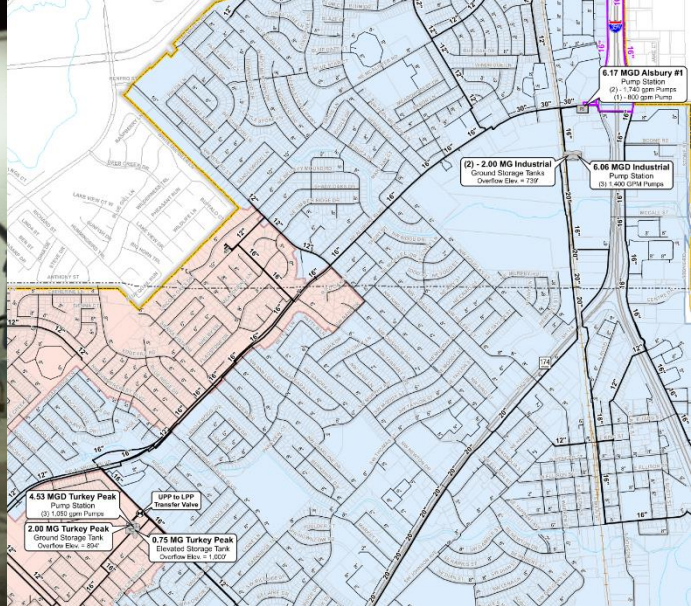
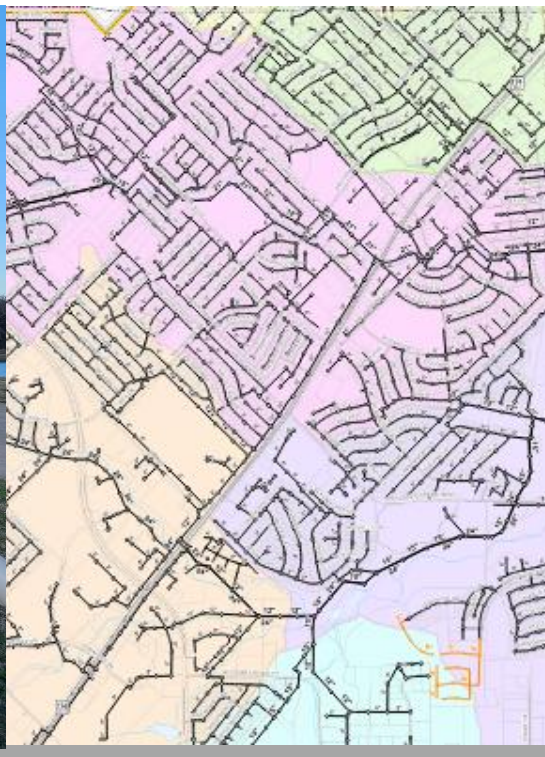




CITY OF BURLESON





WATER & WASTEWATER MASTER PLAN UPDATE

Volume II: Master Plan Report

Prepared By:

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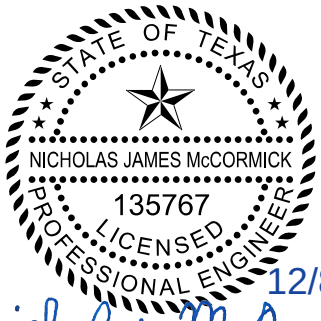
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1.0 INTRODUCTION

The City of Burleson (City) contracted with Freese and Nichols, Inc. (FNI) to prepare an update of the City's Water and Wastewater Master Plan. This report presents the analysis approach, findings and results of the Water and Wastewater Master Plan Update. The goal of the comprehensive Water and Wastewater Master Plan is to evaluate and analyze the systems to measure existing performance, identify deficiencies, and determine improvements needed to meet projected future conditions. Historical water and wastewater usage were reviewed to establish trends and project demands and flows for the system evaluations. Based on the evaluations, a phased Capital Improvement Plan (CIP) through Buildout was developed for each system. The recommended improvements will serve as a basis for the design, construction, and financing of lines and facilities required to meet the City of Burleson's future system needs. Please refer to *Volume I – Executive Summary* for a summary of the results presented in this report.

This study serves as an update to the previous 2015 Water and Wastewater Master Plan. As part of this update, the proposed wastewater service area changed significantly and land use assumptions were developed on a per-parcel basis. Additionally, water and wastewater improvements that have been constructed since 2015 were included in this study, such as the Turkey Peak ground storage tank (GST).

1.1 Scope of Work

The scope of work consisted of the following major tasks:

- **Land Use Assumptions Update:** Population, non-residential acreage, water demands, and wastewater flow projections for existing, near-term (5-Year), intermediate-term (10-Year), long-term (20-Year), and ultimate (Buildout) conditions were developed using future land use assumptions and design criteria. These projections were developed for each parcel within the City's Extraterritorial Jurisdiction (ETJ).
- **Water Distribution System Evaluation:** The existing and future water distribution system was evaluated under average day, maximum day, and peak hour demand conditions to determine where pressure issues occur, if storage tanks are operating properly, and if pumping facilities are adequate to meet the required demand. The water system evaluations were used to develop and provide recommendations for future supply, pumping, elevated storage, and ground storage capacity requirements. The hydraulic model was utilized to prepare CIP to serve the projected Buildout demands. Planning level cost estimates in current-year dollars, including engineering and

contingencies, were developed for each recommended project. A prioritized list of projects was prepared to address existing and projected future deficiencies in the water system.

- **Wastewater Collection System Evaluation:** The existing and future wastewater systems were simulated under peak wet weather loads to identify surcharging and overflow locations and other capacity/restriction issues. The hydraulic model was utilized to prepare two CIP scenarios to serve the projected long-term (20-Year) flows and the Buildout flows. Planning level cost estimates in current-year dollars, including engineering and contingencies, were developed for each recommended project. A prioritized list of projects was prepared to address existing and projected future deficiencies in the wastewater system.

1.2 List of Abbreviations

The frequently used abbreviations in this report are presented in **Table 1-1**.

Table 1-1 List of Abbreviations

Abbreviation	Actual
CCN	Certificate of Convenience and Necessity
CIP	Capital Improvement Plan
EST	Elevated Storage Tank
ETJ	Extraterritorial Jurisdiction
FNI	Freese and Nichols, Inc.
GIS	Geographic Information System
GPAD	Gallons Per Acre Per Day
GPCD	Gallons Per Capita Per Day
GPD	Gallons Per Day
GPM	Gallons Per Minute
GST	Ground Storage Tank
JCSUD	Johnson County Special Utility District
LPP	Lower Pressure Plane
MG	Million Gallons
MGD	Million Gallons Per Day
NCTCOG	North Central Texas Council Of Governments
OPCC	Opinion of Probable Construction Cost
PS	Pump Station
PSI	Pounds Per Square Inch
PRV	Pressure Reducing Valve
PUC	Public Utility Commission
SCADA	Supervisory Control and Data Acquisition
TCEQ	Texas Commission on Environmental Quality
UPP	Upper Pressure Plane
WSC	Water Supply Corporation

2.0 LAND USE ASSUMPTIONS

2.1 Historical Population

FNI reviewed the City's historical population data collected from the North Central Texas Council of Governments (NCTCOG) and the U.S. Census Bureau. Based on the NCTCOG data, the City has maintained a growth rate of approximately 2.68% since 2010. Based on the U.S. Census Bureau data, the City has maintained a growth rate of approximately 3.20% since 2010.

The City does not provide water and wastewater service to every resident in the city limits, because some residents use private wells and septic systems, and others are provided service mainly by Bethesda Water Supply Corporation (WSC) or Johnson County Special Utility District (JCSUD). The population that is served by private wells and septic systems is estimated to have increased since 2015 but is difficult to quantify with the information that is currently available. The historical population refers to the total population within Burleson's city limits. **Table 2-1** includes the historical population and associated growth rates.

Table 2-1 Historical Population Growth

	NCTCOG		U.S. Census Bureau	
Year	City Population[1]	Compound Annual Population Growth Rate	City Population[2]	Compound Annual Population Growth Rate
2010	36,690	--	36,690	--
2011	36,990	0.82%	38,464	4.84%
2012	38,130	3.08%	39,026	1.46%
2013	39,010	2.31%	40,521	3.83%
2014	39,920	2.33%	41,574	2.60%
2015	41,280	3.41%	43,279	4.10%
2016	42,560	3.10%	44,674	3.22%
2017	43,960	3.29%	46,001	2.97%
2018	44,860	2.05%	47,113	2.42%
2019	45,620	1.69%	48,225	2.36%
2020	47,641	4.43%	47,641	-1.21%
2021	48,540	1.89%	51,493	8.09%
2022	50,206	3.43%	53,381	3.67%
2023	51,715	3.01%	--	--
	Average	**2.68%**	**--**	**3.20%**

[1]Source: North Central Texas Council of Governments

[2]Source: U.S. Census Bureau

2.2 Population and Non-Residential Acreage Projections

In the Fall of 2017, as part of a separate contract, FNI developed the Projections Database Tool to calculate a projected population, non-residential acreage, water demand, and wastewater flow for every parcel within the City Limits and Extraterritorial Jurisdiction (ETJ). The Projections Database Tool utilizes available information in the City's Geographic Information Systems (GIS) such as acreage, floodplain, existing zoning, and future zoning to determine a projected population and non-residential acreage for each parcel. The Projections Database Tool utilized the water demand and wastewater flow design criteria developed as part of the *2015 Water/Wastewater Master Plan* to determine a projected water demand and wastewater flow for each parcel. As part of the current Master Plan Update process, FNI updated the Projections Database Tool to reflect the revised planning years, known development densities, and updated water demand and wastewater flow design criteria (as developed in **Section 3.0** and **Section 7.0**). A summary of the design criteria used to determine the projected population and non-residential acreage for each parcel in the Projections Database Tool is shown in **Table 2-2**.

Table 2-2 Land Use Assumptions Design Criteria

Land Use Code	Land Use	Units/ Acre	People/ Unit	Non-Residential Acreage
Existing Zoning				
2F	Two-Family (Duplex)	--*	3.5	--
AL	Assisted Living	--*	1.0	--
C	Commercial	--	--	Developable Acres
CEM	Cemetery	--	--	--
CH	Church	--	--	Developable Acres
FS	Fire Station	--	--	Developable Acres
GW	Gas Well	--	--	--
LI	Light Industrial	--	--	Developable Acres
MF	Multi-Family	24.00	2.2	--
MH	Manufactured Home	--*	3.0	--
O	Office	--	--	Developable Acres
OS	Open Storage	--	--	--
POS	Parks/Open Space	--	--	--
PSP	Public/Semi-Public	--	--	--
R	Retail	--	--	Developable Acres
SCHOOL	Education	--	--	Developable Acres
SF	Single Family	--*	3.0	--
SFA	Single Family Attached	--*	3.0	--
V	Vacant	--	--	--
VB	Vacant Building	--	--	--

*Assumes one unit per parcel, not based on acreage.

Table 2-2 Land Use Assumptions Design Criteria - Continued

Land Use Code	Land Use	Units/ Acre	People/ Unit	Non-Residential Acreage
Future Zoning				
bgc	Business Growth Center	--	--	Developable Acres
cd	Campus District	--	--	Developable Acres
comcor	Commercial Corridor	--	--	Developable Acres
freecom	Conventional Freeway Commercial	--	--	Developable Acres
ind	Industrial/Employment Growth Center	--	--	Developable Acres
maincor	Main Street Corridor	--	--	--
mugc	Mixed Use Growth Center	24.00	2.2	--
POS	Parks/Open Space	--	--	--
rrn	Rural Residential Neighborhood	1.00	3.0	--
urn	Urban Residential Neighborhood	4.25	3.0	--
mdr	Medium Density Residential	6.00	3.0	--

In addition to the existing and future land uses summarized in **Table 2-2**, City staff provided detailed development information for known and upcoming developments. This information included residential unit counts and developable non-residential acreage. **Table 2-3** summarizes the known development information and the associated land use assumptions design criteria.

Table 2-3 Known Development Land Use Assumptions Design Criteria

Development	Land Use	Units	People/ Unit	Non-Residential Acreage	Water/Wastewater Service Area
Animal Pancakes	Single Family	559	3.0	--	Wastewater Only
	Commercial	--	--	39.79	
Chicken Express	Industrial	--	--	26.59	Wastewater Only
Chisholm Summit	Multi-Family	330	2.2	--	Wastewater Only
	Single Family	2,016	3.0	--	
	Townhome	89	3.5	--	
	Commercial	--	--	14.00	
	School	--	--	12.20	
Craftmasters	Mixed Use	--	--	76.93	Wastewater Only
Hulen Subdivision	Single Family	58	3.0	--	Wastewater Only
Hyder Ranch	Multi-Family	326	2.2	--	Water/Wastewater
	Single Family	2,272	3.0	--	
	Commercial	--	--	18.20	
	School	--	--	16.40	
Lakes	Multi-Family	512	2.2	--	Water/Wastewater
	Single-Family	496	3.0	--	
	Commercial	--	--	14.10	
	School	--	--	17.01	

Table 2-3 Known Development Land Use Assumptions Design Criteria - Continued

Development	Land Use	Units	People/ Unit	Non-Residential Acreage	Water/Wastewater Service Area
Bear Ridge	Multi-Family	384	2.2	--	Water/Wastewater
	Single Family	525	3.0	--	
	Commercial	--	--	1.00	
Panchasarp	Multi-Family	354	2.2	--	Wastewater Only
	Single Family	659	3.0	--	
	Commercial	--	--	27.33	
Shannon Creek	Single Family	70	3.0	--	Water/Wastewater

The projected served population and non-residential acreage for the water and wastewater systems are shown in **Tables 2-4** and **2-5**, respectively.

Table 2-4 Water Served Population and Non-Residential Acreage Projections

Year	Served Population	Served Non-Residential Acreage (Acres)
Existing	46,724	1,215
5-Year	52,860	1,465
10-Year	60,548	1,717
Buildout	72,146	2,000

Table 2-5 Wastewater Served Population and Non-Residential Acreage Projections

Year	Served Population	Served Non-Residential Acreage (Acres)
Existing	49,760	1,795
5-Year	62,548	2,383
10-Year	76,822	2,730
20-Year	103,799	4,397
Buildout	120,821	6,523

2.3 Water and Wastewater Service Areas

A certificate of convenience and necessity (CCN) grants a company or entity the exclusive right to provide a retail water/wastewater service to a defined area. In Texas, the Public Utility Commission (PUC) administers CCNs. Because other entities have CCNs and provide service inside Burleson's city limits and in the surrounding areas, there are several pockets of development that do not receive water and/or wastewater service from the City of Burleson. Both JCSUD's and Bethesda WSC's water CCNs include portions of Burleson's city limits and ETJ. There are also a number of residents who have their own septic systems and are not provided service by the City.

There are few wastewater entities with the capability to collect and treat wastewater south of Burleson. JCSUD currently operates a small package plant to treat some wastewater; however, its capacity is limited, and most of the areas in the projected service area boundary are currently served by septic systems. Through discussions with City staff, the future water and wastewater service area was identified. **Appendix A** contains mapping showing the water and wastewater service areas by parcel planning year. Parcels shown in grey are existing and were included in this analysis. Parcels planned for service in the 5-Year, 10-Year, 20-Year, and Buildout are shown in red, blue, green, and purple, respectively. Parcels without any color shading have no current plan for water and/or wastewater service.

3.0 WATER DEMAND PROJECTIONS

The City of Burleson's water distribution system was evaluated under average day demand, maximum day, and peak hour demands. Average day use is the total annual water use divided by the number of days in the year. The average day rate is used as a basis for estimating maximum day and peak hour demands. Maximum day use is the maximum quantity of water used over a 24-hour period and is used in the sizing of ground storage tanks and pump stations. Peak hour use is the peak rate at which water is required during any one hour of the year. Since minimum distribution pressures are usually experienced during peak hour, the sizes and locations of distribution facilities are generally determined based on this condition. These demands represent the range of conditions typically encountered in water distribution systems.

3.1 Historical Water Demands

The historical monthly water billing meter and yearly water usage data provided by Burleson was used in developing the water demand projections design criteria. **Table 3-1** summarizes the historical water usage data. The historical water billing meter data was used to determine the approximate historical usage by land use. Land use was divided into two categories: residential and non-residential. The residential demand category includes all single family, duplex, and apartment land uses, and the demand is determined using a gallons per capita per day (gpcd) factor. This factor represents the amount of water that is used per person on an annual average day basis. The non-residential demand includes all industrial, retail, and commercial demands and is determined by using gallons per acre per day (gpad). This factor represents the amount of water used by a commercial development based on the amount of developed acreage.

Table 3-1 Historical Water Usage

Year	Water Served Population (a)	Residential Average Day Usage[2] (MGD) (b)	Residential Average Day Per Capita Usage (gpcd) (c) = [b x 10^6] / a	Non-Residential Acreage[3] (d)	Non-Residential Average Day Usage[2] (MGD) (e)	Non-Residential Average Day Per Capita Usage (gpad) (f) = [e x 10^6] / d	Total Average Day Usage[1] (MGD) (g) = a + b	Overall Average Day Per Capita Usage (gpcd) (h) = [g x 10^6] / a	Maximum Day Usage[1] (MGD) (i)	Maximum Day Usage to Average Day Usage Peaking Factor (j) = i / g	Peak Hour Usage[1] (MGD) (k)	Peak Hour Usage to Maximum Day Usage Peaking Factor (l) = k / i	Rainfall (in)
2010	33,774	3.78	112	936	0.67	716	4.44	132	9.63	2.2	12.48	1.3	40.30
2011	33,993	4.60	135	943	0.81	859	5.42	159	12.12	2.2	14.47	1.2	24.10
2012	34,548	3.91	113	972	0.69	710	4.60	133	9.80	2.1	12.89	1.3	29.90
2013	35,277	3.98	113	995	0.70	704	4.68	133	8.41	1.8	14.52	1.7	32.10
2014	36,100	3.69	102	1,018	0.65	638	4.34	120	8.75	2.0	12.20	1.4	24.40
2015	38,256	3.51	92	1,053	0.62	589	4.13	108	7.57	1.8	14.27	1.9	63.71
2016	39,536	3.57	90	1,085	0.63	580	4.20	106	7.72	1.8	15.82	2.1	43.48
2017	40,936	3.89	95	1,121	0.69	615	4.58	112	8.28	1.8	15.82	1.9	30.53
2018	41,836	4.19	100	1,144	0.74	647	4.93	118	10.38	2.1	13.17	1.3	46.69
2019	42,596	3.70	87	1,163	0.65	559	4.35	102	8.74	2.0	10.37	1.2	32.75
2020	46,723	3.86	83	1,215	0.68	560	4.54	97	9.05	2.0	11.53	1.3	37.70
2021	47,466	3.92	83	1,238	0.69	557	4.61	97	8.33	1.8	13.55	1.6	33.60
2022	48,210	4.47	93	1,280	0.79	617	5.26	109	10.84	2.1	11.33	1.0	39.69
		Average	**100**	--	--	**642**	--	**117**	--	**2.0**	--	**1.5**	**36.84**
		Maximum	**135**	--	--	**859**	--	**159**	--	**2.2**	--	**2.1**	**63.71**

[1]Historical water usage data provided by City staff for each fiscal year.

[2]Billing meter data was utilized to approximate split between residential and non-residential.

[3]Extrapolated based on historical population growth rates.

The historical average day, maximum day, and peak hour demands were reviewed to determine appropriate design criteria for projecting water demands. The goal of selecting and right-sizing the water demand design criteria for the City is to adequately plan for and to size infrastructure that accommodates dry years when demands tend to be highest. In the previous 2015 Water Master Plan, FNI utilized an average residential gallons per day per capita of 135, an average non-residential gallons per day per acre of 750, a maximum day to average day peaking factor of 2.25, and a peak hour to maximum day peaking factor of 1.85. As shown in **Table 3-1**, the average day usage per capita/acre and maximum day peaking factors have been moving in a slightly downward trend. Therefore, after reviewing the historical water usage data, FNI is recommending a revised average residential gallons per day per capita of 115, an average non-residential gallons per day per acre of 650, and a maximum day demand to average day peaking factor of 2.20. FNI does not recommend changing the peak hour to maximum day peaking factor of 1.85.

3.2 Projected Water Demands

Projected water demands were estimated based on projected residential and commercial growth and land use for each parcel in the City of Burleson. The proposed land use and design criteria information is shown in in **Table 3-2**. In comparison to historical data, these values are slightly larger than the calculated averages to account for above average usage typically experienced during peak dry weather time periods and drought conditions. This also assumes a majority of new homes are constructed with an irrigation system.

Table 3-2 Water System Design Criteria

Land Use Code	Land Use	Residential Average Day Per Capita Usage (gpcd)	Non-Residential Average Day Per Acre Usage (gpad)	Maximum Day to Average Day Peaking Factor	Peak Hour to Maximum Day Peaking Factor
Existing Zoning					
2F	Two-Family (Duplex)	115	--	2.20	1.85
AL	Assisted Living	115	--	2.20	1.85
C	Commercial	--	650	2.20	1.85
CEM	Cemetery	--	--	--	--
CH	Church	115	650	2.20	1.85

Table 3-2 Water System Design Criteria - Continued

Land Use Code	Land Use	Residential Average Day Per Capita Usage (gpcd)	Non-Residential Average Day Per Acre Usage (gpad)	Maximum Day to Average Day Peaking Factor	Peak Hour to Maximum Day Peaking Factor
Existing Zoning					
FS	Fire Station	--	650	2.20	1.85
GW	Gas Well	--	--	--	--
LI	Light Industrial	--	650	2.20	1.85
MF	Multi-Family	115	--	--	--
MH	Manufactured Home	115	--	--	--
O	Office	--	650	2.20	1.85
OS	Open Storage	--	--	--	--
POS	Parks/Open Space	--	--	--	--
PSP	Public/Semi-Public	--	--	--	--
R	Retail	--	650	2.20	1.85
SCHOOL	Education	--	650	2.20	1.85
SF	Single Family	115	--	2.20	1.85
SFA	Single Family Attached	115	--	2.20	1.85
V	Vacant	--	--	--	--
VB	Vacant Building	--	--	--	--
Future Zoning					
bgc	Business Growth Center	--	650	2.20	1.85
cd	Campus District	--	650	2.20	1.85
comcor	Commercial Corridor	--	650	2.20	1.85
freecom	Conventional Freeway Commercial	--	650	2.20	1.85
ind	Industrial/Employment Growth Center	--	650	2.20	1.85
maincor	Main Street Corridor	--	--	--	--
mugc	Mixed Use Growth Center	115	650	2.20	1.85
POS	Parks/Open Space	--	--	--	--
rrn	Rural Residential Neighborhood	115	--	2.20	1.85
urn	Urban Residential Neighborhood	115	--	2.20	1.85
mdr	Medium Density Residential	115	--	2.20	1.85

In addition to the water design criteria for the existing and future land uses summarized in **Table 3-2**, FNI also developed water design criteria for the known and upcoming developments. **Table 3-3** summarizes the known development information and the associated land use assumptions design criteria.

Table 3-3 Known Developments Water System Design Criteria

Development	Land Use	Residential Average Day Per Capita Usage (gpcd)	Non-Residential Average Day Per Acre Usage (gpad)	Maximum Day to Average Day Peaking Factor	Peak Hour to Maximum Day Peaking Factor
Known Developments					
Hyder Ranch	Multi-Family	115	--	2.20	1.85
	Single Family	115	--	2.20	1.85
	Commercial	--	650	2.20	1.85
	School	--	650	2.20	1.85
Lakes	Multi-Family	115	--	2.20	1.85
	Single-Family	115	--	2.20	1.85
	Commercial	--	650	2.20	1.85
	School	--	650	2.20	1.85
Bear Ridge	Multi-Family	115	--	2.20	1.85
	Single Family	115	--	2.20	1.85
	Commercial	--	650	2.20	1.85
Shannon Creek	Single Family	115	--	2.20	1.85

A summary of the projected 5 year, 10 year, and buildout water demands city wide is shown in **Table 3-4**. A detailed summary of the projected water demands by pressure plane is shown in **Table 3-5**. It should be noted that the previous Master Plan projected a Buildout population of 53,110 people and a maximum day demand of 19.80 MGD. The updated projections indicate a larger buildout population, but only a slightly larger maximum day demand. This is due to the decrease in the proposed residential and non-residential water demand design criteria discussed in **Section 3.1**.

Table 3-4 City Wide Projected Water Demands

Planning Period	Served Population	Residential Average Day Flow (MGD)	Non-Residential Average Day Flow (MGD)	Total Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
Existing	46,724	5.37	0.79	6.17	13.56	25.08
5-Year	52,860	6.08	0.93	7.01	15.42	28.54
10-Year	60,548	6.96	1.10	8.06	17.73	32.80
Buildout	72,146	8.30	1.28	9.58	21.07	38.98

Table 3-5 Projected Water Demands by Pressure Plane

Pressure Plane	Served Population (a)	Non-Residential Acres (Acres) (b)	Residential Average Day Flow (MGD) (c) = [a x gpcd] / 10^6	Non-Residential Average Day Flow (MGD) (d) = [a x gpad] / 10^6	Total Average Day Demand (MGD) (e) = [c + d]	Max Day Demand (MGD) (f) = [e x PF]	Peak Hour Demand (MGD) (g) = [f x PF]
Existing Water Demands							
Lower	35,571	1,070	4.09	0.70	4.79	10.53	19.48
Upper	11,153	145	1.28	0.09	1.38	3.03	5.60
Total	**46,724**	**1,215**	**5.37**	**0.79**	**6.17**	**13.56**	**25.08**
Short-Term Water Demands (5-Year)							
Lower	39,670	1,256	4.56	0.82	5.38	11.83	21.89
Upper	13,190	209	1.52	0.12	1.63	3.59	6.65
Total	**52,860**	**1,465**	**6.08**	**0.93**	**7.01**	**15.42**	**28.54**
Intermediate-Term Water Demands (10-Year)							
Lower	39,741	1,459	4.57	0.95	5.52	12.14	22.46
Upper	20,807	258	2.39	0.15	2.54	5.59	10.34
Total	**60,548**	**1,717**	**6.96**	**1.10**	**8.06**	**17.73**	**32.80**
Long-Term Water Demands (Buildout)							
Lower	44,277	1,590	5.09	1.03	6.13	13.48	24.93
Upper	27,869	410	3.20	0.25	3.45	7.59	14.05
Total	**72,146**	**2,000**	**8.30**	**1.28**	**9.58**	**21.07**	**38.98**

4.0 EXISTING WATER DISTRIBUTION SYSTEM

The City of Burleson does not operate any water treatment facilities or groundwater wells. The City purchases water from the City of Fort Worth with delivery points at the Alsbury, Industrial, and Hulen Pump Stations (PS). The existing water distribution system includes two elevated storage tanks (EST), five GSTs and five pumping facilities. **Table 4-1** presents a summary of the City's existing ground storage and elevated storage facilities. **Table 4-2** presents a summary of the City's existing pumps grouped by facility. The existing water distribution system, including elevated storage tanks, ground storage tanks, and pressure plane boundaries, is shown on **Figure 4-1**. A water system schematic is included on **Figure 4-2**. At the time of this study, the Mountain Valley facilities were offline, and the Alsbury PS was not used as part of normal operations. A detailed description of the existing facilities within each of the two pressure planes is discussed in the following sections.

4.1 Existing Water System

4.1.1 Lower Pressure Plane

The Lower Pressure Plane (LPP) generally includes the northern and eastern half of the City. The LPP is supplied water from the Industrial and Hulen Low PS. From this point; water is pumped into the LPP and to the Turkey Peak GST and the Hidden Creek EST. The 2.00 MG Turkey Peak GST is at the same overflow elevation as the 1.00 MG Hidden Creek EST (894 feet) where it serves as effective elevated storage for the LPP. The Industrial PS includes two 2.00 MG GSTs for a total of 4.00 MG ground storage capacity which can be utilized for the LPP. The Industrial PS has three 1,400 gpm pumps and is supplied by the City of Fort Worth Southside II Pressure Plane. The Hulen PS consists of a 2.00 MG GST and a 3.00 MG GST for a total of 5.00 MG of ground storage capacity which can be utilized for either the Upper Pressure Plane (UPP) or LPP. The Hulen Low PS consists of three 1,780 gpm pumps and is supplied by the City of Forth Worth Southside III Pressure Plane. The City also has the ability to transfer water from the UPP to the LPP through two transfer valves; one is located at the Turkey Peak facility, and the other is located near the intersection of Hulen Street and Wilshire Boulevard.

4.1.2 Upper Pressure Plane

The UPP covers the western and southern part of the City, generally being the area west of Wilshire Boulevard and Alsbury Boulevard. The UPP is supplied water from the Hulen High and Turkey Peak PS. From this point; water is pumped into the UPP and to the Turkey Peak EST. The 0.75 MG Turkey Peak EST

has an overflow of 1,000 feet. As described in **Section 4.1.1**, the Hulen PS consists of a 2.00 MG GST and a 3.00 MG GST for a total of 5.00 MG of ground storage capacity which can be utilized for either the UPP or LPP. The Hulen High PS consists of three 1,780 gpm pumps and is supplied by the City of Fort Worth Southside III Pressure Plane. The Turkey Peak PS includes a 2.00 MG GST which can be utilized for the UPP as ground storage capacity, but is shared and also acts as effective elevated storage for the LPP. The Turkey Peak PS has three 1,150 gpm pumps and is supplied by the LPP.

The Mountain Valley Pressure Plane facilities were out of service at the time of the development of this study. The service area previously known as the Mountain Valley Pressure Plane is currently served by the UPP.

Table 4-1 Existing Water System Storage Tanks

GROUND STORAGE TANKS			
Pressure Plane	**Ground Storage Tank Name**	**Capacity (MG)**	**Overflow Elevation**
LPP	Industrial GST #1 (Alsbury #1)	2.00	739’
LPP	Industrial GST #2 (Alsbury #2)	2.00	739’
LPP	Hulen PS GST[1] #1	1.50	876'
LPP	Hulen PS GST[1] #2	1.00	876'
	Lower Pressure Plane TOTAL	**6.50**	--
UPP	Hulen PS GST[1] #1	1.50	876’
UPP	Hulen PS GST[1] #2	1.00	876’
UPP	Turkey Peak[1] GST	0.20	894’
UPP	Wicker Hill GST	0.30[3]	--
	Upper Pressure Plane TOTAL	**2.70**	--
	Total Ground Storage	**9.20**	**--**
ELEVATED STORAGE TANKS			
Pressure Plane	**Ground Storage Tank Name**	**Capacity (MG)**	**Overflow Elevation**
LPP	Hidden Creek EST	1.00	894'
LPP	Turkey Peak[1,2] GST	1.80	894'
	Lower Pressure Plane TOTAL	**2.80**	--
UPP	Turkey Peak EST	0.75	1,000’
UPP	Mountain Valley EST	0.30[4]	1,034’
	Upper Pressure Plane TOTAL	**1.05**	--
	Total Elevated Storage	**3.85**	**--**

[1]Ground Storage tank capacity shared between the LPP and UPP.
[2]Turkey Peak GST acts as effective elevated storage for the LPP.
[3]The Wicker Hill GST serves the Wicker Hill PS that previously served the Mountain Valley Pressure Plane. It is not utilized under normal operations and is not included in the total UPP ground storage facilities.
[4]The Mountain Valley EST is currently offline, but can be activated as necessary, so it is included in the total UPP elevated storage capacity.

Table 4-2 Existing Water System Pumping Facilities

Pressure Plane	Pump Station Name	Number of Pumps	Pump Rated Capacity (gpm)	Total Capacity (MGD)	Firm Capacity[1] (MGD)
LPP	Alsbury PS	2	1,740	6.17	3.66
		1	800		
LPP	Industrial PS	3	1,400	6.06	4.04
LPP	Hulen Low PS	3	1,780	7.68	5.12
Lower Pressure Plane Firm Pumping Capacity[2]				**17.35**	
Lower Pressure Plane Total Pumping Capacity				**19.91**	
UPP	Turkey Peak PS	3	1,050	4.53	3.02
UPP	Hulen High PS	3	1,780	7.68	5.12
UPP	Wicker Hill PS	2	500	1.44[3]	0.72[3]
Upper Pressure Plane Firm Pumping Capacity[2]				**9.65**	
Upper Pressure Plane Total Pumping Capacity				**12.21**	

[1]The pump station firm capacity assumes the largest pump is out of service for each facility.
[2]The pressure plane firm capacity assumes only the largest pump of the entire pressure plane is out of service.
[3]The Wicker Hill PS is a booster pump station that previously served the Mountain Valley Pressure Plane. It is not utilized under normal operations and is not included in the total UPP pumping capacities.

FIGURE 4-1

CITY OF BURLESON

EXISTING WATER SYSTEM

LEGEND

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

(2) - 2.00 MG Industrial
Ground Storage Tanks
Overflow Elev. = 739'

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP
Transfer Valve

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP
Transfer Valve

2.45 MGD Mountain Valley
Pump Station
(OFFLINE)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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User Name: IZ493

THE CITY OF BURLESON TEXAS

DRAFT Figure 4-2
Water System Schematic
City of Burleson
PWS ID: 1260002

FREESE AND NICHOLS

Alsbury #1 Pump Station - Offline

(2) @ 1,740 GPM
(1) @ 800 GPM

M

Purchase Water Source
City of Fort Worth
PWS ID #2200012
SS2 Pressure Plane

Hidden Creek EST
1.00 MG
Overflow: 894 ft

Lower Pressure Plane

12,528 Connections

Hulen Low Pump Station

(3) @ 1,780 GPM

Industrial Pump Station

(3) @ 1,400 GPM

M

(2) @ 2.00 MG

Hulen GSTs
2.00 MG
3.00 MG

M

Purchase Water Source
City of Fort Worth
PWS ID #2200012
SS3 Pressure Plane

Wilshire Boulevard Transfer Valve

Hulen High Pump Station

(3) @ 1,780 GPM

Turkey Peak GST
2.00 MG
Overflow: 894 ft

Turkey Peak Transfer Valve

Turkey Peak Pump Station

Upper Pressure Plane

3,924 Connections

Turkey Peak EST

0.75 MG
Overflow: 1,000 ft

(3) @ 1,050 GPM

Mountain Valley Pump Station - Offline

0.30 MG

Mountain Valley EST - Offline

0.30 MG
Overflow: 1,034 ft

4.2 Model Update and Calibration

4.2.1 Model Update

FNI utilized the existing hydraulic model of the City of Burleson's water distribution system that was developed during the previous Water Master Plan. The H2OMap Water model was converted into an Innovyze InfoWater model. The InfoWater model was used to simulate the operation of the piping system, elevated tanks and pumping facilities in Burleson's water distribution system.

The City of Burleson maintains GIS shapefiles containing all of the water lines currently in the City's water distribution system. FNI utilized the latest GIS information to add the new lines and facilities to the model which provided the most up-to-date representation of the water distribution system. The updated model includes 9,320 pipes, ranging in size from 1-inch to 30-inch. After the new lines were imported into the model, updated facilities were added to complete the computer model. The Hazen-Williams equation was used to determine the friction losses in the distribution pipelines. Hazen-Williams roughness coefficients were initially assigned to the new lines based on pipe age and material where information was available. Some of the roughness coefficients were adjusted during model calibration based on model results.

4.2.2 Pressure Testing and Calibration

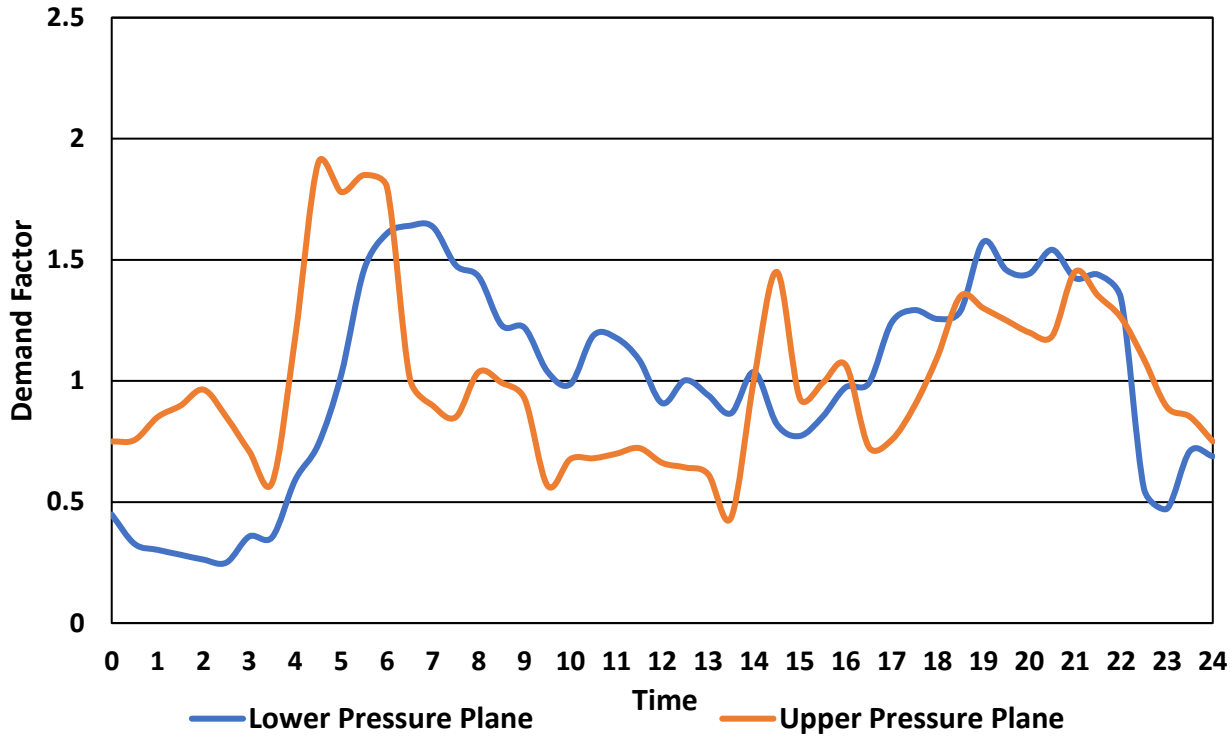
Field pressure monitoring was conducted from March 1 through April 9, 2021, in order to gather information to simulate accurate demand conditions. System pressure was monitored simultaneously at 12 locations across the City. The locations of the pressure testing sites are shown in **Appendix B**. Six locations in the LPP, and six locations in the UPP were monitored. **Appendix B** contains graphs of each of the individual pressure recorder readings and summaries.

FNI utilized an extended period model simulation in order to verify that the hydraulic model accurately represents actual distribution system operation. The calibration process involves adjusting system operation, C-values, demand allocation, and peaking factors to match a known condition. The 24-hour period occurring from 12:05 am on March 31st to 12:05 am on April 1st was selected for calibration. This day was selected because demands were relatively high, and there was a good correlation of data between the pressure recorders and the SCADA.

The City provided SCADA data and FNI used 30-minute time intervals during the pressure testing period. The SCADA reports included ground and elevated storage tank levels, and on/off status for system pumps.

Pump station flow and tank level data was utilized to calculate an overall diurnal curve for each pressure plane by examining water going into (supply) and out of (demand) the distribution system. The calculated total system demand for March 31st was 4.28 MGD with a peak of 7.55 MGD and a minimum demand of 1.40 MGD. **Figure 4-3** shows the calculated system diurnal curves by pressure plane for March 31, 2021.

Figure 4-3 System Diurnal Curves by Pressure Plane, March 31, 2021



Diurnal factors for the 24-hour period in the LPP range from 0.25 to 1.64. Diurnal factors for the 24-hour period in the UPP range from 0.44 to 1.90. **Appendix C** contains calibration charts showing modeled versus SCADA recorded values for pump station flows, tank levels, and field recorded pressures. A close correlation between hydraulic model results and SCADA values and field recorded pressures is key to establishing confidence in the models ability to imitate real-world conditions. A close correlation provides more accurate system analysis results, which inform the proposed system improvements. For system pressures, the industry standard is to match hydraulic model results to within 5 psi of observed pressures. The majority of the model calibration results are within 5-10 psi of the observed pressures, indicating a close correlation between the model and real-world conditions. In addition to matching the field recorded pressures, FNI compared the elevated storage tank levels and pump station discharge flows to the hydraulic model results. For the elevated storage tank levels, model results stayed within 5 feet of the field recorded levels, and more importantly followed the overall pattern of field recorded levels. For the

pump station discharge flows, model results indicated some discrepancies with field recorded flows, however since the pressures and elevated storage tank levels aligned so closely, it was determined to be negligible and could be due to data accuracy issues at the flow meters.

4.3 Existing Water System Analysis

In order to plan for the future, it is important to know how the system performs under existing conditions. The primary parameters analyzed by FNI for the existing system were pressures under peak hour demands, water line maximum headloss/velocity, available fire flow, and TCEQ pumping and storage requirements.

4.3.1 Existing System Facility Evaluation

The City is required to meet the TCEQ minimum elevated storage capacity requirement of 100 gallons per connection and the total storage (elevated and ground) requirement of 200 gallons per connection. The TCEQ requirements for pumping capacity are summarized in **Table 4-3**. The amount of elevated storage affects the minimum required TCEQ pumping capacity. Elevated storage capacity equal to or greater than 200 gallons per connection decreases the amount of required pumping to 0.6 gpm per connection. The City is also required to meet the TCEQ minimum water supply capacity requirement of 0.6 gpm per connection.

Table 4-3 TCEQ Pumping Requirements

Condition	Pumping Capacity Requirement[1]
1. If providing at least 200 gallons per connection of elevated storage	Two service pumps with a minimum combined capacity of 0.6 gpm per connection at each pressure plane.
2. If providing less than 200 gallons per connection of elevated storage	**The lesser of (a) or (b):**
	(a) Total pumping capacity of 2.0 gpm per connection
	(b) Total capacity of at least 1,000 gpm and the ability to meet peak hourly demands[2] with the largest pump out of service

[1]Capacity requirement from TAC §290.45(b)(2)(F)
[2]In the absence of verified historical data, peak hourly demand means 1.25 times the maximum daily demand (prorated to an hourly rate) if a public water supply meets the commission's minimum requirements for elevated storage capacity.

FNI determined a number of people per connection using the connection count available from the TCEQ Drinking Water Watch Database (16,363) and the existing water served population estimate (46,724). **Table 4-4** summarizes the existing water distribution system connections. The number of connections in each pressure plane is assumed based on 2.86 people per connection.

Table 4-4 Existing Connections by Pressure Plane

Pressure Plane	Existing Connections[1]
Lower	12,460
Upper	3,903
Total	**16,363**

[1]Based on 2.86 people/connection

A comparison of the City's existing total storage, elevated storage, pumping capacity, and water supply by pressure plane to TCEQ requirements is shown in **Tables 4-5** through **4-8**.

Table 4-5 TCEQ Total Storage Capacity – Existing System

Pressure Plane	Served Connections	Existing Total Storage (MG)	TCEQ Requirement 200 gal/con (MG)	Meets TCEQ Total Storage Requirement?
Lower	12,460	9.30	2.50	Yes
Upper	3,903	3.75	0.78	Yes

Table 4-6 TCEQ Elevated Storage Capacity – Existing System

Pressure Plane	Served Connections	Existing Elevated Storage (MG)	TCEQ Requirement 100 gal/con (MG)	TCEQ Alternative 200 gal/con (MG)	Meets TCEQ Elevated Storage Requirement for 100 gal/con?	Meets TCEQ Alternative for 200 gal/con?
Lower	12,460	2.80	1.25	2.50	Yes	Yes
Upper	3,903	1.05	0.40	0.79	Yes	Yes

The City meets the TCEQ alternative of 200 gallons/connection of elevated storage in both the LPP and UPP. This assumes the majority of the Turkey Peak GST capacity is reserved for the LPP as elevated storage, and that the Mountain Valley EST capacity is available for the UPP as elevated storage. By meeting the 200 gallons/connection alternative, the City's required pumping capacity is impacted as described in **Table 4-3**. By meeting the 200 gallons/connection of elevated storage, the City is required to have a firm pumping capacity of 0.6 gpm/connection. **Table 4-7** summarizes the TCEQ firm pumping requirements for Condition 1 for each pressure plane.

Table 4-7 TCEQ Pumping Capacity - Existing System (Condition 1)

Pressure Plane	Served Connections	Existing Firm Pumping Capacity (MGD)	TCEQ Requirement 0.6 gpm/con (MGD)	Meets TCEQ Pumping Capacity Requirement for 0.6 gpm/con?
Lower	12,460	17.35	10.77	Yes
Upper	3,903	9.65	3.38	Yes

Table 4-8 shows the City's ability to meet the TCEQ water supply requirement of 0.6 gpm per connection.

Table 4-8 TCEQ Water Supply Capacity - Existing System

Pressure Plane	Served Connections	Existing Water Supply Capacity (MGD)	TCEQ Requirement 0.6 gpm/con (MGD)	Meets TCEQ Supply Requirement of 0.6 gpm/connection?
Lower	12,460	11.00	10.77	Yes
Upper	3,903	5.00	3.38	Yes

Both the LPP and the UPP have sufficient elevated storage, total storage, pumping capacity, and water supply to meet the TCEQ minimum requirements for public water systems in the existing condition.

4.3.2 Hydraulic Analysis

The water distribution system was analyzed for four operating conditions: average day demands, maximum day demands, peak hour demands, and maximum day demand with fire flow. By examining the water system under these various operating conditions, it is possible to determine where there are pressures issues, whether tanks are filling and draining properly and whether the pumping facilities are adequate to meet the demands at acceptable pressures. FNI developed design criteria to inform the need, timing, and size of capital improvement projects.

Per TCEQ standards, water transmission lines shall be sized to maintain a minimum of 35 psi throughout the system during peak hour demand conditions. FNI established additional criteria for following industry best practices in designing distribution systems. Transmission lines (12-inch and greater lines) shall be designed for a maximum pipeline velocity of 5 feet per second (fps) and a maximum friction loss of 5 feet per 1,000 feet of pipeline length. Distribution lines (10-inch and smaller lines) shall be designed for a maximum pipeline velocity of 7 fps and a maximum friction loss of 7 feet per 1,000 feet of pipeline length.

Color-coded pressure maps were prepared to illustrate the residual pressure calculated at model junctions. These maps help to identify potential problem areas in the system and were used as a tool to confirm that reasonable pressure ranges were maintained throughout the system. Minimum pressures shown on the maps represent the lowest value of the pressures experienced during the 24-hour simulation, usually occurring during the peak hour demand. During peak hour events, the distribution system experiences the highest demands, and as a result, the pressure drops. The purpose of the peak hour pressure analysis is to highlight areas where the pressure drops too low.

The LPP has small pockets of pressures under 35 psi which correspond to developments constructed at high elevations: however, most of the pressure plane experiences pressures between 45 and 80 psi. The

higher pressures are seen in the UPP with the highest pressures located on the discharge sides of the Hulen PS. The lower pressures in the UPP are observed on a couple of nodes along Country Vista Circle and near the Mountain Valley EST (currently offline) which were previously served by the Mountain Valley PS (currently offline). A map showing minimum pressures in the existing system under maximum day demands can be found in **Figure D-1** in **Appendix D**.

In addition to documenting minimum and maximum pressures under maximum day demands, FNI evaluated the existing system pipes based on the design velocity and headloss criteria. This was done to show the areas which are stressed when demands are highest. The distribution system water mains that violated the velocity and headloss criteria are located near the discharge of the Hulen PS, the Turkey Peak EST, and the Hidden Creek EST. Mapping was created to highlight the areas which violate the design velocity and headloss criteria in **Figure D-2** and **Figure D-3** in **Appendix D,** respectively.

FNI utilized the results of the hydraulic analyses of the existing system to inform the need, timing, and size of capital improvement projects.

4.3.3 Fire Flow Analysis

The fire flow analysis is another method for evaluating a water system. Having both available fire flow and sufficient water pressure is important because it enables firefighters to respond to an emergency in one area without negatively impacting other areas of the system. The recommended minimum conditions for fire flow in the City of Burleson are 1,500 gpm of available flow at each hydrant, while maintaining a pressure of 20 psi at the fire hydrant. To evaluate the fire suppression capabilities of the system, a fire flow analysis was conducted under maximum day demand conditions. For this analysis, a steady-state model run was utilized to calculate the available fire flow at each fire hydrant node in the system with a pressure of 20 psi. A fire flow contouring map was also prepared to show the available fire flow throughout the distribution system which can be found in **Figure D-4** in **Appendix D**. Areas with small lines in the model (less than 6-inches) and dead-end lines also showed to have low available fire flows. The majority of the City has an available fire flow greater than 1,500 gpm.

5.0 FUTURE WATER SYSTEM ANALYSIS

5.1 Future System Facility Evaluation

As detailed in **Section 4.3.1**, Burleson is required to meet the TCEQ minimum requirements for elevated storage, total storage, pumping, and water supply capacities as growth occurs throughout the system. In addition to the required TCEQ criteria, FNI evaluated the water system's pumping and storage capacities against criteria developed by FNI to promote a high level of service for operational needs. These criteria take into consideration many additional factors including operational flexibility, fire protection, emergency reserve, and energy efficiency.

Table 5-1 summarizes the projected water distribution system connections. The number of connections in each pressure plane is assumed based on 2.86 people per connection and the projected population (as summarized in **Section 2**).

Table 5-1 Projected Connections by Pressure Plane

Pressure Plane	Existing Connections	5-Year Connections	10-Year Connections	Buildout Connections
Lower	12,460	13,896	13,921	15,509
Upper	3,903	4,616	7,284	9,757
Total	16,363	18,512	21,205	25,266

Note: Connections based on 2.86 people/connection

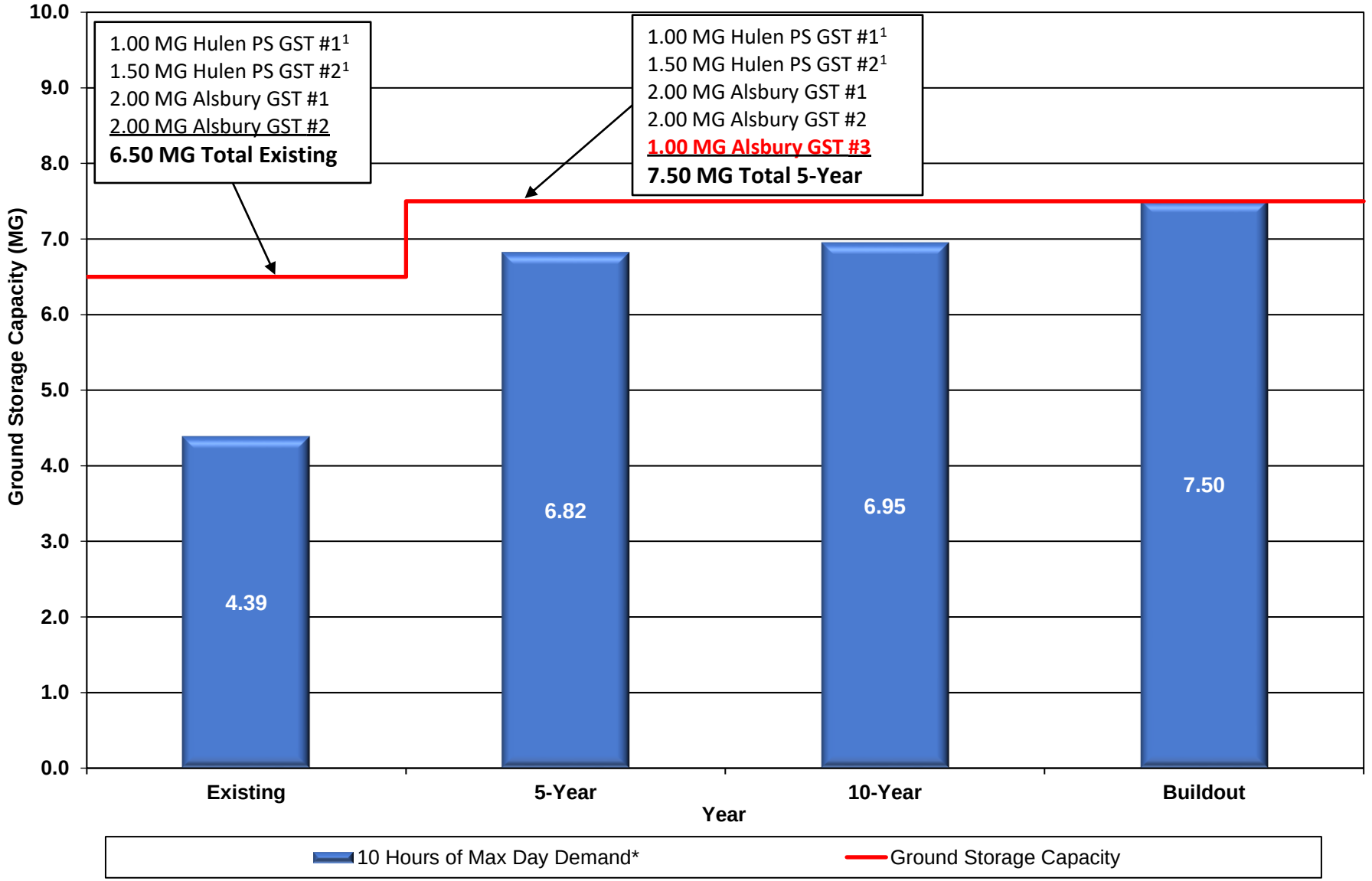
Figures 5-1 through **5-10** showing the required versus proposed ground storage, elevated storage, total storage, pumping capacity, and water supply for future planning periods in each pressure plane. The vertical bars represent the projected water demand/criteria for the planning period, and the capacity of the system over time is shown by the red line. The capacity changes with the expansion, addition, or decommissioning of facilities in order to meet the projected needs.

As indicated in **Section 4.3.1**, the amount of elevated storage affects the minimum required TCEQ pumping capacity. Elevated storage capacity equal to or greater than 200 gallons per connection decreases the amount of required pumping to 0.6 gpm per connection. City staff directed FNI to prioritize meeting the 200 gallons per connection of elevated storage for this Master Plan Update.

5.1.1 Lower Pressure Plane Evaluation

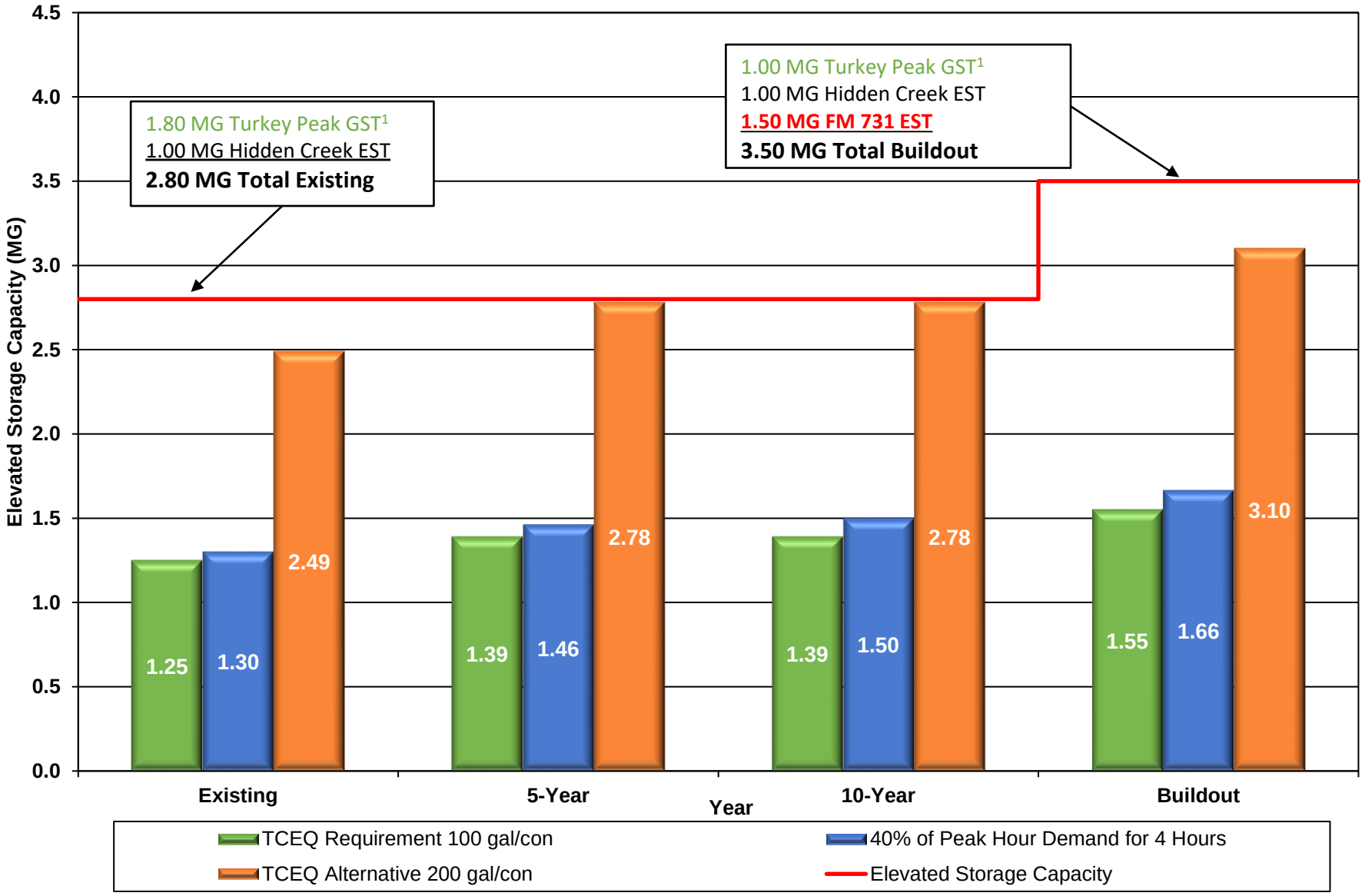
The LPP has sufficient total storage capacity to meet the TCEQ requirement of 200 gallons per connection through Buildout. However, projections indicate the LPP will require additional ground storage, elevated storage, pumping capacity, and water supply to maintain regulatory requirements and provide a high level of service. Within the 5-year planning period, FNI recommends expanding the pumping capacity of the Industrial PS to a total capacity of 14.56 MGD, constructing an additional 1.00 MG GST (minimum) at the Industrial site, and increasing the water supply from Fort Worth (SS2) to 14.00 MGD. Additionally, in order to maintain 200 gallons per connection of elevated storage, FNI recommends constructing a 1.50 MG EST along FM 731 within the Buildout planning period. **Figures 5-1** through **5-5** show the LPP future storage, pumping, and water supply capacities.

Figure 5-1
Lower Pressure Plane
Ground Storage Evaluation



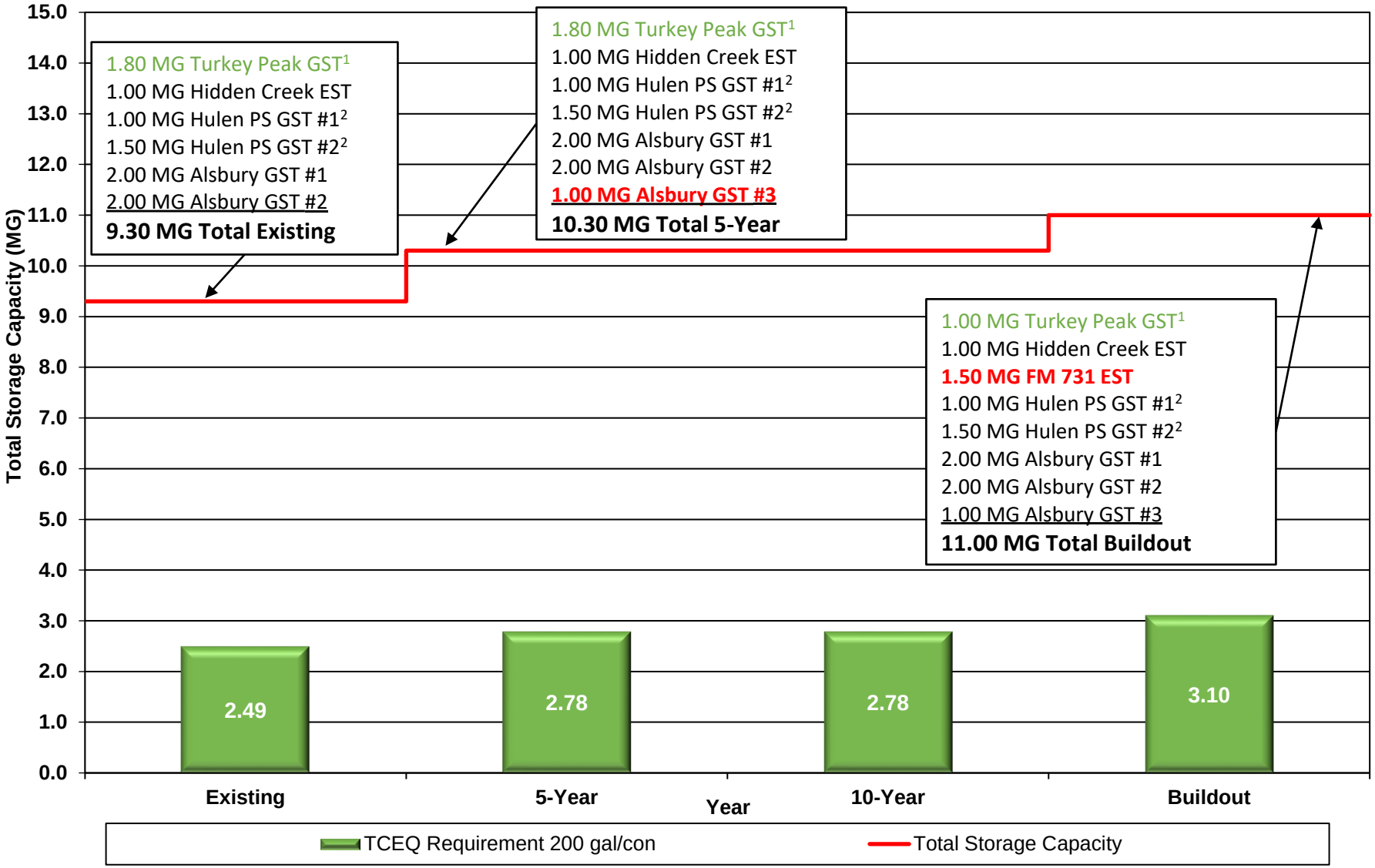
[1]Existing GST capacity of 2.0 MG and 3.0 MG is shared with the Lower Pressure Plane. Assumes 50% of capacity is utilized by the Lower Pressure Plane.
*Includes 4.53 MGD water supply to the Turkey Peak Pump Station (Utilized in the Upper Pressure Plane) beginning in the 5-year period.

Figure 5-2
Lower Pressure Plane
Elevated Storage Evaluation



[1]Existing GST capacity of 2.0 MG is shared with the Upper Pressure Plane. Assumes 90% of capacity is utilized by the Lower Pressure Plane initially, but only 50% within Buildout as the Turkey Peak Pump Station is utilized more for the Upper Pressure Plane.

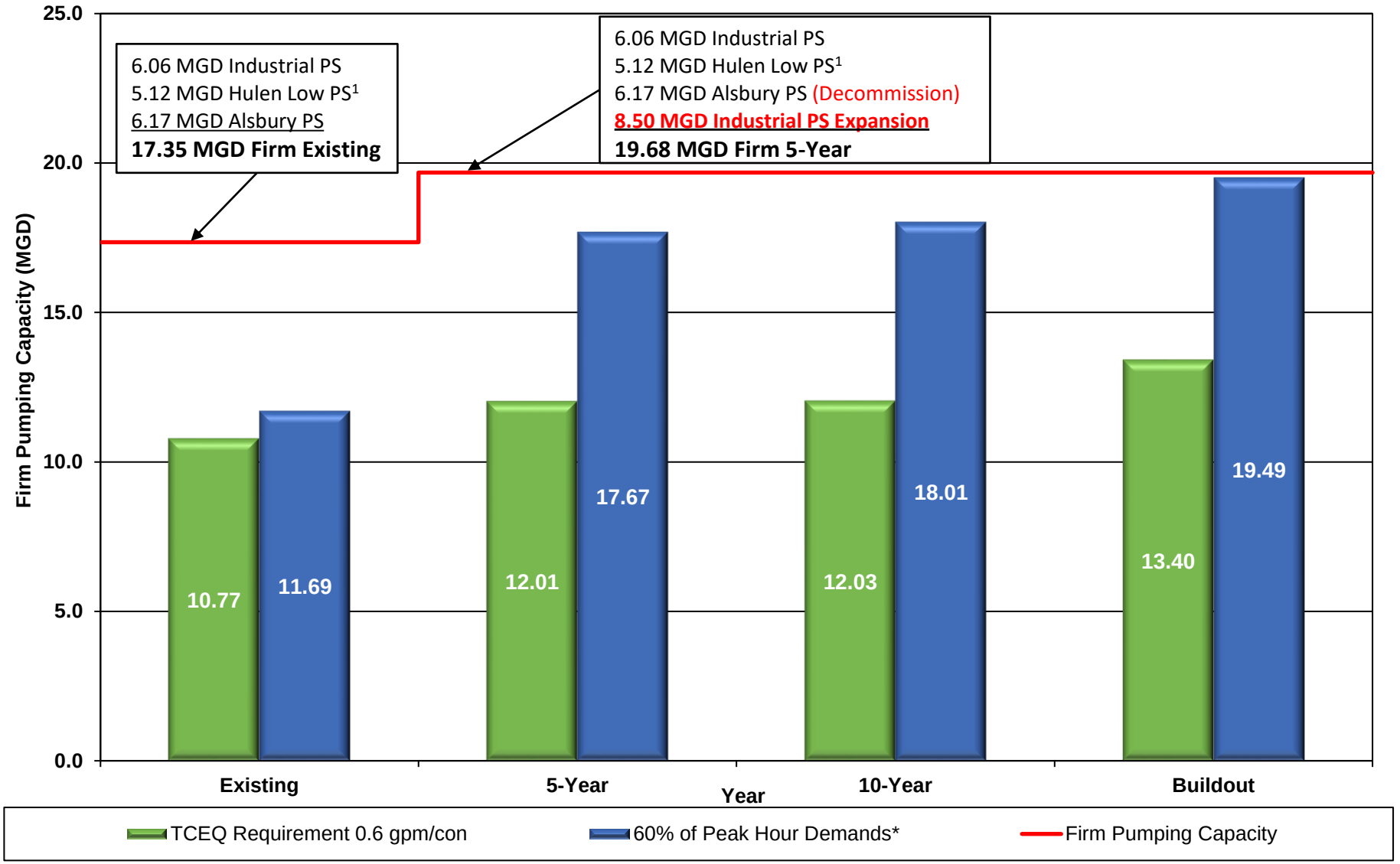
Figure 5-3
Lower Pressure Plane
Total Storage Evaluation



[1]Existing GST capacity of 2.0 MG is shared with the Upper Pressure Plane. Assumes 90% of capacity is utilized by the Lower Pressure Plane initially, but only 50% within Buildout as the Turkey Peak Pump Station is utilized more for the Upper Pressure Plane.

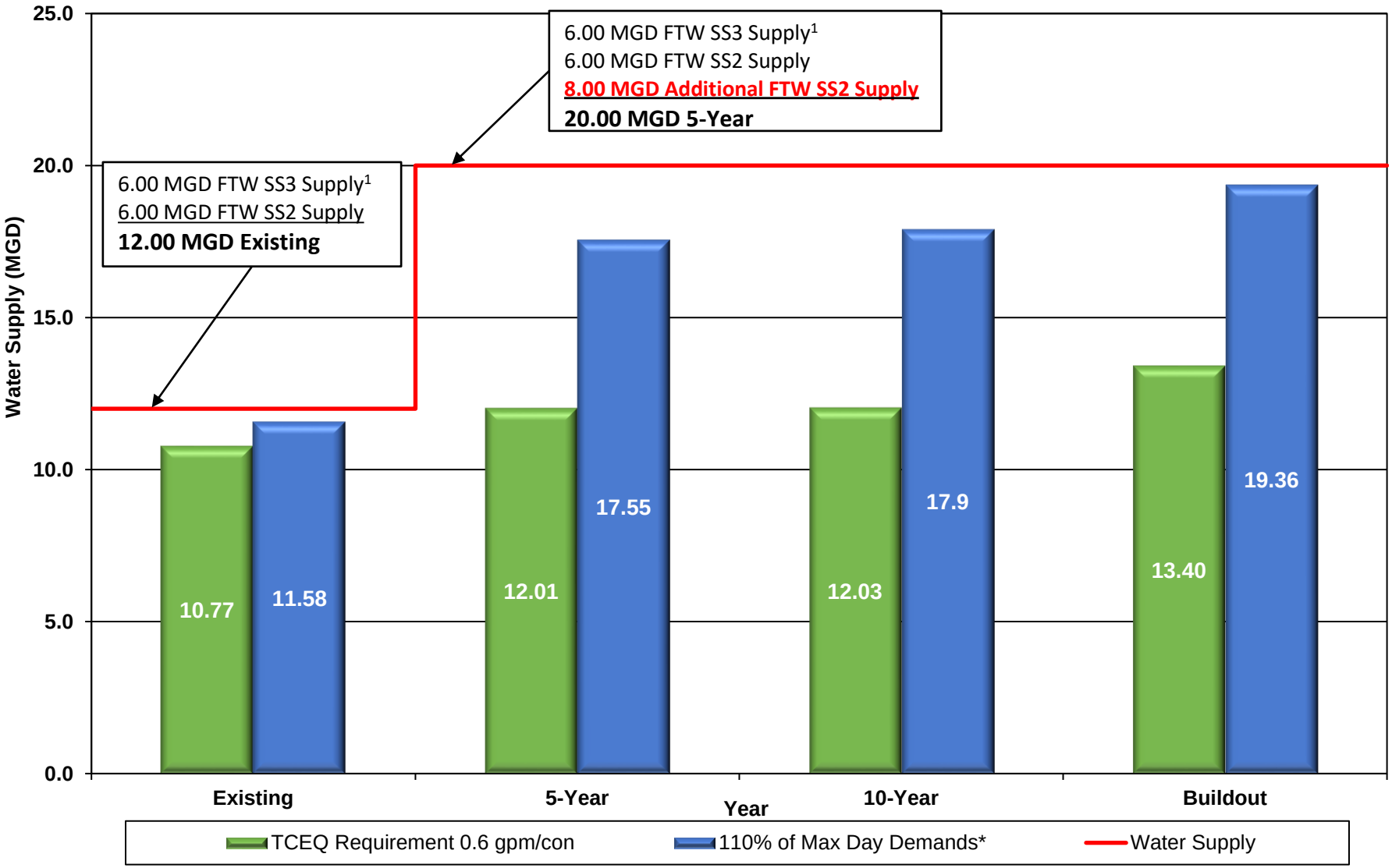
[2]Existing GST capacity of 2.0 MG and 3.0 MG is shared with the Lower Pressure Plane. Assumes 50% of capacity is utilized by the Lower Pressure Plane.

Figure 5-4
Lower Pressure Plane
Pumping Capacity Evaluation



*Includes 4.53 MGD water supply to the Turkey Peak Pump Station (Utilized in the Upper Pressure Plane) beginning in the 5-year period.
[1]Hulen Low PS has the largest pump within the Lower Pressure Plane. Capacity of the largest pump is not included to determine the firm pumping capacity of the pressure plane as a whole.

Figure 5-5
Lower Pressure Plane
Water Supply Evaluation



*Includes 4.53 MGD water supply to the Turkey Peak Pump Station (Utilized in the Upper Pressure Plane) beginning in the 5-year period.
[1]Fort Worth SS3 Water Supply at Hulen PS is shared with the Upper Pressure Plane. Assumes 60% of capacity is utilized by the Lower Pressure Plane.

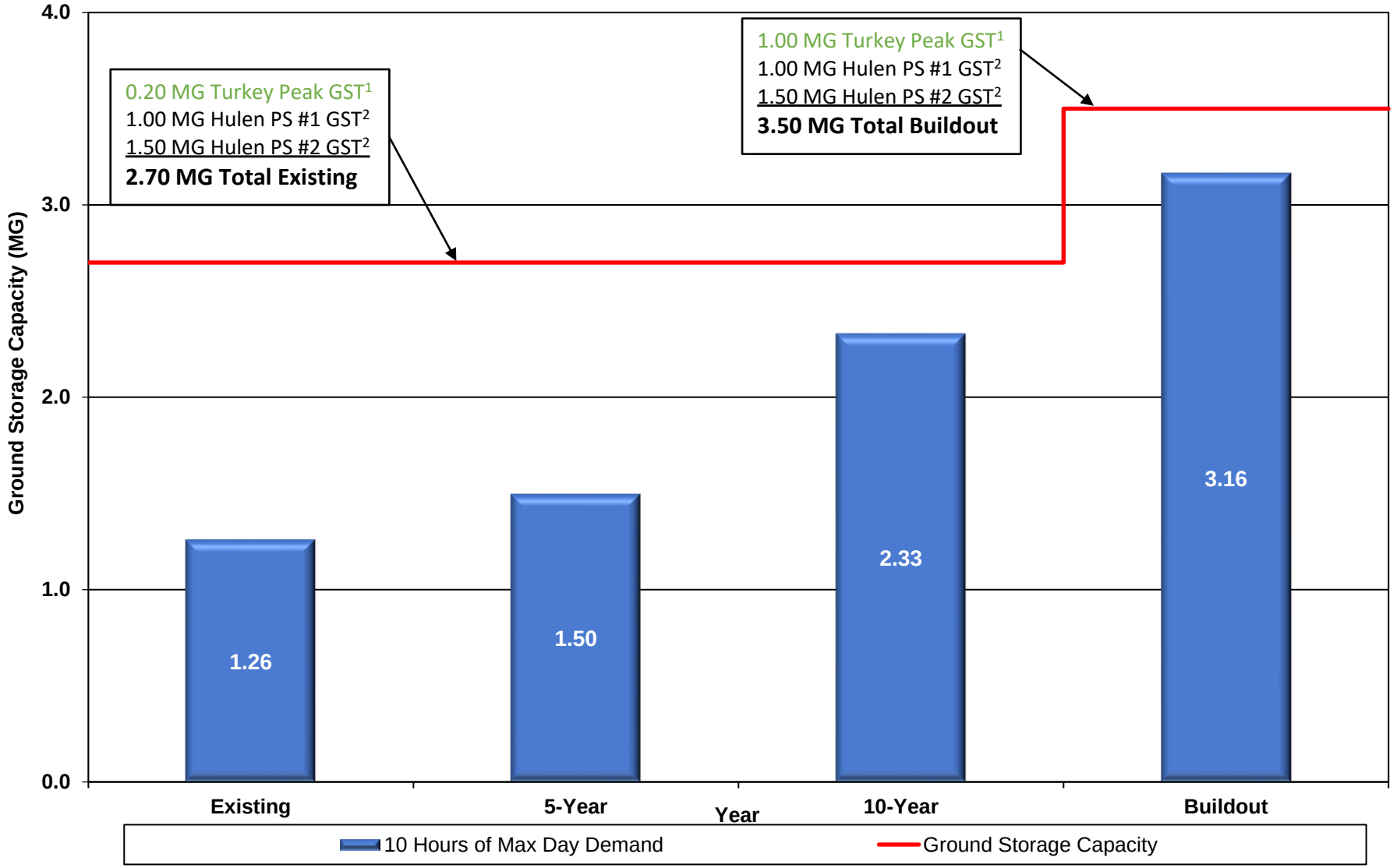
5.1.2 Upper Pressure Plane Evaluation

The UPP has sufficient ground and total storage capacity to meet the FNI and TCEQ criteria through Buildout. Additionally, with the ability to pump water from the LPP into the UPP via the Turkey Peak PS, the UPP has sufficient pumping and water supply capacity to meet TCEQ requirements through Buildout. However, projections indicate the UPP will require additional elevated storage capacity to maintain 200 gallons of elevated storage. Within the 10-year planning period, FNI recommends constructing a 0.50 MG EST to serve the Hyder Ranch development. Additionally, FNI recommends constructing a 0.75 MG EST near the Mountain Valley PS within the Buildout planning period. Lastly, FNI recommends the City add an additional pump 2.56 MGD at the Hulen High PS in order to provide system resiliency/redundancy should the Turkey Peak PS go out of service for any significant period of time. **Figures 5-6** through **5-10** show the UPP future storage, pumping, and water supply capacities.

Figure 5-6

Upper Pressure Plane

Ground Storage Evaluation



[1]Existing GST capacity of 2.0 MG is shared with the Lower Pressure Plane. Assumes 10% of capacity is utilized by the Upper Pressure Plane initially, but increases to 50% within Buildout as the Turkey Peak Pump Station is utilized more for the Upper Pressure Plane.

[2]Existing GST capacity of 2.0 MG and 3.0 MG is shared with the Lower Pressure Plane. Assumes 50% of capacity is utilized by the Upper Pressure Plane.

Figure 5-7
Upper Pressure Plane
Elevated Storage Evaluation

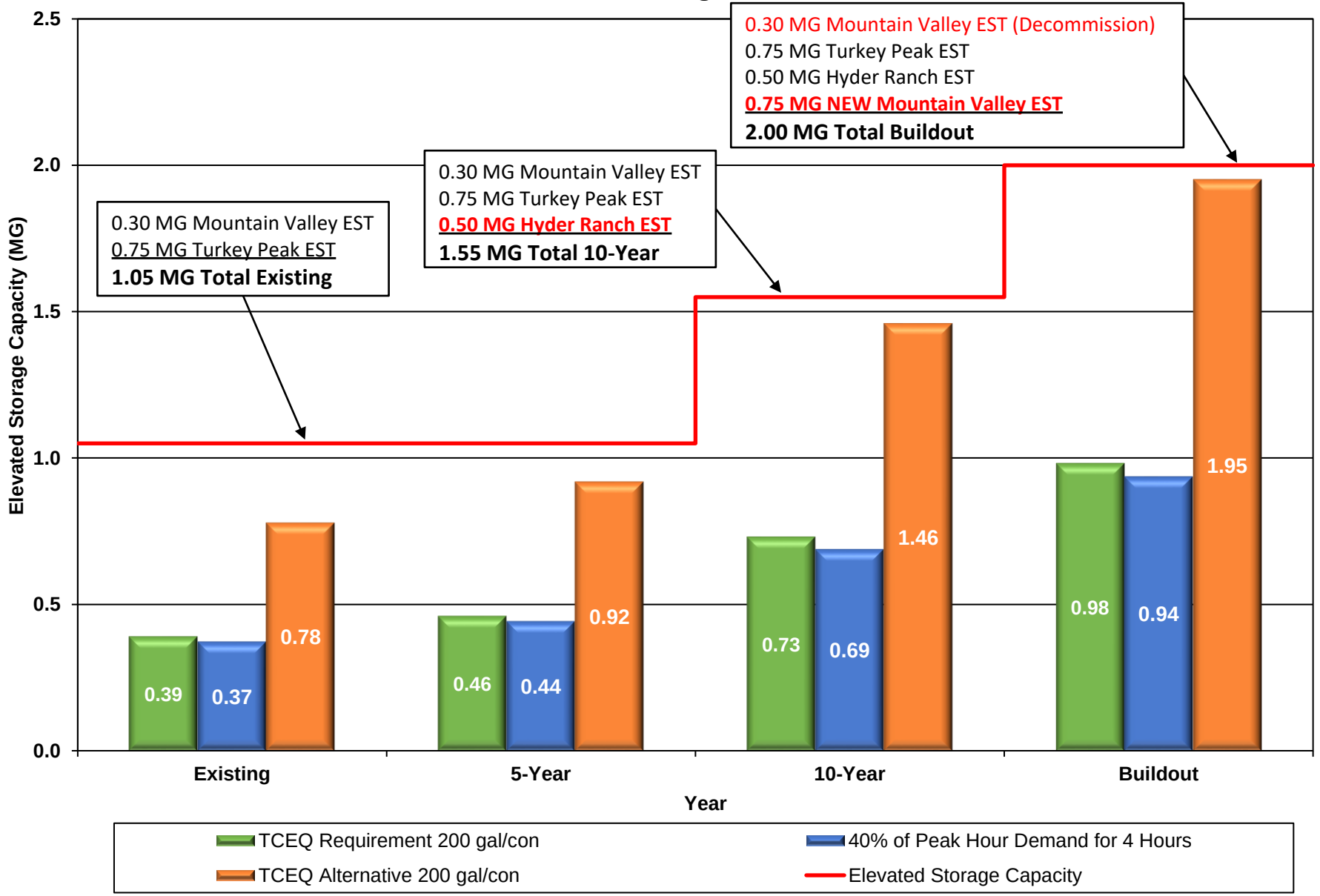
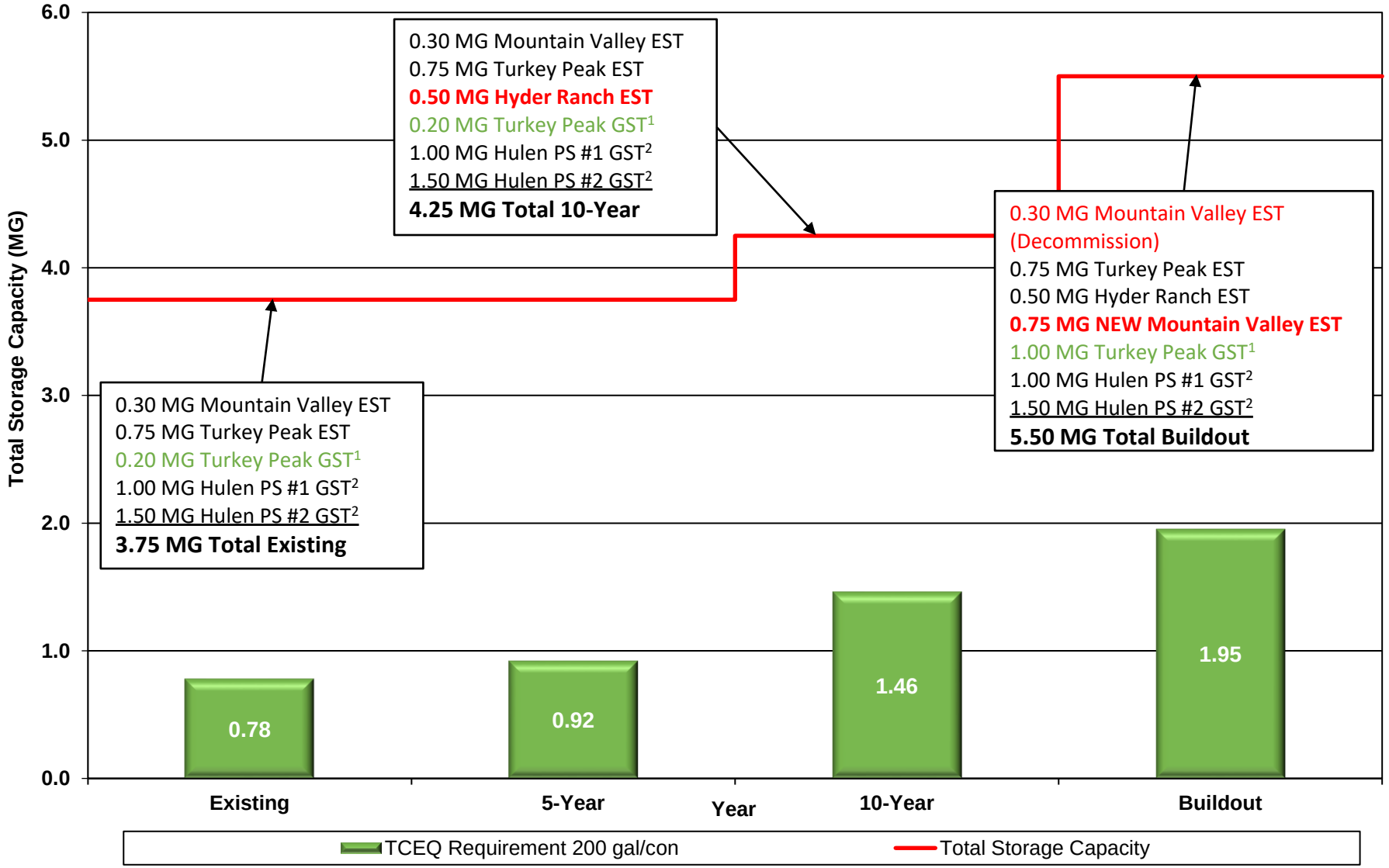


Figure 5-8

Upper Pressure Plane

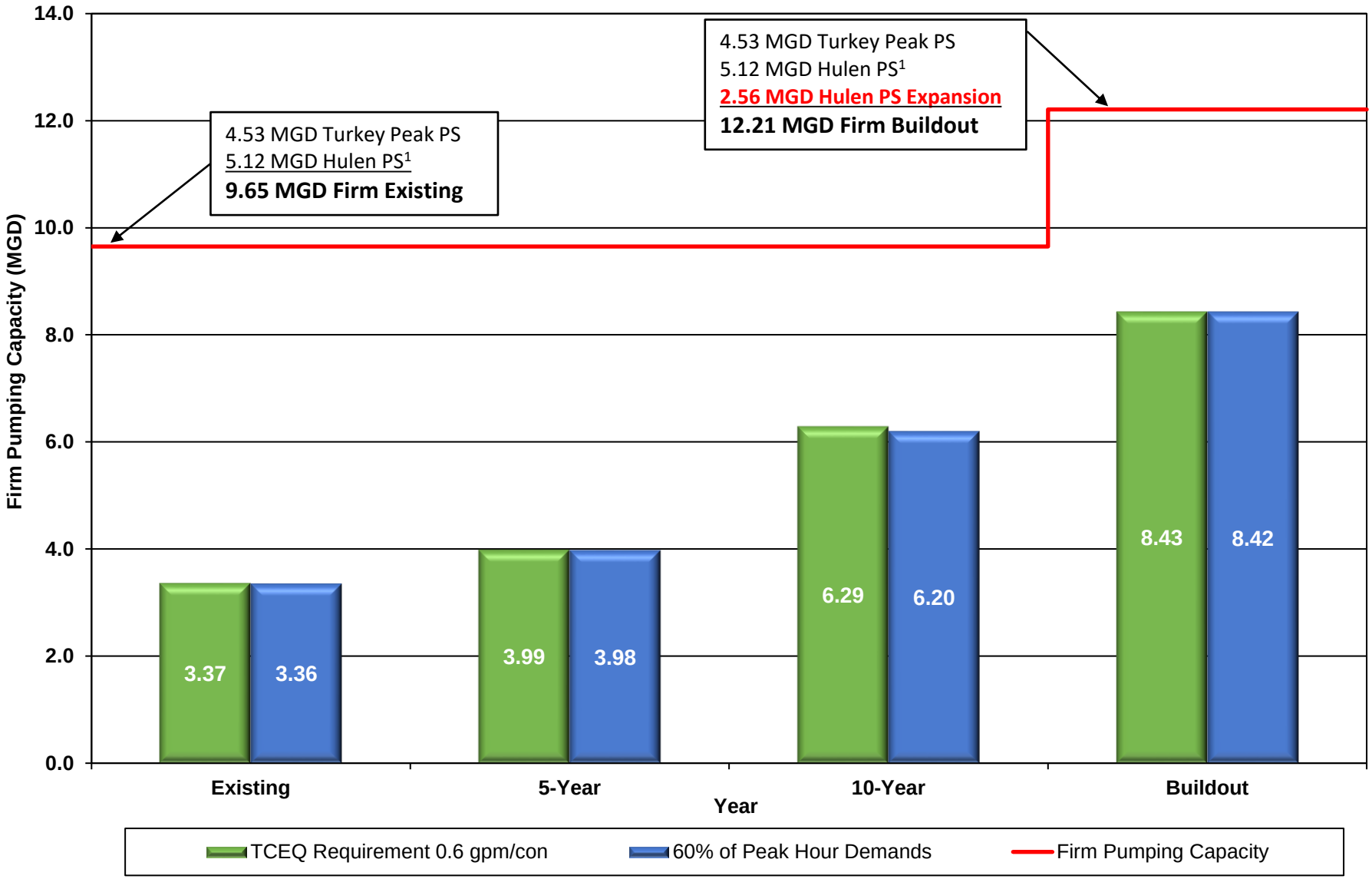
Total Storage Evaluation



[1]Existing GST capacity of 2.0 MG is shared with the Lower Pressure Plane. Assumes 10% of capacity is utilized by the Upper Pressure Plane initially, but increases to 50% within Buildout as the Turkey Peak Pump Station is utilized more for the Upper Pressure Plane.

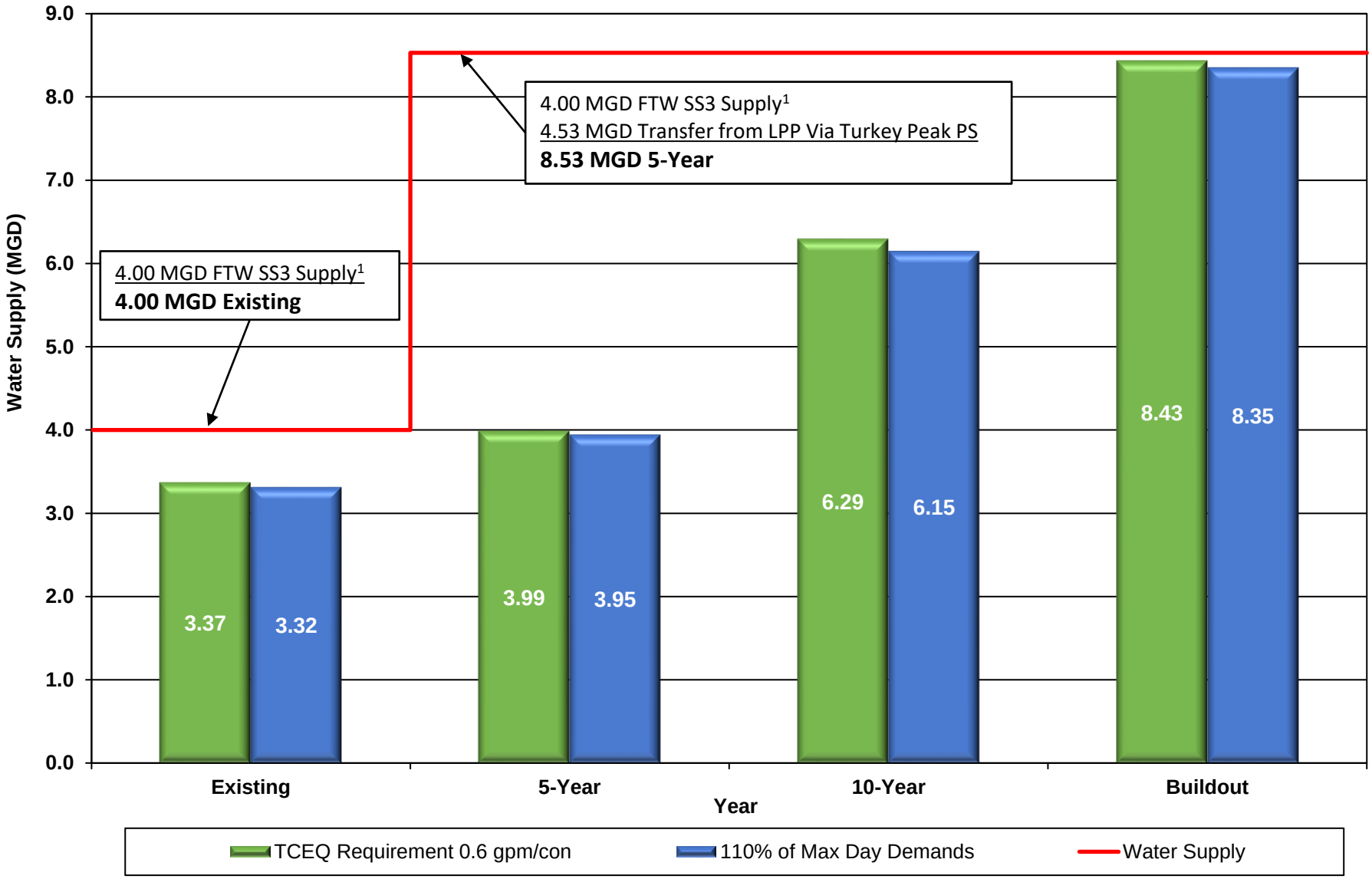
[2]Existing GST capacity of 2.0 MG and 3.0 MG is shared with the Lower Pressure Plane. Assumes 50% of capacity is utilized by the Upper Pressure Plane.

Figure 5-9
Upper Pressure Plane
Pumping Capacity Evaluation



[1]Hulen High PS has the largest pump within the Upper Pressure Plane. Capacity of the largest pump is not included to determine the firm pumping capacity of the pressure plane as a whole.

Figure 5-10
Upper Pressure Plane
Water Supply Evaluation



[1]Fort Worth SS3 Water Supply at Hulen PS is shared with the Lower Pressure Plane. Assumes 40% of capacity is utilized by the Upper Pressure Plane.

5.2 Future System Hydraulic Analysis

The future water distribution system was analyzed utilizing the same criteria summarized in **Sections 4.3.2** and **4.3.3**. The analyses were performed on the future water distribution system, with the proposed water system improvements in service. **Appendix E** includes mapping presenting the results of the future water system hydraulic analyses. A map showing minimum pressures in the future system under maximum day demands can be found in **Figure E-1**. Maps highlighting the water lines which violate the design velocity and headloss criteria in the future system can be found in **Figure E-2** and **Figure E-3**, respectively. Lastly, a fire flow contouring map was also prepared to show the available fire flow throughout the future distribution system which can be found in **Figure E-4**.

An important function of the future system analyses are the EST ranges observed within the hydraulic model. **Table 5-2** summarizes the high and low levels observed for each EST (existing and proposed) within the future water system. **Figures E-5** and **E-6** in **Appendix E** present the modeled level within each EST in the future water system under Buildout maximum day demands.

Table 5-2 Future Water System EST Levels

Storage Tank	Pressure Plane	Capacity (MG)	Existing/ Proposed	Minimum Level (ft)	Maximum Level (ft)
Turkey Peak (Elevated)	Upper	0.75	Existing	27	34
Hyder Ranch	Upper	0.50	Proposed	20	32
New Mountain Valley	Upper	0.75	Proposed	26	33
Hidden Creek	Lower	1.00	Existing	29	37
Turkey Peak (Ground)	Lower/Upper	2.00	Existing	26	36
FM 731	Lower	1.50	Proposed	30	37

5.3 Future Mountain Valley Water System

The service area previously known as the Mountain Valley Pressure Plane is currently served by the UPP. The existing 0.30 MG Mountain Valley EST has an overflow elevation of 1,034 feet and the existing Mountain Valley Booster PS (Wicker Hill) has a firm capacity of 0.72 MGD. FNI was asked to evaluate the impacts of decommissioning the Mountain Valley EST and Booster PS. Future identified water system improvements in this Master Plan will allow the City to abandon/remove the Wicker Hill PS and GST, and replace the existing Mountain Valley EST with a larger tank at a matching overflow elevation of the Turkey Peak EST. Future model system results indicate the proposed larger Mountain Valley EST would float adequately with the other UPP tanks. FNI analyzed different locations for the proposed larger Mountain

Valley EST, and determined either the existing site or the Wicker Hill PS site would be sufficient. However, the proposed EST operates more closely in line with the UPP facilities at the Wicker Hill PS. Under both scenarios, the Wicker Hill PS is not necessary for serving this area under the UPP.

6.0 WATER SYSTEM CAPITAL IMPROVEMENT PLAN

Figure 6-1 illustrates the proposed CIP for the buildout water demand projections. **Table 6-1** provides a cost summary for each project and corresponds with the numbered projects on **Figure 6-1**. All project costs shown in this report are based on construction costs representing 2023 conditions and should be adjusted in the future to reflect the current construction environment. Estimated costs do not include right-of-way and/or easement costs that may be required for each improvement. **Appendix F** contains an estimated cost summary and description for each individual project. For the purposes of this report, the proposed CIP is based upon relying solely on the City of Fort Worth for water supply. FNI recommends the City explore alternative water supply sources for resiliency and reliability.

Table 6-1 Water System Capital Improvement Projects Summary

Project Number	Project Name	Project Driver	Project Purpose	Estimated Cost
H-A	16-inch County Road 920 Lower Pressure Plane Transmission Water Line	Hydraulic Restriction	• This project provides transmission capacity to the LPP from the Hulen Low Pump Station. • The existing 16-inch transmission line from the Hulen Low Pump Station to the LPP experiences high velocity/headloss under existing system max day demand projections.	$3,058,800
H-B	16-inch Wilshire Boulevard Upper Pressure Plane Transmission Water Line	Hydraulic Restriction	• This project provides transmission capacity to the Mountain Valley portion of the Upper Pressure Plane from the Hulen High Pump Station. • This area experiences high velocity/headloss under buildout demands. • This project enables the existing 12-inch water line along Wilshire Boulevard to be converted to a LPP water Line.	$1,826,900
H-C	Small Diameter Replacement Initiative	Hydraulic Restriction	• This project provides additional transmission capacity for areas served via small diameter water lines. • This project increases the available fire flow and minimum pressures observed throughout the distribution system.	$6,646,800
G-A	12-inch County Road 714 Lower Pressure Plane Water Line	Growth/ Development	• This project will allow near-term future developments to be served in the Lower Pressure Plane.	$3,022,900
G-B	12-inch County Road 802 Upper Pressure Plane Water Line	Growth/ Development	• This project will allow near-term future developments to be served in the Upper Pressure Plane. • This project will also provide improved looping and fire flow in the Mountain Valley area.	$2,146,900
G-C	12-inch FM 731 Lower Pressure Plane Water Line	Growth/ Development	• This project will allow future developments (The Lakes) to be served in the LPP. • This project will improve looping and available fire flow in the LPP.	$1,157,200
G-D	12-inch I-35 W Lower Pressure Plane Water Line	Growth/ Development	• This project will allow future developments to be served in the Lower Pressure Plane. • This project will improve looping and available fire flow in the Lower Pressure Plane.	$2,972,100

Table 6-1 Water System Capital Improvement Projects Summary - Continued

Project Number	Project Name	Project Driver	Project Purpose	Estimated Cost
G-E	12-inch Wilshire Boulevard Upper Pressure Plane Water Line	Growth/ Development	• This project will allow future developments (Bear Ridge) to be served in the Upper Pressure Plane. • The primary trigger for project G-A is the implementation of the proposed UPP to LPP pressure plane transition of the area generally bounded by Wilshire Boulevard and FM 731. This project will provide resiliency and alternate feed to these development areas.	$1,288,700
G-F	12/16-inch Hyder Ranch Distribution Line Phase 1	Growth/ Development	• This project facilitates the transmission capacity to serve the Hyder Ranch Development	$5,857,500
G-G	12-inch Village Creek Lower Pressure Plane Water Line Phase 1	Growth/ Development	• The development area near the Mountain Valley Pump Station (offline), is recommended to be served from the LPP. • This project facilitates the transmission capacity to serve the developments through the LPP. • This project will eliminate a 12-inch dead-end line.	$1,823,900
G-H	12-inch Wicker Hill Road Upper Pressure Plane Water Line	Growth/ Development	• This project will allow future developments (Bear Ridge) to be served in the Upper Pressure Plane. • This project will eliminate a 12-inch dead-end line.	$846,200
G-I	12-inch Village Creek Lower Pressure Plane Water Line Phase 2	Growth/ Development	• The development area near the Mountain Valley Pump Station (offline), is recommended to be served from the LPP. • This project facilitates the transmission capacity to serve the developments through the LPP.	$1,127,300
G-J	12-inch Hyder Ranch Distribution Line Phase 2	Growth/ Development	• This project facilitates the transmission capacity to serve the Hyder Ranch Development	$4,419,300
F-A	8-inch Village Creek Lower Pressure Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Lower Pressure Plane. • This project will eliminate two 8-inch dead-end lines.	$633,900
F-B	12-inch Shoreline Drive Upper Pressure Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Lower Pressure Plane. • This project will eliminate a 12-inch dead-end line.	$965,800

Table 6-1 Water System Capital Improvement Projects Summary - Continued

Project Number	Project Name	Project Driver	Project Purpose	Estimated Cost
F-C	12-inch Willow Creek Lower Upper Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Upper Pressure Plane. • This project will eliminate a 12-inch dead-end line. • This project will add system resiliency by eliminating a single 12-inch feed to the Mountain Valley portion of the Upper Pressure Plane.	$765,500
F-D	8-inch County Road 715 Lower Pressure Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Lower Pressure Plane. • This project will allow near-term future developments to be served in the Lower Pressure Plane.	$457,500
F-E	10-inch FM 1187 Lower Pressure Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Lower Pressure Plane.	$314,000
F-F	8-inch Dobson Road Lower Pressure Plane Water Line	Fire Flow/Looping	• This project will improve looping and available fire flow in the Lower Pressure Plane.	$891,100
R-A	8.50 MGD Industrial Pump Station Expansion	Regulatory/ Operational	• This project will provide pumping capacity to meet TCEQ and FNI planning criteria. • This will also allow the system to provide pumping capacity for 60% of peak hour demand through buildout.	$20,948,000
R-B	Fort Worth Water Supply Offsite Improvements	Regulatory/ Operational	• This project will provide additional water supply to meet projected growth and development.	$5,501,000
R-C	0.50 MG Hyder Ranch EST	Regulatory/ Operational	• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.	$1,868,800
R-D	NEW 0.75 MG Mountain Valley EST	Regulatory/ Operational	• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.	$3,333,700
R-E	1.50 MG FM 731 EST	Regulatory/ Operational	• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.	$5,606,300
R-F	2.56 MGD Hulen High Pump Station Expansion	Regulatory/ Operational	• This project will provide system resiliency/redundancy should the Turkey Peak PS go out of service for any significant period of time.	$373,800
			Grand Total	**$77,853,900**

FIGURE 6-1

CITY OF BURLESON

WATER SYSTEM RECOMMENDED IMPROVEMENTS

LEGEND

Recommended Improvement by Driver

- Regulatory / Operational
- Hydraulic Restriction
- Growth / Development
- Fireflow / Looping

Existing Water System

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

R-B Fort Worth Water Supply Offsite Improvements

H-C Small Diameter Replacement Initiative

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

Supply from Fort Worth (SS2)

10.0 MGD Supply from Fort Worth (SS3)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump
Decommission

(2) - 2.00 MG Industrial
Ground Storage Tanks
Overflow Elev. = 739'
1.00 MG Ground Storage Tank

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps
8.50 MGD Pump Station Expansion

0.50 MG Hyder Ranch
Elevated Storage Tank
Overflow Elev. = 1,000'

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

UPP to LPP Transfer Valve

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps
2.56 MGD Pump Station Expansion

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

Lower Pressure Plane Transmission Water Line

Upper Pressure Plane Transmission Water Line

Convert Existing 12-inch Line from UPP to LPP

1.50 MG FM 731
Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley
Pump Station
Decommission

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
Decommission

0.75 MG New Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,000'

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
Decommission

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

FORT WORTH

TARRANT CO.
JOHNSON CO.

JOSHUA

CROSS TIMBER

BRIAROAKS

0 1,100 2,200
SCALE IN FEET

Created by Freese and Nichols, Inc.
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Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\FINAL_MP_REPORT\[Figure_06-01]-Water_Recomm_Improve.mxd
Updated: Monday, November 20, 2023 8:10:05 AM
User Name: GI499

7.0 WASTEWATER FLOW PROJECTIONS

The City of Burleson's wastewater collection system was evaluated under projected peak wet weather flow conditions. Peak wet weather flow conditions refers to the peak rate at which wastewater is conveyed through the collection system during the year. Typically this condition occurs during significant rain events. Since peak flows are typically experienced during peak wet weather conditions, the sizes and locations of collection system facilities are generally determined based on this condition.

7.1 Historical Wastewater Flows

The historical monthly water billing meter and monthly wastewater flow data provided by Burleson was used in developing the wastewater flow projections design criteria. **Table 7-1** summarizes the historical wastewater flow data. The historical water billing meter data was used to determine the approximate historical flows by land use, as described in **Section 3.1**.

The historical average day and peak wet weather flows were reviewed to determine appropriate design criteria for projecting wastewater flows. One thing to note, is the large peak wet weather flow and subsequent peak wet weather to average day peaking factor that occurred in 2015. The state was experiencing dry conditions and was within a drought, but in 2015 there was such significant rainfall (172% of the historical average) that many local DFW utilities experienced higher than normal peak wet weather flows. The goal of selecting and right-sizing the wastewater flow design criteria for the City is to adequately plan for and to size infrastructure that accommodates wet years when flows tend to be highest. In the previous 2015 Wastewater Master Plan, FNI utilized an average residential gallons per day per capita of 80, an average non-residential gallons per day per acre of 450, and a peak wet weather to average day peaking factor of 3.4. After review of the data presented in **Table 3-1**, FNI determined the previous wastewater design criteria remains accurate and appropriate for projecting wastewater flows. In addition to the historical wastewater flow data, FNI reviewed the peak wet weather to average day peaking factors observed during the temporary flow monitoring period, as summarized in **Table 7-2**. **Section 8.2.1** provides additional explanation of the temporary flow monitoring period and results. The results of the temporary flow monitoring was utilized in this section to provide a more detailed breakdown of the peak wet weather flows observed throughout the City's collection system. After reviewing the temporary flow monitoring results, FNI recommends utilizing a peak wet weather to average day peaking factor of 2.92 for establishing existing peak wet weather flows. The 3.4 peak wet weather to average day peaking factor will be utilized for projecting future peak wet weather flows.

Table 7-1 Historical Wastewater Flows

Year	NCTCOG Historical Population (a)	Residential Average Day Flow[2] (MGD) (b)	Residential Average Day Per Capita Flow (gpcd) (c) = [b x 10^6] / a	Non-Residential Acreage[3] (d)	Non-Residential Average Day Flow[2] (MGD) (e)	Non-Residential Average Day Per Capita Flow (gpad) (f) = [e x 10^6] / d	Total Average Day Flow[1] (MGD) (g)	Overall Average Day Per Capita Flow (gpcd) (h) = [g x 10^6] / a	Peak Wet Weather Flow[1] (MGD) (i)	Peak Wet Weather Flow to Average Day Flow Peaking Factor (j) = i / g	Rainfall[1] (in)
2010	36,690	3.24	88	1,382	0.57	412	3.81	104	14.20	3.7	40.30
2011	36,990	2.75	74	1,394	0.48	344	3.23	87	9.80	3.1	24.10
2012	38,130	2.98	78	1,437	0.53	369	3.51	92	12.30	3.5	29.90
2013	39,010	2.80	72	1,470	0.49	333	3.29	84	9.70	2.9	32.10
2014	39,920	3.15	79	1,504	0.56	372	3.70	93	12.60	3.4	24.40
2015	41,280	3.77	91	1,555	0.66	424	4.43	107	31.56	7.12	63.71
2016	42,560	3.45	81	1,604	0.61	380	4.06	95	9.02	2.2	43.48
2017	43,960	2.85	65	1,656	0.50	302	3.35	76	6.62	2.0	30.53
2018	44,860	3.29	73	1,690	0.58	343	3.87	86	8.73	2.3	46.69
2019	45,620	3.47	76	1,719	0.61	355	4.08	89	9.26	2.3	32.75
2020	47,641	3.34	70	1,795	0.59	329	3.93	83	8.32	2.1	37.70
2021	48,540	3.43	71	1,829	0.61	334	4.04	83	8.46	2.1	33.60
2022	50,206	3.21	64	1,892	0.57	301	3.78	75	10.87	2.9	39.69
		Average	**76**	--	--	**354**	--	**89**	--	**3.0**	**36.84**
		Maximum	**91**	--	--	**424**	--	**107**	--	**7.1**	**63.71**

[1]Historical wastewater flow data provided by City staff.

[2]From Billing meter data was utilized to approximate split between residential and non-residential.

[3]Extrapolated based on historical population growth rates.

Table 7-2 Temporary Flow Monitoring Wet Weather Flow Characteristics

Flow Monitor	Flow Monitor Basin Linear Footage (Feet)	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)	Peak Wet Weather Flow to Average Day Flow Peaking Factor
FM01	9,472	3.34	7.38	2.21
FM02	161,530	0.32	0.90	2.81
FM03	161,530	0.18	0.60	3.33
FM04	120,563	1.98	4.92	2.48
FM05	78,312	0.46	1.29	2.80
FM06	168,316	0.66	1.70	2.58
FM07	184,666	0.55	1.64	2.98
FM08	116,453	0.26	0.58	2.23
FM09	116,453	0.91	2.27	2.49
FM10	176,810	0.58	1.35	2.33
FM11	176,810	0.14	0.52	3.71
FM12	101,733	0.31	0.82	2.65
			Average	**2.72**

7.2 Projected Wastewater Flows

Projected wastewater flows were estimated based on projected residential and commercial growth and land use for each parcel in the City of Burleson. The proposed land use and design criteria information is shown in **Table 7-3**. In comparison to historical data, these values are slightly larger than the calculated historical averages to account for above average flow typically experienced during peak wet weather time periods.

Table 7-3 Wastewater System Design Criteria

Land Use Code	Land Use	Residential Average Day Per Capita Flow (gpcd)	Non-Residential Average Day Per Capita Flow (gpad)	Peak Wet Weather Flow to Average Day Flow Peaking Factor
Existing Zoning				
2F	Two-Family (Duplex)	80	--	2.92
AL	Assisted Living	80	--	2.92
C	Commercial	--	450	2.92
CEM	Cemetery	--	--	--
CH	Church	--	450	2.92
FS	Fire Station	--	450	2.92
GW	Gas Well	--	--	--
LI	Light Industrial	--	450	2.92
MF	Multi-Family	80	--	2.92
MH	Manufactured Home	80	--	2.92
O	Office	--	450	2.92
OS	Open Storage	--	--	--
POS	Parks/Open Space	--	--	--
PSP	Public/Semi-Public	--	--	--
R	Retail	--	450	2.92
SCHOOL	Education	--	450	2.92
SF	Single Family	80	--	2.92
SFA	Single Family Attached	80	--	2.92
V	Vacant	--	--	--
VB	Vacant Building	--	--	--

Table 7-3 Wastewater System Design Criteria - Continued

Land Use Code	Land Use	Residential Average Day Per Capita Flow (gpcd)	Non-Residential Average Day Per Capita Flow (gpad)	Peak Wet Weather Flow to Average Day Flow Peaking Factor
Future Zoning				
bgc	Business Growth Center	--	450	3.4
cd	Campus District	--	450	3.4
comcor	Commercial Corridor	--	450	3.4
freecom	Conventional Freeway Commercial	--	450	3.4
Ind	Industrial/Employment Growth Center	--	450	3.4
maincor	Main Street Corridor	--	--	--
mugc	Mixed Use Growth Center	80	450	3.4
POS	Parks/Open Space	--	--	--
rrn	Rural Residential Neighborhood	80	--	3.4
urn	Urban Residential Neighborhood	80	--	3.4
mdr	Medium Density Residential	80	--	3.4

In addition to the wastewater design criteria for the existing and future land uses summarized in **Table 7-3**, FNI also developed wastewater design criteria for the known and upcoming developments. **Table 7-4** summarizes the known development information and the associated land use assumptions design criteria.

Table 7-4 Known Developments Wastewater System Design Criteria

Land Use Code	Land Use	Residential Average Day Per Capita Flow (gpcd)	Non-Residential Average Day Per Capita Flow (gpad)	Peak Wet Weather Flow to Average Day Flow Peaking Factor
Known Developments				
Animal Pancakes	Commercial	80	450	3.4
Burleson West Business Park	Hospital	200	--	3.4
	Commercial	--	450	3.4
Chicken Express	Industrial	80	2,000	3.4
Chisholm Summit	Multi-Family	80	--	3.4
	Single Family	80	--	3.4
	Townhome	80	--	3.4
	Commercial	--	450	3.4
	School	--	450	3.4
Hulen Subdivision	Single Family	80	--	3.4

Table 7-4 Known Developments Wastewater System Design Criteria - Continued

Land Use Code	Land Use	Residential Average Day Per Capita Flow (gpcd)	Non-Residential Average Day Per Capita Flow (gpad)	Peak Wet Weather Flow to Average Day Flow Peaking Factor
Known Developments				
Hyder Ranch	Multi-Family	80	--	3.4
	Single Family	80	--	3.4
	Commercial	--	450	3.4
	School	--	450	3.4
Lakes	Multi-Family	80	--	3.4
	Single-Family	80	--	3.4
	Commercial	80	450	3.4
	School	--	450	3.4
Bear Ridge	Multi-Family	80	--	3.4
	Single Family	80	--	3.4
	Commercial	--	450	3.4
Panchasarp	Multi-Family	80	--	3.4
	Single Family	80	--	3.4
	Commercial	--	450	3.4
Shannon Creek	Single Family	80	--	3.4

Table 7-5 shows a summary of the projected 5-year, 10-year, 20-year, and Buildout wastewater flows for the identified service area. A detailed summary of the projected wastewater flows by wastewater basin is shown in **Table 7-6**.

Table 7-5 Wastewater Service Area Projected Wastewater Flows

Planning Period	Population	Residential Average Day Flow (MGD)	Non-Residential Average Day Flow (MGD)	Total Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
Existing	49,760	1,795	4.00	0.84	4.84
5-Year	62,548	2,383	4.99	1.30	6.29
10-Year	76,822	2,730	6.15	1.43	7.57
20-Year	103,799	4,397	8.29	2.19	10.48
Buildout	120,821	6,523	9.66	3.14	12.80

Table 7-6 Projected Wastewater Flows by Major Wastewater Basin

Sewer Basin	Served Population (a)	Non-Residential Acres (Acres) (b)	Residential Average Day Flow (MGD) (c) = [a x gpcd] / 10^6	Non-Residential Average Day Flow (MGD) (d) = [b x gpad] / 10^6	Total Average Day Flow (MGD) (e) = [c + d]	Peak Wet Weather Flow (MGD) (f) = [e x PF]
Existing Wastewater Flows						
Burleson Main	3,684	140	0.29	0.06	0.36	1.04
Burleson West	0	0	0.00	0.00	0.00	0.00
North Creek	9,214	296	0.74	0.13	0.87	2.54
Quil Miller Creek	4,851	484	0.39	0.26	0.65	1.89
Shannon Creek	7,764	277	0.63	0.12	0.75	2.18
Town Creek	15,851	425	1.27	0.19	1.46	4.26
Village Creek	4,718	87	0.38	0.04	0.42	1.22
Willow Creek	3,678	86	0.30	0.04	0.33	0.97
Total	**49,760**	**1,795**	**4.00**	**0.84**	**4.84**	**14.10**
Short-Term Wastewater Flows (5-Year)						
Burleson Main	3,773	156	0.30	0.07	0.37	1.09
Burleson West	4,171	91	0.33	0.23	0.56	2.02
North Creek	9,378	379	0.75	0.17	0.92	2.71
Quil Miller Creek	5,183	634	0.41	0.33	0.74	2.21
Shannon Creek	8,907	304	0.71	0.14	0.85	2.53
Town Creek	16,340	575	1.31	0.26	1.57	4.62
Village Creek	5,883	125	0.47	0.06	0.53	1.59
Willow Creek	8,913	119	0.71	0.04	0.75	2.40
Total	**62,548**	**2,383**	**4.99**	**1.30**	**6.29**	**19.17**
Intermediate-Term Wastewater Flows (10-Year)						
Burleson Main	3,773	156	0.30	0.07	0.37	1.09
Burleson West	8,704	131	0.70	0.24	0.94	3.31
North Creek	9,378	447	0.75	0.20	0.95	2.82
Quil Miller Creek	6,457	764	0.52	0.38	0.90	2.75
Shannon Creek	12,431	353	0.99	0.16	1.15	3.56
Town Creek	20,491	591	1.64	0.26	1.90	5.75
Village Creek	5,896	126	0.47	0.06	0.53	1.60
Willow Creek	9,692	162	0.78	0.06	0.83	2.68
Total	**76,822**	**2,730**	**6.15**	**1.43**	**7.57**	**23.56**

Table 7-6 Projected Wastewater Flows by Major Wastewater Basin - Continued

Sewer Basin	Served Population (a)	Non-Residential Acres (Acres) (b)	Residential Average Day Flow (MGD) (c) = [a x gpcd] / 10^6	Non-Residential Average Day Flow (MGD) (d) = [b x gpad] / 10^6	Total Average Day Flow (MGD) (e) = [c + d]	Peak Wet Weather Flow (MGD) (f) = [e x PF]
Long-Term Wastewater Flows (20-Year)						
Burleson Main	4,182	156	0.33	0.07	0.40	1.20
Burleson West	14,139	143	1.13	0.25	1.38	4.81
North Creek	9,379	458	0.75	0.21	0.96	2.83
Quil Miller Creek	11,481	2,136	0.92	1.00	1.92	6.22
Shannon Creek	20,059	453	1.60	0.21	1.81	5.79
Town Creek	21,213	621	1.70	0.27	1.97	5.99
Village Creek	6,684	152	0.53	0.07	0.60	1.85
Willow Creek	16,662	278	1.33	0.11	1.44	4.75
Total	**103,799**	**4,397**	**8.29**	**2.19**	**10.48**	**33.44**
Buildout Wastewater Flows (2060)						
Burleson Main	4,182	156	0.33	0.07	0.40	1.20
Burleson West	14,655	195	1.17	0.27	1.44	5.03
North Creek	9,379	458	0.75	0.21	0.96	2.83
Quil Miller Creek	12,862	4,160	1.03	1.91	2.94	9.69
Shannon Creek	31,137	482	2.49	0.22	2.71	8.85
Town Creek	21,226	621	1.70	0.27	1.97	6.00
Village Creek	6,684	173	0.53	0.08	0.61	1.88
Willow Creek	20,696	278	1.66	0.11	1.77	5.85
Total	**120,821**	**6,523**	**9.66**	**3.14**	**12.80**	**41.33**

8.0 EXISTING WASTEWATER SYSTEM

8.1 Existing Wastewater Collection System

The existing collection system currently conveys wastewater to the Fort Worth meter located in the northeast corner of the City and an existing 27-inch gravity main conveys wastewater flow from the meter to Fort Worth's Village Creek Water Reclamation Facility. The City of Burleson's service area is divided into eight major wastewater basins:

- North Creek
- Burleson Main
- Burleson West
- Town Creek
- Quil Miller Creek
- Shannon Creek
- Village Creek
- Willow Creek

The City's current wastewater system GIS shows a range of pipes from 2-inch collector lines to 36-inch interceptors. The City also owns and operates three lift stations that service areas of lower elevation. **Figure 8-1** shows the existing wastewater system.

8.2 Wastewater Model Update

The hydraulic model of the City of Burleson's wastewater system includes 10-inch and larger wastewater gravity lines, key 6-inch and 8-inch wastewater gravity lines, and force mains for all major lift stations. The wastewater model was updated using the City's GIS data where new lines have been added since the previous Master Plan update. The wastewater model contains approximately half of the City's GIS lines. The City provided as-built drawings for the major wastewater interceptors, and the invert elevations were input to the model. If as-builts showing the pipe invert elevations were not available, inverts were back calculated either from known inverts using TCEQ minimum slope requirements or by straight line interpolation if an upstream and downstream invert elevation was available.

FIGURE 8-1

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM

LEGEND

- Manhole
- Lift Station
- Under Design/Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Fort Worth Wastewater Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MAJOR BASINS

- Burleson Main
- Burleson West
- North Creek
- Quil Miller Creek
- Shannon Creek
- Town Creek
- Village Creek
- Willow Creek

Alsbury #1 Lift Station

6" F.M.

Village Creek WWTP

12" F.M.

Mtn. Valley Lift Station

Hidden Creek Lift Station

CROWLEY

FORT WORTH

JOSHUA

CROSS TIMBER

BRIAROAKS

TARRANT CO.
JOHNSON CO.

0 1,300 2,600
SCALE IN FEET

Created by Freese and Nichols, Inc.
Job No.: BURG043
Location: H:\W_WW_PLANNING\01_DELIVERABLES\01_FINAL_REPORT\FINAL_MP_REPORT\Figure_08-01(Existing_Wastewater_System.mxd
Date Created: November 20, 2023 8:59:43 AM
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8.2.1 Temporary Flow Monitoring

Flow monitoring is one of the most important steps in evaluating a sanitary sewer collection system. It is typically performed during spring and fall seasons when the chances of rainfall are greatest. The flow monitoring data is used to examine the existing dry and wet weather flows, evaluate the effects of rainfall on the wastewater collection system, and calibrate the hydraulic model to evaluate the capacity of the system to transport peak flows. The site investigation reports and flow data for each meter are included in **Appendix G.**

The temporary flow monitoring was conducted from October 10, 2020 to January 7, 2021 using 12 flow meters and two rainfall gauges. The location of the flow monitors and rain gauges are shown in **Appendix H**. **Table 8-1** summarizes the storm events observed during the flow monitoring.

Table 8-1 Storm Summary During Flow Monitoring Period

Date	Duration (hours)	RG01 Rain Total (in)	RG02 Rain Total (in)
10/23/2020	2	1.38	1.39
10/28/2020	6	0.71	0.63
11/28/2020	6	0.57	0.59
12/13/2020	6	0.90	0.87
12/30/2020	48	1.56	1.57

8.2.2 Sanitary Sewer Evaluation – RDII Results

Rainfall dependent inflow and infiltration (RDII) is defined as all rainwater that enters the sewer system during the storm event. An RDII volume was calculated to assist in ranking the temporary flow monitoring basins. The volume of RDII was calculated by average storm response and removing the dry weather flow. The RDII volume was normalized by considering the linear footage of gravity pipe in each flow meter basin and the depth of each rainfall event. **Table 8-2** summarizes the normalized RDII in units of gallons per linear foot of gravity pipe per inch of rainfall (gal/LF/in) for each observed storm event. This illustrates which basins have RDII issues versus those basins that are relatively large or downstream of a basin with large flows.

Table 8-2 Normalized Net RDII by Flow Meter Basin

Flow Meter Basin	Linear Footage of Gravity Pipe	Normalized Net RDII[1] (gal/LF/in)				
		10/23/20	10/28/20	11/28/20	12/13/20	12/30/20
FM02 & 03	161,530	0.17	0.44	2.61	1.22	1.96
FM04	120,563	0.12	2.11	3.97	0.47	2.01
FM05	78,312	1.41	3.94	3.82	4.91	5.35
FM06	168,316	0.30	0.77	1.16	1.52	1.92
FM07	184,666	0.67	0.85	2.05	2.34	3.10
FM08 & 09	116,453	0.64	1.13	0.35	0.89	1.61
FM10 & 11	176,810	1.84	1.38	3.50	3.79	5.36
FM12	101,733	0.35	0.37	0.89	0.79	1.97

[1]Rainfall events from 2020/2021 field testing events

The eight flow meter basins (twelve total basins, but parallel meters were summarized as one) were categorized into **excessive**, **high**, and **low-to-moderate** levels of I/I to prioritize necessary Sanitary Sewer Evaluation Study (SSES) work in each basin. The ranking was based on the rate of normalized net RDII as gal/LF/in calculated within each basin for a 3.6-inch projected storm. **Table 8-3** shows the categories of RDII.

Table 8-3 Categories of RDII Intensity

RDII (Gal/LF/in)	Description
RDII Greater than 3.0	Excessive RDII
RDII between 2.0 – 3.0	High RDII
RDII less than 2.0	Low-to-Moderate RDII

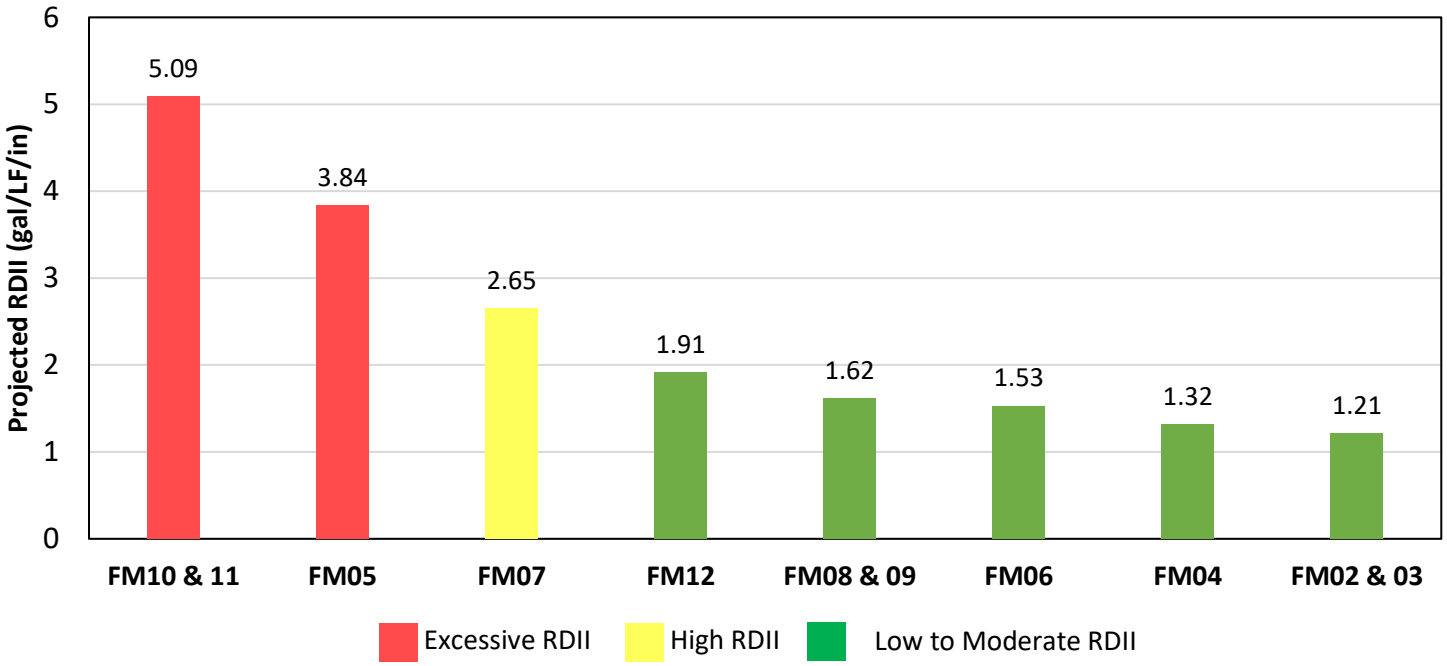
Table 8-4 shows the flow meter basin ranking by RDII, and **Figure 8-2** provides a graphical summary of the projected RDII. The meter basin RDII ranking results are as follows:

- Two basins with excessive levels of I/I
- One basin with high levels of I/I
- Five basins with low-to-moderate levels of I/I

Table 8-4 Normalized Net RDII Volume for 3.6-inch Design Storm

Flow Meter Basin	RDII (MG)	Basin Size (LF)	RDII (gal/LF)	RDII (gal/LF/in)	Rank
FM02 & 03	0.71	161,530	4.4	1.21	8
FM04	0.57	120,563	4.7	1.32	7
FM05	1.08	78,312	13.8	3.84	2
FM06	0.87	168,316	5.2	1.53	6
FM07	1.62	184,666	8.8	2.65	3
FM08 & 09	0.61	116,453	5.2	1.62	5
FM10 & 11	2.94	176,810	16.6	5.09	1
FM12	0.61	101,733	6.0	1.91	4

Figure 8-2 Projected Design Storm RDII by Flow Meter Basin



Flow meter basins with high levels of RDII during the temporary flow monitoring period were identified for follow-up SSES activities. A detailed analysis of these areas should be conducted to pinpoint the sources of RDII and develop improvements to reduce the additional flow. SSES activities typically include smoke testing, closed-circuit television (CCTV) inspections of the gravity mains, and digital manhole inspections of the entire basin. These activities will help the City understand the condition of the collection system, identify sources of RDII, and improve data management and connectivity data within these areas.

Based on the results of the temporary flow monitoring, flow meter basin 10/11 (Shannon Creek) and flow meter basin 5 (Burleson Main) have excessive levels of RDII (gal/LF/in). Planning level cost estimates were developed for each basin for Sanitary Sewer Evaluation Studies (SSES) based on recent bid tabs. The cost

estimates include manhole inspection, CCTV and cleaning, smoke testing, and program management. These costs do not include escalation or inflation. **Table 8-5** summarizes the total SSES costs by flow meter basin.

Table 8-5 Summary of SSES Rehabilitation Costs by Basin

Normalized RDII Ranking	Flow Meter Basin	# Manholes To Inspect	Total Length of Pipe (LF)	Estimated Budgetary Cost
1	FM10 &11	604	176,810	$1,644,400
2	FM05	205	78,312	$708,000
3	FM07	539	184,666	$1,687,500
4	FM12	296	101,733	$929,400
5	FM08 & 09	358	116,453	$1,070,200
6	FM06	488	168,316	$1,537,100
7	FM04	366	120,563	$1,106,300
8	FM02 & 03	498	161,530	$1,484,700
			Total:	**$10,167,600**

8.2.3 Collection System Model Verification

Model verification is the process of adjusting parameters within the sewer model until the model generates and conveys flow in the same manner as was observed during the flow monitoring period. The hydraulic model utilizes a steady state analysis of the collection system. A steady state analysis assumes all wastewater flows are conveyed through the collection system instantaneously and does not take into account flow travel time and attenuation. To validate the hydraulic model, FNI matched the modeled wastewater flows with the observed peak wet weather flows over the temporary flow monitoring period at each flow monitoring location. Due to the lack of flow travel time and attenuation conditions in the hydraulic model, the modeled flow at the downstream flow meters is higher than the observed peak wet weather flows. Additionally, the flow split that occurs along the City's parallel wastewater interceptors is difficult to optimize based on the observed flow meter data. The hydraulic model does not take into account any potential sediment or defects within the wastewater infrastructure that may impact the flow split between parallel interceptors. A map of the results of the wastewater model verification is in **Appendix H**.

8.3 Wastewater System Design Criteria

FNI has established design criteria for future wastewater lines and facilities. Criteria was developed for sizing wastewater trunk lines, force mains and lift station wet wells and pumping capacities for the

wastewater system. Where possible, it is desirable to construct gravity wastewater lines and avoid lift stations to avoid the additional energy and operations and maintenance costs associated with lift stations.

Wastewater Lines: The design criteria for wastewater trunk lines or interceptors are based on the TCEQ requirements that meet peak wet weather design flows with no overflows while maintaining a minimum of 2-feet/second cleaning velocity and a maximum of 8-feet/second velocity.

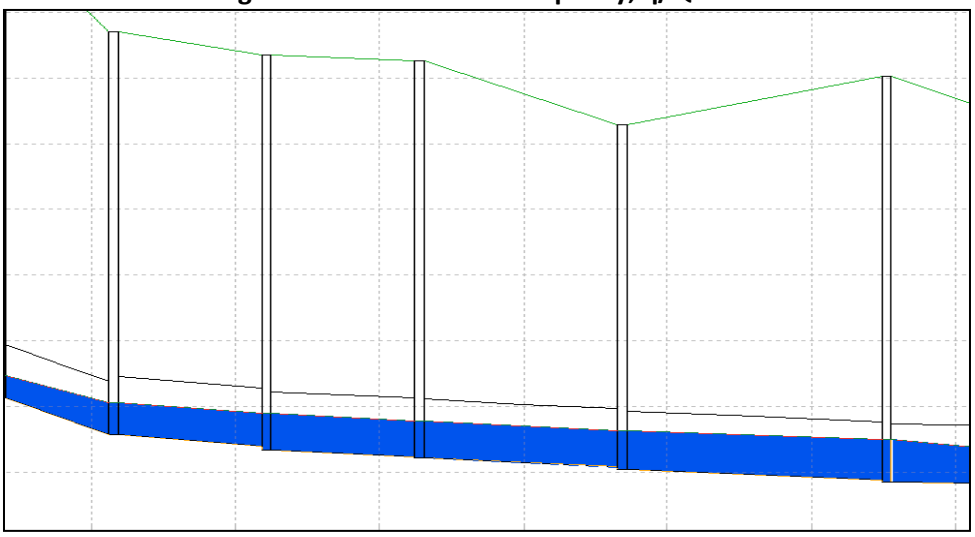
Lift Stations: The design criteria for lift station pumping shall be to provide firm pumping capacity to meet 125% of the peak wet weather design flows. The firm pumping capacity is defined as the total available pumping capacity with the largest pump out of service.

Force Mains: The design criteria recommended for force mains are to meet the required pumping capacity of the lift station at a velocity less than 8-feet per second and a maximum discharge pressure of 150 psi and to allow a minimum of 2-feet per second scouring velocity during a single pump operation.

8.4 Existing Wastewater System Analysis

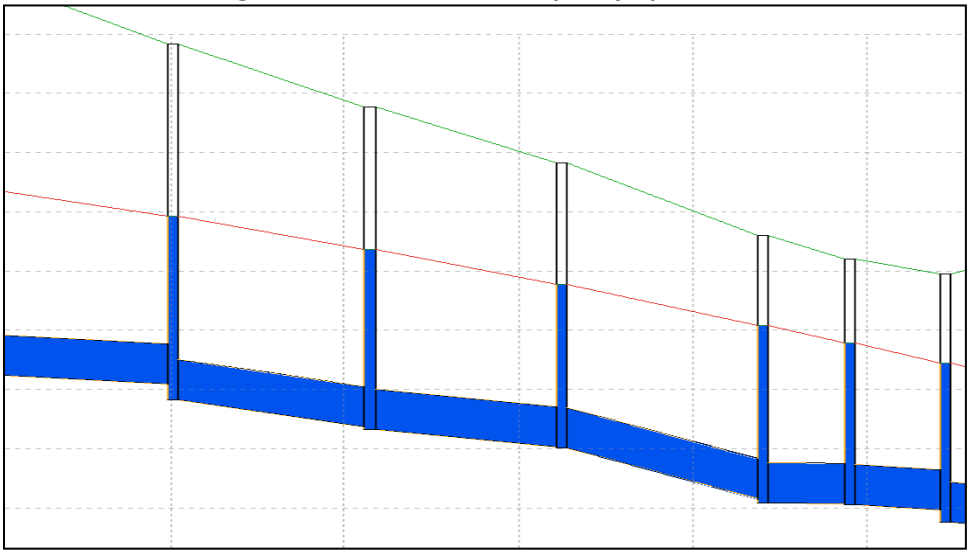
The collection system was evaluated using a q/Q ratio, where q represents the actual flow through a pipe, and Q is the capacity of that pipe. The q/Q ratio indicates whether the flow rate in the system exceeds the capacity of the network and causes surcharging. A q/Q ratio of less than 1.0 indicates the line is not surcharging due to capacity restraints, as shown in **Figure 8-3**. A q/Q ratio equal to or greater than 1.0 indicates that the line has surcharged, and the hydraulic gradient is greater than the gradient of the pipe. This indicates the line is surcharging due to insufficient capacity. **Figure 8-4** gives a visual representation of the surcharged state.

Figure 8-3 Full Flow Capacity, q/Q < 1.0



*q/Q < 1.0, the pipe is not surcharged.

Figure 8-4 Full Flow Capacity, q/Q > 1.0



*q/Q > 1.0, Hydraulic gradient is greater than pipe gradient.

Figure H-4 in **Appendix H** shows the q/Q ratio for every modeled pipe in the system that surcharges under the peak wet weather flows. The sewer interceptors highlighted red are overloaded during existing peak wet weather events and should be priority areas in the future CIP. The lines highlighted blue could potentially surcharge and overflow during a storm event as well. As a result of this, many lines which tie into overloaded large interceptors could become backed up and surcharge.

9.0 FUTURE WASTEWATER SYSTEM ANALYSIS

Hydraulic analyses were conducted to identify projected deficiencies in Burleson's wastewater collection system and to establish a CIP to reinforce the existing system and convey projected wastewater flows. Various combinations of improvements and modifications were investigated to determine the most appropriate approach for conveying projected flows. Parameters used in developing the CIP included accommodating anticipated growth, simplifying system operations, and having the capacity to handle peak wet weather flows. The following analyses, which result from modeling and evaluating the collection system, provide observations and recommendations which serve as the basis for the CIP recommendations.

The wastewater collection system was evaluated under projected 5-year, 10-year, 20-year, and Buildout peak wet weather flow conditions to determine where and when additional capacity is required. The hydraulic analyses discussed in **Section 8.4** were conducted for each future model scenario with the recommended CIP in service to check if the system has the capacity to handle peak wet weather flows. The future wastewater collection system has been designed and laid out to utilize gravity interceptors as much as possible and to avoid developed parcels with new wastewater lines where possible.

9.1 Fort Worth Downstream Wastewater Capacity

As described in **Section 8.1**, all of the City's wastewater flow is conveyed through Fort Worth's existing 27-inch gravity main from the meter station to Fort Worth's Village Creek Water Reclamation Facility. Fort Worth is constructing a parallel 48-inch gravity main that will provide additional capacity for growth in Burleson wastewater flows. The City of Burleson has purchased additional capacity in the Village Creek Sewer Basin to convey future projected wastewater flows. However, at this time, the Fort Worth system will have parallel 27-inch and 48-inch gravity interceptors which convey the City's wastewater flows. Ultimately, in the Buildout recommended wastewater system improvements, the City of Burleson would have parallel 36-inch and 48-inch gravity interceptors conveying the City's wastewater flows to the Fort Worth meter. This could potentially create a capacity constraint on Fort Worth's infrastructure. As part of Fort Worth's Master Planning efforts, this potential capacity constraint would need to be addressed.

10.0 WASTEWATER SYSTEM CAPITAL IMPROVEMENT PLAN

FNI analyzed the impacts of the 20-year and Buildout flow projections on the wastewater collection system and developed recommendations sized for both flow conditions. The 5 and 10-year flow projections were utilized to prioritize the recommended projects. **Table 10-1** summarizes the recommendations based on the hydraulic analyses for both the 20-year and Buildout CIP. All project costs shown in this report are based on construction costs representing 2023 conditions and should be adjusted in the future to reflect the current construction environment. Estimated costs do not include right-of-way and/or easement costs that may be required for each improvement. **Figures 10-1** and **10-2** illustrate the proposed improvements and correspond with the project numbers in **Table 10-1**. **Appendix I** contains an estimated cost summary and description for each individual project. For the purposes of this report, the proposed CIP is based upon relying solely on the City of Fort Worth for wastewater treatment. FNI recommends the City explore alternative wastewater services for resiliency and reliability.

Additionally, FNI developed high-level project triggers for each recommended gravity main improvement. The project triggers, represented by single family homes and non-residential acres, are based on the minimum pipe capacity of each recommended gravity main improvement and the associated peak wet weather flows conveyed as indicated by the hydraulic model. **Appendix J** contains the high-level project trigger summary for each individual project. The CIP capacities shown in the table are for planning purposes only and are based on high level assumptions and matching existing grades/elevations. Actual pipe grade, capacity, and alignment will be determined at the time of the engineering design.

Table 10-1 Wastewater System Capital Improvements Plan Summary

Project ID	Project Driver	Project Size		Project Cost	
		20-Year	Buildout	20-Year	Buildout
C-A	Existing Capacity Restriction	Gravity 36/42-inch	Gravity 42/48-inch	$6,758,900	$7,795,000
C-B	Existing Capacity Restriction	Gravity 36-inch		$4,659,300	
C-E	Existing Capacity Restriction	Gravity 10-inch		$829,800	
SSES-A	Existing Capacity Restriction	Gravity 36/42-inch		$1,707,100	
SSES-B	Existing Capacity Restriction	Gravity 30-inch		$707,800	
C-C	Future Capacity Restriction	Gravity 30/36-inch		$9,529,200	
C-D	Future Capacity Restriction	Gravity 12-inch		$1,022,600	
C-F	Future Capacity Restriction	Gravity 24-inch		$7,071,400	
C-G	Future Capacity Restriction	Gravity 24-inch		$6,297,000	
C-H	Future Capacity Restriction	Gravity 18-inch		$3,191,900	
C-I	Future Capacity Restriction	Gravity 15-inch		$2,445,900	
C-J	Future Capacity Restriction	N/A	Gravity 24-inch	--	$10,369,400
C-K	Future Capacity Restriction	N/A	Gravity 15-inch	--	$3,014,000
G-A	Growth / Development	Gravity 10-inch		$1,517,500	
G-B	Growth / Development	Gravity 15-inch		$1,528,700	
G-C	Growth / Development	Gravity 12-inch		$1,372,500	
G-D	Growth / Development	Gravity 12-inch	Gravity 15-inch	$1,746,200	$2,156,600
G-E	Growth / Development	Gravity 10-inch		$1,181,100	
G-F	Growth / Development	N/A	Gravity 12-inch	--	$1,734,200
G-G	Growth / Development	Gravity 12-inch		$876,100	

Table 10-1 Wastewater System Capital Improvements Plan Summary – Continued

Project ID	Project Driver	Project Size		Project Cost	
		20-Year	Buildout	20-Year	Buildout
G-H	Growth / Development	Force Main 16-inch Lift Station 3.25 MGD		$8,013,200	
G-I	Growth / Development	Gravity 12-inch Force Main 12-inch Lift Station 2.50 MGD		$9,659,200	
G-J	Growth / Development	N/A	Gravity 8-inch	--	$1,426,300
G-K	Growth / Development	Gravity 8/12-inch	Gravity 15/21-inch	$4,309,400	$5,779,000
G-L	Growth / Development	Gravity 8-inch Force Main 8-inch Lift Station 0.5 MGD	Gravity 8-inch Force Main 8-inch Lift Station 0.6 MGD	$3,588,000	$3,737,500
G-M	Growth / Development	N/A	Gravity 8/12/15-inch	--	$3,620,200
G-N	Growth / Development	Gravity 8/15-inch Force Main 10-inch Lift Station 1.88 MGD	Gravity 8/12/15-inch Force Main 16-inch Lift Station 3.3 MGD	$7,705,300	$12,604,400
G-O	Growth / Development	Gravity 8/12-inch Force Main 8-inch Lift Station 1.0 MGD	Gravity 8/12/15-inch Force Main 12-inch Lift Station 2.5 MGD	$8,742,800	$12,457,900
			Grand Total	**$94,460,900**	**$126,304,800**

FIGURE 10-1

CITY OF BURLESON

20-YEAR WASTEWATER SYSTEM RECOMMENDED IMPROVEMENTS

The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

LEGEND

Existing Capacity Restriction Driver Improvement
- Parallel Wastewater Line
- Replace Wastewater Line
- SSES Basin

Future Capacity Restriction Driver Improvement
- Parallel Wastewater Line
- Replace Wastewater Line

Growth / Development Driver Improvement
- Lift Station
- Wastewater Line
- Force Main

Existing Wastewater System
- Manhole
- Lift Station
- FTW Meter Station

- Under Design / Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- 10-ft Contour
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MAJOR BASINS

- Burleson Main
- Burleson West
- North Creek
- Quil Miller Creek
- Shannon Creek
- Town Creek
- Village Creek
- Willow Creek
- Transition to Willow Creek

Alsbury #1 Lift Station

Village Creek WWTP

FTW Under Design / Construction Line (Burleson Cost Participation)

FTW Meter Station

Parallel to Existing 36-inch Wastewater Line

Parallel to Existing 30-inch Wastewater Line

Parallel to Existing 27-inch Wastewater Line

Replace Existing 6-inch with 10-inch Wastewater Line

Replace Existing 15/18-inch with 36-inch Wastewater Line
Existing 24/27-inch Wastewater Line to remain In Service

Replace Existing 8-inch with 12-inch Wastewater Line

Replace Existing 15/18-inch with 30-inch Wastewater Line
Existing 24/27-inch Wastewater Line to remain In Service

Parallel to Existing 15-inch Wastewater Line

Mountain Valley Lift Station

Parallel to Existing 15-inch Wastewater Line

Parallel to Under Design 15-inch Wastewater Line

Parallel to Under Design 21-inch Wastewater Line

Hidden Creek Lift Station

Proposed Burleson Westside Business Park Lift Station
Total Capacity = 3.25 MGD

Proposed Chisholm West Lift Station
Total Capacity = 2.50 MGD

Proposed Martin Tract Lift Station
Total Capacity = 0.50 MGD

Proposed Industrial Park I Lift Station
Total Capacity = 1.88 MGD

Proposed Industrial Park II Lift Station
Total Capacity = 1.00 MGD

SSES-A

SSES-B

0 1,900 3,800
SCALE IN FEET

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FIGURE 10-2

CITY OF BURLESON

BUILDOUT WASTEWATER SYSTEM RECOMMENDED IMPROVEMENTS

LEGEND

Existing Capacity Restriction Driver Improvement
- Parallel Wastewater Line
- Wastewater Line
- SSES Basin

Growth / Development Driver Improvement
- Lift Station
- Wastewater Line
- Force Main

Future Capacity Restriction Driver Improvement
- Parallel Wastewater Line
- Replace Wastewater Line

Existing Wastewater System
- Manhole
- Lift Station
- FTW Meter Station

- Under Design / Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- 10-ft Contour
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MAJOR BASINS

- Burleson Main
- Burleson West
- North Creek
- Quil Miller Creek
- Shannon Creek
- Town Creek
- Village Creek
- Willow Creek
- Transition to Willow Creek

The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

Alsbury #1 Lift Station

Village Creek WWTP

FTW Under Design / Construction Line (Burleson Cost Participation)

FTW Meter Station

Parallel to Existing 36-inch Wastewater Line

Parallel to Existing 30-inch Wastewater Line

Parallel to Existing 27-inch Wastewater Line

Replace Existing 12-inch with 18-inch Wastewater Line

Replace Existing 6-inch with 10-inch Wastewater Line

Existing 24/27-inch Wastewater Line to remain in service

Replace Existing 15/18-inch with 36-inch Wastewater Line

Replace Existing 8-inch with 12-inch Wastewater Line

Replace Existing 15/18-inch with 30-inch Wastewater Line

Parallel to Existing 21-inch Wastewater Line

Parallel to Existing 15-inch Wastewater Line

Mountain Valley Lift Station

Parallel to Existing 15-inch Wastewater Line

Hidden Creek Lift Station

Parallel to Existing 15-inch Wastewater Line

Parallel to Under Design 15-inch Wastewater Line

Parallel to Under Design 21-inch Wastewater Line

Proposed Burleson Westside Business Park Lift Station
Total Capacity = 3.25 MGD

Proposed Chisholm West Lift Station
Total Capacity = 2.50 MGD

Proposed Martin Tract Lift Station
Total Capacity = 0.60 MGD

Proposed Industrial Park II Lift Station
Total Capacity = 2.50 MGD

Proposed Industrial Park I Lift Station
Total Capacity = 3.30 MGD

SSES-A

SSES-B

FORT WORTH

CROWLEY

TARRANT CO.
JOHNSON CO.

BRIAROAKS

CROSS TIMBER

JOSHUA

CLEBURNE

KEENE

ALVARADO

0 1,900 3,800
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APPENDIX A
WATER AND WASTEWATER SERVICE AREA BY PLANNING YEAR

FIGURE A-1

CITY OF BURLESON

PARCELS BY PLANNING YEAR WATER SERVICE AREA

LEGEND

- Road
- Railroad
- Stream
- Lake
- Parcel
- Water Service Area
- Burleson CCN Boundary
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

PARCELS BY PLANNING YEAR

- Existing
- 5-Year
- 10-Year
- 20-Year/Buildout
- No Current Plan for Water Service

DEVELOPMENTS

- The Lakes
- Shannon Creek
- Bear Ridge
- Hyder Ranch

Hyder Ranch

Shannon Creek

The Lakes

Bear Ridge

TARRANT CO.
JOHNSON CO.

CROWLEY

FORT WORTH

BRIAROAKS

CROSS TIMBER

JOSHUA

CLEBURNE

KEENE

ALVARADO

0 2,200 4,400

SCALE IN FEET

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FIGURE A-2

CITY OF BURLESON

PARCELS BY PLANNING YEAR
WASTEWATER SERVICE AREA

LEGEND

- Road
- Railroad
- Stream
- Lake
- Parcel
- Wastewater Service Area
- Wastewater CCN Boundary
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

PARCELS BY PLANNING YEAR

- Existing
- 5-Year
- 10-Year
- 20-Year
- Buildout
- No Current Plan for WW Service

DEVELOPMENTS

- The Lakes
- Shannon Creek
- Bear Ridge
- Burleson Westside Business Park
- Business Park Development
- Hyder Ranch
- Panchasarp
- Chisholm Summit

Hyder Ranch
Shannon Creek
Chisholm Summit
The Lakes
Panchasarp
Bear Ridge
Business Park

CROWLEY
FORT WORTH
TARRANT CO.
JOHNSON CO.
BRIAROAKS
CROSS TIMBER
JOSHUA
CLEBURNE
KEENE
ALVARADO

0 2,200 4,400
SCALE IN FEET

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APPENDIX B
PRESSURE RECORDER DATA SUMMARY

FIGURE B-1

CITY OF BURLESON

EXISTING WATER SYSTEM PRESSURE TESTING LOCATIONS

LEGEND

- Pressure Recorder
- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

Supply from Fort Worth (SS2)

10.0 MGD Supply from Fort Worth (SS3)

PR#1 WFH875 1208 Scarlet Sage Pkwy

PR#2 WFH12 517 Ann Lois Ln

PR#3 WFH288 417 SW Gregory St

PR#4 WFH456 616 Parkridge Blvd

PR#5 WFH276 944 Vaughn Dr

PR#6 WFH883 204 Flagstone Dr

PR#7 WFH1153 1432 Amber Ct

PR#8 WFH380 1820 Potomac Dr

PR#9 WFH681 127 Country Vista Cir

PR#10 WFH686 2715 Park Pl

PR#11 WFH559 1071 Irene St

PR#12 WFH807 1148 Mourning Dove Dr

6.17 MGD Alsbury #1 Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

6.06 MGD Industrial Pump Station
(3) 1,400 GPM Pumps

(2) - 2.00 MG Industrial Ground Storage Tanks
Overflow Elev. = 739'

4.53 MGD Turkey Peak Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak Ground Storage Tank
Overflow Elev. = 894'

0.75 MG Turkey Peak Elevated Storage Tank
Overflow Elev. = 1,000'

UPP to LPP Transfer Valve

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low Pump Station
(3) 1,780 gpm Pumps

2.45 MGD Mountain Valley Pump Station
(OFFLINE)

0.30 MG Mountain Valley Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

UPP to LPP Transfer Valve

1.00 MG Hidden Creek Elevated Storage Tank
Overflow Elev. = 894'

CROWLEY

FORT WORTH

JOSHUA

BRIAROAKS

CROSS TIMBER

TARRANT CO.
JOHNSON CO.

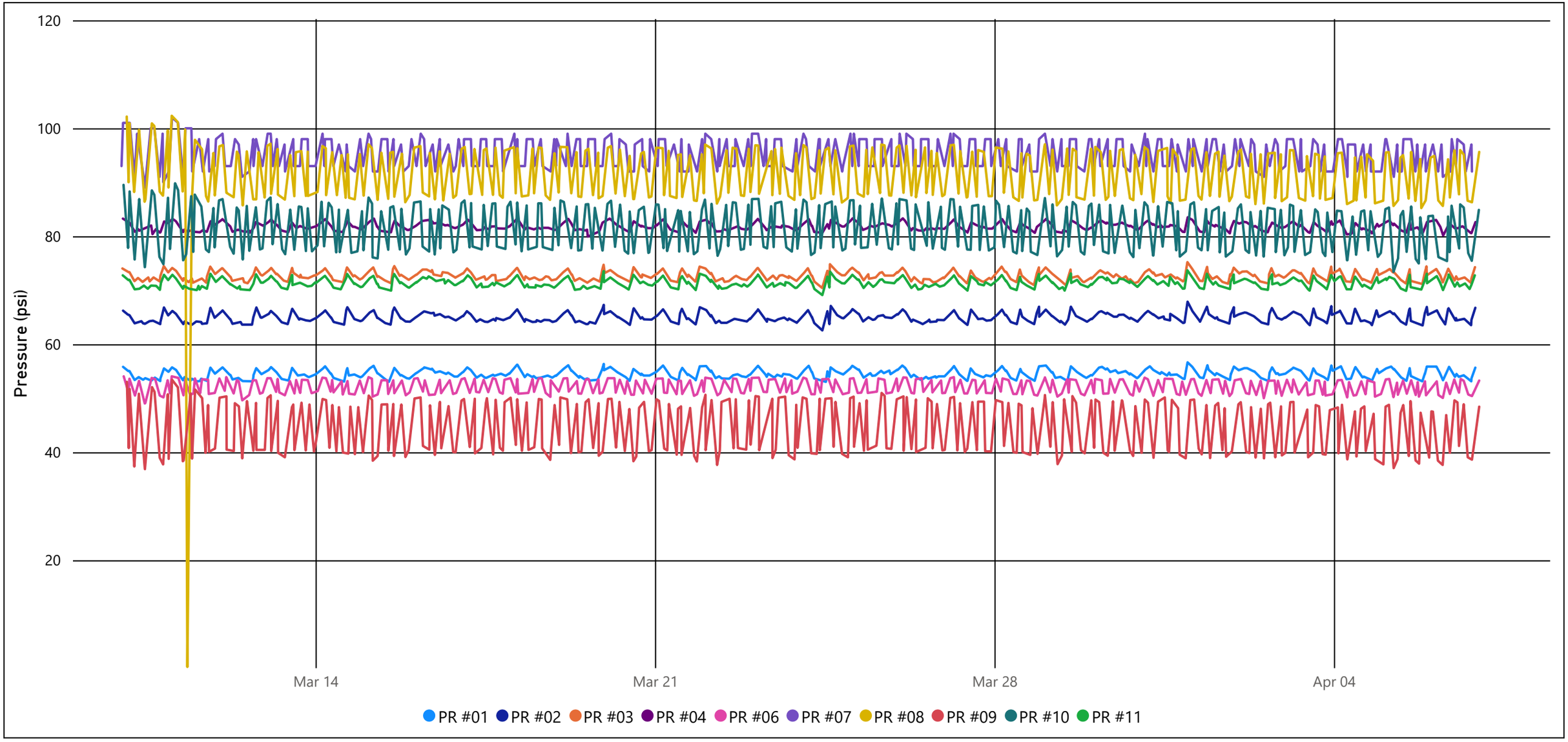
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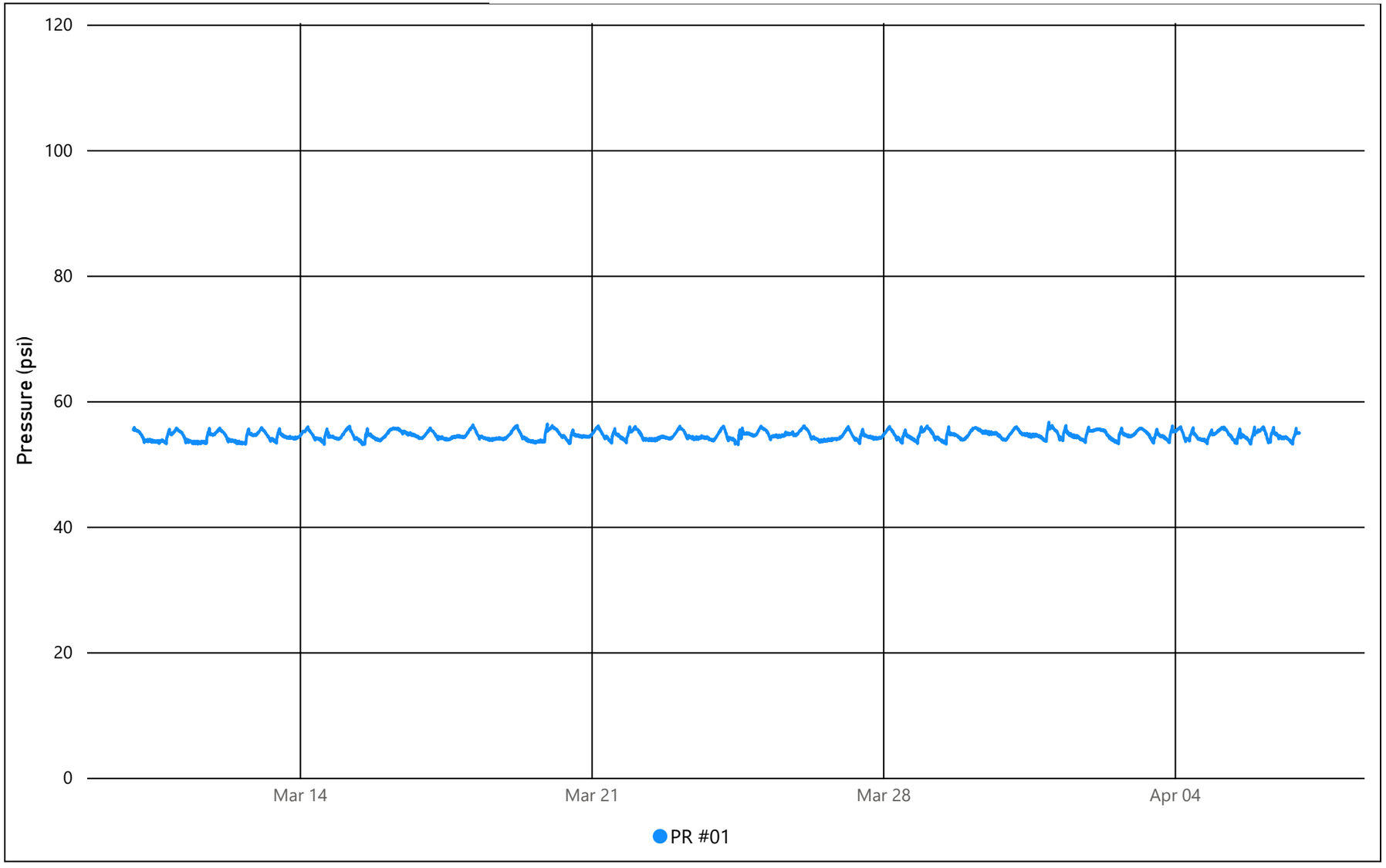
Figure B-2
City of Burleson
Field Pressure Testing Results

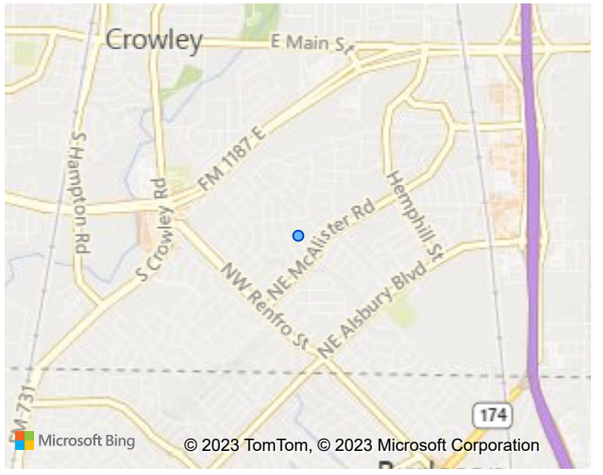


Date Range

3/10/2021 4/6/2021

Figure B-3
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #1





Address

1208 Scarlet Sage Parkway

Pressure Plane

Lower

Hydrant ID

WFH875

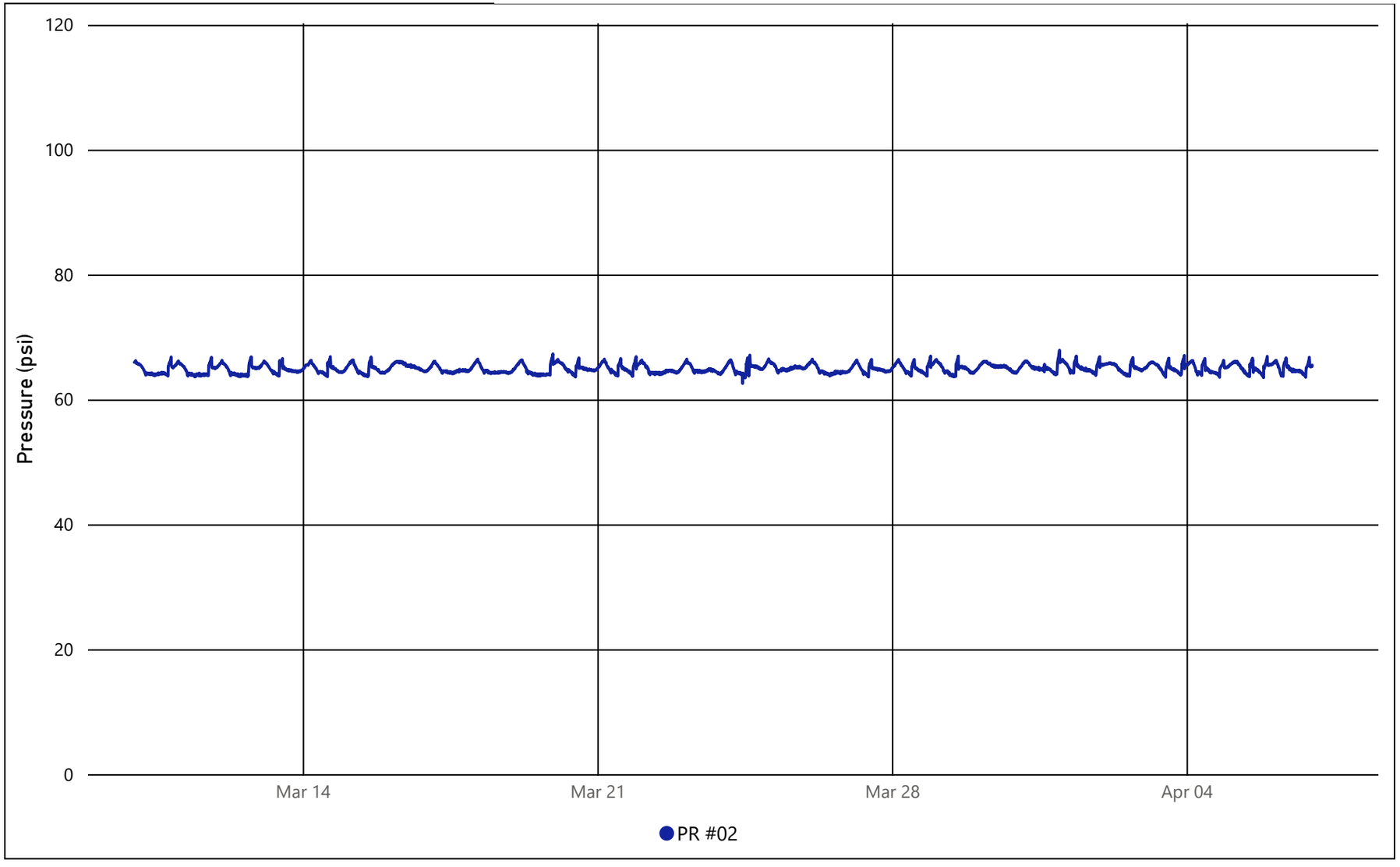
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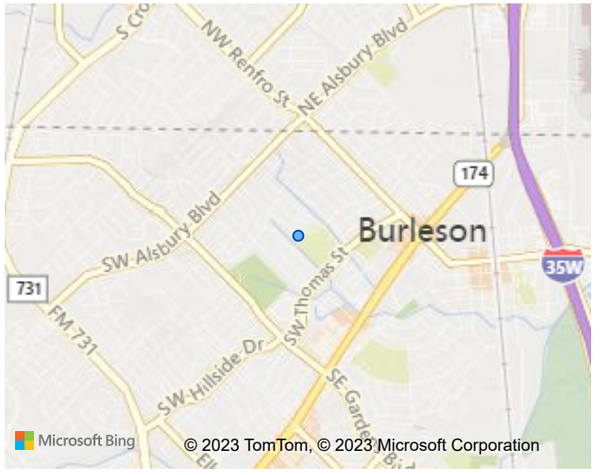
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- [ ] PR #03
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- [ ] PR #08
- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-4
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #2





Address

517 Ann Lois Lane

Pressure Plane
Lower

Hydrant ID
WFH12

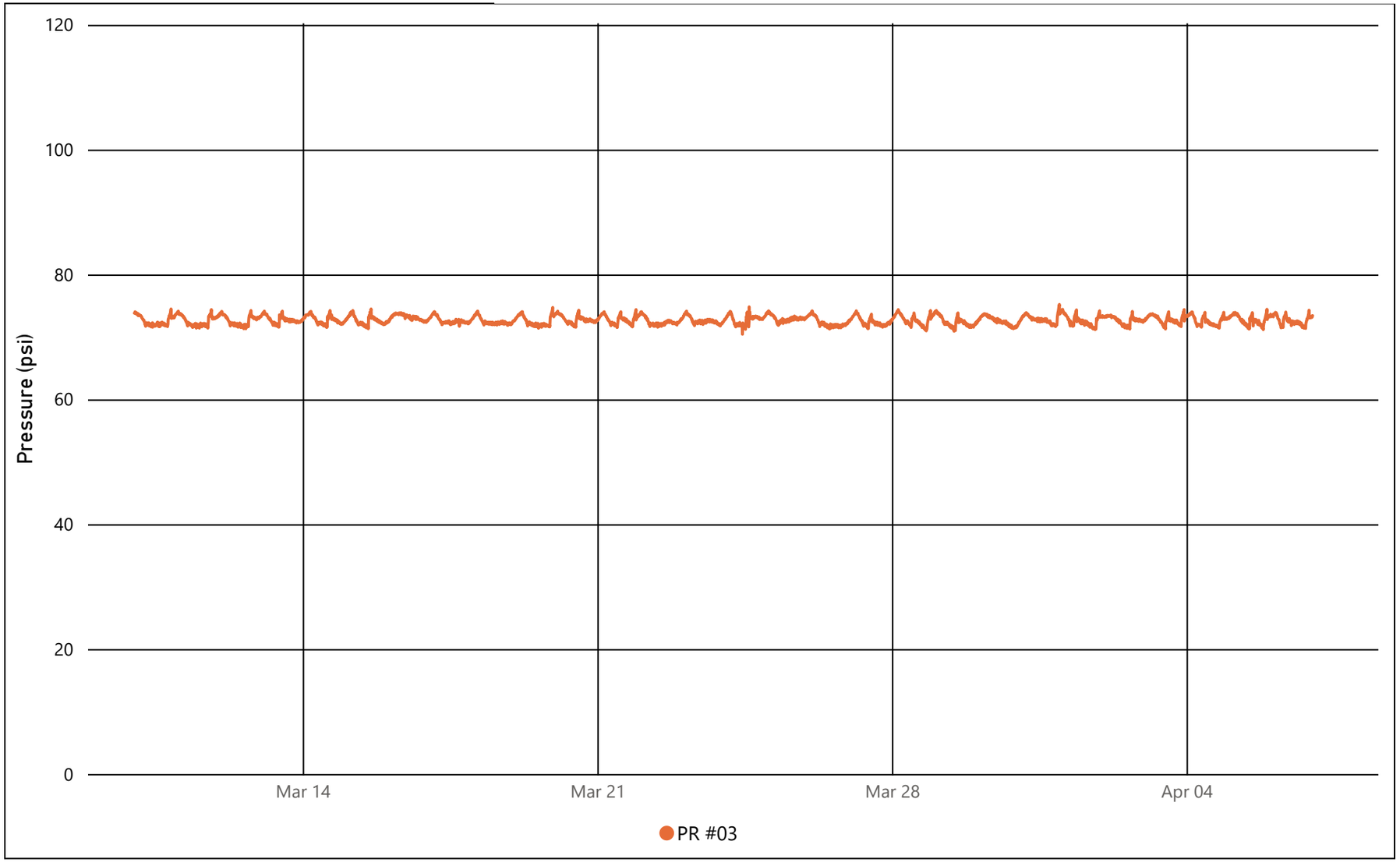
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Avg: 65 psi

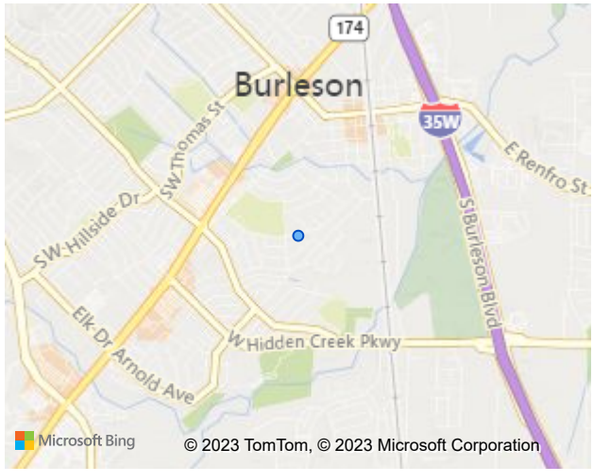
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- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-5
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #3





Address

417 Southwest Gregory Street

Pressure Plane
Lower

Hydrant ID
WFH288

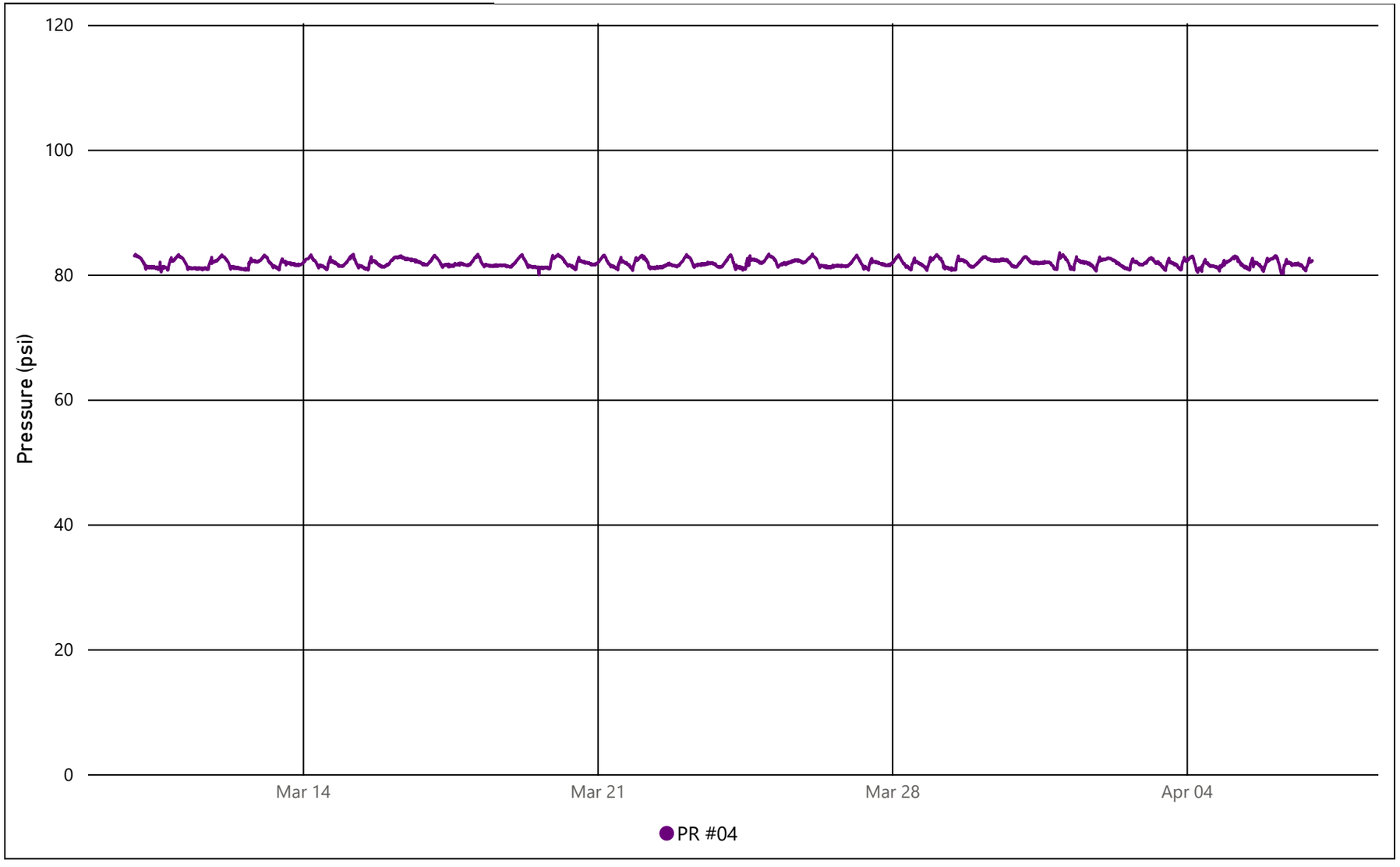
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Avg: 73 psi

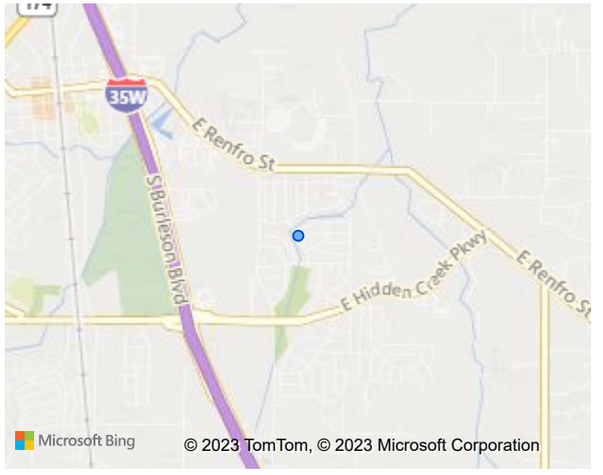
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- [ ] PR #08
- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-6
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #4





Address

616 Parkridge Boulevard

Pressure Plane
Lower

Hydrant ID
WFH456

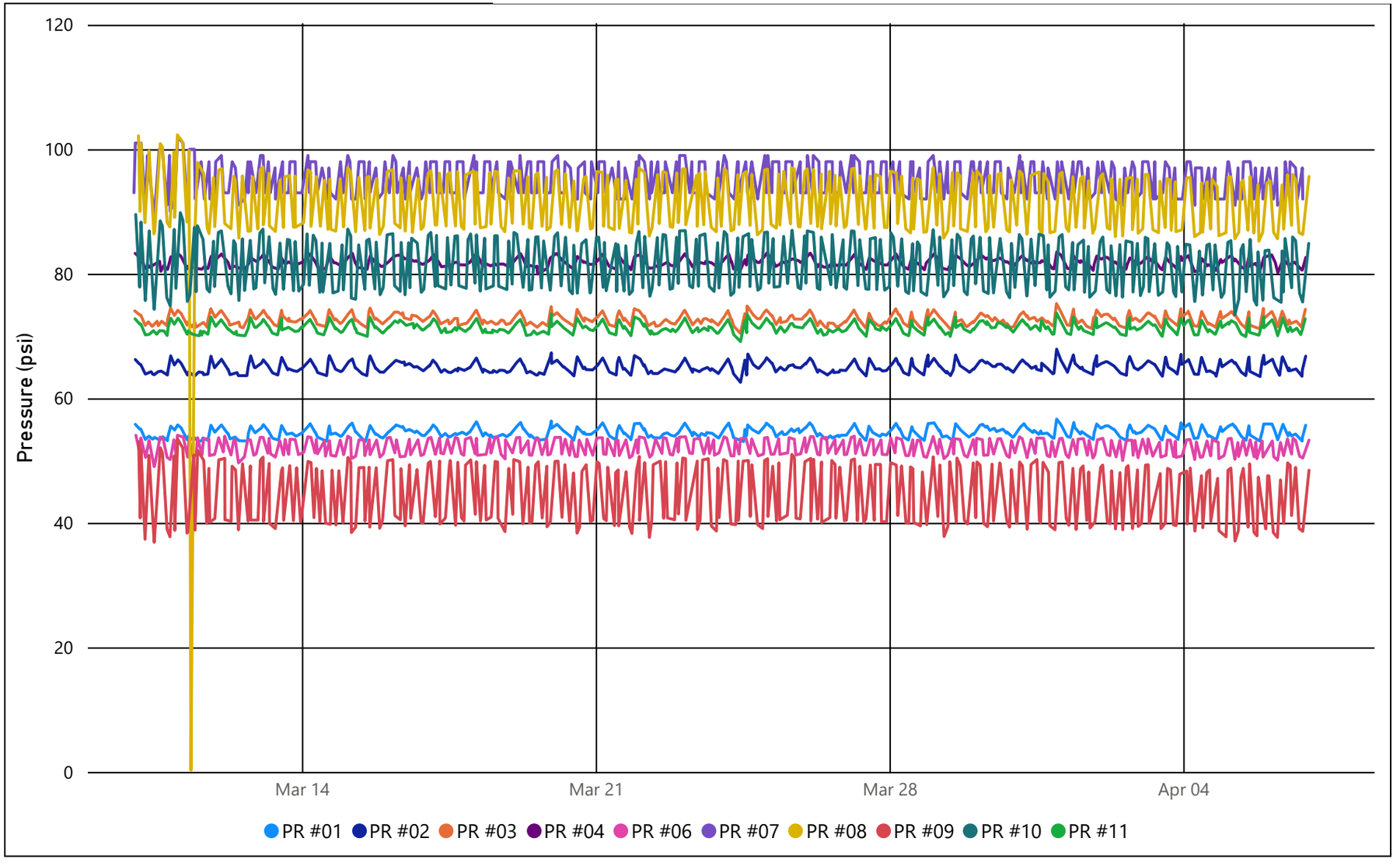
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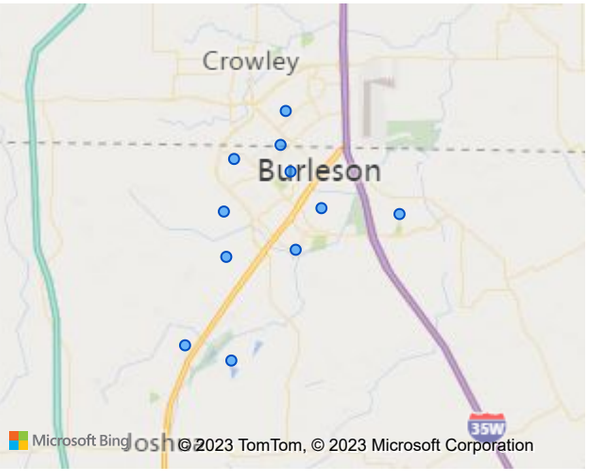
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- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-7
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #5





Address

1071 Irene Street

Pressure Plane

Lower

Hydrant ID

WFH1153

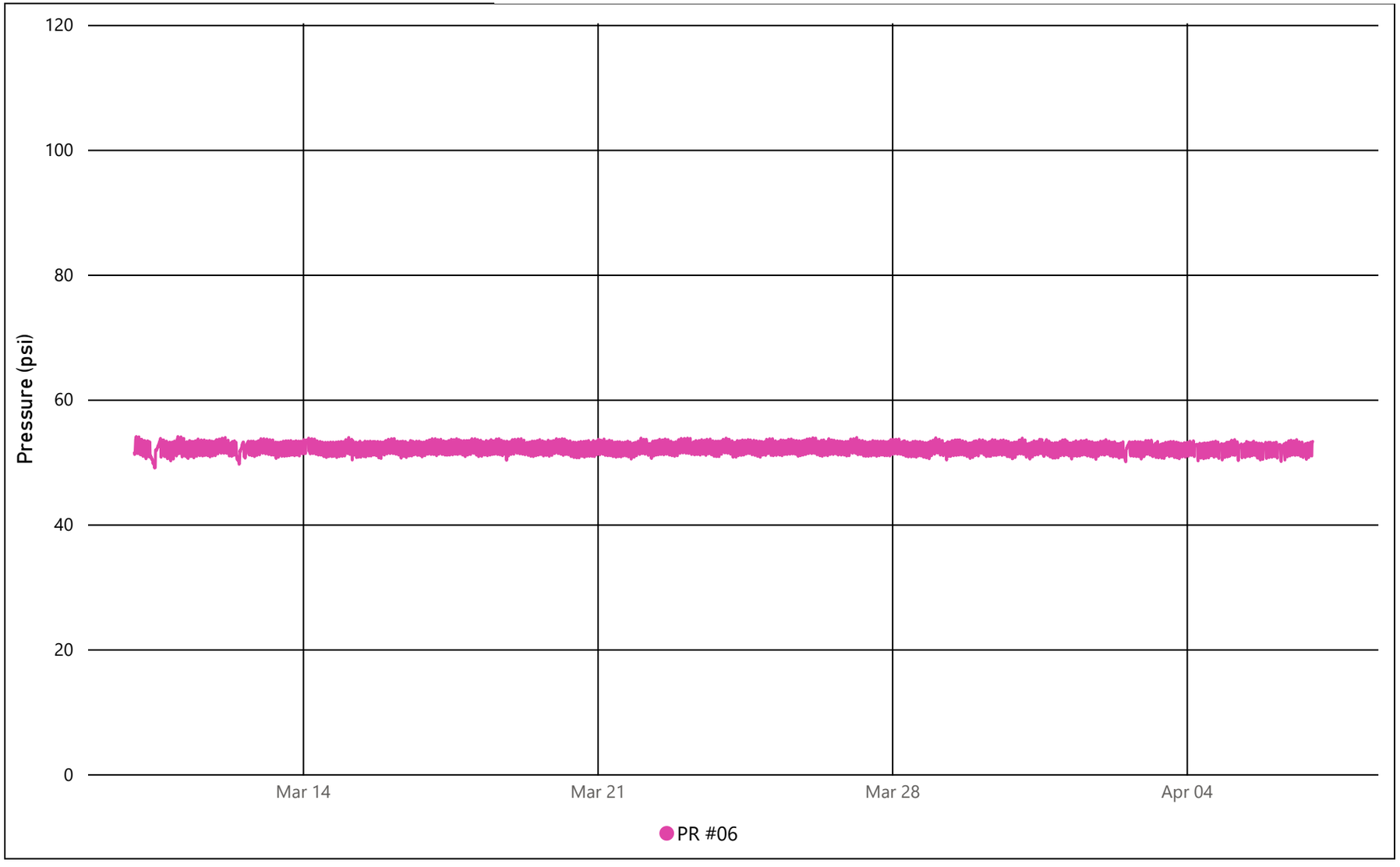
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Max: 102 psi
Avg: 73 psi

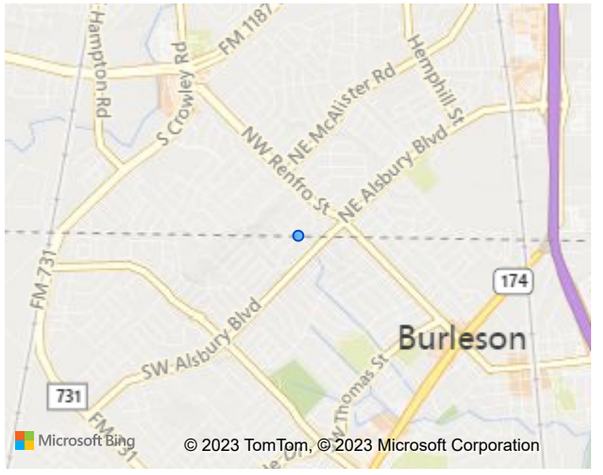
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- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-8
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #6





Address

204 Flagstone Drive

Pressure Plane
Upper

Hydrant ID
WFH883

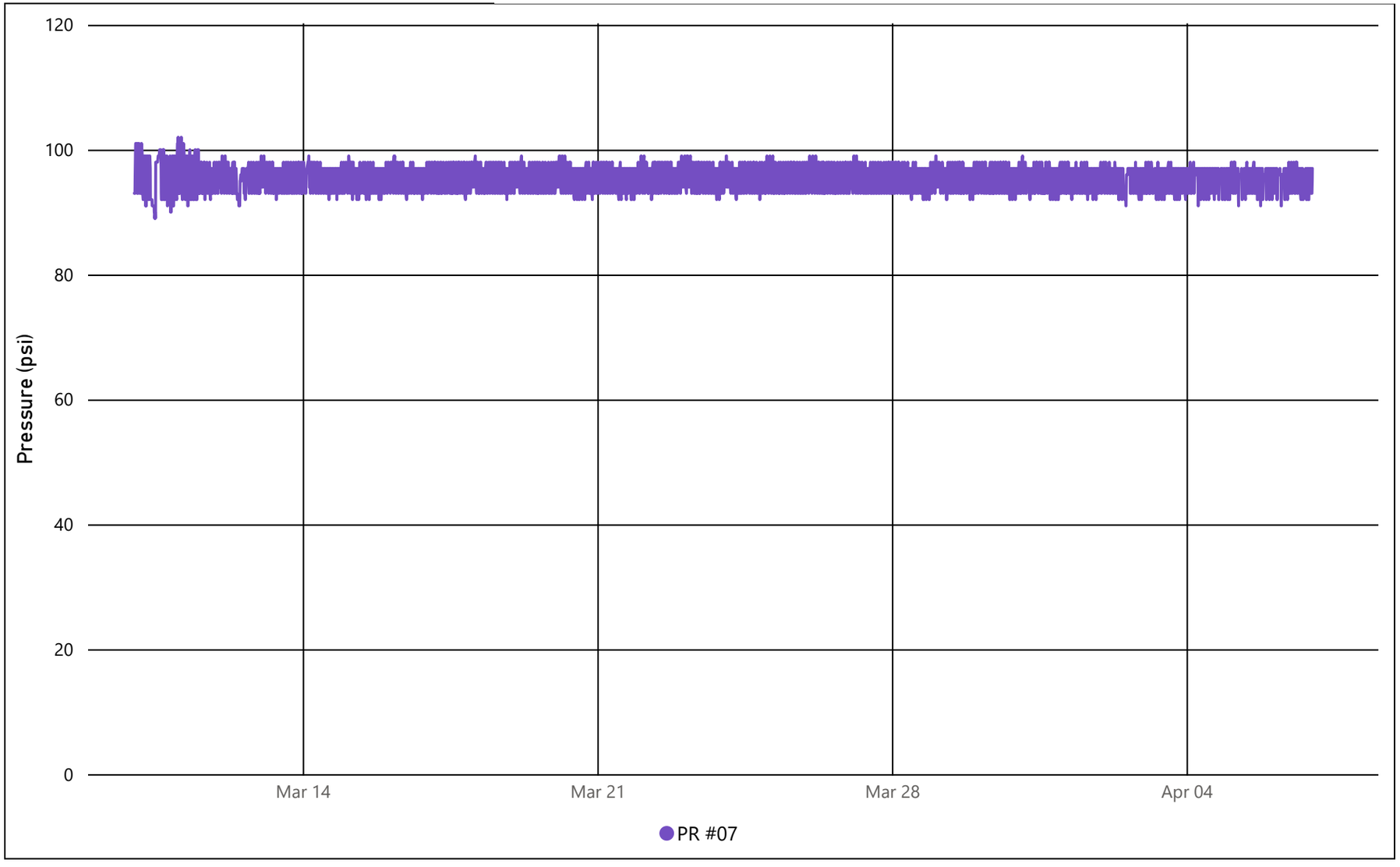
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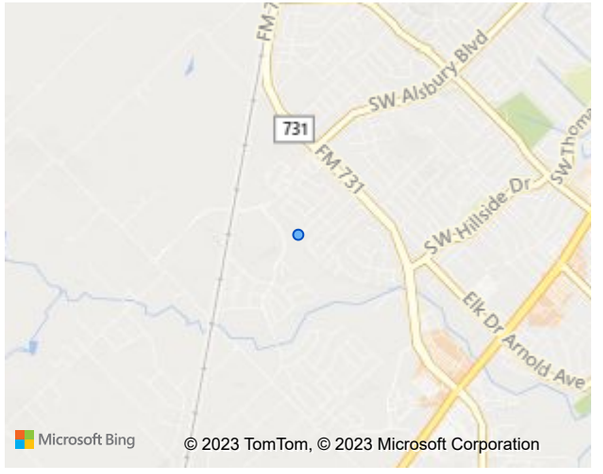
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- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-9
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #7





Address

1432 Amber Court

Pressure Plane

Upper

Hydrant ID

WFH1153

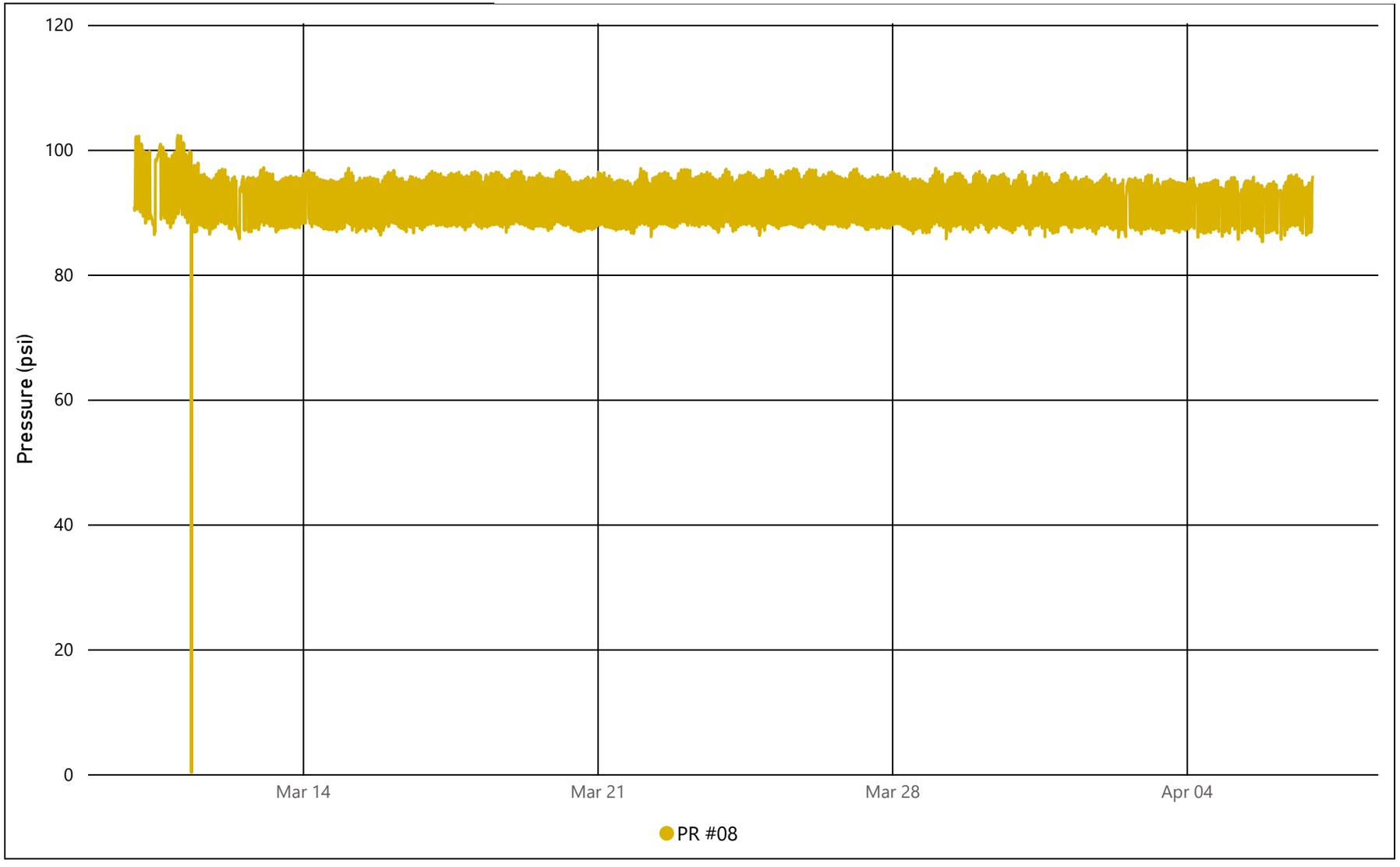
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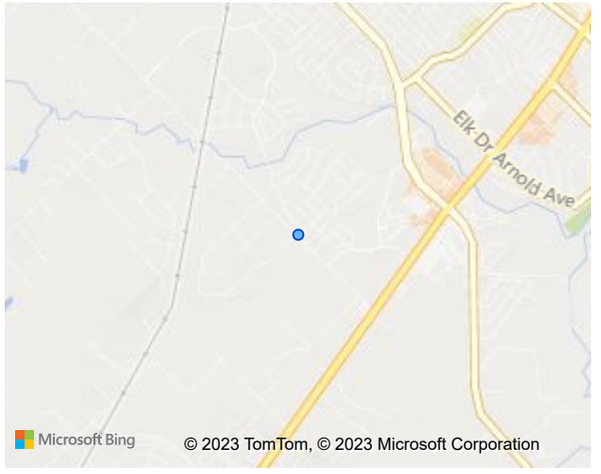
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- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-10
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #8





Address

1820 Potomac Drive

Pressure Plane
Upper

Hydrant ID
WFH380

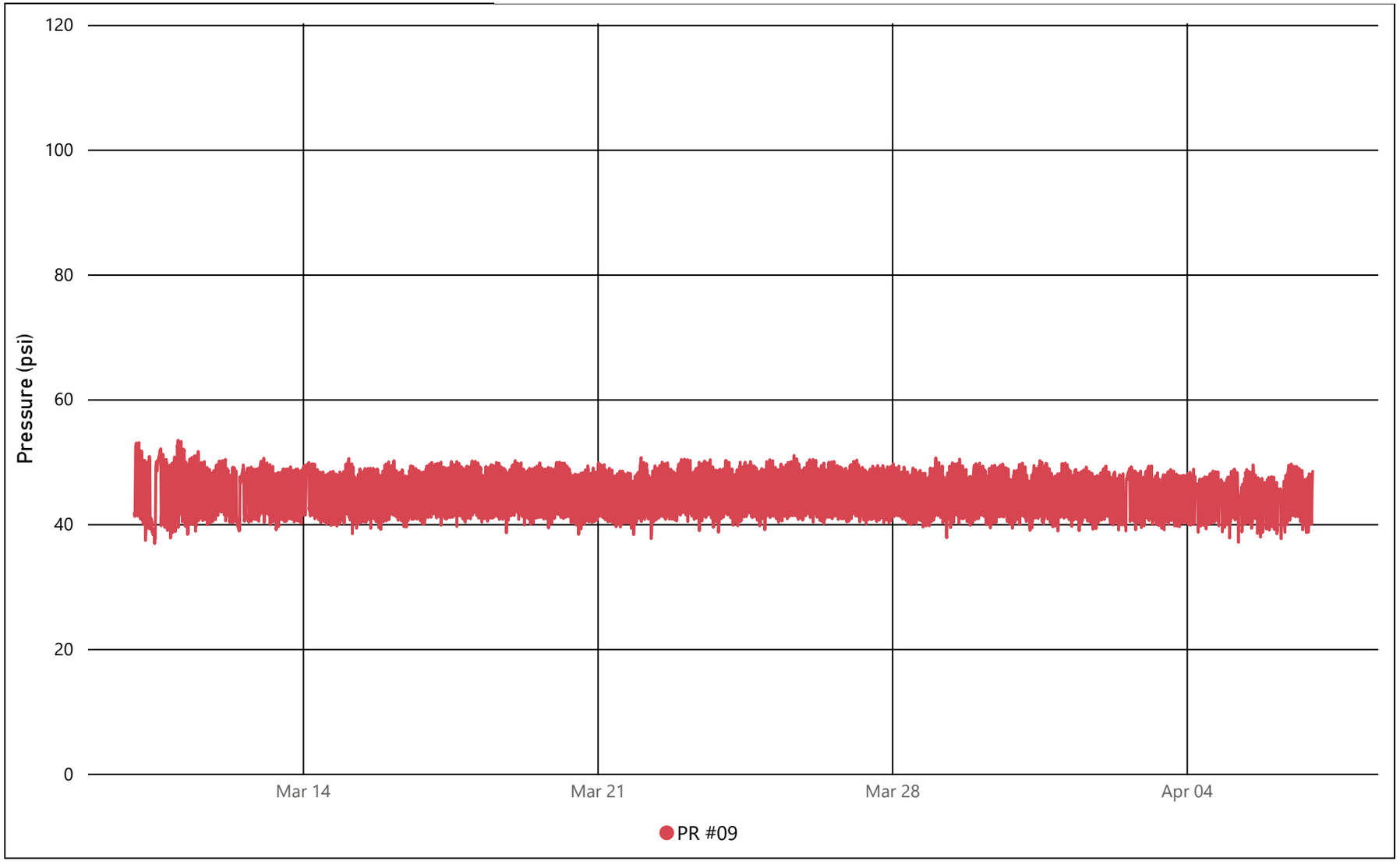
Min: 0 psi
Max: 102 psi
Avg: 92 psi

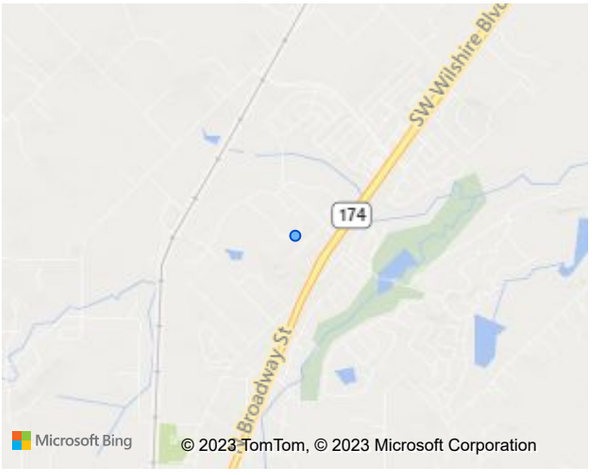
- [ ] PR #01
- [ ] PR #02
- [ ] PR #03
- [ ] PR #04
- [ ] PR #06
- [ ] PR #07
- [x] PR #08
- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-11
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #9





Address

127 County Vista Circle

Pressure Plane
Upper

Hydrant ID
WFH681

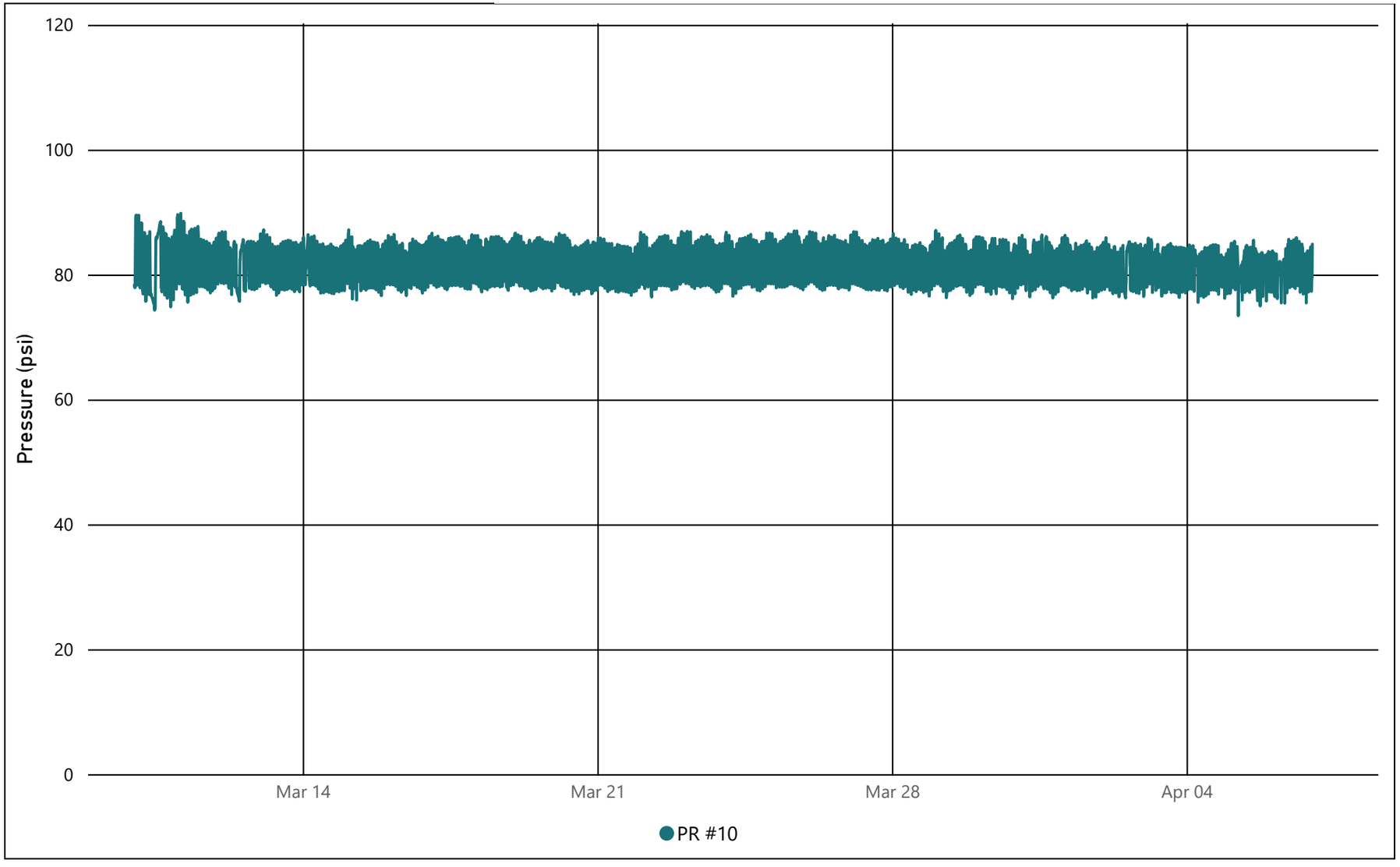
Min: 37 psi
Max: 53 psi
Avg: 45 psi

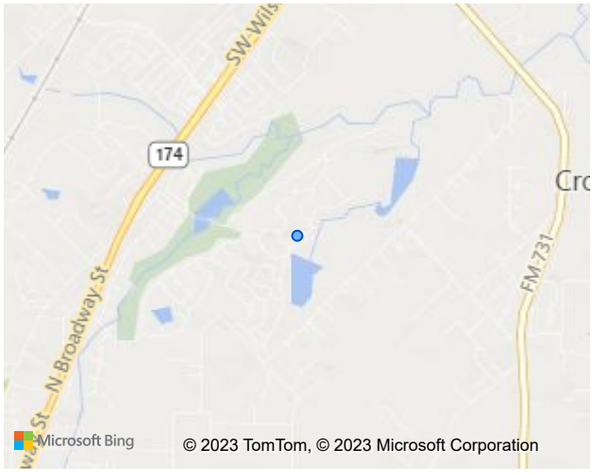
- [ ] PR #01
- [ ] PR #02
- [ ] PR #03
- [ ] PR #04
- [ ] PR #06
- [ ] PR #07
- [ ] PR #08
- [x] PR #09
- [ ] PR #10
- [ ] PR #11
- [ ] PR #12

Date Range

3/10/2021 4/6/2021

Figure B-12
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #10





Address

2715 Park Place

Pressure Plane

Upper

Hydrant ID

WFH686

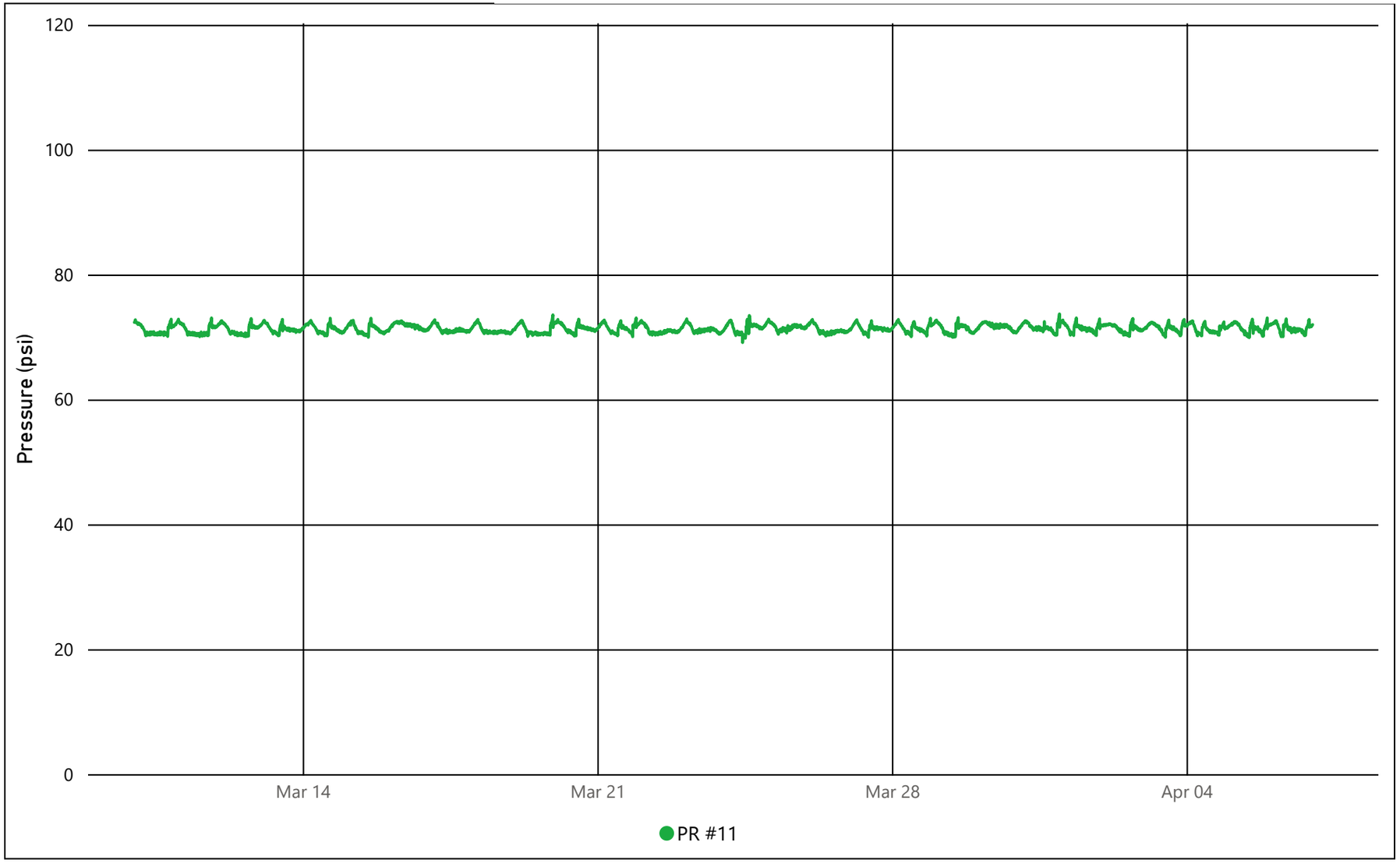
Min: 73 psi
Max: 90 psi
Avg: 82 psi

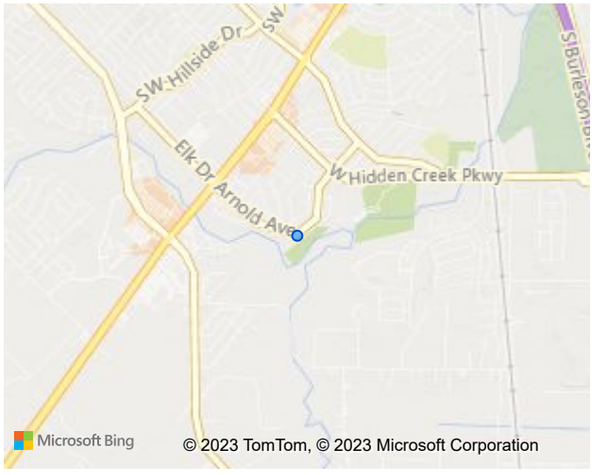
- ☐ PR #01
- ☐ PR #02
- ☐ PR #03
- ☐ PR #04
- ☐ PR #06
- ☐ PR #07
- ☐ PR #08
- ☐ PR #09
- ☑ PR #10
- ☐ PR #11
- ☐ PR #12

Date Range

3/10/2021 4/6/2021

Figure B-13
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #11





Address

1071 Irene Street

Pressure Plane
Lower

Hydrant ID
WFH559

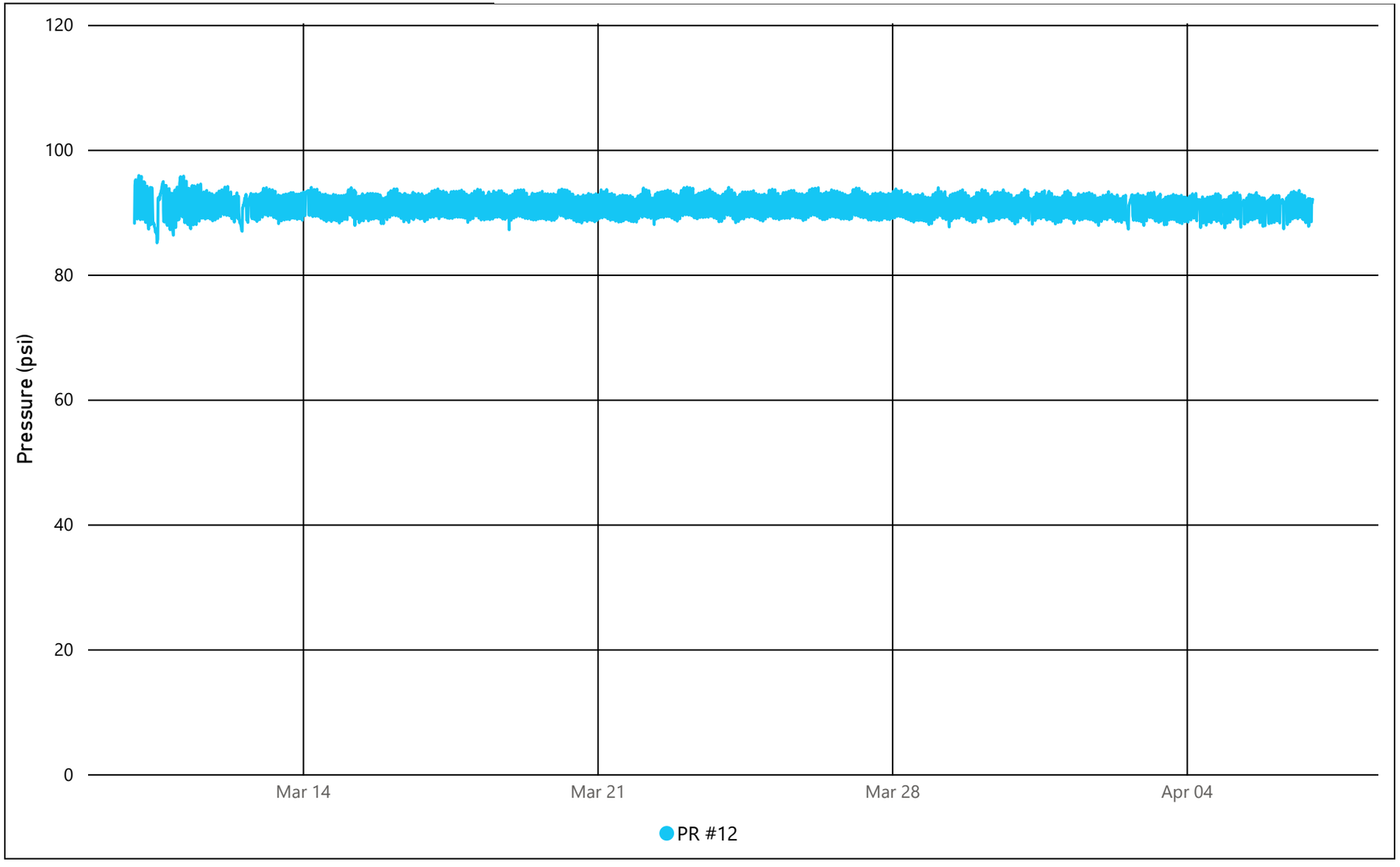
Min: 69 psi
Max: 74 psi
Avg: 71 psi

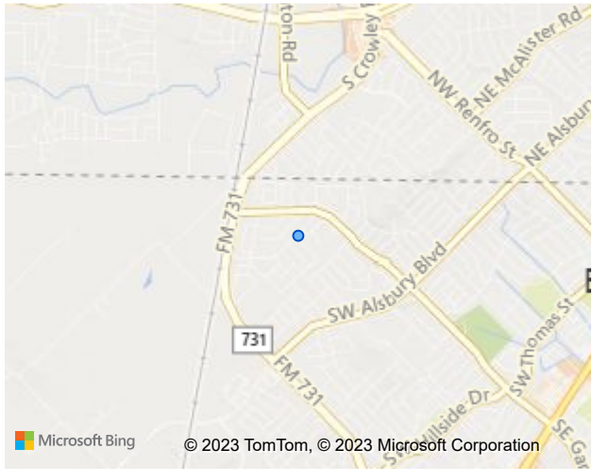
- ☐ PR #01
- ☐ PR #02
- ☐ PR #03
- ☐ PR #04
- ☐ PR #06
- ☐ PR #07
- ☐ PR #08
- ☐ PR #09
- ☐ PR #10
- ☑ PR #11
- ☐ PR #12

Date Range

3/10/2021 4/6/2021

Figure B-14
City of Burleson
Field Pressure Testing Results
Pressure Recorder: PR #12





Address

1148 Mourning Dove Drive

Pressure Plane
Upper

Hydrant ID
WFH807

Min: 85 psi
Max: 96 psi
Avg: 91 psi

- [ ] PR #01
- [ ] PR #02
- [ ] PR #03
- [ ] PR #04
- [ ] PR #06
- [ ] PR #07
- [ ] PR #08
- [ ] PR #09
- [ ] PR #10
- [ ] PR #11
- [x] PR #12

APPENDIX C
WATER MODEL CALIBRATION CHARTS

Figure C-1
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #1
Lower Pressure Plane

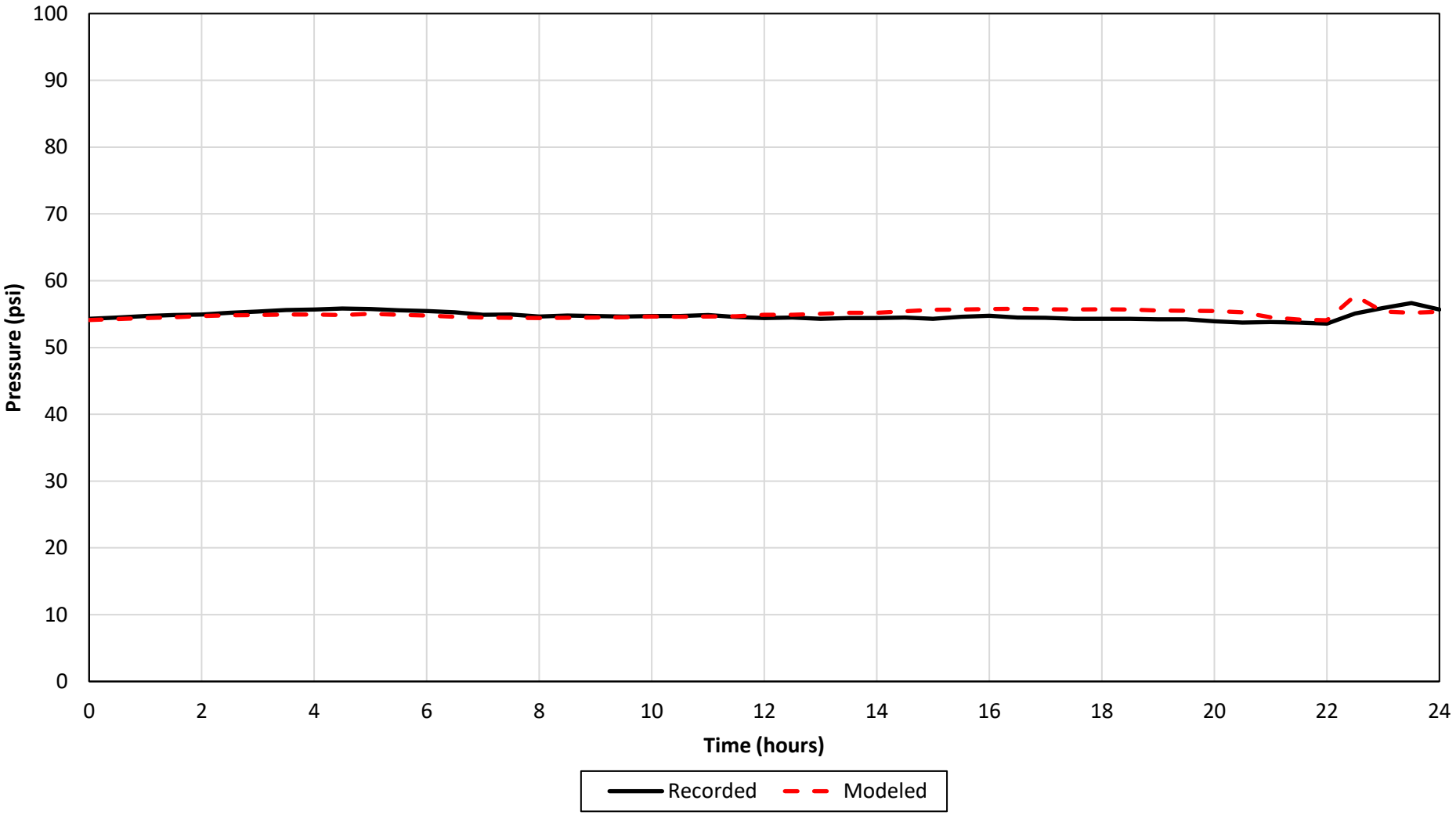


Figure C-2
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #2
Lower Pressure Plane

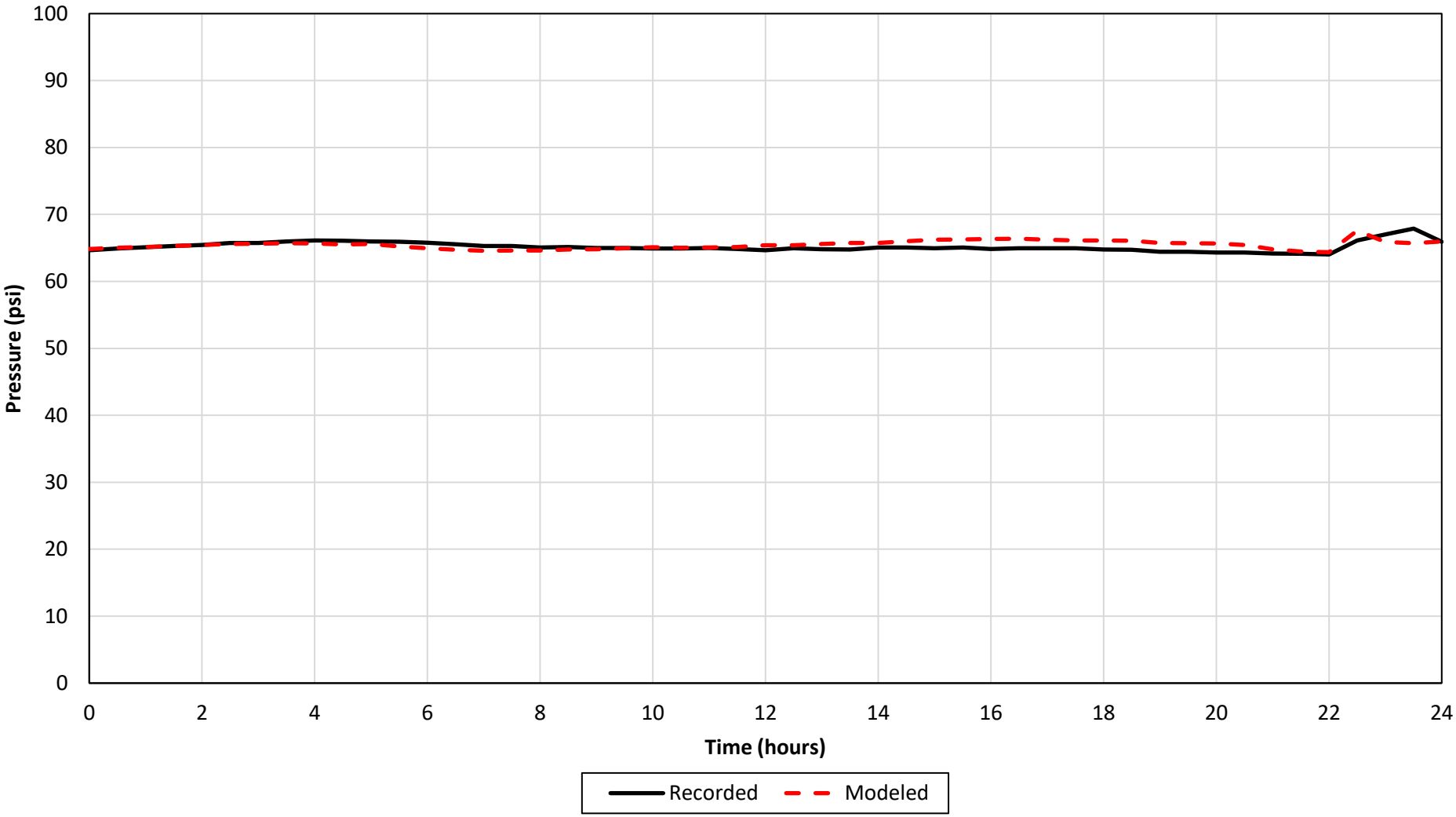


Figure C-3
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #3
Lower Pressure Plane

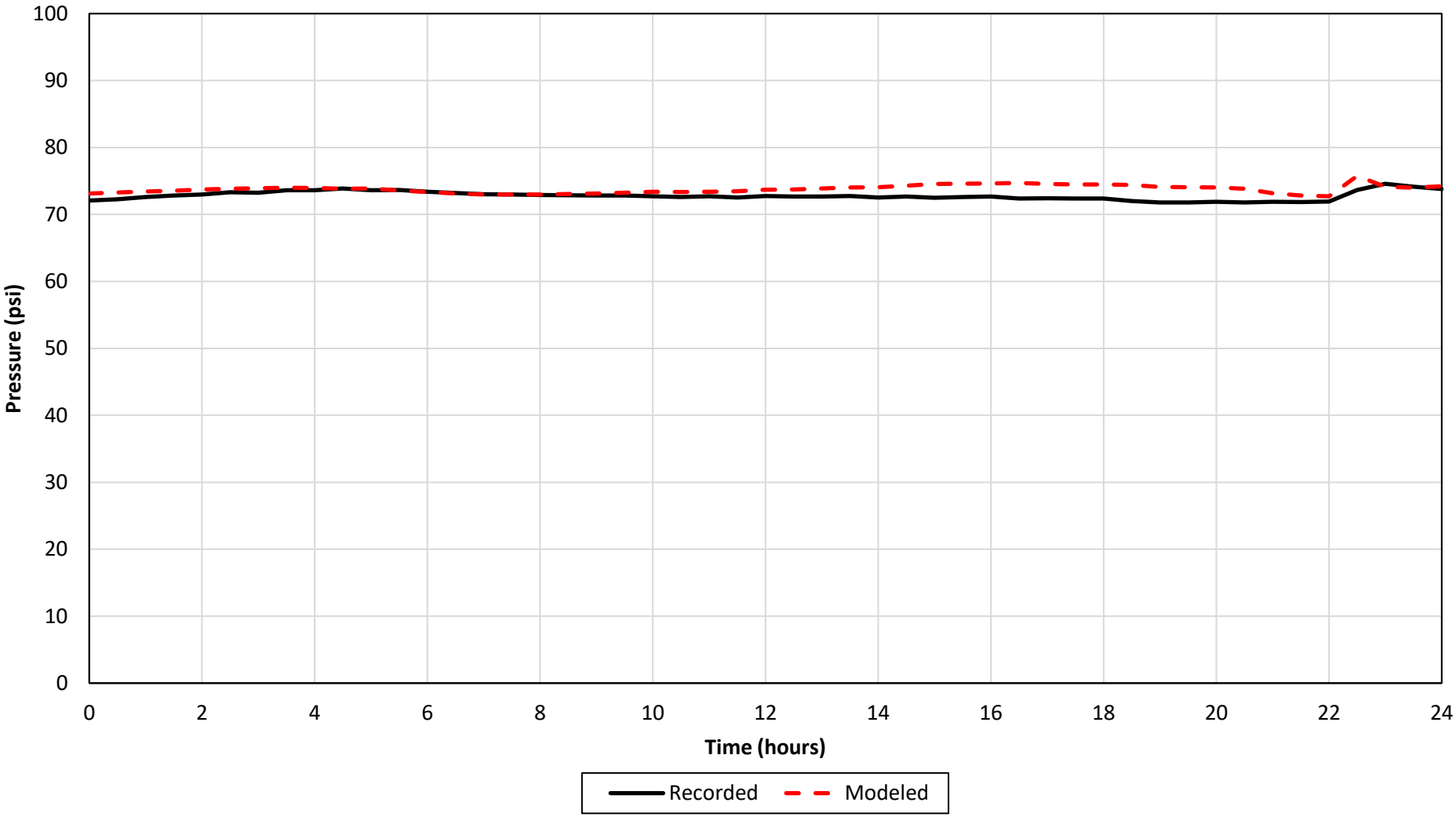


Figure C-4
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #4
Lower Pressure Plane

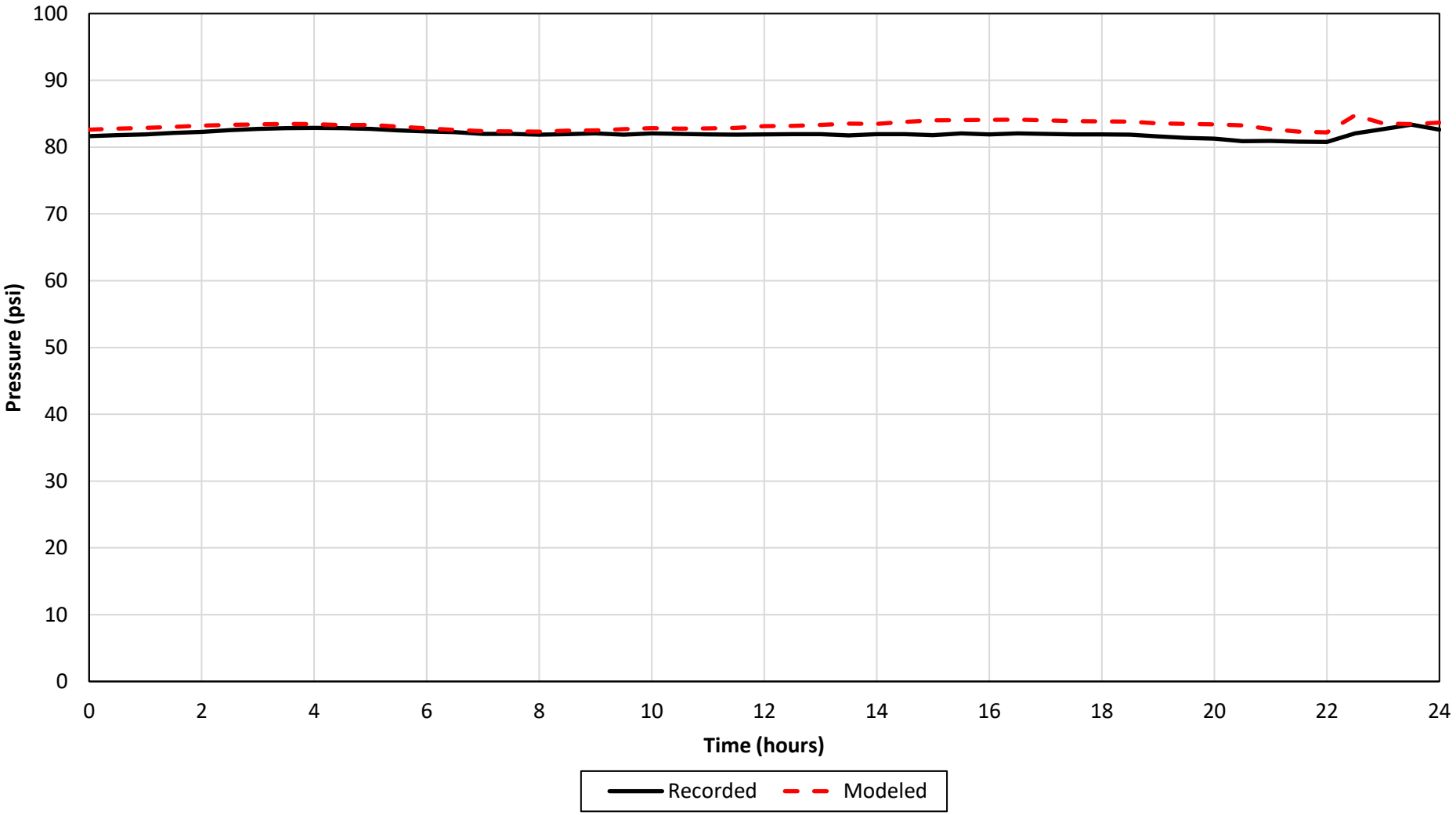


Figure C-5
Water Model Calibration Results (July 29, 2020*)
Pressure Recorder #5
Lower Pressure Plane

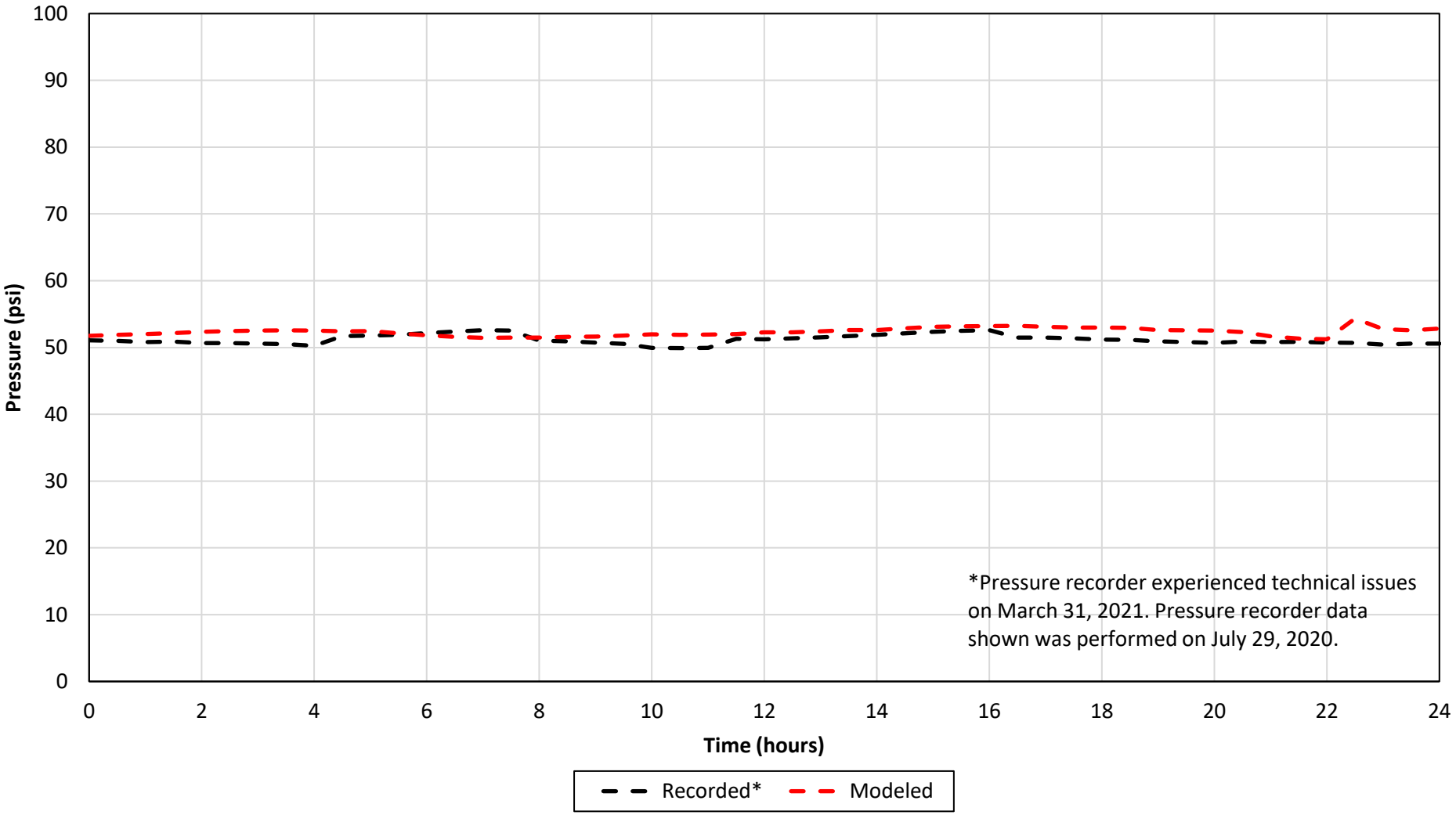


Figure C-6
Water Model Calibration Results (July 29, 2020*)
Pressure Recorder #6
Upper Pressure Plane
Approx Elevation: 807.56 ft

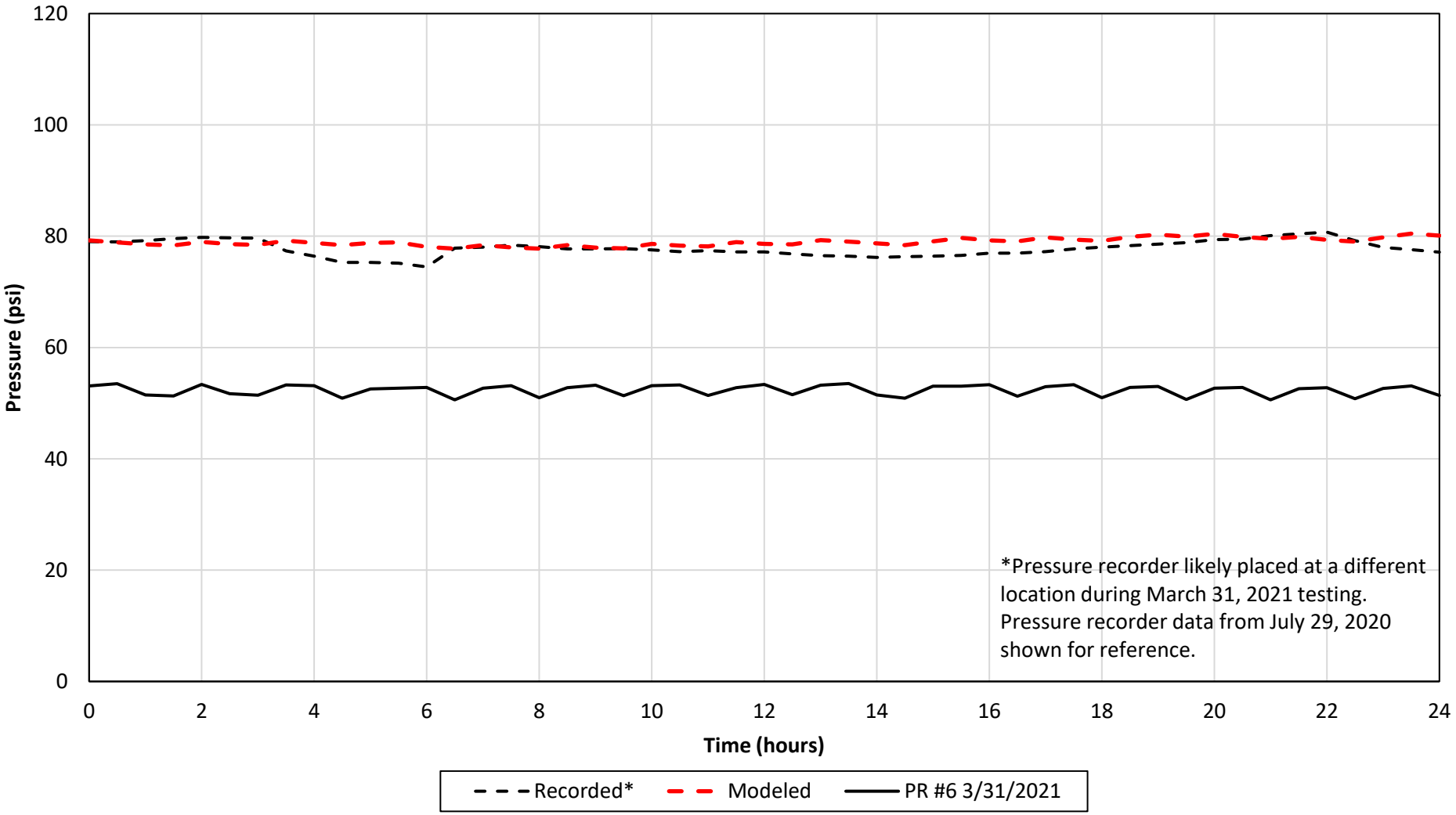


Figure C-7
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #7
Upper Pressure Plane

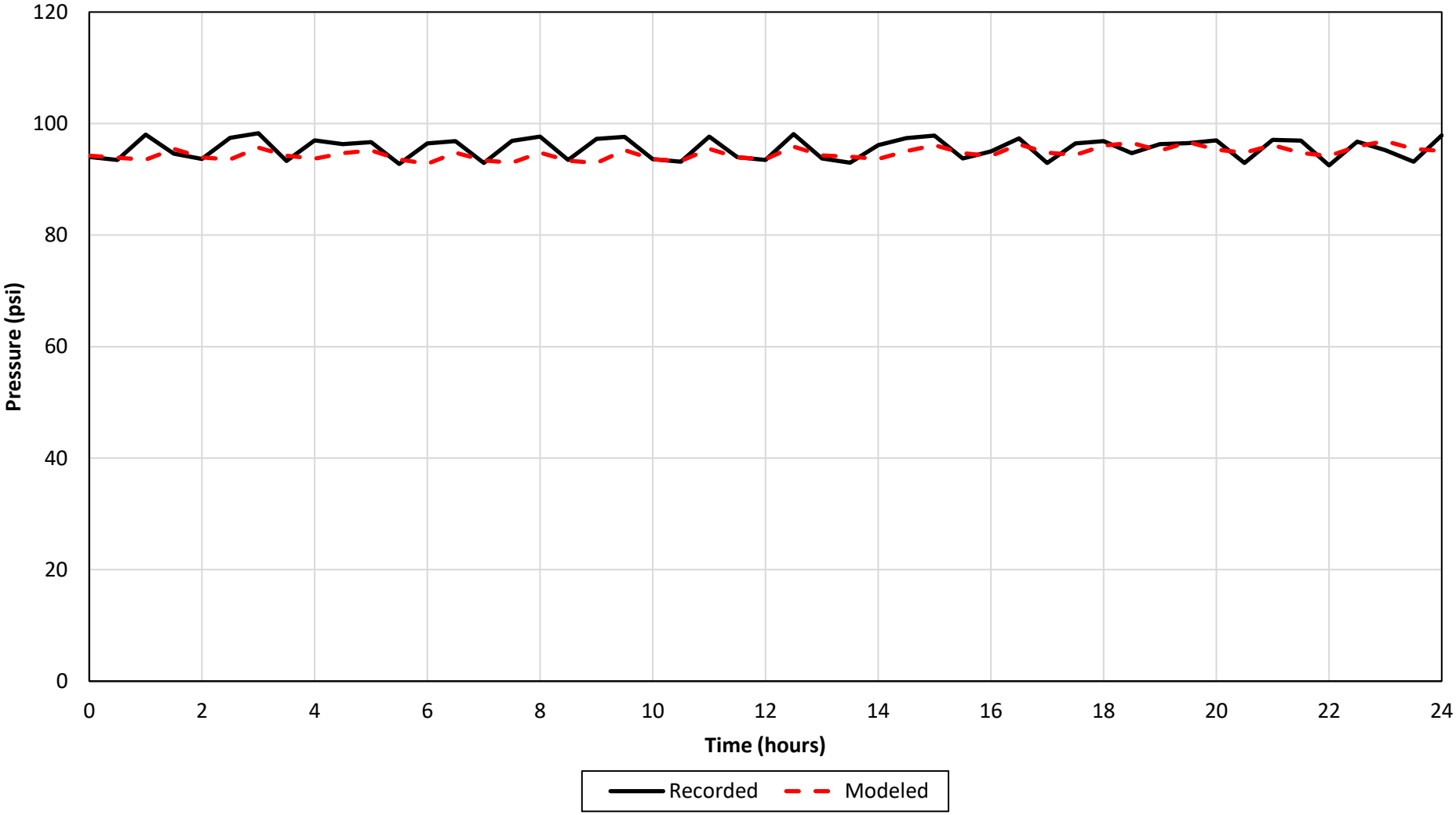


Figure C-8
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #8
Upper Pressure Plane

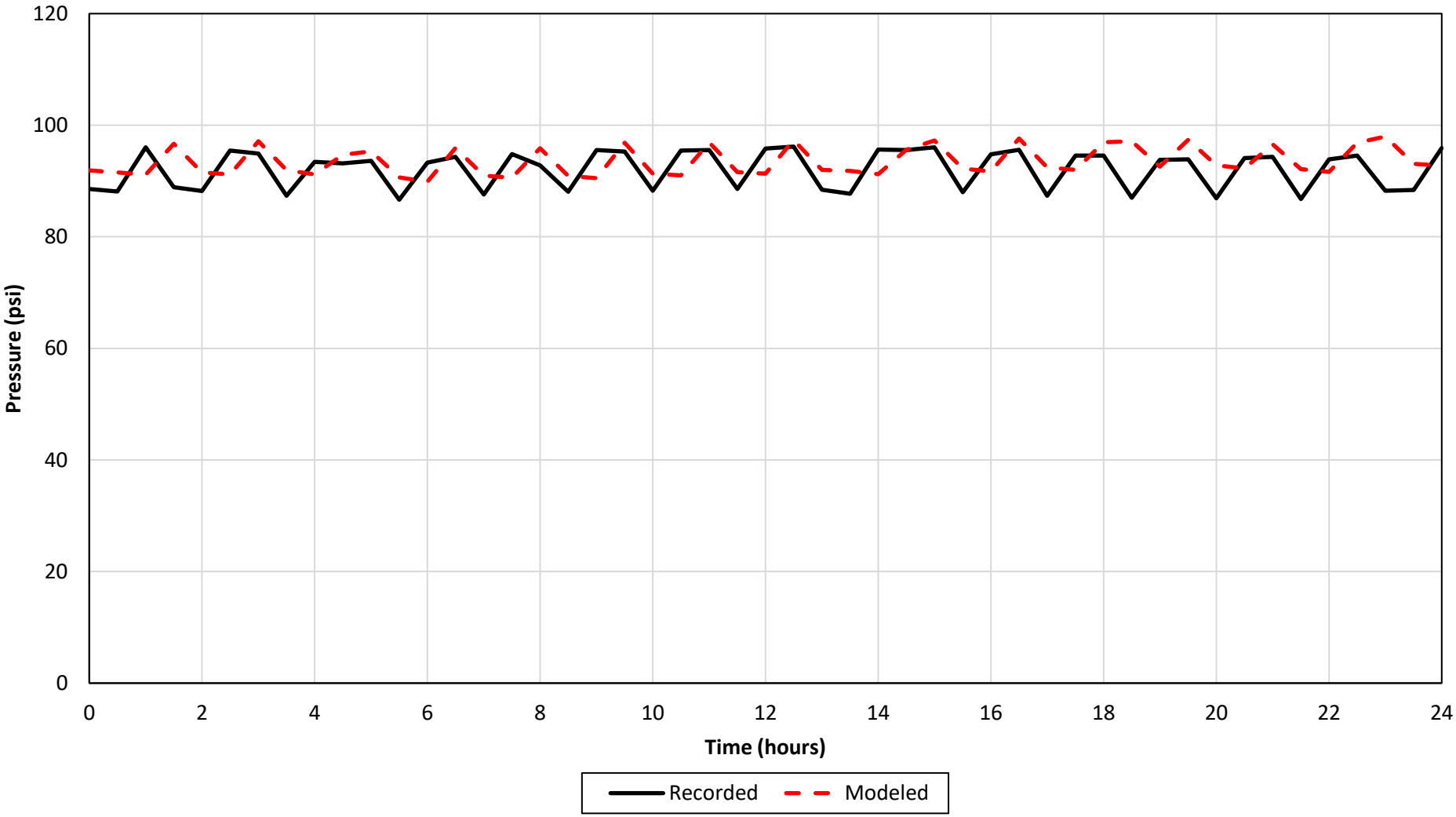


Figure C-9
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #9
Upper Pressure Plane

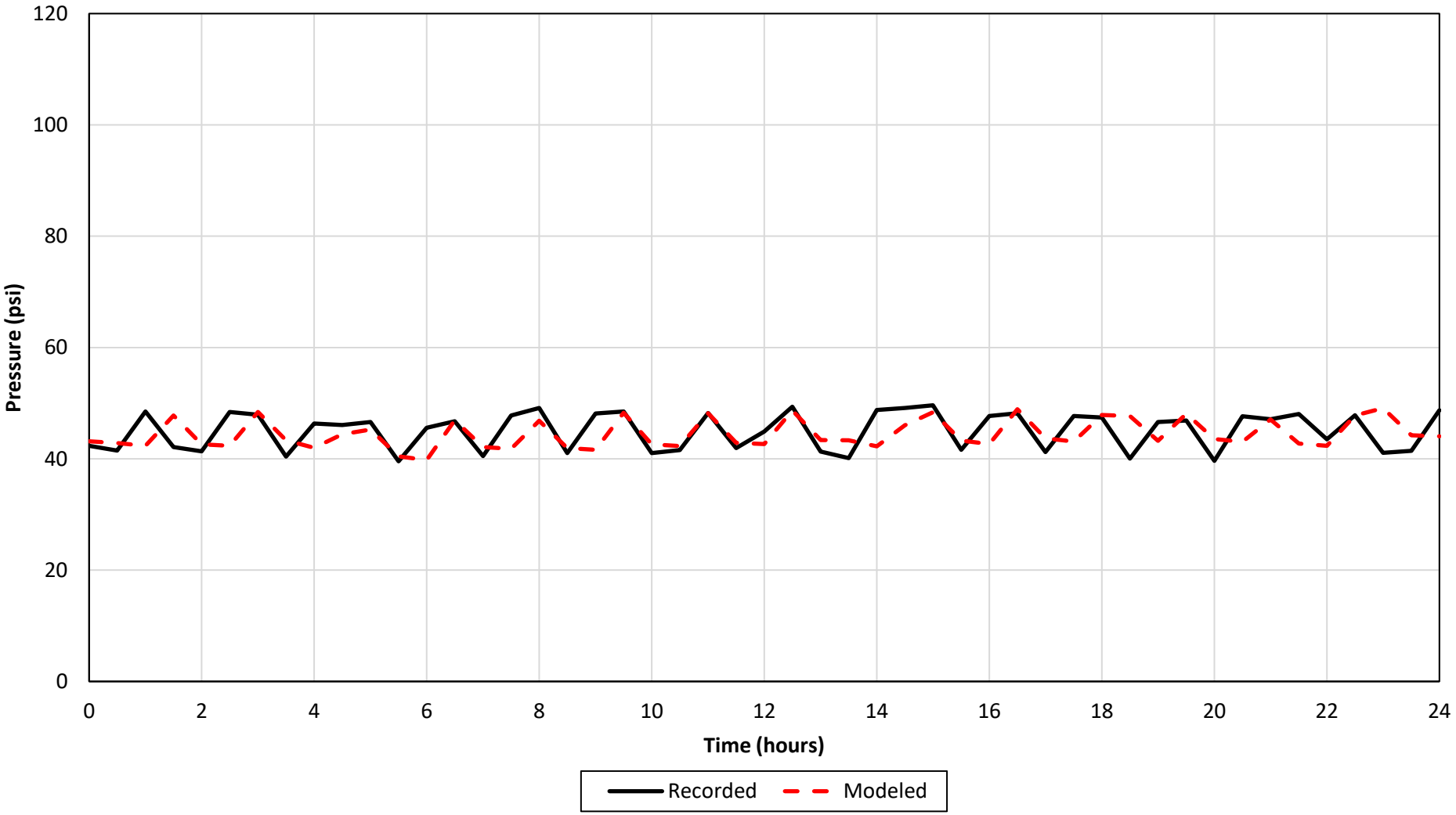


Figure C-10
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #10
Upper Pressure Plane

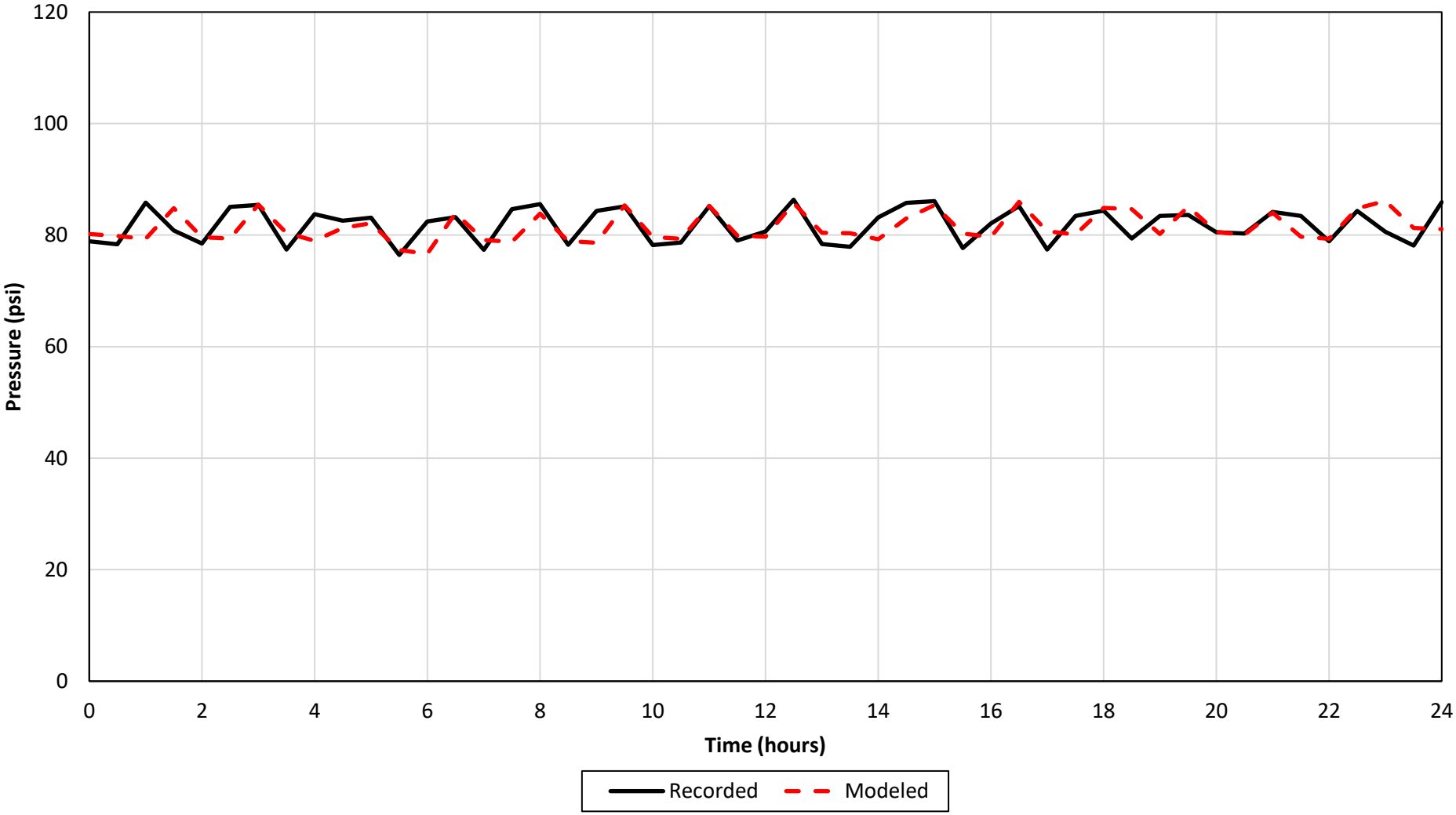


Figure C-11
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #11
Lower Pressure Plane

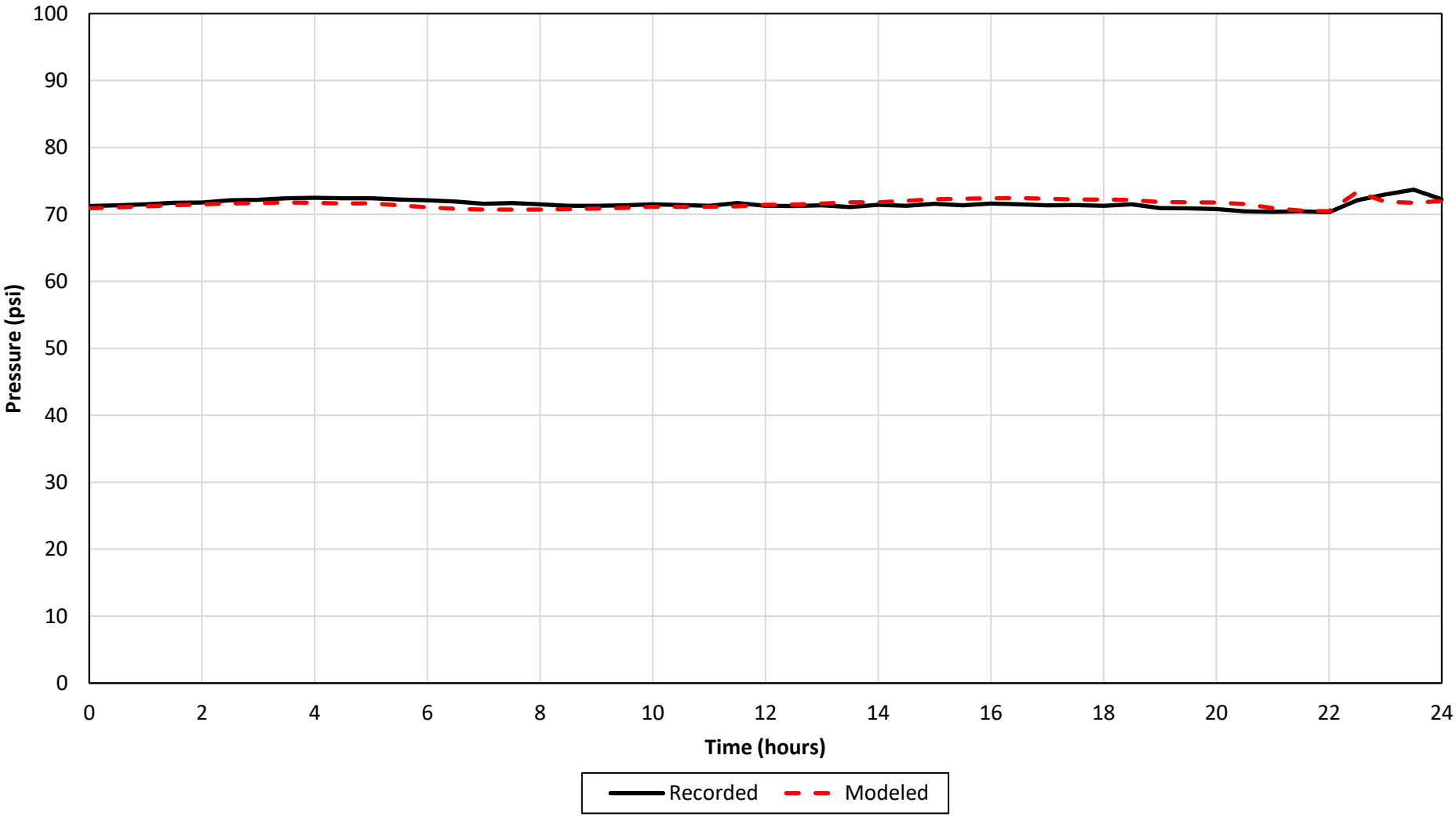


Figure C-12
Water Model Calibration Results (March 31, 2021)
Pressure Recorder #12
Upper Pressure Plane

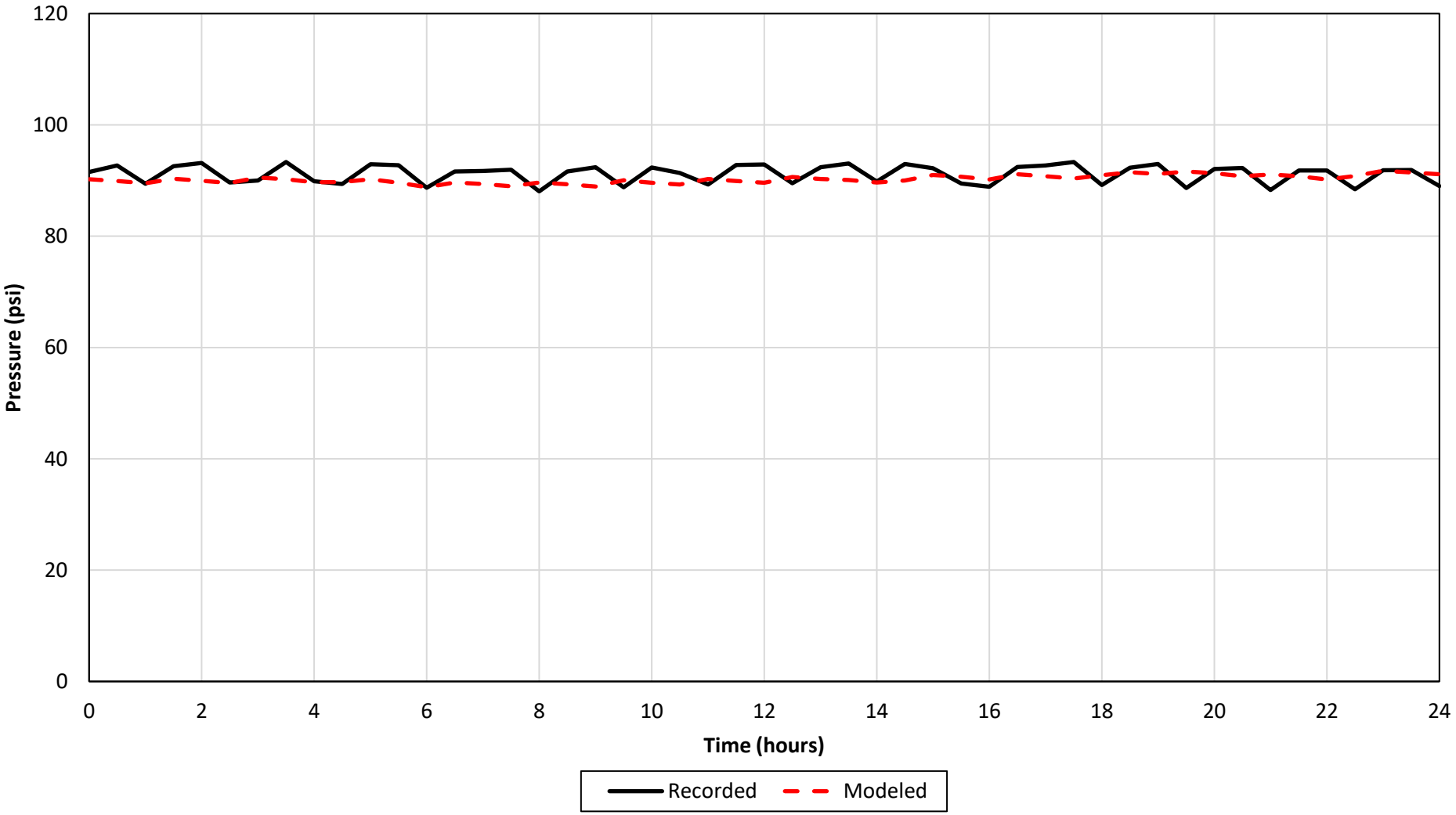


Figure C-17
Flow Calibration Results (March 31, 2021)
Hulen LPP Discharge
Lower Pressure Zone

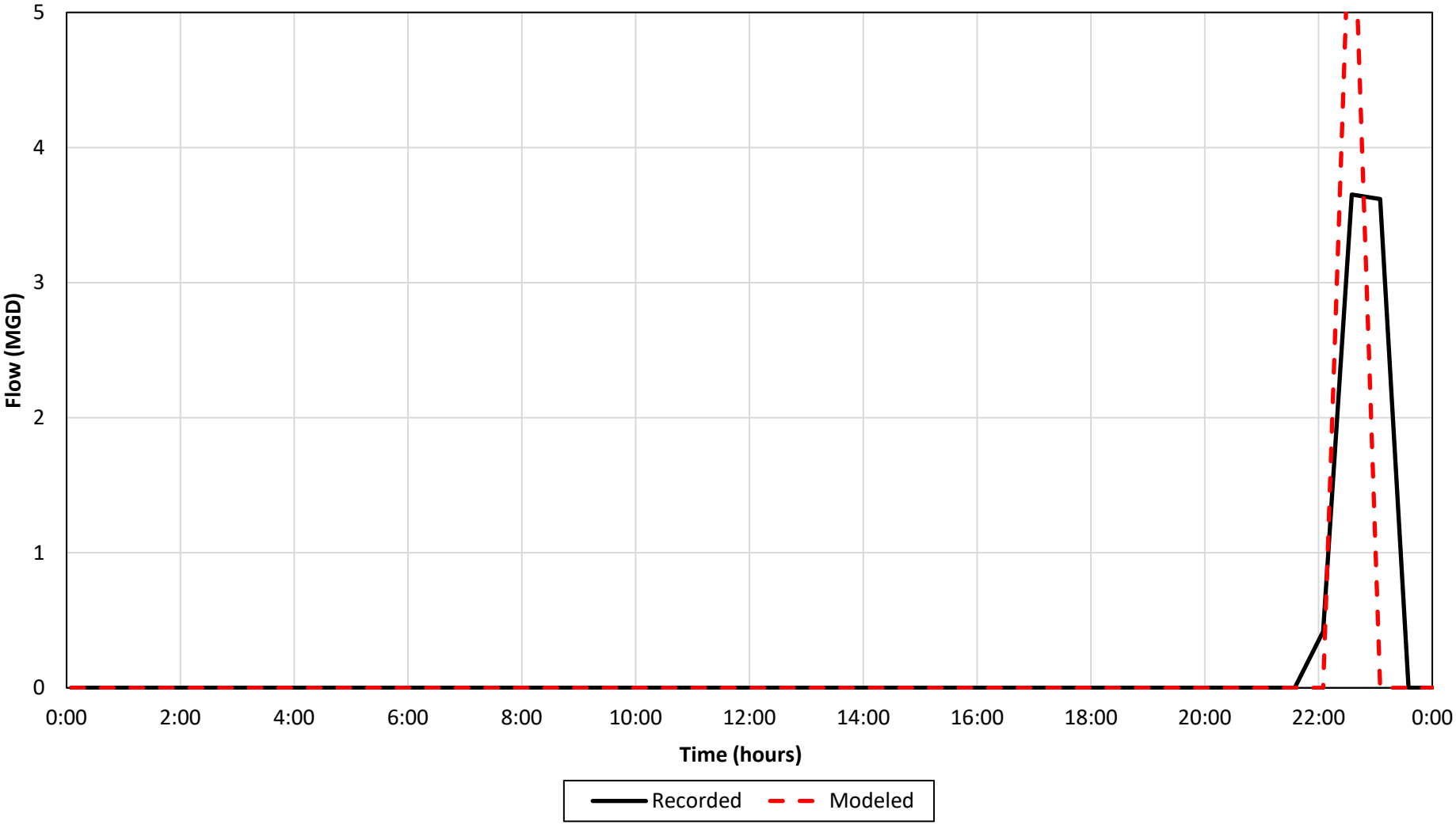


Figure C-18
Flow Calibration Results (March 31, 2021)
Industrial LPP Discharge
Lower Pressure Zone

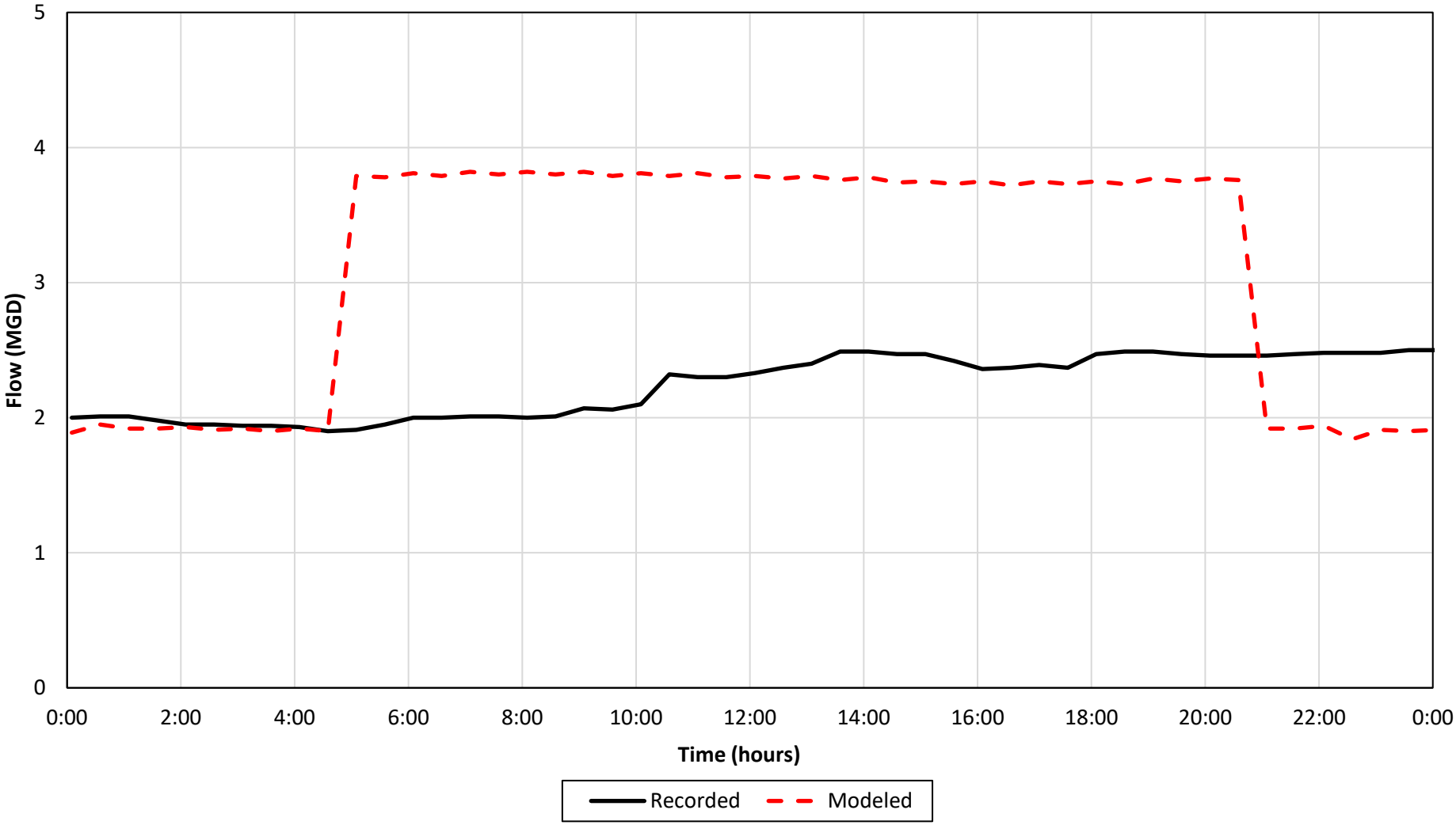


Figure C-19
Flow Calibration Results (March 31, 2021)
Hulen UPP Discharge
Upper Pressure Zone

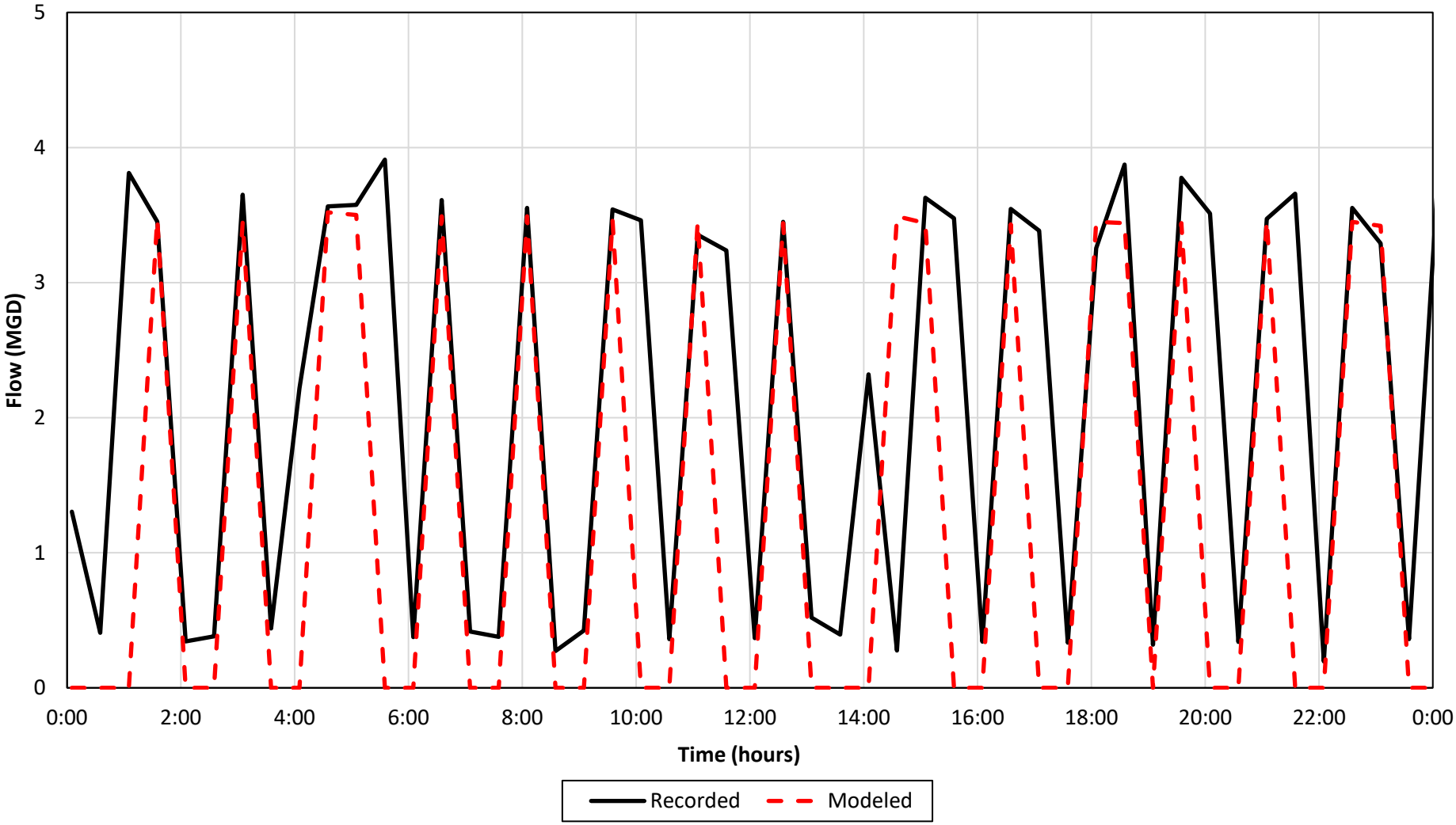


Figure C-13
Level Calibration Results (March 31, 2021)
Hidden Creek EST
Lower Pressure Zone

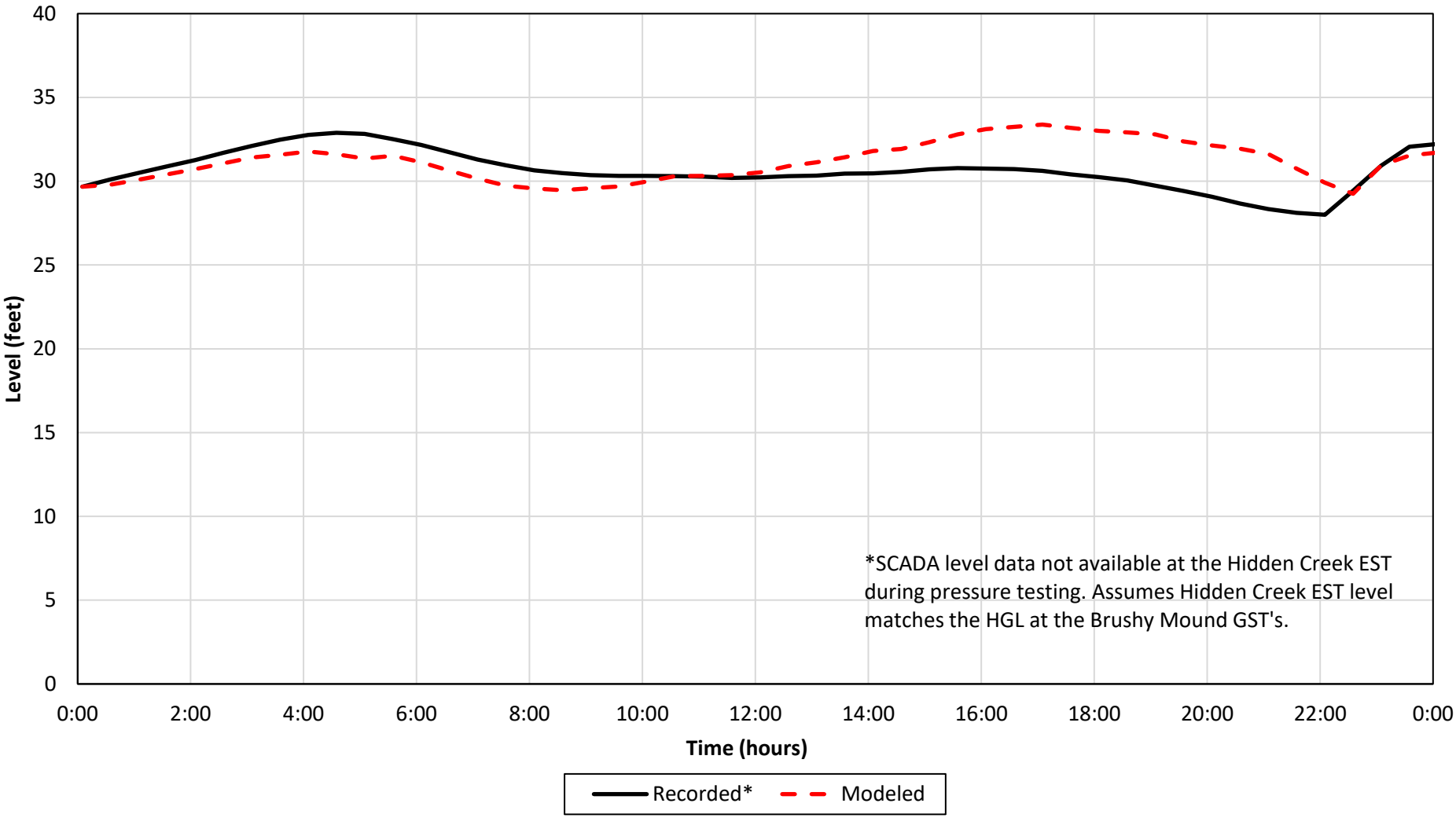


Figure C-14
Level Calibration Results (March 31,2021)
Turkey Peak EST
Upper Pressure Zone

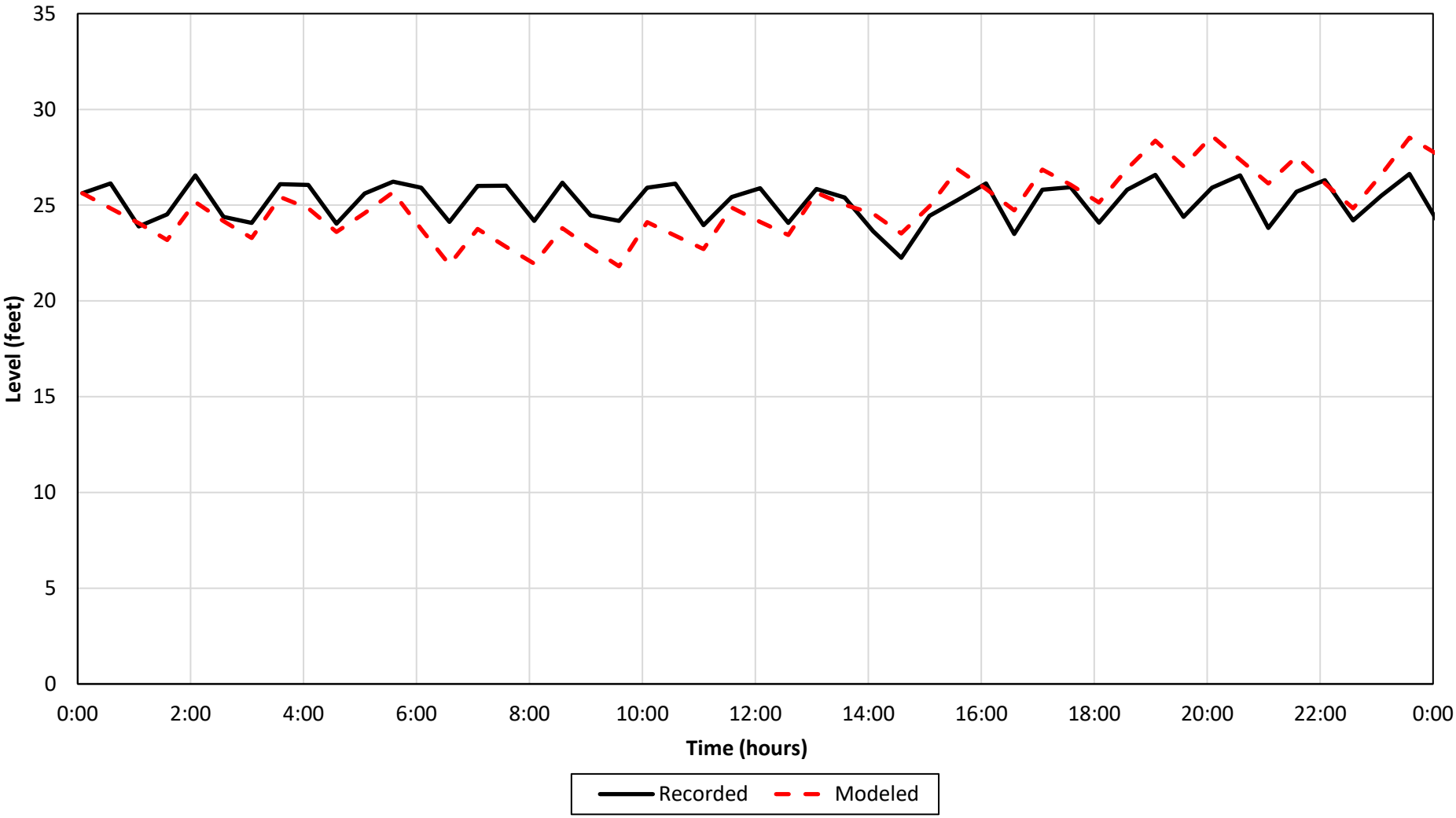


Figure C-15
Level Calibration Results (March 31, 2021)
Brushy Mound GST 1
Upper Pressure Zone

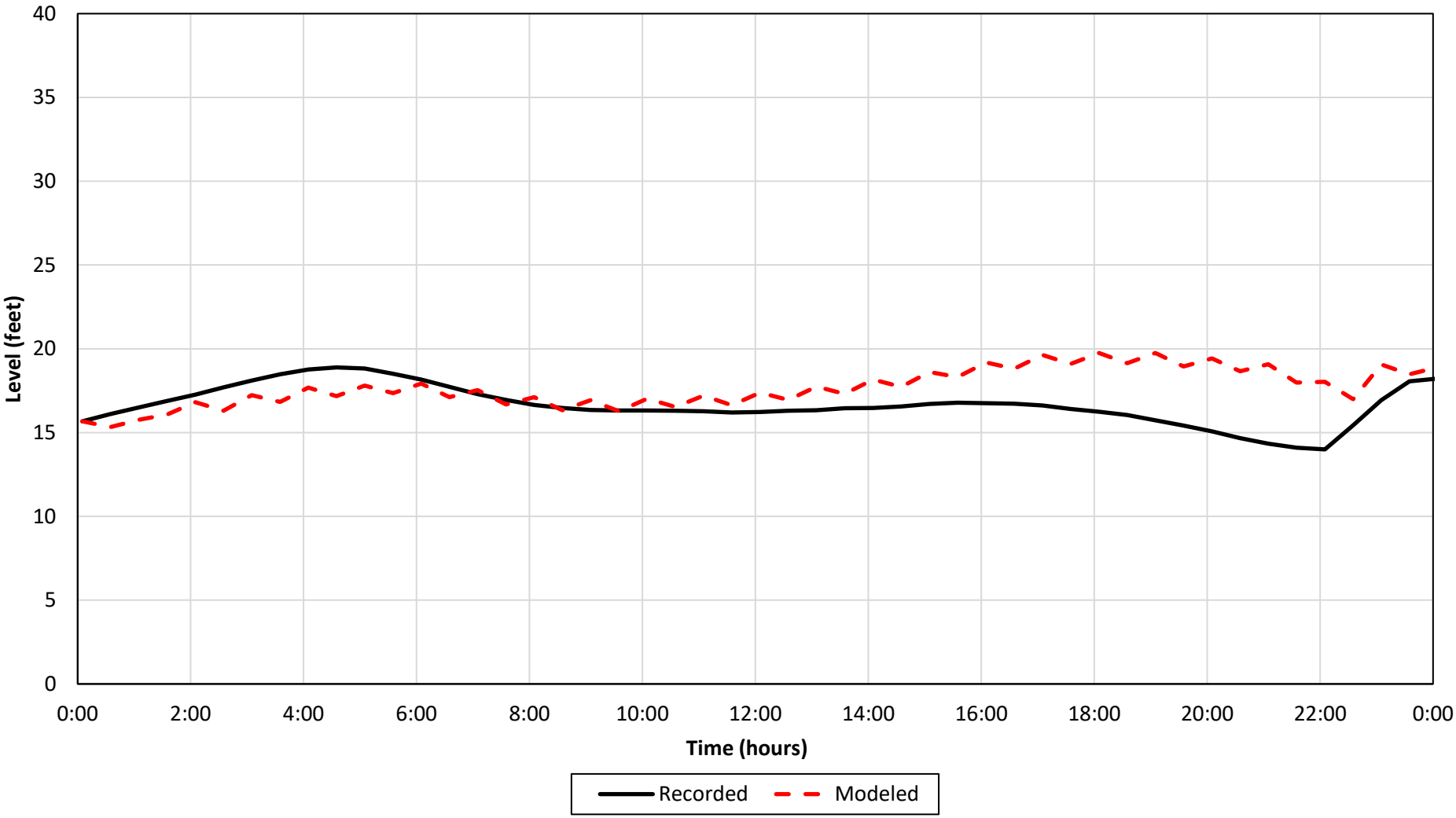


Figure C-16
Level Calibration Results (March 31, 2021)
Brushy Mound GST 2
Upper Pressure Zone

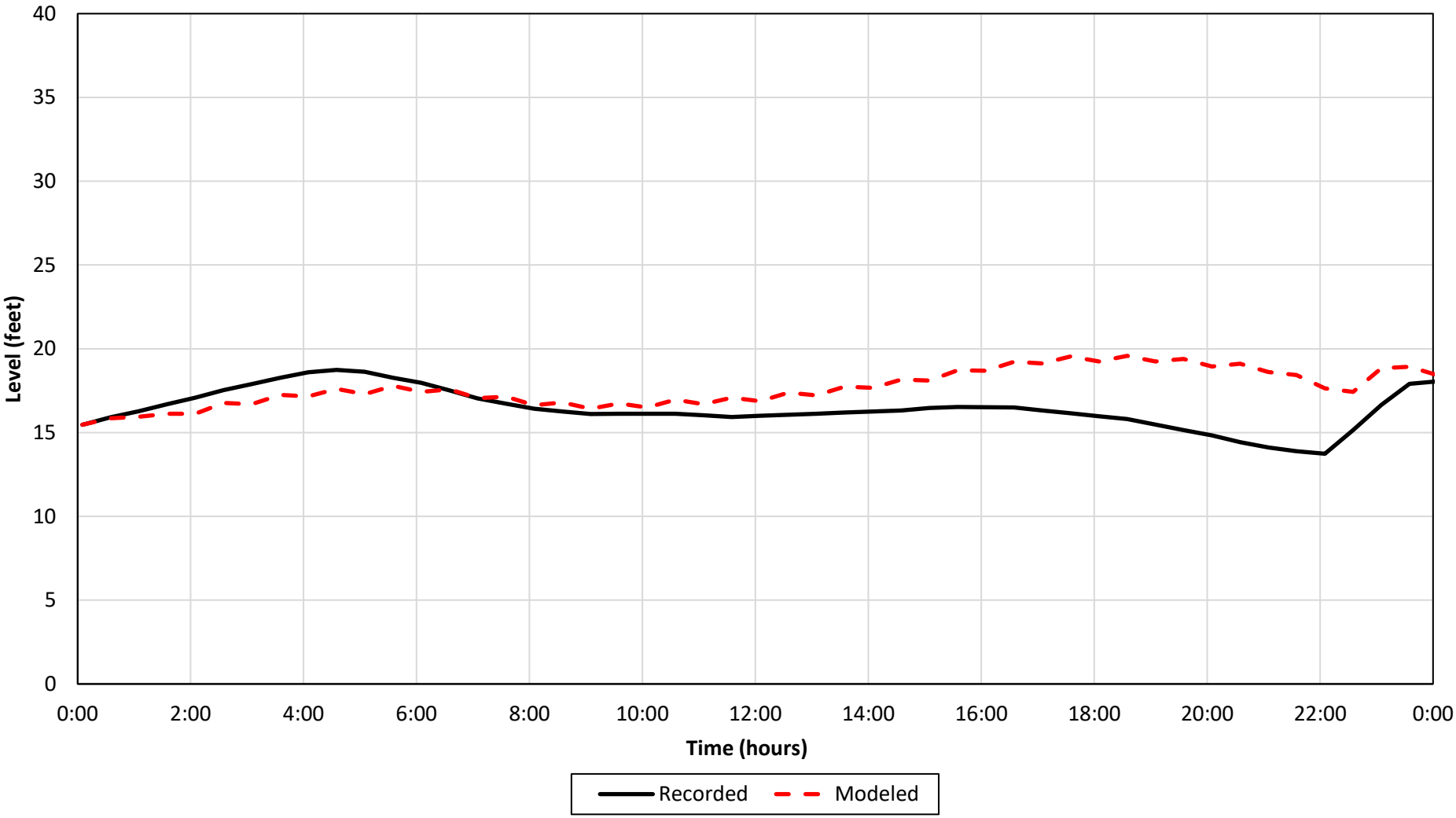


Table C-1. Water Model Calibration Pressure Recorder Summary

Facility	Within 5 psi	Within 3 psi
Pressure Recorder 1 at Fire Hydrant ID WFH875	100%	100%
Pressure Recorder 2 at Fire Hydrant ID WFH12	100%	100%
Pressure Recorder 3 at Fire Hydrant ID WFH288	100%	100%
Pressure Recorder 4 at Fire Hydrant ID WFH456	100%	100%
Pressure Recorder 5 at Fire Hydrant ID WFH276	100%	98%
Pressure Recorder 6 at Fire Hydrant ID WFH883	100%	90%
Pressure Recorder 7 at Fire Hydrant ID WFH1153	100%	88%
Pressure Recorder 8 at Fire Hydrant ID WFH380	86%	39%
Pressure Recorder 9 at Fire Hydrant ID WFH681	78%	61%
Pressure Recorder 10 at Fire Hydrant ID WFH686	86%	67%
Pressure Recorder 11 at Fire Hydrant ID WFH559	100%	100%
Pressure Recorder 12 at Fire Hydrant ID WFH807	100%	86%
Average	**96%**	**86%**

Note: Pressure recorders #5 and #6 experienced technical issues on March 31, 2021. Pressure recorder data shown for these locations was performed on July 29, 2020.

Table C-2. Water Model Calibration EST Level Summary

Facility	Within 5 feet	Within 3 feet
Hidden Creek EST	100%	92%
Turkey Peak EST	100%	96%
Brushy Mound GST 1	100%	80%
Brushy Mound GST 2	100%	80%
Average	**100%**	**87%**

Table C-3. Water Model Calibration Pump Station Summary

Facility	Within 1 MGD	Within 0.5 MGD
Hulen LPP Low	96%	96%
Industrial LPP Flow	35%	20%
Hulen UPP Flow	73%	71%
Average	**68%**	**63%**

APPENDIX D
EXISTING WATER SYSTEM ANALYSIS MAPPING

FIGURE D-1

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
MINIMUM PRESSURES

LEGEND

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MINIMUM PRESSURES

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1 Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

(2) - 2.00 MG Industrial Ground Storage Tanks
Overflow Elev. = 739'

6.06 MGD Industrial Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

4.53 MGD Turkey Peak Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

0.75 MG Turkey Peak Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low Pump Station
(3) 1,780 gpm Pumps

UPP to LPP Transfer Valve

1.00 MG Hidden Creek Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley Pump Station
(OFFLINE)

0.30 MG Mountain Valley Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

CROWLEY
FORT WORTH
JOSHUA
BRIAROAKS
CROSS TIMBER
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

Created by: Freese and Nichols, Inc.
Date: 11/21/2023 8:31:10 AM
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Updated: Tuesday, November 21, 2023 8:31:15 AM
User Name: DHR5

FIGURE D-2

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
MAXIMUM VELOCITY

LEGEND

Lines 12" and Larger
- Less than 5 ft/s
- Greater than 5 ft/s

Lines Smaller than 12"
- Less than 7 ft/s
- Greater than 7 ft/s

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

12" (10.0) Exceeds velocity design criteria - *Values are in feet per second*

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1 Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

(2) - 2.00 MG Industrial Ground Storage Tanks
Overflow Elev. = 739'

6.06 MGD Industrial Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

4.53 MGD Turkey Peak Pump Station
(3) 1,050 gpm Pumps

UPP to LPP Transfer Valve

2.00 MG Turkey Peak Ground Storage Tank
Overflow Elev. = 894'

0.75 MG Turkey Peak Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

2.45 MGD Mountain Valley Pump Station
(OFFLINE)

0.30 MG Mountain Valley Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

Created by Freese and Nichols, Inc.
Author: Schroder
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Updated: Tuesday, November 21, 2023 7:47:09 AM
User Name: DHRS

FIGURE D-3

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
MAXIMUM HEADLOSS

LEGEND

Lines 12" and Larger
- Less than 5 ft/1,000 ft
- Greater than 5 ft/1,000 ft

Lines Smaller than 12"
- Less than 7 ft/1,000 ft
- Greater than 7 ft/1,000 ft

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

12" (10.0) Exceeds headloss design criteria - *Values are in feet per 1,000 feet*

Supply from Fort Worth (SS2)

10.0 MGD Supply from Fort Worth (SS3)

6.17 MGD Alsbury #1 Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

(2) - 2.00 MG Industrial Ground Storage Tanks
Overflow Elev. = 739'

6.06 MGD Industrial Pump Station
(3) 1,400 GPM Pumps

4.53 MGD Turkey Peak Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

0.75 MG Turkey Peak Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

2.45 MGD Mountain Valley Pump Station
(OFFLINE)

0.30 MG Mountain Valley Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

CROWLEY
FORT WORTH
JOSHUA
BRIAROAKS
CROSS TIMBER
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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Job No. 91267.000
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Updated: Tuesday, November 21, 2023 8:51:15 AM
User Name: IZ493

FIGURE D-4

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
AVAILABLE FIREFLOW

LEGEND

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

AVAILABLE FIREFLOW

- Less than 1,000 gpm
- 1,000 - 1,500 gpm
- 1,500 - 3,000 gpm
- Greater than 3,000 gpm

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump

(2) - 2.00 MG Industrial
Ground Storage Tanks
Overflow Elev. = 739'

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

2.45 MGD Mountain Valley
Pump Station
(OFFLINE)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(OFFLINE)

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(OFFLINE)

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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User Name: GEMS

APPENDIX E
FUTURE WATER SYSTEM ANALYSIS MAPPING

FIGURE E-1

CITY OF BURLESON

FUTURE WATER SYSTEM
MAXIMUM DAY DEMANDS
MINIMUM PRESSURES

LEGEND

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MINIMUM PRESSURES

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump
(Decommissioned)

Industrial
(2) - 2.00 MG Ground Storage Tanks
(1) - 1.00 MG Ground Storage Tank
Overflow Elev. = 739'

8.50 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

0.50 MG Hyder Ranch
Elevated Storage Tank
Overflow Elev. = 1,000'

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

1.50 MG FM 731
Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley
Pump Station
(Decommissioned)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(Decommissioned)

0.75 MG New Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,000'

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(Decommissioned)

CROWLEY
FORT WORTH
JOSHUA
BRIAROAKS
CROSS TIMBER
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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FIGURE E-2

CITY OF BURLESON

FUTURE WATER SYSTEM
MAXIMUM DAY DEMANDS
MAXIMUM VELOCITY

LEGEND

Lines 12" and Larger
- Less than 5 ft/s
- Greater than 5 ft/s

Lines Smaller than 12"
- Less than 7 ft/s
- Greater than 7 ft/s
- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

12" (10.0) Exceeds velocity design criteria - *Values are in feet per second*

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump
(Decommissioned)

Industrial
(2) - 2.00 MG Ground Storage Tanks
(1) - 1.00 MG Ground Storage Tank
Overflow Elev. = 739'

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

0.50 MG Hyder Ranch
Elevated Storage Tank
Overflow Elev. = 1,000'

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

UPP to LPP Transfer Valve

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

1.50 MG FM 731
Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley
Pump Station
(Decommissioned)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(Decommissioned)

0.75 MG New Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,000'

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(Decommissioned)

CROWLEY
FORT WORTH
JOSHUA
BRIAROAKS
CROSS TIMBER
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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FIGURE E-3

CITY OF BURLESON

FUTURE WATER SYSTEM
MAXIMUM DAY DEMANDS
MAXIMUM HEADLOSS

LEGEND

Lines 12" and Larger
- Less than 5 ft/1,000 ft
- Greater than 5 ft/1,000 ft

Lines Smaller than 12"
- Less than 7 ft/1,000 ft
- Greater than 7 ft/1,000 ft
- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Lower Pressure Plane
- Upper Pressure Plane
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

12" (10.0) Exceeds headloss design criteria - *Values are in feet per 1,000 feet*

Supply from Fort Worth (SS2)

10.0 MGD Supply from Fort Worth (SS3)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump
(Decommissioned)

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

Industrial
(2) - 2.00 MG Ground Storage Tanks
(1) - 1.00 MG Ground Storage Tank
Overflow Elev. = 739'

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

UPP to LPP Transfer Valve

0.50 MG Hyder Ranch
Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

1.50 MG FM 731
Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley
Pump Station
(Decommissioned)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(Decommissioned)

0.75 MG New Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,000'

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(Decommissioned)

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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FIGURE E-4

CITY OF BURLESON

FUTURE WATER SYSTEM MAXIMUM DAY DEMANDS AVAILABLE FIREFLOW

LEGEND

- Transfer Valve
- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Under Design/Construction Water Line
- 10" and Smaller Water Line
- 12" and Larger Water Line
- Fort Worth Supply Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

AVAILABLE FIREFLOW

- Less than 1,000 gpm
- 1,000 - 1,500 gpm
- 1,500 - 3,000 gpm
- Greater than 3,000 gpm

Supply from Fort Worth (SS2)

6.17 MGD Alsbury #1
Pump Station
(2) - 1,740 gpm Pumps
(1) - 800 gpm Pump
(Decommissioned)

Industrial
(2) - 2.00 MG Ground Storage Tanks
(1) - 1.00 MG Ground Storage Tank
Overflow Elev. = 739'

6.06 MGD Industrial
Pump Station
(3) 1,400 GPM Pumps

10.0 MGD Supply from Fort Worth (SS3)

4.53 MGD Turkey Peak
Pump Station
(3) 1,050 gpm Pumps

2.00 MG Turkey Peak
Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

0.75 MG Turkey Peak
Elevated Storage Tank
Overflow Elev. = 1,000'

0.50 MG Hyder Ranch
Elevated Storage Tank
Overflow Elev. = 1,000'

Hulen PS
(1) - 2.00 MG Ground Storage Tank
(1) - 3.00 MG Ground Storage Tank
Overflow Elev. = 876'

7.68 MGD Hulen High
Pump Station
(3) 1,780 gpm Pumps

7.68 MGD Hulen Low
Pump Station
(3) 1,780 gpm Pumps

1.00 MG Hidden Creek
Elevated Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

1.50 MG FM 731
Elevated Storage Tank
Overflow Elev. = 894'

2.45 MGD Mountain Valley
Pump Station
(Decommissioned)

0.30 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(Decommissioned)

0.75 MG New Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,000'

0.30 MG Mountain Valley
Elevated Storage Tank
Overflow Elev. = 1,034'
(Decommissioned)

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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Figure E-5

Lower Pressure Plane

Buildout System - EST Modeled Levels

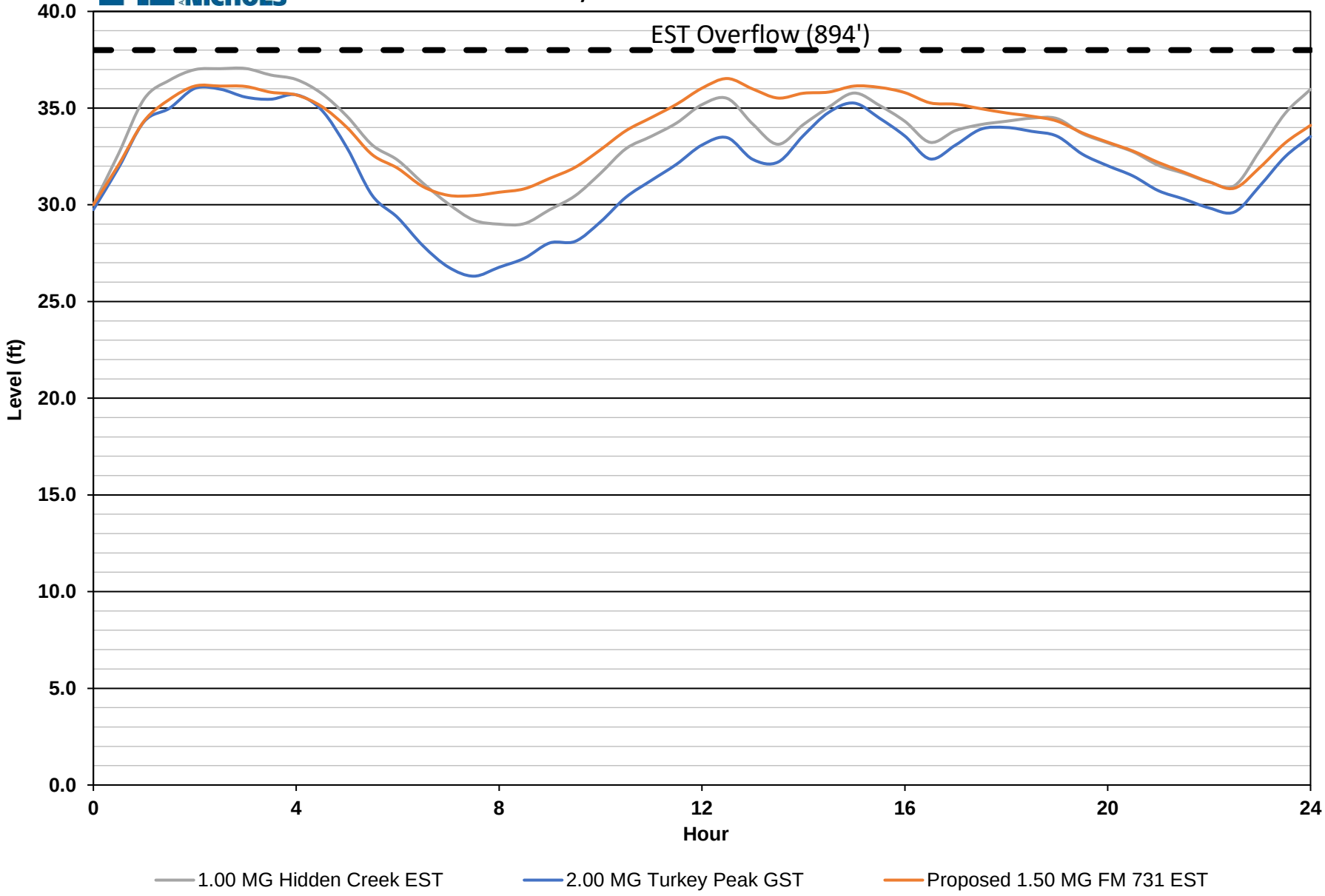
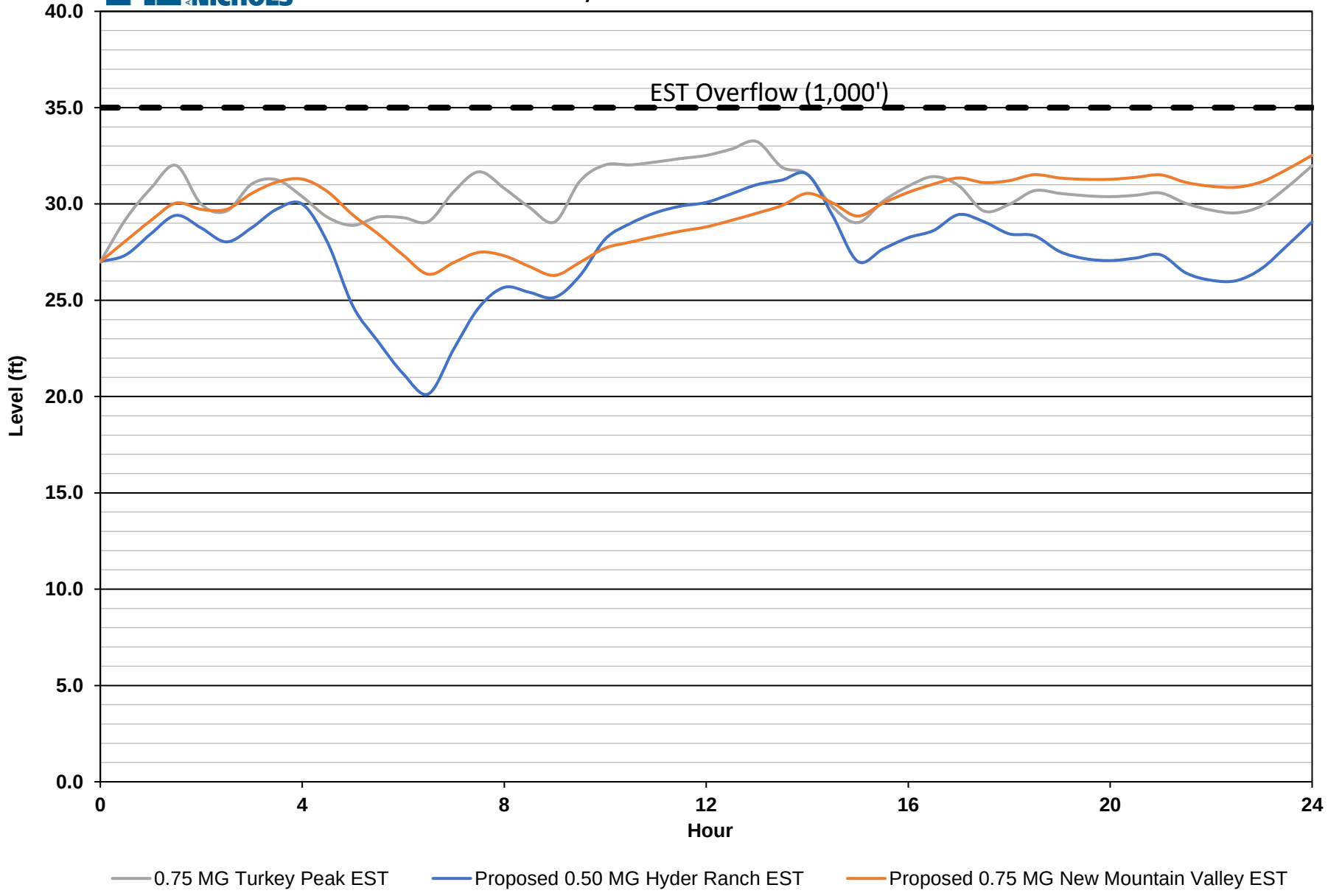


Figure E-6

Upper Pressure Plane

Buildout System - EST Modeled Levels



APPENDIX F
ESTIMATED WATER CIP OPINION OF PROBABLE CONSTRUCTION COSTS

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: H-A — **Phase:** Hydraulic Restriction

Project Name: 16-inch County Road 920 Lower Pressure Plane Transmission Water Line

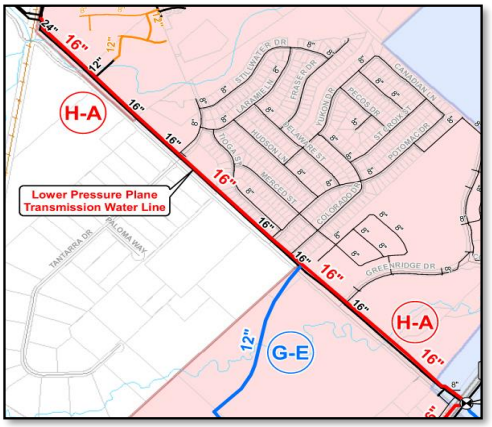
Project Description:

This project consists of the construction of a 16-inch transmission water line in the LPP parallel to the existing UPP 16-inch water line along County Road 920 from the existing 16-inch near the railroad to the existing 12-inch water line near Wilshire Boulevard.

Project Drivers:

- This project provides transmission capacity to the LPP from the Hulen Low Pump Station.
- The existing 16-inch transmission line from the Hulen Low Pump Station to the LPP experiences high velocity/headloss under existing system max day demand projections.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	7,600	LF	$ 240	$ 1,824,000
2	30" Boring and Casing	290	LF	$ 600	$ 174,000
3	Asphalt Pavement Repair	600	LF	$ 80	$ 48,000
				SUBTOTAL:	**$ 2,046,000**
		CONTINGENCY		30%	$ 613,800
				SUBTOTAL:	**$ 2,659,800**
		ENG/SURVEY		15%	$ 399,000
				SUBTOTAL:	**$ 3,058,800**
				Estimated Project Total:	**$ 3,058,800**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: H-B — **Phase:** Hydraulic Restriction

Project Name: 16-inch Wilshire Boulevard Upper Pressure Plane Transmission Water Line

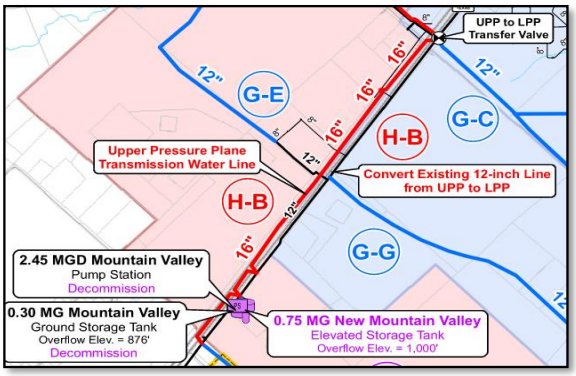
Project Description:

This project consists of the construction of a 16-inch transmission water line along Wilshire Boulevard from the existing LPP 12-inch water line on Wilshire Boulevard to the proposed 12-inch water line near the Mountain Valley Pump Station.

Project Drivers:

- This project provides transmission capacity to the Mountain Valley portion of the Upper Pressure Plane from the Hulen High Pump Station.
- This area experiences high velocity/headloss under buildout demands.
- This project enables the existing 12-inch water line along Wilshire Boulevard to be converted to a LPP water Line.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	4,800	LF	$ 240	$ 1,152,000
2	Asphalt Pavement Repair	500	LF	$ 80	$ 40,000
3	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
				SUBTOTAL:	**$ 1,222,000**
				CONTINGENCY 30%	$ 366,600
				SUBTOTAL:	**$ 1,588,600**
				ENG/SURVEY 15%	$ 238,300
				SUBTOTAL:	**$ 1,826,900**
				Estimated Project Total:	**$ 1,826,900**

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

City of Burleson

Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**H-C**	**Phase:**	**Hydraulic Restriction**
Project Name:	**Small Diameter Replacement Initiative**		

Project Description:

This project consists of the replacement of 4-inch and smaller diameter water lines in the City's distribution system with 8-inch water lines.

Vicinity Map



Project Drivers:

- This project provides additional transmission capacity for areas served via small diameter water lines.
- This project increases the available fire flow and minimum pressures observed throughout the distribution system.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" WL & Appurtenances	20,800	LF	$ 120	$ 2,496,000
2	Concrete Pavement Repair	19,500	LF	$ 100	$ 1,950,000
				SUBTOTAL:	**$ 4,446,000**
		CONTINGENCY		30%	$ 1,333,800
				SUBTOTAL:	**$ 5,779,800**
		ENG/SURVEY		15%	$ 867,000
				SUBTOTAL:	**$ 6,646,800**
				Estimated Project Total:	**$ 6,646,800**

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

City of Burleson

Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-A**	**Phase: Growth / Development**
Project Name:	**12-inch County Road 714 Lower Pressure Plane Water Line**	

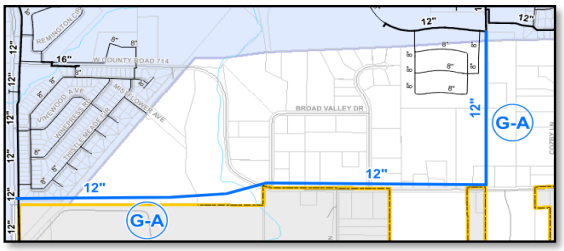
Project Description:

This project consists of the construction of a 12-inch water line along Country Road 714 from the existing 12-inch water line on FM 731 to the existing 12-inch water line near Landmark Boulevard.

Project Drivers:

• This project will allow near-term future developments to be served in the Lower Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	9,100	LF	$ 180	$ 1,638,000
2	Asphalt Pavement Repair	300	LF	$ 80	$ 24,000
3	20" Boring and Casing	900	LF	$ 400	$ 360,000
				SUBTOTAL:	**$ 2,022,000**
		CONTINGENCY		30%	$ 606,600
				SUBTOTAL:	**$ 2,628,600**
		ENG/SURVEY		15%	$ 394,300
				SUBTOTAL:	**$ 3,022,900**
				Estimated Project Total:	**$ 3,022,900**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-B — **Phase:** Growth / Development

Project Name: 12-inch County Road 802 Upper Pressure Plane Water Line

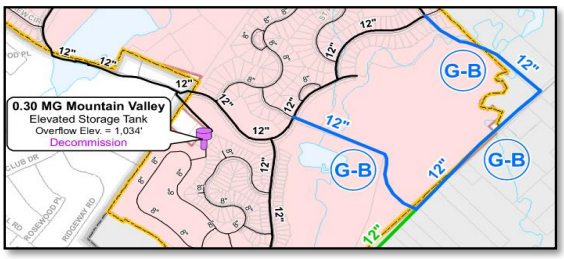
Project Description:

This project consists of the construction of a 12-inch water line looping from the existing 12-inch water line on Red Cedar Way up along County Road 802 and back to the existing 12-inch water line on Morningside Drive.

Project Drivers:

- This project will allow near-term future developments to be served in the Upper Pressure Plane.
- This project will also provide improved looping and fireflow in the Mountain Valley area.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	6,500	LF	$ 180	$ 1,170,000
2	20" Boring and Casing	600	LF	$ 400	$ 240,000
3	Asphalt Pavement Repair	200	LF	$ 80	$ 16,000
4	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 1,436,000**
		CONTINGENCY		30%	$ 430,800
				SUBTOTAL:	**$ 1,866,800**
		ENG/SURVEY		15%	$ 280,100
				SUBTOTAL:	**$ 2,146,900**
				Estimated Project Total:	**$ 2,146,900**

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

City of Burleson

Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-C**		**Phase: Growth / Development**
Project Name:	**12-inch FM 731 Lower Pressure Plane Water Line**		

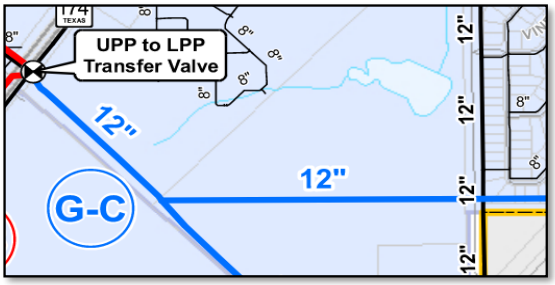
Project Description:

This project consists of the construction of a 12-inch water line from the proposed 16-inch water line on Wilshire Boulevard to the existing 12-inch water line on FM 731.

Project Drivers:

- This project will allow future developments (The Lakes) to be served in the LPP.
- This project will improve looping and available fireflow in the LPP.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	4,200	LF	$ 180	$ 756,000
2	Asphalt Pavement Repair	100	LF	$ 80	$ 8,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 774,000**
		CONTINGENCY		30%	$ 232,200
				SUBTOTAL:	**$ 1,006,200**
		ENG/SURVEY		15%	$ 151,000
				SUBTOTAL:	**$ 1,157,200**
				Estimated Project Total:	**$ 1,157,200**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

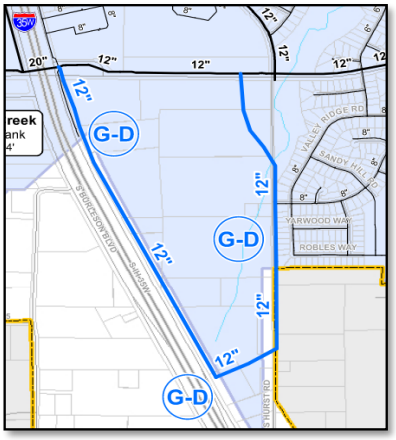
Construction Project Number: G-D — **Phase:** Growth / Development

Project Name: 12-inch I-35 W Lower Pressure Plane Water Line

Project Description:

This project consists of the construction of a 12-inch water line looping from the existing 12-inch water line on Hidden Creek Parkway down along Country Road 601 and back along I-35 W to the existing 12-inch water line on Hidden Creek Parkway.

Vicinity Map



Project Drivers:

- This project will allow future developments to be served in the Lower Pressure Plane.
- This project will improve looping and available fireflow in the Lower Pressure Plane.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	8,900	LF	$ 180	$ 1,602,000
2	20" Boring and Casing	500	LF	$ 400	$ 200,000
3	Asphalt Pavement Repair	200	LF	$ 80	$ 16,000
4	Concrete Pavement Repair	1,700	LF	$ 100	$ 170,000
				SUBTOTAL:	**$ 1,988,000**
		CONTINGENCY		30%	$ 596,400
				SUBTOTAL:	**$ 2,584,400**
		ENG/SURVEY		15%	$ 387,700
				SUBTOTAL:	**$ 2,972,100**
				Estimated Project Total:	**$ 2,972,100**

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

City of Burleson

Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-E**	**Phase: Growth / Development**
Project Name:	**12-inch Wilshire Boulevard Upper Pressure Plane Water Line**	

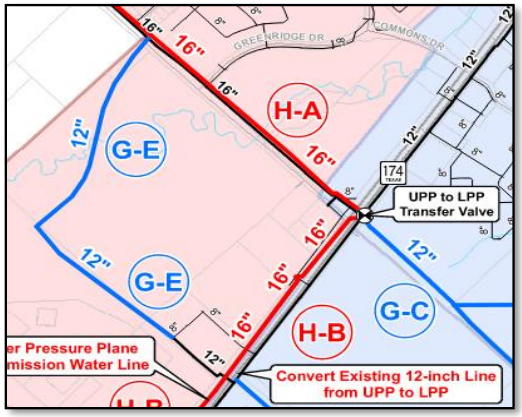
Project Description:

This project consists of the construction of a 12-inch water line looping from the existing 16-inch water line on County Road 920 across Village Creek to the existing 12-inch water line on Wilshire Boulevard.

Project Drivers:

- This project will allow future developments (Bear Ridge) to be served in the Upper Pressure Plane.
- The primary trigger for project G-A is the implementation of the proposed UPP to LPP pressure plane transition of the area generally bounded by Wilshire Boulevard and FM 731. This project will provide resiliency and alternate feed to these development areas.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	4,100	LF	$ 180	$ 738,000
2	20" Boring and Casing	250	LF	$ 400	$ 100,000
3	Asphalt Pavement Repair	300	LF	$ 80	$ 24,000
				SUBTOTAL:	**$ 862,000**
		CONTINGENCY		30%	$ 258,600
				SUBTOTAL:	**$ 1,120,600**
		ENG/SURVEY		15%	$ 168,100
				SUBTOTAL:	**$ 1,288,700**
				Estimated Project Total:	**$ 1,288,700**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-F — **Phase:** Growth / Development

Project Name: 12/16-inch Hyder Ranch Distribution Line Phase 1

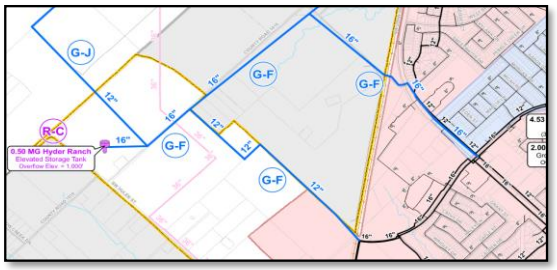
Project Description:

This project consists of the construction of a 12/16-inch water line from the existing 16-inch water line on Alsbury Boulevard, looping around the Hyder Ranch Development, to the existing 16-inch water line on Alsbury Boulevard.

Project Drivers:

• This project facilitates the transmission capacity to serve the Hyder Ranch Development.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	5,300	LF	$ 180	$ 954,000
2	16" WL & Appurtenances	10,800	LF	$ 240	$ 2,592,000
3	20" Boring and Casing	25	LF	$ 400	$ 10,000
4	30" Boring and Casing	270	LF	$ 600	$ 162,000
5	Concrete Pavement Repair	2,000	LF	$ 100	$ 200,000
				SUBTOTAL:	**$ 3,918,000**
		CONTINGENCY		30%	$ 1,175,400
				SUBTOTAL:	**$ 5,093,400**
		ENG/SURVEY		15%	$ 764,100
				SUBTOTAL:	**$ 5,857,500**
				Estimated Project Total:	**$ 5,857,500**

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

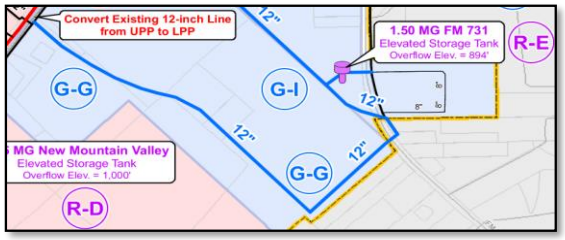
City of Burleson

Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-G**	**Phase: Growth / Development**
Project Name:	**12-inch Village Creek Lower Pressure Plane Water Line Phase 1**	

Project Description:

This project consists of the construction of a 12-inch water line from the existing 12-inch water line on Wilshire Boulevard to the existing 12-inch water line on FM 731. This project consists of extending water service to the area roughly defined as Wilshire Boulevard to the northwest, FM 731 to the northeast, the City Limit to the southeast, and Wicker Hill Road to the southwest.

Vicinity Map



Project Drivers:

- The development area near the Mountain Valley Pump Station (offline), is recommended to be served from the LPP.
- This project facilitates the transmission capacity to serve the developments through the LPP.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	6,400	LF	$ 180	$ 1,152,000
2	Asphalt Pavement Repair	100	LF	$ 80	$ 8,000
3	Concrete Pavement Repair	600	LF	$ 100	$ 60,000
				SUBTOTAL:	**$ 1,220,000**
		CONTINGENCY		30%	$ 366,000
				SUBTOTAL:	**$ 1,586,000**
		ENG/SURVEY		15%	$ 237,900
				SUBTOTAL:	**$ 1,823,900**
				Estimated Project Total:	**$ 1,823,900**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-H — **Phase:** Growth / Development

Project Name: 12-inch Wicker Hill Road Upper Pressure Plane Water Line

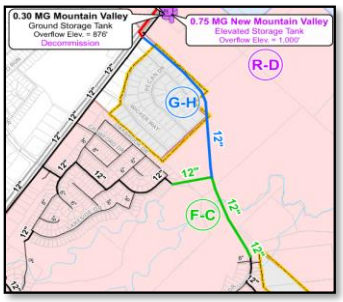
Project Description:

This project consists of the construction of a 12-inch water line from the existing 12-inch water line near the Mountain Valley Pump Station to the proposed 12-inch water line on Fairway View Drive.

Project Drivers:

- This project will allow future developments (Bear Ridge) to be served in the Upper Pressure Plane.
- This project will eliminate a 12-inch dead-end line.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	3,100	LF	$ 180	$ 558,000
2	Asphalt Pavement Repair	100	LF	$ 80	$ 8,000
				SUBTOTAL:	**$ 566,000**
		CONTINGENCY		30%	$ 169,800
				SUBTOTAL:	**$ 735,800**
		ENG/SURVEY		15%	$ 110,400
				SUBTOTAL:	**$ 846,200**
				Estimated Project Total:	**$ 846,200**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-I — **Phase:** Growth / Development

Project Name: 12-inch Village Creek Lower Pressure Plane Water Line Phase 2

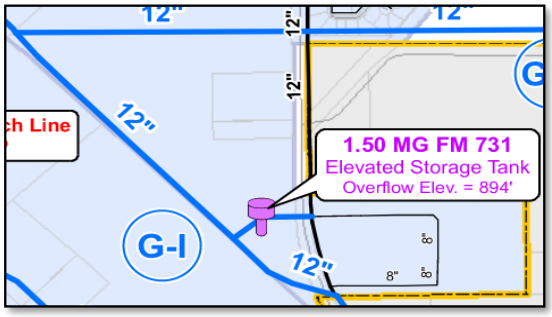
Project Description:

This project consists of the construction of a 12-inch water line from the proposed 12-inch water line near Wilshire Boulevard to the existing 12-inch water line on FM 731. This project enables the construction of the proposed FM 731 Elevated Storage Tank.

Project Drivers:

- The development area near the Mountain Valley Pump Station (offline), is recommended to be served from the LPP.
- This project facilitates the transmission capacity to serve the developments through the LPP.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	3,900	LF	$ 180	$ 702,000
2	16" Boring and Casing	100	LF	$ 320	$ 32,000
3	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
				SUBTOTAL:	**$ 754,000**
		CONTINGENCY		30%	$ 226,200
				SUBTOTAL:	**$ 980,200**
		ENG/SURVEY		15%	$ 147,100
				SUBTOTAL:	**$ 1,127,300**
				Estimated Project Total:	**$ 1,127,300**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-J — **Phase:** Growth / Development

Project Name: 12-inch Hyder Ranch Distribution Line Phase 2

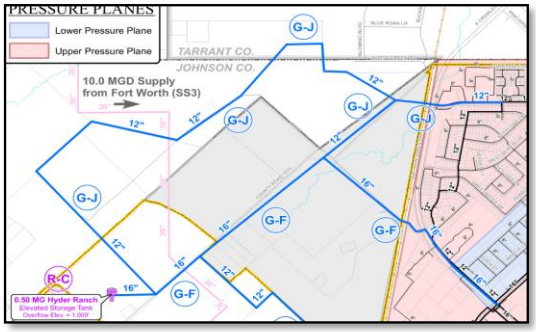
Project Description:

This project consists of the construction of a 12-inch water line from the proposed 16-inch water line on County Road 1016, looping around the Hyder Ranch Development, to the proposed 12-inch water line on County Road 1016. It also consists of a 12-inch water line from the proposed 12-inch line on Country Road 1016 to the existing 12-inch line on Summercrest Boulevard.

Project Drivers:

• This project facilitates the transmission capacity to serve the Hyder Ranch Development.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	15,700	LF	$ 180	$ 2,826,000
2	20" Boring and Casing	200	LF	$ 400	$ 80,000
3	Concrete Pavement Repair	500	LF	$ 100	$ 50,000
				SUBTOTAL:	**$ 2,956,000**
		CONTINGENCY		30%	$ 886,800
				SUBTOTAL:	**$ 3,842,800**
		ENG/SURVEY		15%	$ 576,500
				SUBTOTAL:	**$ 4,419,300**
				Estimated Project Total:	**$ 4,419,300**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: F-A — **Phase:** Fireflow / Looping

Project Name: 8-inch Village Creek Lower Pressure Plane Water Line

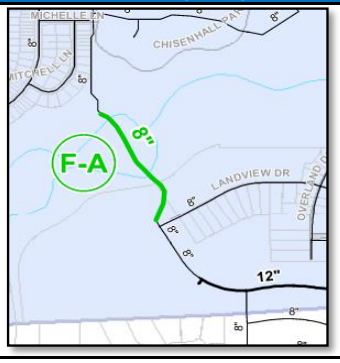
Project Description:

This project consists of the construction of an 8-inch water line across Chisenhall Park from the existing 8-inch water line on Chisenhall Park Lane to the existing 8-inch water line on Landview Drive.

Project Drivers:

- This project will improve looping and available fireflow in the Lower Pressure Plane.
- This project will eliminate two 8-inch dead-end lines.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" WL & Appurtenances	1,400	LF	$ 120	$ 168,000
2	16" Boring and Casing	800	LF	$ 320	$ 256,000
				SUBTOTAL:	**$ 424,000**
		CONTINGENCY		30%	$ 127,200
				SUBTOTAL:	**$ 551,200**
		ENG/SURVEY		15%	$ 82,700
				SUBTOTAL:	**$ 633,900**
				Estimated Project Total:	**$ 633,900**

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

City of Burleson

Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**F-B**	**Phase: Fireflow / Looping**
Project Name:	**12-inch Shoreline Drive Upper Pressure Plane Water Line**	

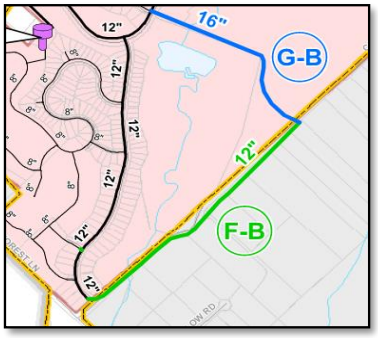
Project Description:

This project consists of the construction of a 12-inch water line along Country Road 802 from the proposed 12-inch water line to the existing 12-inch water line on Shoreline Drive.

Project Drivers:

- This project will improve looping and available fireflow in the Lower Pressure Plane.
- This project will eliminate a 12-inch dead-end line.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	3,100	LF	$ 180	$ 558,000
2	20" Boring and Casing	100	LF	$ 400	$ 40,000
3	Asphalt Pavement Repair	600	LF	$ 80	$ 48,000
				SUBTOTAL:	**$ 646,000**
		CONTINGENCY		30%	$ 193,800
				SUBTOTAL:	**$ 839,800**
		ENG/SURVEY		15%	$ 126,000
				SUBTOTAL:	**$ 965,800**
				Estimated Project Total:	**$ 965,800**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: F-C — **Phase:** Fireflow / Looping

Project Name: 12-inch Willow Creek Lower Upper Plane Water Line

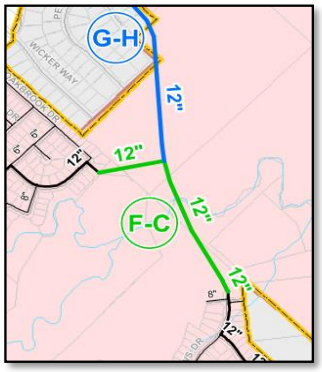
Project Description:

This project consists of the construction of a 12-inch water line from the existing 12-inch water line on Fairway View Drive to the existing 12-inch water line on St Andrews Drive.

Project Drivers:

- This project will improve looping and available fireflow in the Upper Pressure Plane.
- This project will eliminate a 12-inch dead-end line.
- This project will add system resiliency by eliminating a single 12-inch feed to the Mountain Valley portion of the Upper Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	2,400	LF	$ 180	$ 432,000
2	20" Boring and Casing	200	LF	$ 400	$ 80,000
				SUBTOTAL:	**$ 512,000**
				CONTINGENCY 30%	$ 153,600
				SUBTOTAL:	**$ 665,600**
				ENG/SURVEY 15%	$ 99,900
				SUBTOTAL:	**$ 765,500**
				Estimated Project Total:	**$ 765,500**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: F-D — **Phase:** Fireflow / Looping

Project Name: 8-inch County Road 715 Lower Pressure Plane Water Line

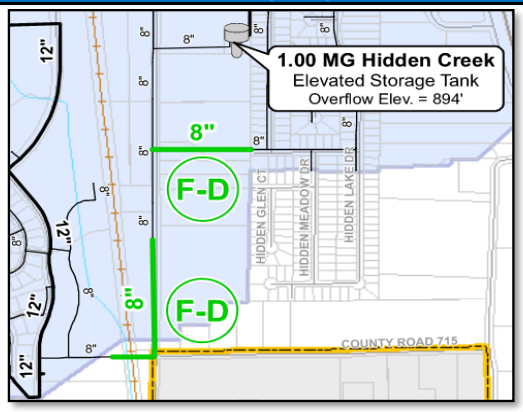
Project Description:

This project consists of the construction of a 12-inch water line from the existing 8-inch water line on Everest Court to the existing 8-inch water line along Dobson Street. This project also includes the construction of an 8-inch water line from the existing 8-inch on Dobson Street to the existing 8-inch water line on Hidden Ridge Drive.

Project Drivers:

- This project will improve looping and available fireflow in the Lower Pressure Plane.
- This project will allow near-term future developments to be served in the Lower Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" WL & Appurtenances	2,200	LF	$ 120	$ 264,000
2	16" Boring and Casing	100	LF	$ 320	$ 32,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 306,000**
		CONTINGENCY		30%	$ 91,800
				SUBTOTAL:	**$ 397,800**
		ENG/SURVEY		15%	$ 59,700
				SUBTOTAL:	**$ 457,500**
				Estimated Project Total:	**$ 457,500**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: F-E — **Phase:** Fireflow / Looping

Project Name: 10-inch FM 1187 Lower Pressure Plane Water Line

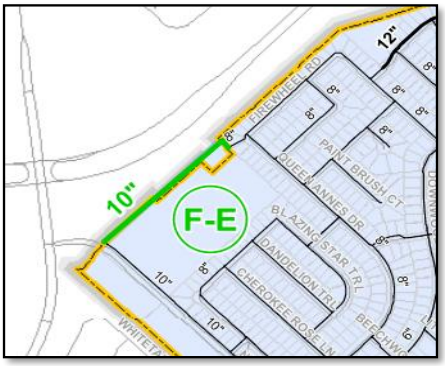
Project Description:

This project consists of the construction of a 10-inch water line from the existing 10-inch on Renfro Street to the existing 8-inch water line on Queen Annes Drive.

Project Drivers:

• This project will improve looping and available fireflow in the Lower Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" WL & Appurtenances	1,400	LF	$ 150	$ 210,000
				SUBTOTAL:	**$ 210,000**
		CONTINGENCY		30%	$ 63,000
				SUBTOTAL:	**$ 273,000**
		ENG/SURVEY		15%	$ 41,000
				SUBTOTAL:	**$ 314,000**
				Estimated Project Total:	**$ 314,000**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: F-F — **Phase:** Fireflow / Looping

Project Name: 8-inch Dobson Road Lower Pressure Plane Water Line

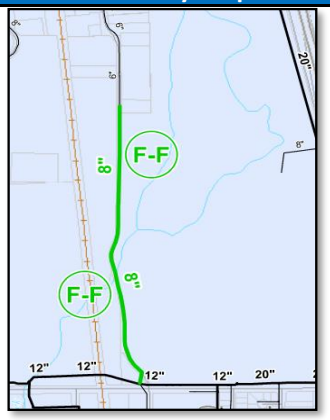
Project Description:

This project consists of the construction of an 8-inch water line from the existing 6-inch on Dobson Road to the existing 12-inch water line on Hidden Creek Drive.

Project Drivers:

• This project will improve looping and available fireflow in the Lower Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" WL & Appurtenances	3,600	LF	$ 120	$ 432,000
2	16" Boring and Casing	200	LF	$ 320	$ 64,000
3	Concrete Pavement Repair	1,000	LF	$ 100	$ 100,000
				SUBTOTAL:	**$ 596,000**
		CONTINGENCY		30%	$ 178,800
				SUBTOTAL:	**$ 774,800**
		ENG/SURVEY		15%	$ 116,300
				SUBTOTAL:	**$ 891,100**
				Estimated Project Total:	**$ 891,100**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: R-A — **Phase:** Regulatory / Operational

Project Name: 8.50 MGD Industrial Pump Station Expansion

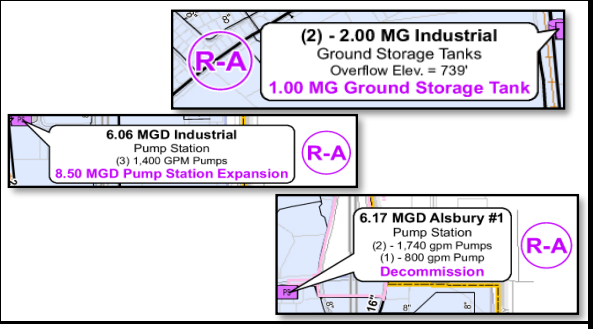
Project Description:

This project consists of the construction of a 8.50 MGD pump station expansion and a 1.00 MG ground storage tank at the Industrial Pump Station to serve the LPP.

Project Drivers:

- This project will provide pumping capacity to meet TCEQ and FNI planning criteria.
- This will also allow the system to provide pumping capacity for 60% of peak hour demand through buildout.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station - Expansion 8.5 MGD	1	LS	$ 12,750,000	$ 12,750,000
2	1.0 MG Ground Storage Tank	1	LS	$ 1,000,000	$ 1,000,000
3	Decommission Pump Station	1	LS	$ 262,000	$ 262,000
				SUBTOTAL:	**$ 14,012,000**
		CONTINGENCY		30%	$ 4,203,600
				SUBTOTAL:	**$ 18,215,600**
		ENG/SURVEY		15%	$ 2,732,400
				SUBTOTAL:	**$ 20,948,000**
				Estimated Project Total:	**$ 20,948,000**

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

City of Burleson

Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**R-B**		**Phase: Regulatory / Operational**
Project Name:	**Fort Worth Water Supply Offsite Improvements**		

Project Description:

This project consists of cost participating with the City of Fort Worth to construct offsite water supply improvements.

Project Drivers:

• This project will provide additional water supply to meet projected growth and development.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Fort Worth Offsite Water Supply Improvements	1	LS	$ 5,501,000	$ 5,501,000
		1			
				SUBTOTAL:	**$ 5,501,000**
		CONTINGENCY		--	--
				SUBTOTAL:	**$ 5,501,000**
		ENG/SURVEY		--	--
				SUBTOTAL:	**$ 5,501,000**
				Estimated Project Total:	**$ 5,501,000**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: R-C — **Phase:** Regulatory / Operational

Project Name: 0.50 MG Hyder Ranch EST

Project Description:

This project consists of the construction of a 0.50 MG elevated storage tank in the Hyder Ranch Development.

Project Drivers:

• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	0.50 MG Elevated Storage Tank	1	LS	$ 1,250,000	$ 1,250,000
				SUBTOTAL:	**$ 1,250,000**
		CONTINGENCY		30%	$ 375,000
				SUBTOTAL:	**$ 1,625,000**
		ENG/SURVEY		15%	$ 243,800
				SUBTOTAL:	**$ 1,868,800**
				Estimated Project Total:	**$ 1,868,800**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: R-D — **Phase:** Regulatory / Operational

Project Name: NEW 0.75 MG Mountain Valley EST

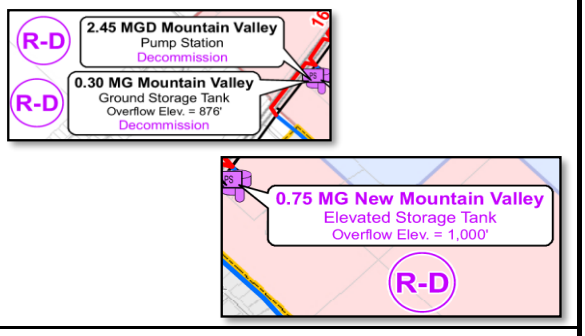
Project Description:

This project consists of the construction of a 0.75 MG elevated storage tank near the Mountain Valley Pump Station.

Project Drivers:

• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	0.75 MG Elevated Storage Tank	1	LS	$ 1,875,000	$ 1,875,000
2	Decommission Pump Station	1	LS	$ 262,000	$ 262,000
3	Decommission Ground Storage Tank	1	LS	$ 32,750	$ 32,750
4	Decommission Elevated Storage Tank	1	LS	$ 60,000	$ 60,000
				SUBTOTAL:	**$ 2,229,800**
		CONTINGENCY		30%	$ 669,000
				SUBTOTAL:	**$ 2,898,800**
		ENG/SURVEY		15%	$ 434,900
				SUBTOTAL:	**$ 3,333,700**
				Estimated Project Total:	**$ 3,333,700**

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

City of Burleson

Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: R-E — **Phase:** Regulatory / Operational

Project Name: 1.50 MG FM 731 EST

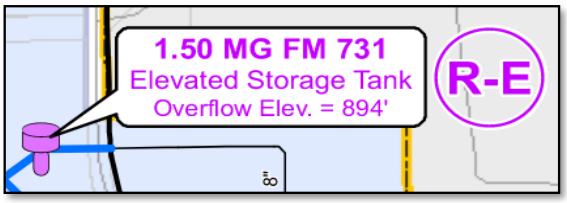
Project Description:

This project consists of the construction of 1.50 MG elevated storage tank along FM 731

Project Drivers:

• This project will provide storage capacity to meet TCEQ requirements of 200 gallons per connection.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	1.5 MG Elevated Storage Tank	1	LS	$ 3,750,000	$ 3,750,000
				SUBTOTAL:	**$ 3,750,000**
		CONTINGENCY		30%	$ 1,125,000
				SUBTOTAL:	**$ 4,875,000**
		ENG/SURVEY		15%	$ 731,300
				SUBTOTAL:	**$ 5,606,300**
				Estimated Project Total:	**$ 5,606,300**

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

City of Burleson

Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**R-F**	**Phase: Regulatory / Operational**
Project Name:	**2.56 MGD Hulen High Pump Station Expansion**	

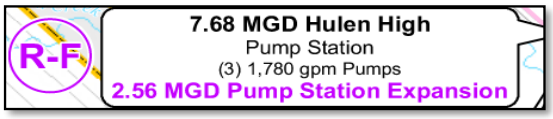
Project Description:

This project consists of the construction of a 2.56 MGD pump station expansion at the Hulen High Pump Station to serve the Upper Pressure Plane.

Project Drivers:

• This project will provide system resiliency/redundancy should the Turkey Peak PS go out of service for any significant period of time.

Vicinity Map



Opinion of Probable Construction Cost

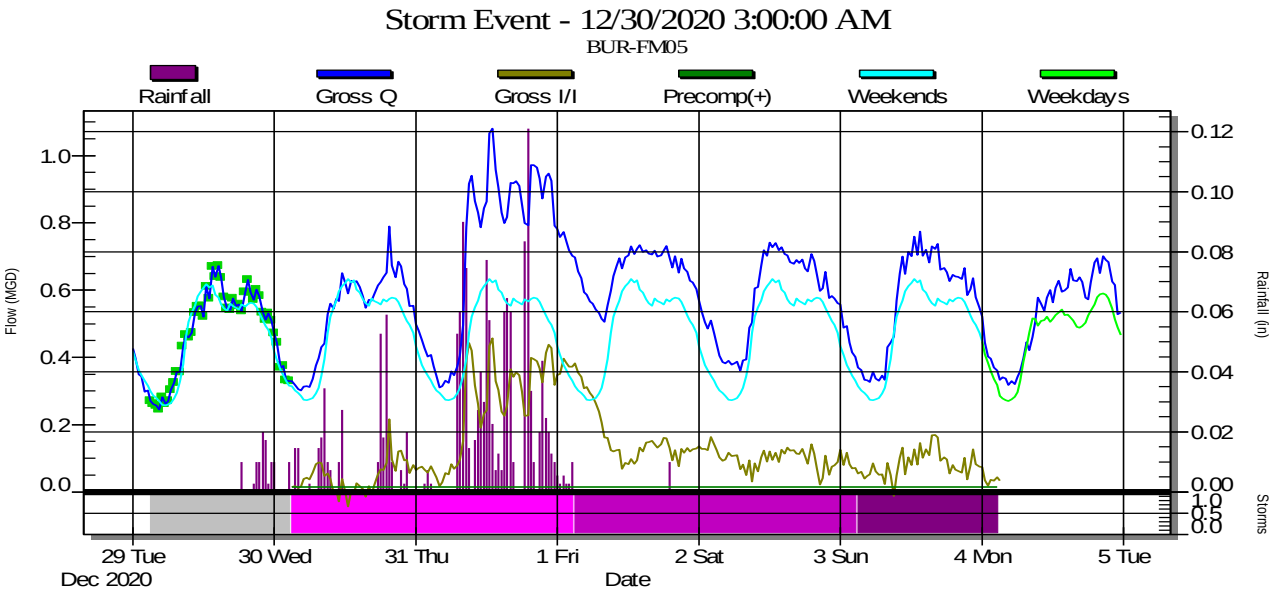
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station - Expansion 2.56 MGD	1	LS	$ 250,000	$ 250,000
				SUBTOTAL:	**$ 250,000**
		CONTINGENCY		30%	$ 75,000
				SUBTOTAL:	**$ 325,000**
		ENG/SURVEY		15%	$ 48,800
				SUBTOTAL:	**$ 373,800**
				Estimated Project Total:	**$ 373,800**

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

APPENDIX G
FLOW MONITORING REPORT

Sewer System Performance Report

Wastewater Collection System, Burleson TX



PREPARED FOR

Freese and Nichols, Inc.

4055 International Plaza Suite 200
Fort Worth, Texas 76109

SUBMITTED

February 2021

ADS ENVIRONMENTAL SERVICES®

FREESE AND NICHOLS

Sewer System Performance Report

Wastewater Collection System, Burleson TX

Prepared for:

Freese and Nichols, Inc.

ADS Environmental Services
Texas Registered Engineering Firm
F-8540
ADS Environmental Services
340 The Bridge Street, Suite 204
Huntsville, Alabama 35806
800.633.7246

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Appendix A – Flow Monitor Site Installation Details

Appendix B – Detailed Flow Monitor Specifications

Appendix C – Flow Monitor RDII Performance Graphics

Introduction

ADS Environmental Services (ADS) was retained by Freese and Nichols, Inc. (Engineer) to gather and evaluate flow monitor and rainfall data within selected portions of the existing Burleson collection system. The scope of this study is to characterize dry weather and wet weather flow conditions at select locations within the sewer system, evaluate key performance indicators, and rank the relative severity of observed rainfall-dependent inflow and infiltration (RDII) to assist the Engineer to direct subsequent planning and rehabilitation activities.

Methodology

Dry weather and wet weather performance data were obtained by installing sewer flow monitors to observe and document existing flow conditions. A total of 8 sewer basins were evaluated from a total 12 deployed temporary flow monitors. Rain data was obtained from 2 temporarily deployed rain gauges. ADS maintained the temporary flow monitors (and rain gauges) during the study. Descriptions of the temporary flow monitor locations, equipment, study period, and data format are detailed in the Appendices.

Flow Monitor Locations

Preliminary flow monitor locations were selected by the Engineer, and final locations were determined by ADS based on observed flow conditions, site access, and site safety considerations. A general flow monitor schematic displays the relationship between each flow monitor and is shown in Figure 1. Descriptions of each sewer basin and its associated flow monitor are provided in Table 1. Diameters reported in Table 1 are based upon the largest pipe (in cases where multiple flow sites represent a basin) and on field measurements by ADS personnel. There are two instances where basins (i.e. net flows) were defined by directly subtracting flow data readings from upstream flow meters. Specifically, basin FM04 was defined as flow recorded from flow monitor FM04 minus flow recorded at upstream flow monitors FM07, FM08 and FM09 (shown as upstream subtractions in Table 1). Basin FM0809 was defined as additive flows from monitors FM08 plus FM09 minus flows recorded from monitors FM10, FM11, and FM12. It is notable that flow monitor FM01 is about the same flow as the sum of upstream sites FM02, FM03, FM04, FM05 and FM06 and therefore cannot be effectively evaluated as a separate basin due to the extreme subtraction and effective zero net flow attributed to the small area between FM01 and the 5 upstream flow sites.

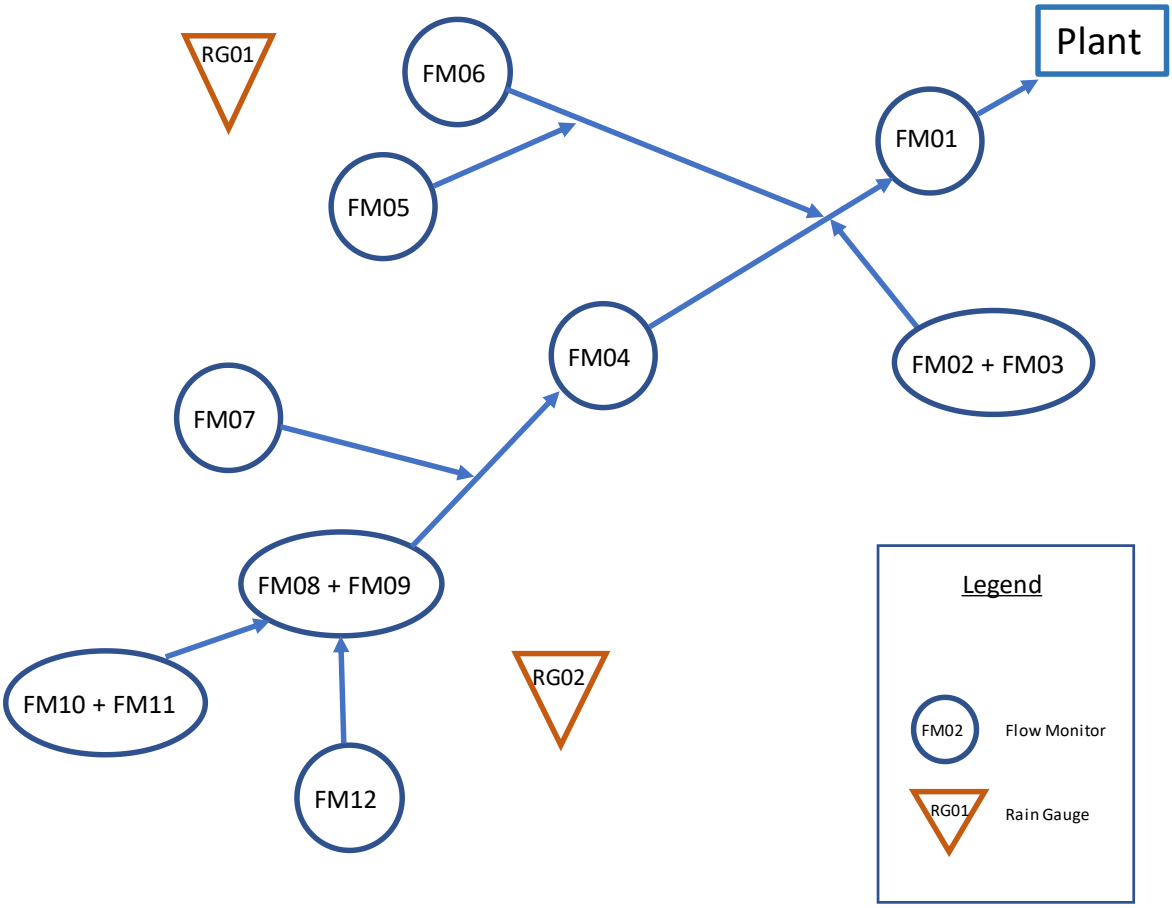


Figure 1: Flow Monitor Schematic

Table 1: Flow Monitor and Basin Descriptions

Monitor/ Basin	Basin Definition (related monitors)	Diameter (Height - inches)	Basin Size (LF)
FM0203	+(FM02) + (FM03)	35.5	161,530
FM04	+(FM04) – (FM07) – (FM08) – (FM09)	26.25	120,563
FM05	+(FM05)	12.5	78,312
FM06	+(FM06)	17.0	168,316
FM07	+(FM07)	20.63	184,666
FM0809	+(FM08) +(FM09) – (FM1011) – (FM12)	26.0	116,453
FM1011	+(FM10) +(FM11)	23.0	176,810
FM12	+(FM12)	16.38	101,733

Site installation reports with more detailed location information for each flow monitor are provided in Appendix A.

Flow Monitor Equipment

Sewer flow monitoring was performed using Triton+ flow monitors manufactured, installed, and maintained by ADS. Each flow monitor is mounted near the top of a manhole and is connected to depth and velocity sensors positioned in an incoming sewer. Detailed specifications of the flow monitor equipment used for this project are provided in Appendix B.

Flow Monitor Study Period

Flow monitors and rain gauges were installed such that the study period extended from October 10, 2020 through January 7, 2021.

Flow Monitor Data Format

Flow depth (d), flow velocity (v), and flow rate (Q) data from each sewer flow monitor are plotted on a variety of hydrographs and scattergraphs provided in Appendix C. Hydrographs display flow rate data vs. time for the duration of the observation period, along with associated rainfall data. Scattergraphs display flow depth vs. flow velocity data for each location. Electronic copies of the data are provided in Microsoft Excel format.

Results

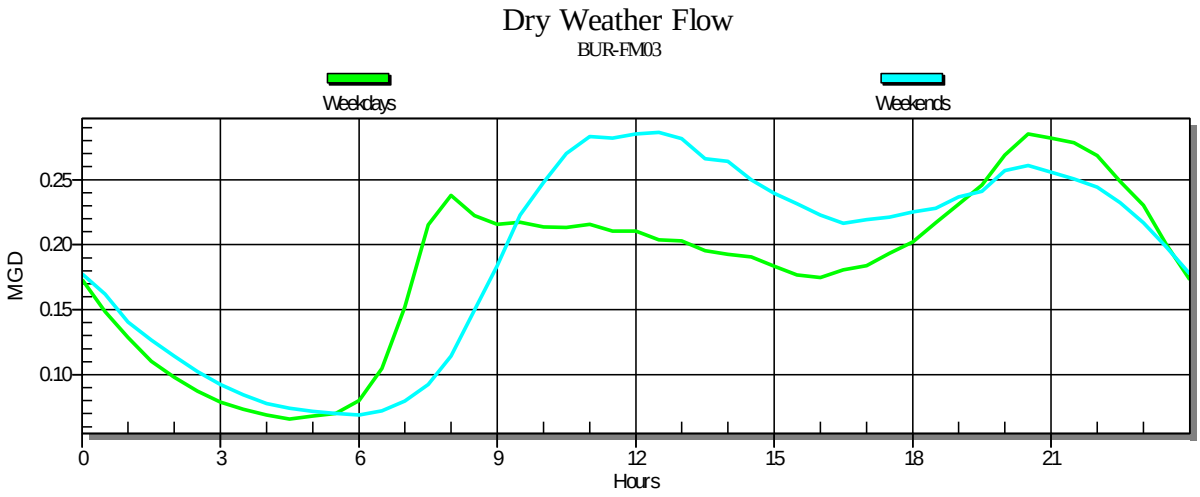
Flow monitor data provides insight into sewer performance – revealing important information about how the existing sewer system accommodates observed flow rates. The following

sections evaluate flow monitor data observed during both dry weather and wet weather periods using a variety of key performance indicators (KPIs). The next two sections on flow and depth peaks pertain only to the 12 flow monitor locaitons whereas Rainfall Dependent Infiltration and Inflow (RDII) KPIs pertain only to the 8 identified basins (refer to Table 1).

Flow Rates and Peaking Factors

Dry weather flow conditions are characterized by evaluating flow monitor data observed during normal conditions, excluding wet weather events and the periods associated with the recovery from these events. The average dry day pattern is identified as a diurnal pattern and results from the collective sewer use of residential, commercial, institutional, and industrial users located upstream from a given flow monitor. Land use within a particular area affects the shape of the diurnal pattern. An example of a representative diurnal pattern observed during the study period is shown in Figure 2.

Figure 2: Dry Weather Hydrograph



The minimum, average, and maximum (30 min. interval) dry weather gross (as observed at the monitor) flow rates (Q_{min-D}, Q_{avg-D}, and Q_{max-D}) are determined from the dry weather diurnal pattern for each flow monitor location and are provided in Table 2, along with the resulting gross dry weather peaking factor (PF_D). The maximum gross wet weather flow rate (Q_{max-W}) determined for each flow monitor location is also provided, along with the resulting gross wet weather peaking factor (PF_W).

Table 2: Gross Dry and Wet Weather Flow Rates and Peaking Factors

Monitor	Q_{min-D} (mgd)	Q_{avg-D} (mgd)	Q_{max-D} (mgd)	Q_{max-W} (mgd)	Peaking Factor PF_D	Peaking Factor PF_W
FM01	1.60	3.34	4.72	7.38	1.4	2.2
FM02	0.26	0.32	0.37	0.90	1.2	2.9
FM03	0.07	0.18	0.29	0.60	1.6	3.3
FM04	0.96	1.98	2.87	4.92	1.5	2.5
FM05	0.27	0.46	0.59	1.29	1.3	2.8
FM06	0.28	0.66	0.96	1.70	1.5	2.6
FM07	0.23	0.55	0.86	1.64	1.6	3.0
FM08	0.12	0.26	0.36	0.58	1.4	2.2
FM09	0.46	0.91	1.31	2.27	1.4	2.5
FM10	0.30	0.58	0.86	1.35	1.5	2.4
FM11	0.08	0.14	0.19	0.52	1.3	3.7
FM12	0.17	0.31	0.43	0.82	1.4	2.6

Peaking factors are commonly used to estimate maximum flow rates based on average flow rate estimates and play a key role in sewer design. Peaking factors are typically inversely proportional to the population served and generally decrease as the average dry weather flow rate increases.

Depth-to-Diameter Ratios

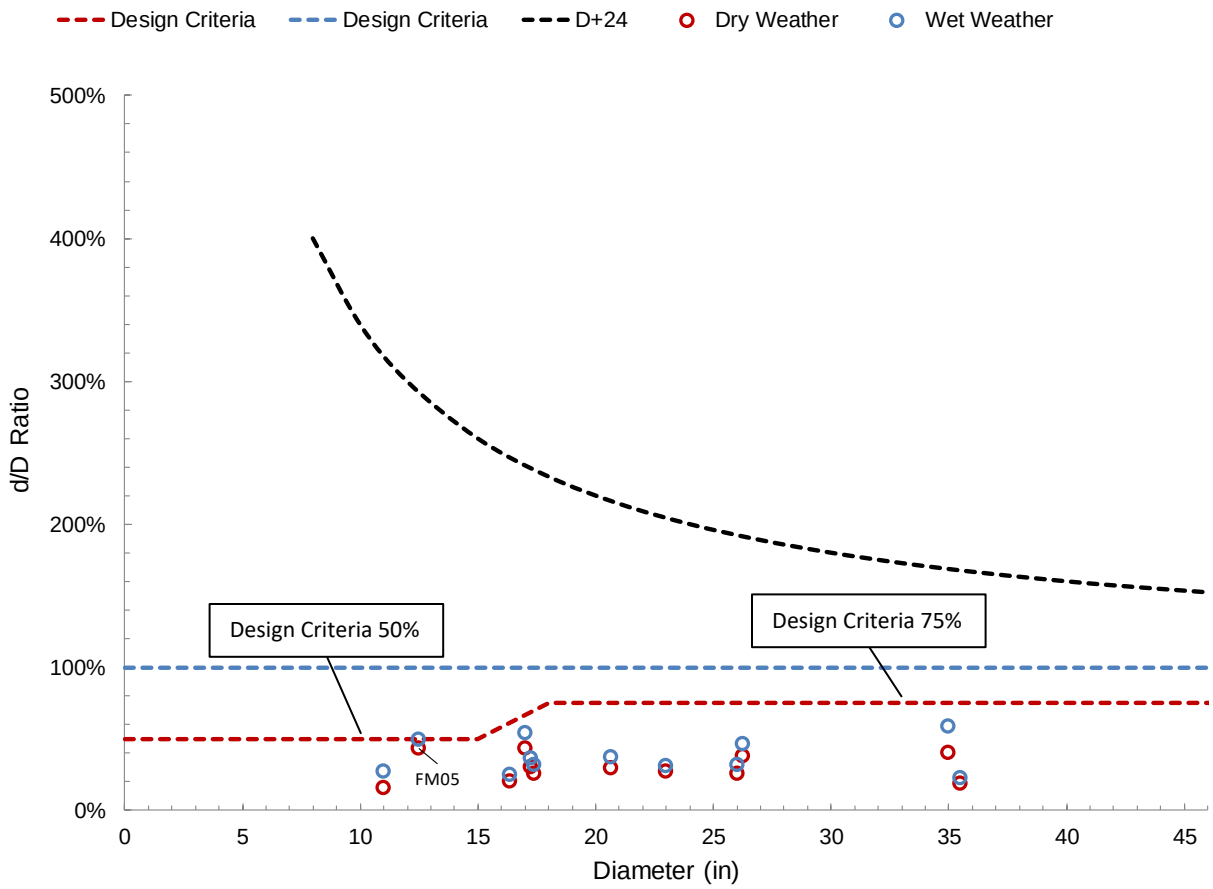
Once dry weather and wet weather flow rates are characterized, the hydraulic conditions under which they occur are evaluated. The maximum (hourly interval) flow depth observed during dry weather (d_{max-D}) and wet weather (d_{max-W}) and their corresponding flow depth-to-diameter (d/D) ratios observed during the study period are provided in Table 3. The D values shown in the table represent field measurements for each pipe. The maximum dry weather flow depth is the flow depth associated with the maximum dry weather flow rate and is the approximate maximum flow depth (to the nearest 0.1 inch) that is consistently observed each day during normal dry weather conditions. The maximum wet weather flow depth may or may not be directly associated with the maximum wet weather flow rate, depending on the hydraulic conditions observed at a given flow monitor location.

Table 3: Dry and Wet Weather Depth-to-Diameter Ratios

Monitor	D (inches)	d_{max-D} (inches)	d_{max-D} / D (%)	d_{max-W} (inches)	d_{max-W} / D (%)
FM01	35.0	14.0	40%	20.5	59%
FM02	35.5	6.5	18%	8.0	23%
FM03	17.38	4.5	26%	5.5	32%
FM04	26.25	10.0	38%	12.2	46%
FM05	12.50	5.4	43%	6.2	50%
FM06	17.0	7.3	43%	9.2	54%
FM07	20.63	6.0	29%	7.6	37%
FM08	17.25	5.2	30%	6.2	36%
FM09	26.0	6.7	26%	8.2	32%
FM10	23.0	6.2	27%	7.1	31%
FM11	11.0	1.7	15%	3.0	27%
FM12	16.38	3.3	20%	4.1	25%

The d/D ratio is a performance indicator used to assess sewer capacity. Sewers are often designed to flow under open channel flow conditions with some reserve capacity. As a result, ASCE and WEF recommend that sewers with diameters up to 15 inches be designed to flow with dry weather d/D ratios of 50%, and larger diameter sewers be designed to flow with dry weather d/D ratios of 75% (based on hourly averaged values). Sewers are not generally designed to operate under surcharge conditions with wet weather d/D ratios greater than 100%. Observed wet weather d/D ratios are also compared to additional capacity assurance criteria, designed to highlight portions of the sewer system where flow depths are greater than 24 inches above the crown of the sewer (D+24). These design and capacity assurance criteria are useful for comparison to observed d/D ratios as shown in Figure 3.

Figure 3: Flow Depth-to-Diameter Ratios Compared to Design Criteria



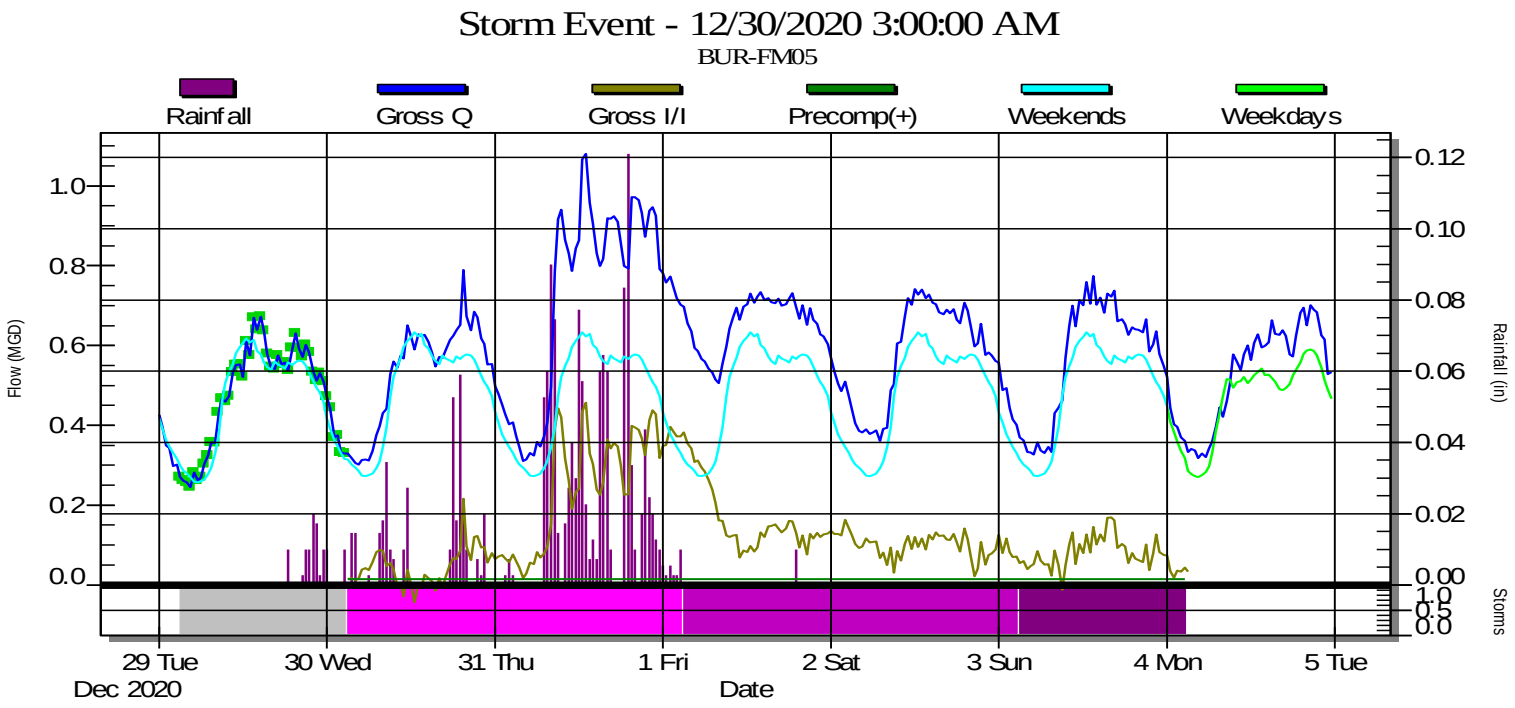
During dry weather conditions, all of the observed d/D ratios are within design criteria recommended by ASCE and WEF.

During wet weather conditions, the observed d/D ratios at all sites are less than 100% during the study period and are within design criteria recommended by ASCE and WEF.

Rainfall-Dependent Inflow and Infiltration (RDII)

During wet weather events, significant amounts of extraneous water can enter a sewer system, resulting in sanitary sewer overflows (SSOs), basement backups, and/or problems at the wastewater treatment plant (WWTP). A comparison of flow monitor data from dry weather and wet weather periods provides a quantification of rainfall-dependent inflow and infiltration (RDII), which is calculated by the difference in the measured flow (Gross Q) during a rainfall event from the flow pattern of an average dry day in the study period. A wet weather storm decomposition hydrograph is provided in Figure 4 for FM05. The storm event is depicted by the purple bands, and a precompensation period prior to the storm is depicted by the light gray band. The precompensation period allows adjustments to the average dry day pattern (a slight upward adjustment in the case of FM05) as needed to account for antecedent conditions by adjusting the dry day pattern so it more closely matches observed conditions prior to each storm event.

Figure 4: Storm Decomposition Hydrograph



Up to five storm events of interest were observed and evaluated for each flow monitor basin during the study period, with event rainfall totals between approximately 0.57 and 1.57 inches. Storm decomposition hydrographs are provided in Appendix C for each basin during each storm event and show the observed responses to rainfall during the study period. A summary of the storm events observed during the study is shown below in Table 4.

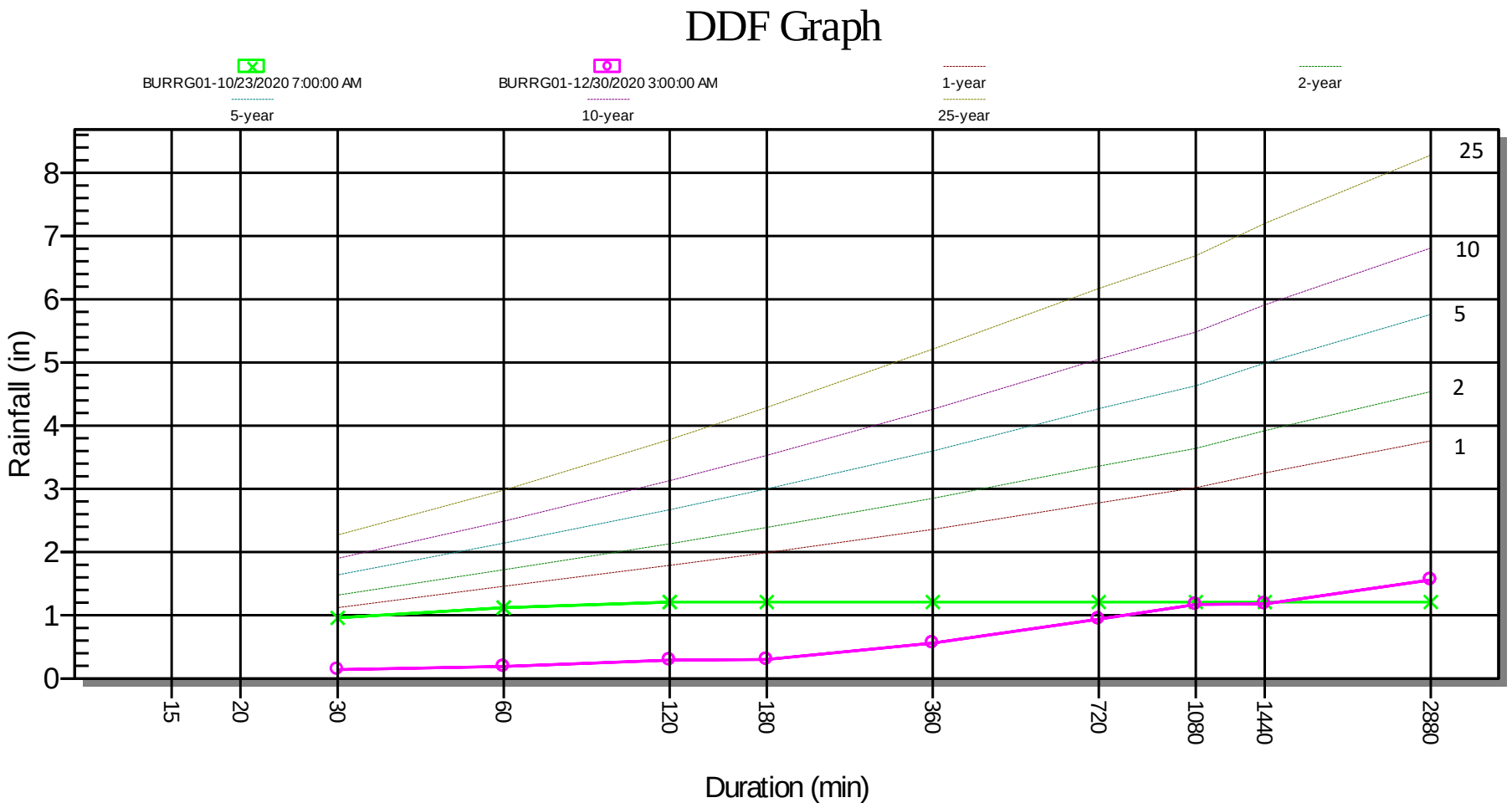
Table 4: Storm Summary

Date	Approx. Duration (hours)	RG01 (inches)	RG02 (inches)
10/23/2020	2	1.38	1.39
10/28/2020	6	0.71	0.63
11/28/2020	6	0.57	0.59
12/13/2020	6	0.90	0.87
12/30/2020	48	1.56	1.57

A rainfall accumulation chart was prepared (called a Depth-Duration-Frequency or DDF graph or chart) based on the “Burleson” public rain gauge and is depicted in Figure 5 for the 2 storms exceeding 1 inch of rainfall. This chart was used to compare captured rainfall to historical rainfall statistics for the area (thin color lines on the DDF chart)[1]. The 2 storms plotted on the DDF graph to show how they compare to statistical records for the area. The storms captured in this study represent well below 1 year return frequency.

[1] NOAA Precipitation Frequency Data Server (https://hdsc.nws.noaa.gov/hdsc/pfds), Station Name: BURLESON.

Figure 5: Rainfall Depth Duration Frequency (DDF) Graph



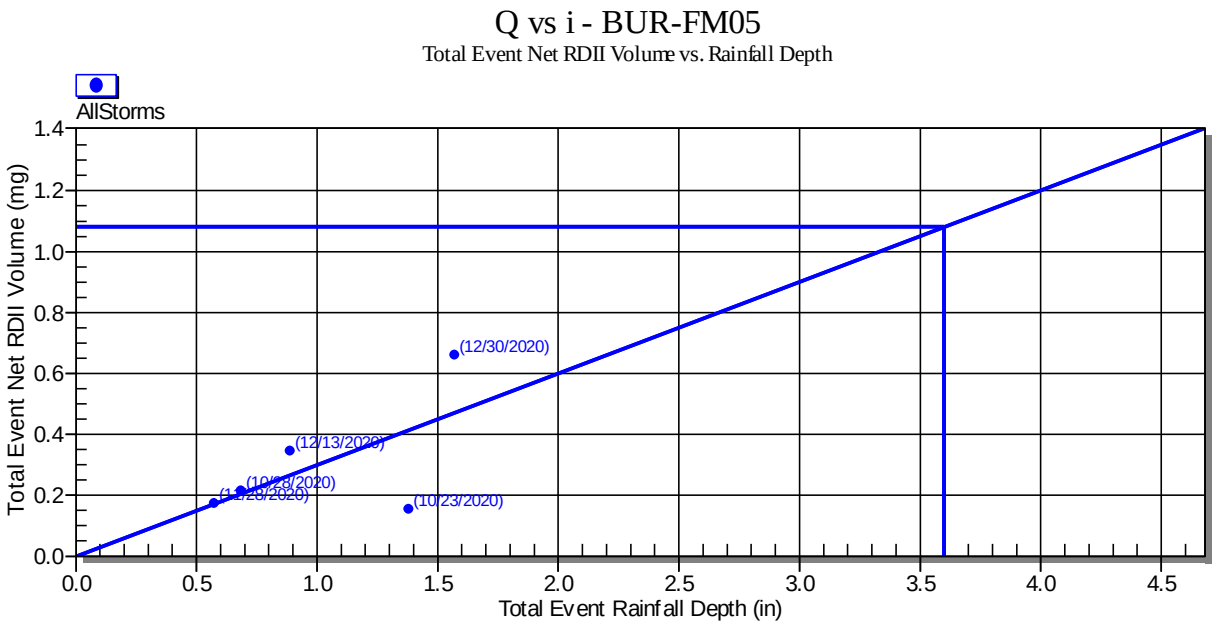
Each basin was assigned rainfall amounts in proportion to the distance each rain gauge was located from the approximate center of each basin. The Inverse-Distance Squared method was used to assign weighting factors for each rain gauge to each basin. To illustrate, a basin that is 1 mile from rain gauge RG01 and 2 miles from rain gauge RG02 would be assigned a relative rainfall weighting of 1.0 and ¼ (or 100 and 25), respectively for rain recorded at RG01 and RG02. As a specific example, at basin FM12, RG02 rainfall is weighted 3 times heavier than RG01 since RG02 is so much closer to that basin (refer to Figure 1). Table 5 shows the relative weighting of rainfall from each of the rain gauges assigned to each of the study basins.

Table 5: RG Relative Weighting Per Basin

Basin	RG01	RG02
FM0203	7	19
FM04	25	51
FM05	83	31
FM06	400	14
FM07	44	35
FM0809	13	400
FM1011	11	39
FM12	4	12

After the RDII calculations are determined for each storm event, the results are plotted as a function of rainfall total. An example is shown in Figure 6 in which the relationship between the Storm Event RDII volume (mg) is plotted with respect to the Storm Event rainfall (inches) for each storm event. These relationships are called Q vs i diagrams and can then be used to evaluate the consistency of rainfall responses within the sanitary sewer system and estimate the RDII response for various rainfall amounts. Figure 6 also shows a best fit trend line on the storm data points. A storm volume representing 3.6 in. rain (volume of rain associated with a 5 year, 6 hour event) is also depicted on Figure 6 and can be used to predict (project) expected RDII response for that volume of rain. Q vs i diagrams for each flow monitor basin are provided in Appendix C.

Figure 6: RDII Volume Response vs. Rainfall Depth



Based on the results obtained during the study period, Net RDII volumes are reported for each flow monitor for each storm event. Net RDII volumes are computed by subtracting the Gross RDII volume of any upstream flow monitor basin from the Gross RDII volume measured at the outlet monitor(s) of each basin. The resulting Net RDII volumes for each basin for each storm are shown in Table 6 in millions of gallons (mg). Normalized Net RDII is then calculated by dividing the net RDII volume by the associated basin size, and the results are shown in Table 7 in units of gallons per foot (gal/LF). If at any site, there is no observable response to a storm, there is missing or suspect data during the storm, or there is not a full recovery during the study period, then the related storm is not used in Q vs. i analysis for that site.

Table 6: Net RDII (Million Gallons - mg) for All Storm Events

Basin	10/23/2020	10/28/2020	11/28/2020	12/13/2020	12/30/2020
FM0203	0.04	0.05	0.25	0.17	0.50
FM04	0.02	0.17	0.28	0.05	0.38
FM05	0.15	0.21	0.17	0.34	0.66
FM06	0.07	0.09	0.11	0.23	0.51
FM07	0.17	0.11	0.22	0.38	0.90
FM0809	0.10	0.08	0.02	0.09	0.30
FM1011	0.45	0.16	0.36	0.59	1.49
FM12	0.05	0.03	0.05	0.07	0.32

*Note: Values marked with an * designate storms not used in Q vs. i analysis*

Table 7: Normalized Net RDII (gal/LF) for All Storm Events

Basin	10/23/2020	10/28/2020	11/28/2020	12/13/2020	12/30/2020
FM0203	0.23	0.29	1.53	1.07	3.09
FM04	0.16	1.38	2.31	0.42	3.17
FM05	1.95	2.71	2.2	4.38	8.42
FM06	0.41	0.54	0.66	1.36	3.02
FM07	0.92	0.58	1.18	2.08	4.89
FM0809	0.89	0.71	0.21	0.77	2.54
FM1011	2.56	0.9	2.05	3.32	8.45
FM12	0.48	0.24	0.52	0.69	3.10

*Note: Values marked with an * designate storms not used in Q vs. i analysis*

These Normalized RDII values are then normalized per inch of rain by dividing the values in Table 7 for each monitor for each storm by the total inches of rain in each event at the respective site. These values are provided in Table 8 in units of gallons per foot per inch rain (gal/LF/in).

Table 8: Normalized Net RDII (gal/LF/in) for All Storm Events

Basin	10/23/2020	10/28/2020	11/28/2020	12/13/2020	12/30/2020
FM0203	0.17	0.44	2.61	1.22	1.96
FM04	0.12	2.11	3.97	0.47	2.01
FM05	1.41	3.94	3.82	4.91	5.35
FM06	0.30	0.77	1.16	1.52	1.92
FM07	0.67	0.85	2.05	2.34	3.10
FM0809	0.64	1.13	0.35	0.89	1.61
FM1011	1.84	1.38	3.50	3.79	5.36
FM12	0.35	0.37	0.89	0.79	1.97

*Note: Values marked with an * designate storms not used in Q vs. i analysis*

The trend line on the Q vs I charts can be used to provide another means of comparison of the RDII from each basin. Based upon this trend line, the RDII for a 3.6-inch design storm was projected for each site. These values are provided in Table 9.

Table 9: Normalized Net RDII volume for 3.6-inch Design Storm

Basin	RDII (mg)	Basin Size (LF)	RDII (gal/LF)	RDII (gal/LF/in)	Rank
FM0203	0.71	161,530	4.4	1.21	8
FM04	0.57	120,563	4.7	1.32	7
FM05	1.08	78,312	13.8	3.84	2
FM06	0.87	168,316	5.2	1.53	6
FM07	1.62	184,666	8.8	2.65	3
FM0809	0.61	116,453	5.2	1.62	5
FM1011	2.94	176,810	16.6	5.09	1
FM12	0.61	101,733	6.0	1.91	4

Based on the analysis, basin FM1011 was the highest ranked (worst) basin in regards to normalized RDII, with a value of 5.09 gal/LF/in for a 3.6-inch projected storm. Basins FM05 and FM07 were second and third with values of 3.84 and 2.65 gal/LF/in, respectively.

Conclusions and Recommendations

The conclusions and recommendations in this study are based on data gathered using 12 temporary flow monitors and 2 rain gauges. The study period was conducted from October 10, 2020 through January 7, 2021. Up to five rain events of interest were observed during the study period, with rainfall totals ranging from approximately 0.57 and 1.57 inches. A detailed analysis of dry weather and wet weather periods was performed and included an evaluation of various key performance indicators.

Dry Weather Performance

During dry weather conditions, all of the observed dry weather d/D ratios are within design criteria recommended by ASCE and WEF, indicating that there is largely sufficient capacity to accommodate dry weather flow rates at these locations.

Wet Weather Performance

The largest gross peaking factor observed during the study period was a value of 3.7 at Site FM11. The observed wet weather peaking factors at the remaining flow monitor locations ranged from 2.2 to 3.3.

During wet weather conditions, the observed d/D ratios at all sites are less than 100% during the study period and are within design criteria recommended by ASCE and WEF.

Rainfall-Dependent Inflow and Infiltration

Based on the analysis, basin FM1011 was the highest ranked (worst) basin in regards to normalized RDII, with a value of 5.09 gal/LF/in for a 3.6-inch projected storm. Basins FM05 and FM07 were second and third with values of 3.84 and 2.65 gal/LF/in, respectively. Investigation of RDII sources may be warranted if capacity issues result from RDII coming from these basins.

Definitions

Basin – a designation given to a series of interconnected sewers within a sanitary sewer system that collect and convey wastewater to a common manhole or pump station. The size and geographic extent of a given basin are system specific. Basin designations are established to provide a consistent nomenclature for system components to facilitate effective planning, operation, and maintenance.

Depth-to-Diameter (d/D) Ratio – a ratio of maximum flow depth to sewer diameter. d/D ratios are often calculated to describe both dry weather and wet weather periods and are one measure used to assess sewer capacity utilization. d/D ratios are typically computed using hourly average data.

Infiltration – water that enters a sanitary sewer system from the ground through defective system components including, but not limited to, defective sewers, manholes, service connections, or other system appurtenances. Infiltration is primarily dependent upon groundwater elevations, but may also be influenced by storm events and leaking water mains.

Inflow – storm water runoff that enters a sanitary sewer system from direct connections including, but not limited to, building downspouts, clean-outs, foundation drains, sump pumps, basement and area drains, and cross connections with storm sewer systems.

Peaking Factor (PF) – a ratio of maximum flow rate to average flow rate. Peaking factors are often calculated to describe both dry weather and wet weather periods, where maximum flow rates are compared to average dry weather flow rates. Peaking factors are usually computed using hourly average data.

Rain-Dependent Inflow and Infiltration (RDII) – the collective inflow and infiltration that enter a sewer system as a direct result of rainfall.

Sanitary Sewer Overflow (SSO) – a discharge of untreated wastewater from a sanitary sewer system, caused by a variety of reasons including, but not limited to, inadequate sewer design and construction, insufficient operation and maintenance, power failures, and vandalism.

Sanitary Sewer System – a collection of sewers, manholes, pump stations, and other appurtenances designed for the collection and transportation of wastewater.

References

1. Bizier, Paul, Editor (2007). *Gravity Sanitary Sewer Design and Construction*, ASCE Manuals and Reports on Engineering Practice No. 60, American Society of Civil Engineers: Reston, VA.

2. Enfinger, K.L. and Stevens, P.L. (2006). "Scattergraph Principles and Practice – Tools and Techniques to Evaluate Sewer Capacity," *Proceedings of the Pipeline Division Specialty Conference*; Chicago, IL; American Society of Civil Engineers: Reston, VA.

Appendix A – Flow Monitor Site Installation Details

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-FM01

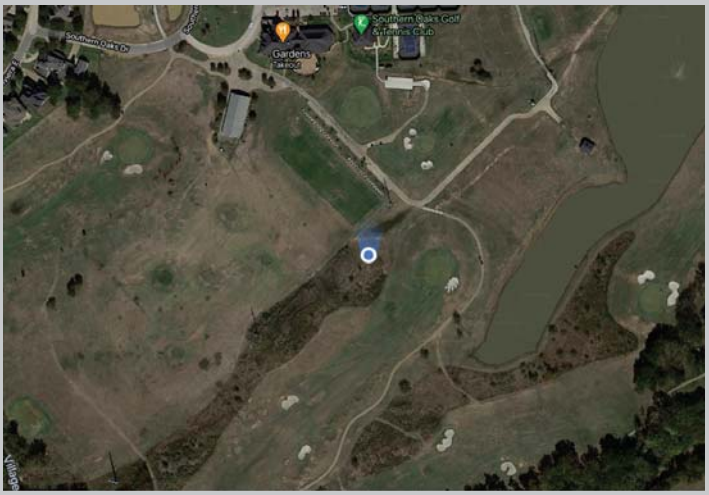
Site Address / Location:	**Southern Oaks Golf & Tennis Club 13765 Southern Oaks Dr, Burleson**
Site Access:	**Just past the driving range in tall grass.**

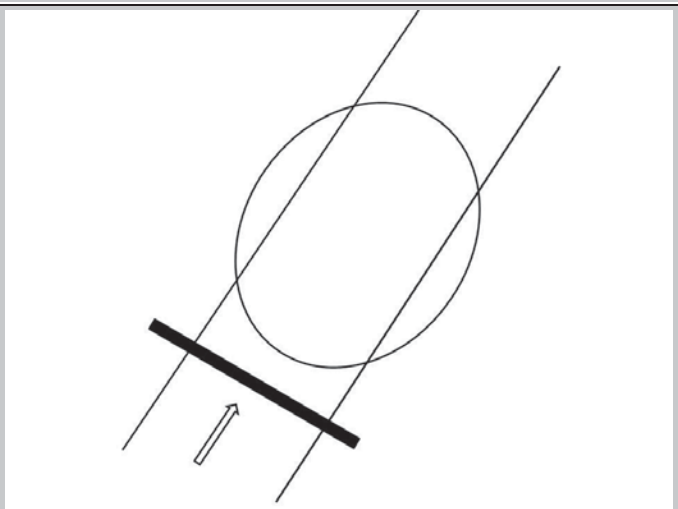
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.554224, -97.290515	Circular



Manhole #	System Characteristics
SMH1429	Residential
Access	**Traffic**
Drive	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Friday October 02 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
9:56 am	**35 x 35.75**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
11.5	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
3.28	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Straight smooth flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
186.5 inches	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Good**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**11.0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

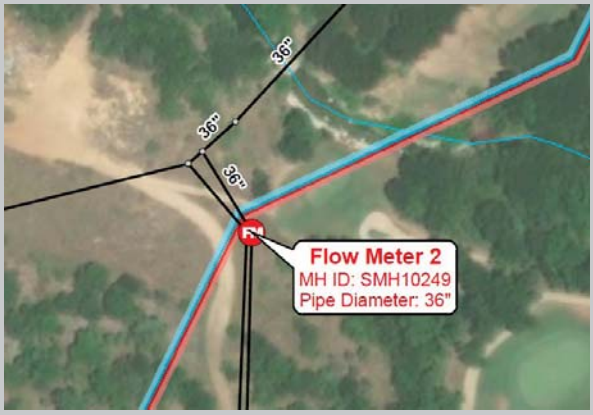
Flow Monitoring
Site Installation Report

SITE.I.D.

BUR-FM02

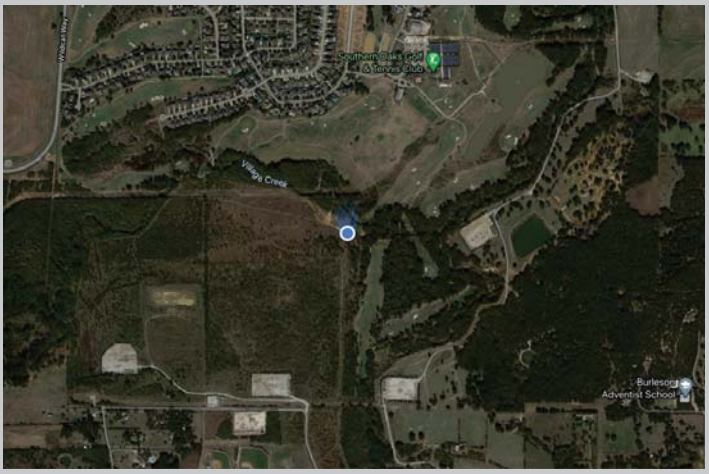
Site Address / Location:	**Southern Oaks Golf & Tennis Club 13765 Southern Oaks Dr, Burleson**
Site Access:	**Take cart down past past driving range and keep right.**

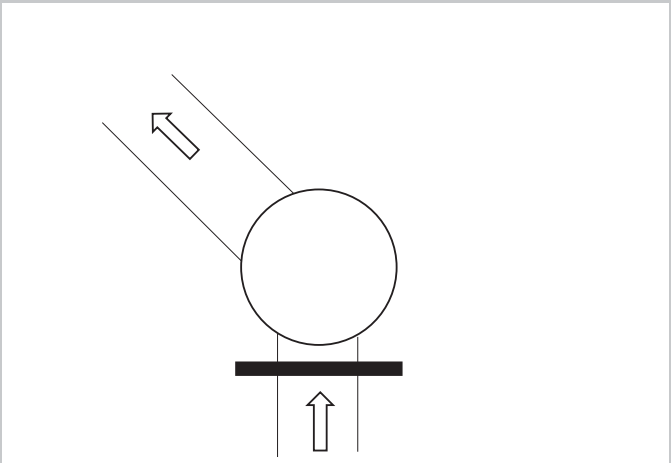
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.55121, -97.29365	Circular



Manhole #	System Characteristics
SMH10249	Residential
Access	**Traffic**
Walk (Commercial)	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Friday October 02 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
1:34 pm	**35.5 x 35**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
5.5	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
1.18	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Low and slow flow.

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
11ft	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Concealed	Normal
Active Drop Connections	**Air Quality:**
No	**18.0, 0, 0, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Lining in manhole looks to be coming lose in one big sheet. Take caution where you step.

Additional Photos

Incoming	Outgoing	Down
		

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Flow Monitoring
Site Installation Report

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SITE.I.D.

BUR-FM03

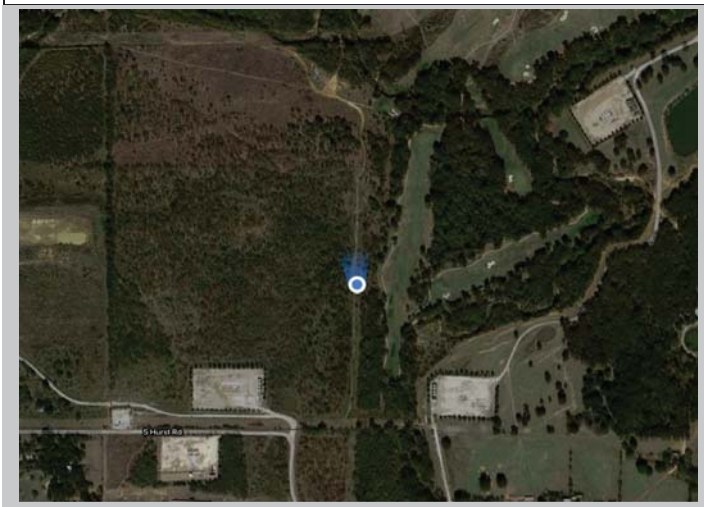
Site Address / Location:	**Behind 201 S Hurst Rd, Burleson, TX 76028**
Site Access:	**Gate entrance on S hurst Rd and Fox Ln**

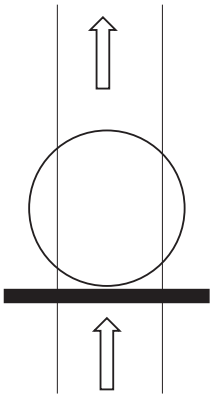
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5484430, -97.2937977	Circular

Manhole #	System Characteristics
SMH539	**Other**
Access	**Traffic**
Drive	**None**









ADS Crew Leader:	**Paul Needham**
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Saturday October 10 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
12:58 pm	**17.38 x 17.75**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
4.75	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
1.36	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth straight flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
8.5	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Good**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**19.1, 20, 0, 0 before blower**
Pipe Material	**Pipe Condition:**
Lined	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	Grass (buried)

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-FM04

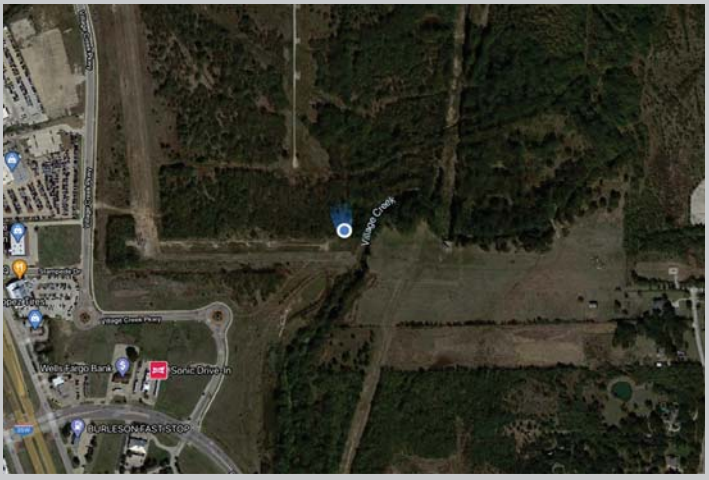
Site Address / Location:	Off Village Creek Pkwy
Site Access:	In woods, follow rough track

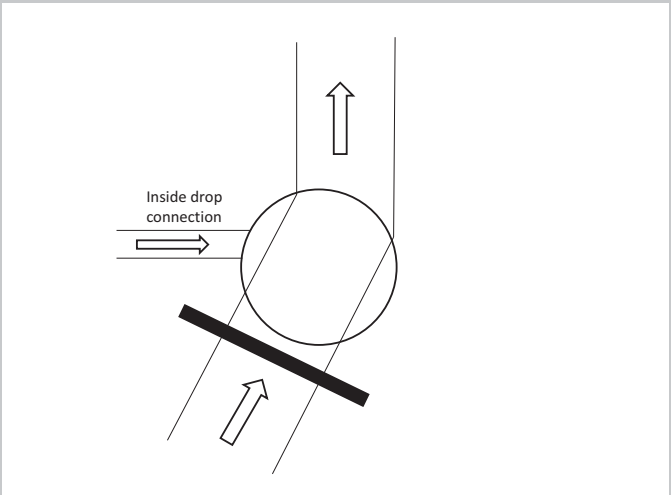
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5468304 -97.3089002	Circular



Manhole #	System Characteristics
SMH1433	**Other**
Access	**Traffic**
Drive	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Thursday October 08 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
11:24 am	**26.25 x 26.5**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
8.5	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
3.88	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth flow bending through manhole

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
18.3	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	**-**
Manhole Cover	**Manhole Frame**
Concealed	Normal
Active Drop Connections	**Air Quality:**
Yes, Inside	20.3, 0, 6, 0
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	Grass (buried)

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		
Incoming west		
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-FM05

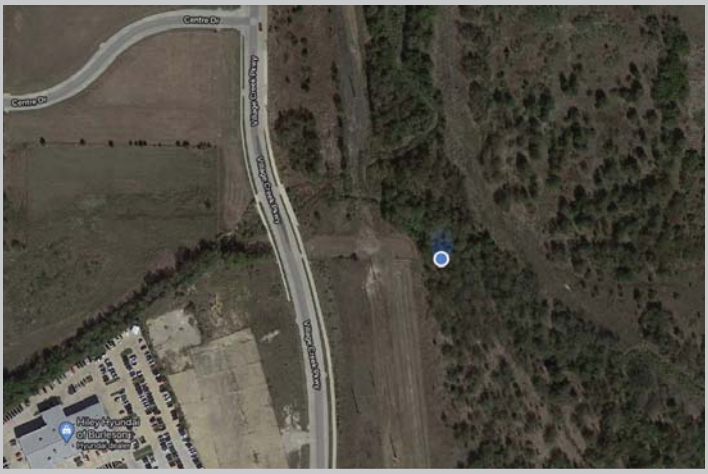
Site Address / Location:	**Opposite 320 N Burleson Blvd, Burleson, TX 76028**
Site Access:	**In woods**

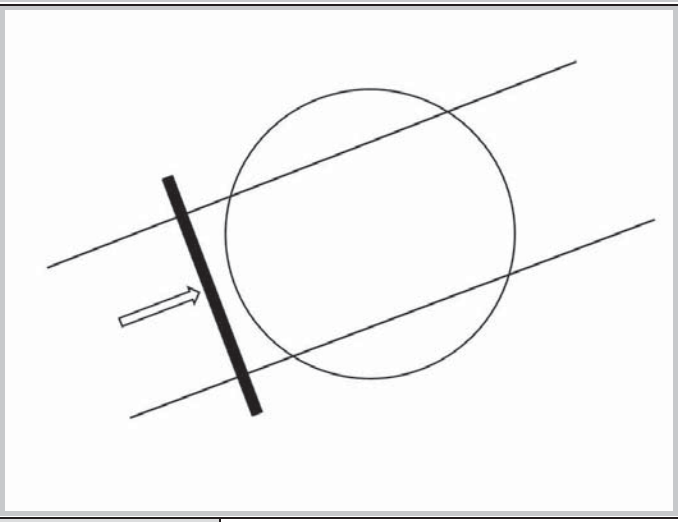
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5506661 -97.3125618	**Circular**



Manhole #	System Characteristics
SMH217	**Commercial**
Access	**Traffic**
Walk (Wooded)	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
4:52 pm	**12.5 x 12.5**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
4.75	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
1.88	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
10.1	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Good**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Concealed	Normal
Active Drop Connections	**Air Quality:**
No	20.8, 0, 0, 0
Pipe Material	**Pipe Condition:**
Vitrified Clay Pipe	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-FM06

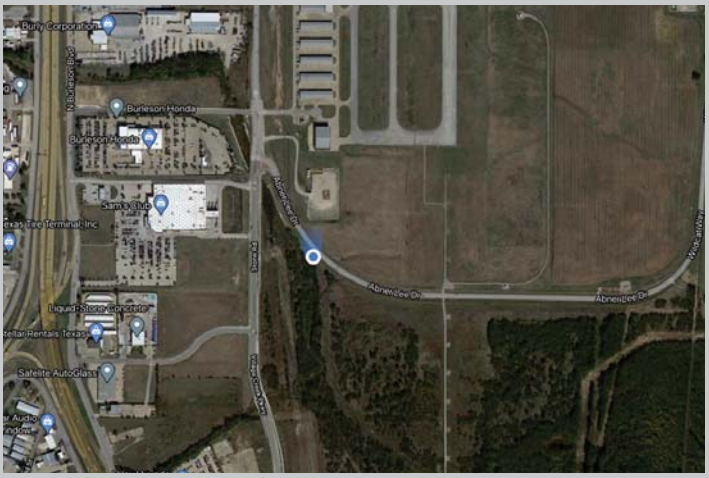
Site Address / Location:	Ahmed Lee Drive TX 76028
Site Access:	**Directly south of Spinks Airport on Ahmed Lee Drive**

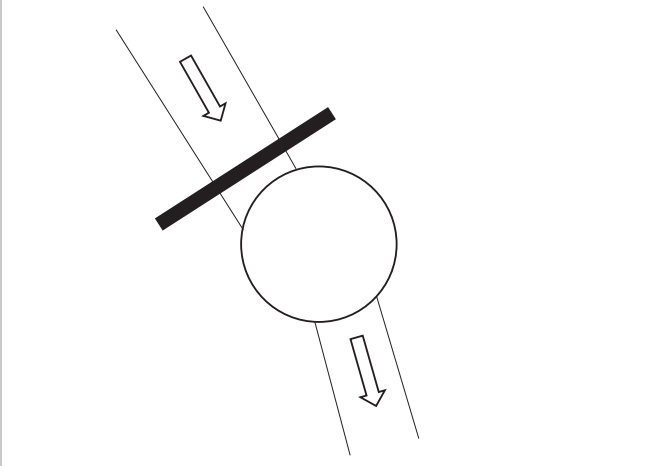
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.55385, -97.31283	**Circular**



Manhole #	System Characteristics
SMH159	**Commercial**
Access	**Traffic**
Drive	**Light**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Friday October 02 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
4:26 pm	**17 x 17**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
5.63	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
2.83	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
12.91	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Good**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Concealed	Normal
Active Drop Connections	**Air Quality:**
No	**20.8, 0, 0, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Grass (buried)**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-FM07

Site Address / Location:	**425 SW Wiltshire Blvd, Burleson, TX 76028**
Site Access:	**Near creek bed**

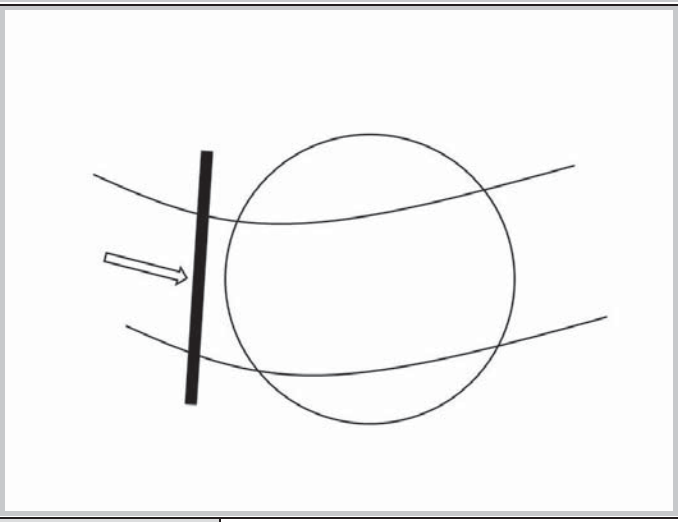
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5387849 -97.3323910	**Circular**

Manhole #	System Characteristics
SMH1540	**Commercial**
Access	**Traffic**
Drive	**None**









ADS Crew Leader:	**Paul Needham**
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Tuesday October 06 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
12:30 pm	**20.63 x 20.63**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
4.75	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
2.48	**0**
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth flow bending through manhole

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
7.28	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Unbolted	Normal
Active Drop Connections	**Air Quality:**
No	**20.8, 0, 0, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Grass (buried)**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

SITE.I.D.

BUR-FM08

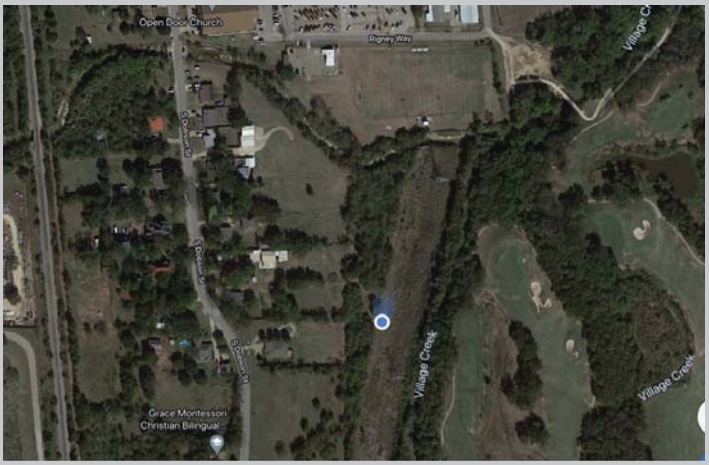
Site Address / Location:	**Behind 401 S Dobson St, Burleson, TX 76028**
Site Access:	**In Power Lines Easement**

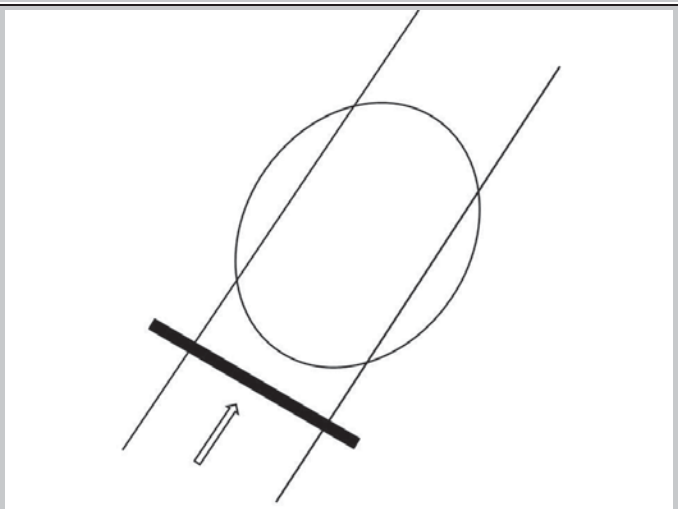
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5365461 -97.3167762	**Circular**



Manhole #	System Characteristics
SMH1996	**Residential**
Access	**Traffic**
Drive	**None**







ADS Crew Leader:	
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
12:27 pm	**17.25 x 17.75**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
5.38	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
1.26	**1**
Silt (in)	**Silt Type**
0.5	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9.9	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**20.6, 0, 3, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Grass (buried)**

Additional Site Info. / Comments:

Sheeena 817 344 9197. Access from 461 S Dobson St

Additional Photos

Incoming	Outgoing	Down
		
Sealed Connection to West		
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

SITE.I.D.

BUR-FM09

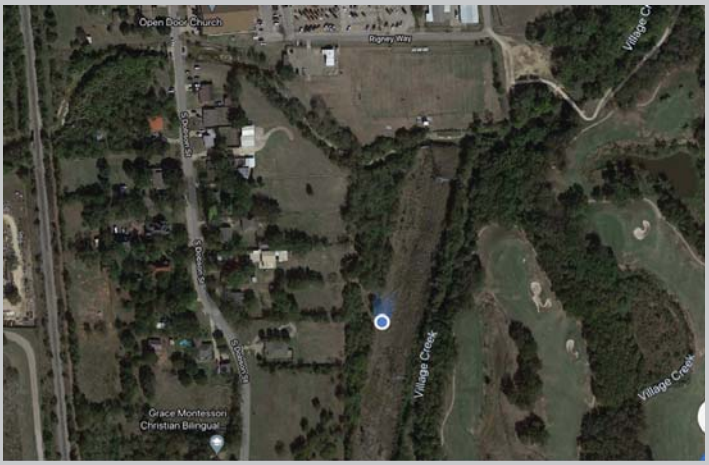
Site Address / Location:	**Behind 401 S Dobson St, Burleson, TX 76028**
Site Access:	**In Power Line Easement**

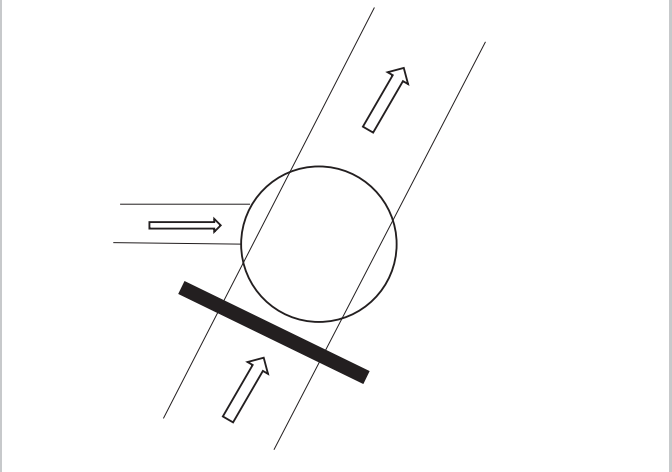
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5365427 -97.3168097	**Circular**



Manhole #	System Characteristics
SMH1991	**Residential**
Access	**Traffic**
Drive	**None**







ADS Crew Leader:	**Paul Needham**
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
11:37 am	**26 x 26.88**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
5.25	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
2.67	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth straight flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
11.29	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**20.1, 0, 17, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Grass (buried)**

Additional Site Info. / Comments:

See contact details for BUR-FM08

Additional Photos

Incoming	Outgoing	Down
		
Connection from West		
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

SITE.I.D.

BUR-FM10

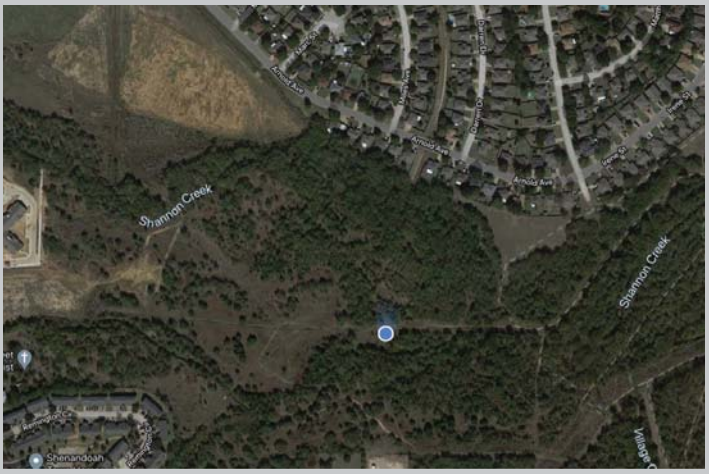
Site Address / Location:	**In woods behind 326 Arnold Ave, Burleson, TX 76028**
Site Access:	**Along walking track**

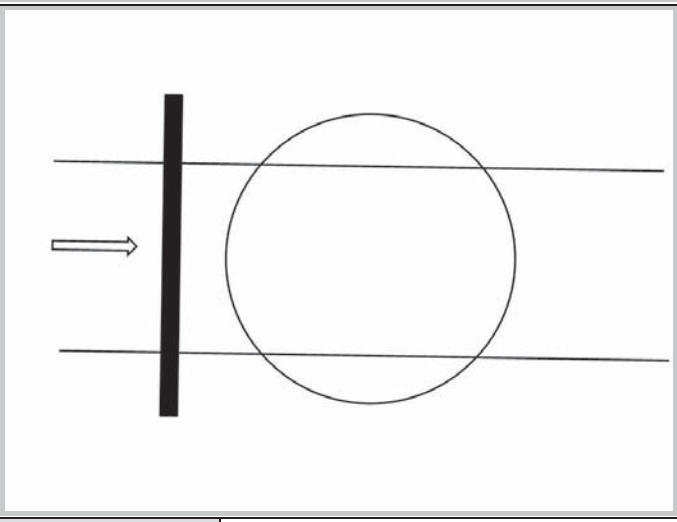
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5190967 -97.3394754	**Circular**



Manhole #	System Characteristics
SMH1307	**Residential**
Access	**Traffic**
Walk (Wooded)	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
10:34 am	**23 x 24**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
5.25	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
2.37	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
11.2	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**20.8, 0, 0, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

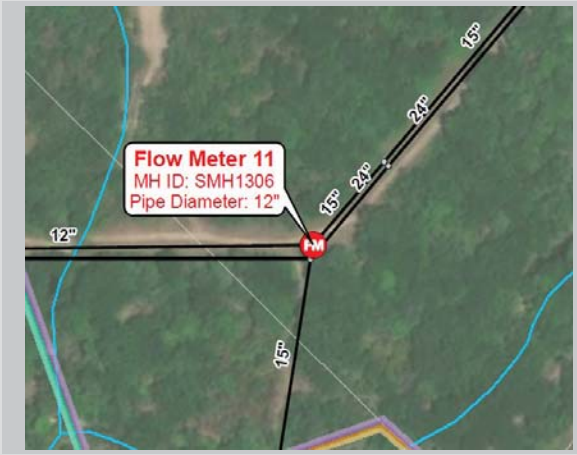
Flow Monitoring
Site Installation Report

SITE.I.D.

BUR-FM11

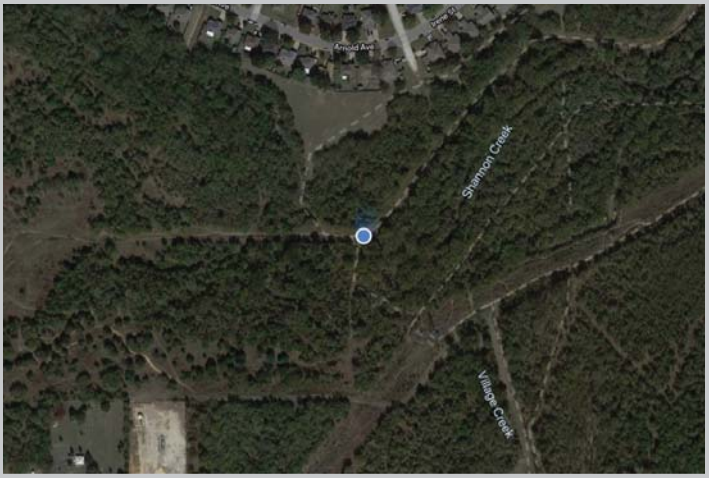
Site Address / Location:	**Behind 424 Arnold Ave, Burleson, TX 76028**
Site Access:	**In woods just off walking track**

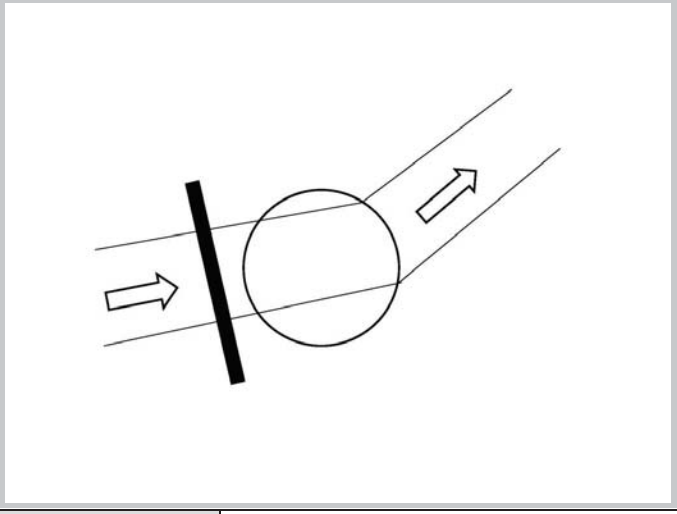
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5191038 -97.3371623	**Circular**



Manhole #	System Characteristics
SMH1306	**Residential**
Access	**Traffic**
Walk (Wooded)	**None**







ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4), Surface Combo (CS5-V	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
12:33 pm	**11 x 12.13**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
1.25	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
1.38	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
4.55	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
11.7	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Fair**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	**20.8, 0, 0, 0**
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Grass (buried)**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

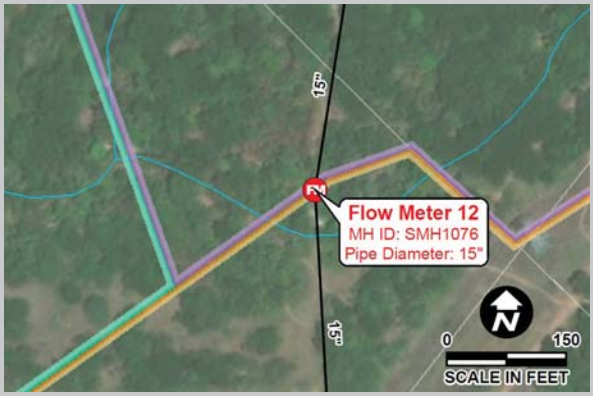
SITE.I.D.

BUR-FM12

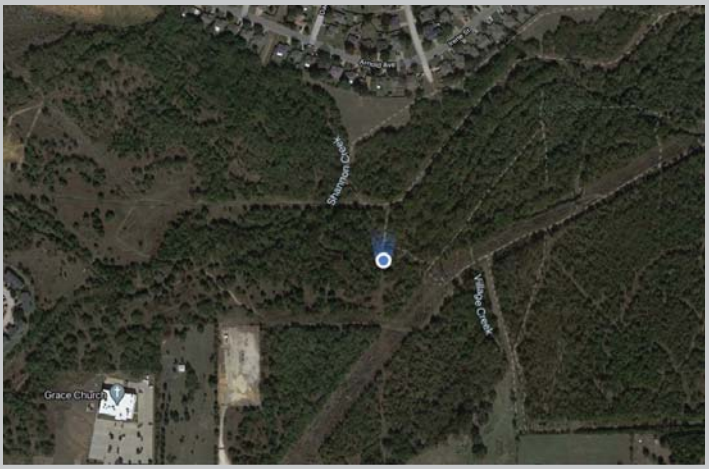
Site Address / Location:	**In woods directly behind 424 Arnold Ave, Burleson, TX 76028**
Site Access:	**In bush along walking easement**

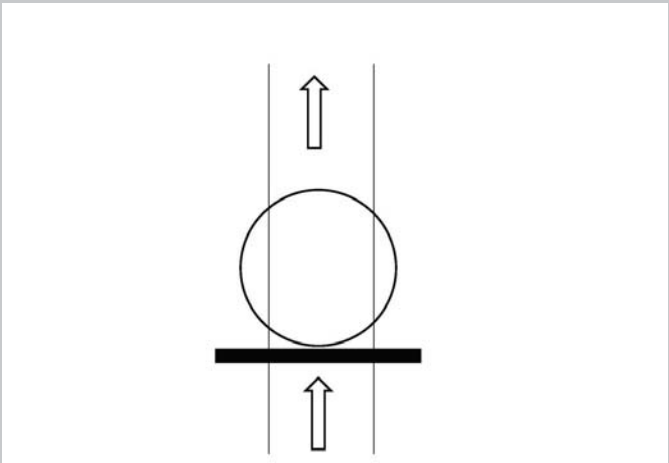
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.5183928 -97.3373266	**Circular**

Manhole #	System Characteristics
SMH1076	**Residential**
Access	**Traffic**
Walk (Wooded)	**None**









ADS Crew Leader:	Ricky Salinas
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Wednesday October 07 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
1:51 pm	**16.38 x 16.38**
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
2.75	**-**
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
-	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
3.66	0
Silt (in)	**Silt Type**
0	-

Hydraulic Comments:

Smooth straight flow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
5.8	Single
Manhole Material:	**Manhole Condition:**
Concrete	**Good**
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
23	-
Manhole Cover	**Manhole Frame**
Bolted	Normal
Active Drop Connections	**Air Quality:**
No	20.8,0,0,0
Pipe Material	**Pipe Condition:**
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-RG01

Site Address / Location:	**856 NE Alsbury Blvd**
Site Access:	**On roof of Water pump station**

Monitor Series	Location Type
Rain Alert III	Temporary
GPS Coordinates	**Pipe Shape**
32.5627587 -97.3210758	-



Manhole #	System Characteristics
	-
Access	**Traffic**
Ladder	**None**





Installation Information

Installation Date:	Installation Type:
Tuesday October 06 2020	Rain Gauge
Monitoring Location (Sensors):	**Monitor Location:**
Rooftop	**Building**
Sensors / Devices:	**Pressure Sensor Range (psi)**
Rain Gauge Tipping Bucket	-

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
	-
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
Silt (in)	**Silt Type**
	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
	-
Manhole Material:	**Manhole Condition:**
-	-
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
	-
Manhole Cover	**Manhole Frame**
-	-
Active Drop Connections	**Air Quality:**
-	
Pipe Material	**Pipe Condition:**
-	-

Communication Information:

Communication Type	Antenna Location
Wireless	-

Additional Site Info. / Comments:

ADS Crew Leader:	**Paul Needham**
ADS Field Manager:	Paul Needham

BURLESON TFM 2020

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

SITE.I.D.

BUR-RG02

Site Address / Location:	**725 SE John Jones Dr, Burleson, TX 76028**
Site Access:	**In back of City Service Center Compound**

Monitor Series	Location Type
Rain Alert III	Temporary
GPS Coordinates	**Pipe Shape**
32.5058273 -97.3446299	-



Manhole #	System Characteristics
	Residential
Access	**Traffic**
Drive	**None**





ADS Crew Leader:	**Paul Needham**
ADS Field Manager:	Paul Needham

Installation Information

Installation Date:	Installation Type:
Monday October 05 2020	Rain Gauge
Monitoring Location (Sensors):	**Monitor Location:**
Ground	**Ground**
Sensors / Devices:	**Pressure Sensor Range (psi)**
Rain Gauge Tipping Bucket	-

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
	-
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
	-
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
Silt (in)	**Silt Type**
	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
	-
Manhole Material:	**Manhole Condition:**
-	-
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
	-
Manhole Cover	**Manhole Frame**
-	Normal
Active Drop Connections	**Air Quality:**
-	
Pipe Material	**Pipe Condition:**
-	-

Communication Information:

Communication Type	Antenna Location
Wireless	-

Additional Site Info. / Comments:

Appendix B – Detailed Flow Monitor Specifications

ADS' Self-Contained Solutions for Power, Communication, Analog and Digital I/O and Modbus

The ***TRITON+*** COMM+EXT PWR port is used for external power via the ADS XIO, XBUS or ExPAC devices, delivery of Modbus output values as well as for on-site, direct monitor communication.

XIO Features



- Process variables measured by the ***TRITON+*** can be converted to two (2) 4-20mA loop output signals for SCADA systems or local display and control
- Logging capabilities of the ***TRITON+*** can be used for two (2) 4-20mA input process variables measured by other instrumentation
- Alarms produced by the ***TRITON+*** Monitor Level Intelligence (MLI) device can be output on the two (2) XIO relay contacts for process actuation
- Two (2) switch, solid state or dry contact digital inputs can be sampled and logged
- Design facilitates easy field wiring
- Supports easy plug and play configuration and start-up
- Associated Apparatus IECEx certification for use with approved equipment in Zone 0 (equivalent to Class I, Division 1, Groups C & D); ATEX Zone 0; and CSA Class I, Zone 0, IIB hazardous areas
- Rugged indoor/outdoor NEMA 4x case with hinged clear cover
- Accepts 85-264 VAC, 120-375 VDC; 47-62 Hz; 1.1A@110/0.59A @250 VAC
- Supplies 8 – 11.5 VDC, 500mA power to the ***TRITON+*** flow monitors

XBUS Features



- Supports Modbus RTU, ASCII and TCP communications
- Wireless Modbus via ***TRITON+*** internal modem communications
- Connects to wired networks via RS485 or RS232
- Supports easy plug and play configuration and start-up
- Associated Apparatus IECEx certification for use with approved equipment in Zone 0 (equivalent to Class I, Division 1, Groups C & D); ATEX Zone 0; and CSA Class I, Zone 0, IIB hazardous areas
- Rugged indoor/outdoor NEMA 4x case with hinged clear cover
- Accepts 85-264 VAC, 120-375 VDC; 47-62 Hz; 1.1A@110/0.59A @250 VAC
- Supplies 8 – 11.5 VDC, 500mA power to the ***TRITON+*** flow monitors

ExPAC Features



- Designed to be housed in another enclosure
- Associated Apparatus IECEx certification for use with approved equipment in Zone 0 (equivalent to Class I, Division 1, Groups C & D); ATEX Zone 0; and CSA Class I, Zone 0, IIB hazardous areas
- Requires DC power input between 9 and 36 volts and a minimum of 15 watts
- Supplies DC power of 8 to 11.5 volts, 500mA to the ***TRITON+*** flow monitors
- RS485 and RS232 Modbus output connections to SCADA systems
- Wireless Modbus via ***TRITON+*** internal modem communications
- Supports Modbus RTU, ASCII and TCP/IP communications

ADS LLC

340 The Bridge Street, Suite 204 - Huntsville, AL 35806
Phone: 256.430.3366/ Fax: 256.430.6633
Toll Free: 1.800.633.7246

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Specifications subject to change without notice.

DS-TRIT+080217

HARDWARE

ADS TRITON+®

The ADS TRITON+® is an intrinsically safe, "Fit-for-Purpose" open channel flow monitor for use in sanitary, combined, and storm sewers. It is designed to be the most versatile flow monitoring system available for wastewater collection applications. It supports single pipe or dual pipe flow measurement installations.

ADS TRITON+

This multiple technology flow monitor will power almost every available sensor technology that is used in wastewater applications today. It is the most versatile and cost-effective, multiple-technology flow monitor on the market. The ***TRITON+*** includes four multiple technology sensor options: a Long Range Depth Sensor, a Peak Combo Sensor, a Surface Combo Sensor, and an Ultrasonic Level Sensor (see inside for technology and specifications). This array of monitoring technologies provides for unmatched flexibility in a fully integrated, fit-for-purpose monitoring platform.

The ***TRITON+*** platform adapts to a wide range of customer applications and budgets. It can be configured as an economical single sensor monitor or dual sensor monitor. It offers a longer battery life and fewer parts for a more reliable system. This provides a lower purchase price and a lower ownership cost over the life of the monitor. The ***TRITON+*** has the lowest operational cost per data sample of any Intrinsically Safe flow monitor available.



About ADS

A leading technology and service provider, ADS®LLC has established the industry standard for open channel flow monitoring and has the only ETV-verified flow monitoring technology for wastewater collection systems. These battery-powered monitors are specially designed to operate with reliability, durability, and accuracy in sewer environments.

TRITON+ Features

- Versatile performance that is easy to install and operate
- Two sensor ports supporting 4 interchangeable sensors providing up to 6 sensor readings at a time
- Single or dual pipe/monitoring point measurement capabilities
- Multi-carrier cellular 3G/4G UMTS/HSPA+ or Verzon® CDMA/EV-DO wireless communications; direct serial communications also available
- Industry-leading battery life with a wireless connection providing up to 15 months at the standard 15-minute sample rate (*varies with sensor configuration*)
- External power and Modbus network connectivity option available with an ADS External Power and Communications Unit (ExPAC™) and a 9-36 VDC power supply or an ADS XBUS™ which includes a power supply
- Analog and digital I/O expansion (4-20 mA and dry contacts) available with an ADS External I/O unit (XIO™)
- Modbus protocols enabling RTUs to help simplify SCADA system integration
- Supports the delivery of CSV files to an FTP site at user-defined intervals , and direct monitor SMS and e-mail messaging
- Supports actuation of a water quality sampler for flow proportional or level-based operation
- Monitor-Level Intelligence (MLI®) enables the ***TRITON+*** to effectively operate over a wide range of hydraulic conditions
- Superior noise reduction design for maximizing acoustic signal detection from depth and velocity sensors
- Five software packages for accessing flow information: Q*start*™ (configuration and activation); FlowView Operations (web-based alarming); Sliicer.com® (I/I analysis); FlowView Portal® (online data presentation and reporting); and Profile® (data collection, analysis, and reporting)
- Intrinsically-Safe (IS) certification by ATEX, IECEx and CSA for use in Zone 0 (equivalent to Class I, Division 1, Groups C & D) hazardous areas
- Thick, seamless, high-impact, ABS plastic canister with aluminum end cap (meets IP68 standard)
- Innovative circuit board dome-enclosure protects and limits exposure of electronics when opening the canister to change the battery

To Learn more, visit www.adsenv.com/TRITON+

ADS LLC

Multiple Technology Sensors

The ***TRITON+*** features three depths and two velocities with three sensor options. Each sensor provides multiple technologies for continuous running of comparisons.

Peak Combo Sensor



Dimensions: 6.76 inches (172 mm) long x 1.23 inches (31 mm) wide x 0.83 inches (21 mm) high

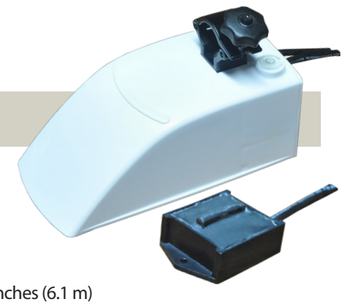
This versatile and economical sensor includes three measurement technologies in a single housing: ADS-patented continuous wave peak velocity, uplooking ultrasonic depth, and pressure depth.

Continuous Wave Velocity
Range: -30 feet per second (-9.1 m/s) to +30 ft/sec (9.1 m/s)
Resolution: 0.01 feet per second (0.003 m/s)
Accuracy: +/- 0.2 feet per second (0.06 m/s) or 4% of actual peak velocity (whichever is greater) in flow velocities between -5 and 20 ft/sec (-1.52 and 6.10 m/s)

Uplooking Ultrasonic Depth
Performs with rotation of up to 15 degrees from the center of the invert; up to 30 degrees rotation with Silt Mount Adapter
Operating Range: 1.0 inch (25 mm) to 5 feet (152 cm)
Resolution: 0.01 inches (0.254 mm)
Accuracy: 0.5% of reading or 0.125 inches (3.2 mm), whichever is greater

Pressure Depth
Range: 0-5 PSI up to 11.5 feet (3.5 m); 0-15 PSI up to 34.5 feet (10.5 m); or 0-30 PSI up to 69 feet (21.0 m)
Accuracy: +/-1.0% of full scale
Resolution: 0.01 inches (0.25 mm)

Long Range Depth Sensor



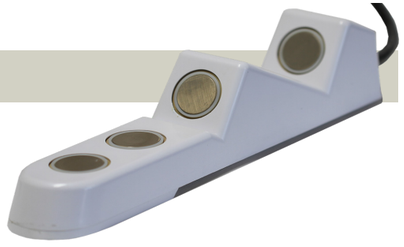
Dimensions: 9.15 inches (232.4 mm) long X 4.40 inches (111.8 mm) wide x 4.22 inches (107.2 mm) high (without bracket)

A narrow, powerful ultrasonic beam allows this depth sensor to perform well over long ranges. Integral Submersion Sensor provides detection of flooding at the point of interest.

Long Range Ultrasonic Depth
Minimum Dead Band: 0.0 inch (0.0 mm) from the bottom of sensor housing; Maximum Operating Air Range: 240 inches (6.1 m)
Beam Angle: +/- 3 degrees
Accuracy: +/- 0.25% of sensor range measurement or 0.13 inches (3.2 mm) whichever is greater, in a homogeneous temperature air column
Drift: 0.0 inches (0.0 mm)
Temperature Compensation: Additional compensation for variable temperature air column supported

Submersion
Detects submersion when fully covered with liquid.

Surface Combo Sensor



Dimensions: 10.61 inches (269 mm) long x 2.03 inches (52 mm) wide x 2.45 inches (62 mm) high

This revolutionary new sensor features four technologies including surface velocity, ultrasonic depth, surcharge continuous wave velocity, and pressure depth.

Surface Velocity *
Minimum air range: 3 inches (76 mm) from the bottom of the rear, descended portion of the sensor
Maximum air range: 42 inches (107 cm)
Range: 1.00 to 15 feet per second (0.30 to 4.57 m/s)
Resolution: 0.01 feet per second (0.003 m/s)
Accuracy: +/-0.25 feet per second (0.08 m/s) or 5% of actual reading (whichever is greater) in flow velocities between 1.00 and 15 ft/sec (0.30 and 4.57 m/s)

** The flow conditions existing in some applications may prevent the surface velocity technology from being used.*

Ultrasonic Depth
(*Does not require electronic offsets*)
Minimum dead band: 1.0 inches (25.4 mm) from the face of the sensor or 5% of the maximum range, whichever is greater
Maximum operating air range: 10 feet (3.05 m)
Resolution: 0.01 inches (0.25 mm)
Accuracy: +/- 0.125 inches (3.2 mm) with 0.0 inches (0 mm) drift, compensating for variations in air temperature

Surcharge Continuous Wave Velocity (*Under submerged conditions, this technology provides the same accuracy and range as* **Continuous Wave Velocity** *for Peak Combo Sensors*)

Surcharge Pressure Depth (*Under submerged conditions, this technology provides the same accuracy and range as* **Pressure Depth** *for Peak Combo Sensors*)

Ultrasonic Level Sensor This non-intrusive, zero-drift sennsing method results in s stable, accurate, and reliable flow depth calculation. Two independent ultrasonic transducers allow for independent cross-checking.

TRITON+ Specifications

Connectors
U.S. Military specification MIL-C 26482 series 1, for environmental sealing, with gold-plated contacts

Communications
- Verizon® CDMA/EV-DO cellular wireless modem, or Hepta band UMTS/HSPA+ cellular wireless modem
- Direct connection to PC using an ADS USB serial cable

Monitor Interfaces
- Supports simultaneous interfaces with up to two combo sensors
- Supports optional Analog and Digital I/O with ADS XIO: two 4-20 mA inputs and outputs, two switch inputs and two relay outputs

Power
Internal - Battery life with a cellular modem:
- Over 15 months at a 15-minute sample rate*
- Over 6 months at a 5-minute sample rate*

External - Optional external power available with ADS External Power and Communications Unit (ExPAC) with an ADS- or customer-supplied 9-36 Volt DC power supply

** Rate based on collecting data once a day and varies according to sensor configuration and operating temperature*

Operating and Storage Temperature
-4 degrees to 140 degrees F (-20 degrees to 60 degrees C)

Connectivity
- Modbus ASCII: Wireless; Wired using ADS ExPAC or XBUS
- Modbus RTU: Wireless; Wired using ADS ExPAC or XBUS
- Modbus TCP: Wireless only

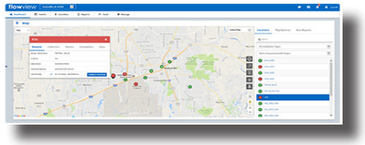
Intrinsic Safety Certification
- Certified under the ATEX European Intrinsic Safety standards for Zone 0 rated hazardous areas
- Certified under IECEx (International Electrotechnical Commission) Intrinsic Safety Standards for use in Zone 0 rated hazardous areas (equivalent to Class I, Division 1, Groups C & D)
- CSA Certified to Class 225803 – Process Control Equipment, Intrinsically Safe and Non-Incendive Systems – For Zone 0 Hazardous Locations, Ex ia IIB T3 (152°C) in Canada
- CSA Certified to Class 225883 – Process Control Equipment, Intrinsically Safe and Non-Incendive Systems – For Class I Zone 0 Hazardous Locations, AEx ia IIB T3 (152°C) in the USA (equivalent to Class I, Division 1, Groups C & D)

Other Certifications/Compliances
- FCC Part 15 and Part 68 compliant
- ROHS (lead-free) compliant
- Carries the EU CE mark
- Canada IC CS-03 compliant

Certificate No: 940056

ADS Flow Monitoring Software

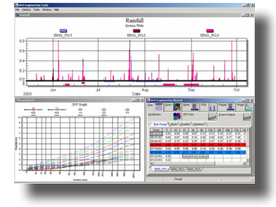
Qstart is desktop software providing field crews with a simple, easy-to-use tool for quickly configuring and activating ADS monitors. *Qstart* enables the user to collect and review the monitor's depth and velocity data in hydrograph and tabular views simultaneously.



FlowView is web-hosted software providing near real-time operational intelligence on the status of flow activity throughout the wastewater collection system. FlowView utilizes dynamic (or smart) alarming to inform clients about the occurrence of rain events, flow performance abnormalities, and data anomalies at the flow monitoring locations.

FlowView Portal is web-hosted software providing robust report delivery, enabling the user to manage data, customize reports, and select viewing parameters. FlowView Portal has a virtually unlimited database for storing and accessing historical data, using data for comparison and trend analysis purposes, and sharing information electronically.

Sliicer.com is web-hosted software providing a powerful set of engineering tools designed for both the consulting and municipal engineer. Sliicer.com's inflow and infiltration tools examine wastewater collection system dry and wet weather flow data and provide rigorous performance measurements in one-tenth the time of other analysis tools.



Profile is desktop software providing the industry's best data analysis tools, from basic flow monitoring data to complex hydraulic analysis. Profile is intuitive software that saves time and improves data quality by compiling project data into one location for analysis and reporting.

FLOW MONITORING APPLICATIONS

- Billing
- Inflow/Infiltration
- Model Calibration
- Combined Sewer Overflows (CSOs)
- Stormwater Monitoring
- Capacity Analysis
- Spill Notification

HARDWARE

ADS RAINALERT III™ Rainfall Monitor

The ADS RainAlert III provides rainfall data acquisition and intelligent alarming to support wastewater capital improvement, operations and maintenance, and regulatory programs. Applications include infiltration and inflow studies, hydraulic modeling, and overflow response and reporting.

The ADS RainAlert III is a low-cost, wireless rainfall monitor that alerts operators via text or email messages when rainfall intensity exceeds a critical threshold. RainAlert III technology is designed for ultra low power consumption, yielding up to a five-year battery life depending on modem and data delivery rate configuration.

* Reliable data delivery through established 3G/4G mobile communications
* Rainfall intensity alarming for faster response to wet weather overflows
* Rugged design for easy installation and low maintenance
* Compatible with a range of tipping bucket rain gauges to match accuracy levels with local rainfall characteristics and design storms of interest



Features

- Priced for deployment as a stand-alone unit or part of a comprehensive flow and rain monitoring network
- Designed for ground-level, pole-mount, and rooftop installations
- Connects to ADS or customer-supplied tipping bucket
- Equipped with multi-carrier cellular 3G/4G UMTS/HSPA+ wireless communications; USB communications also available
- Generates immediate cryouts of alarms and allows instant delivery of logged rain and alarm data
- Logs and time-stamps rainfall totals at user-specified intervals down to one minute
- Automatically notifies up to 5 different addresses via SMS text message and/or email whenever a user-defined rainfall threshold is exceeded
- Powered by long-life, replaceable, internal alkaline battery pack (or via an optional external 6 to 24-V DC, 1-A power supply)
- Uses internal cellular antenna or optional external antenna
- Easily configured and managed using ADS Q*start*™ software
- Provides 100% compatibility with ADS FlowView™ software for accessing and managing all alarm events, alarm history, and stored rain data over the Internet
- Maintains alarm system readiness via daily check-in calls and automatically generates maintenance alarms for low battery conditions
- Two-year warranty

Mounting Options

Ground-Level



Pole-Mount



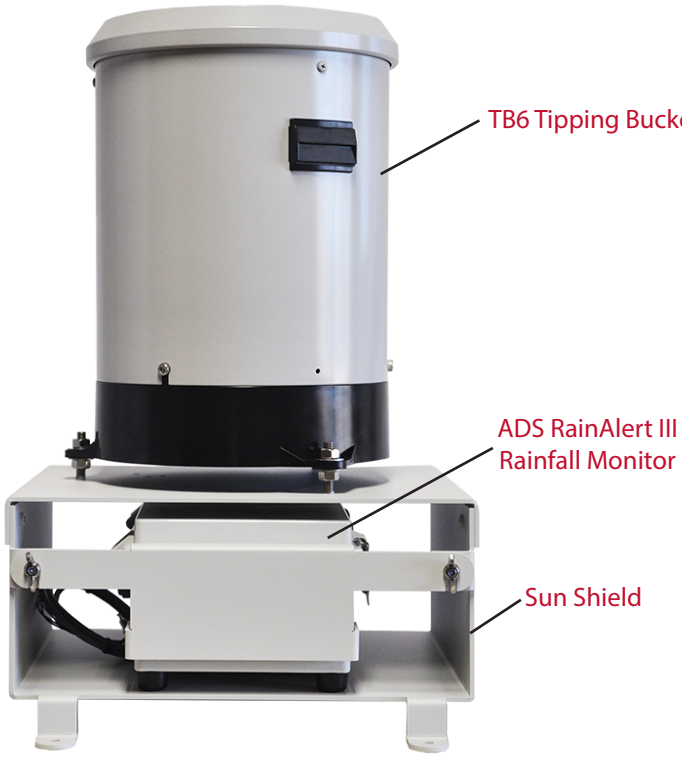
Rooftop



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Specifications subject to change without notice.

ADS RainAlert III Rain Gauge

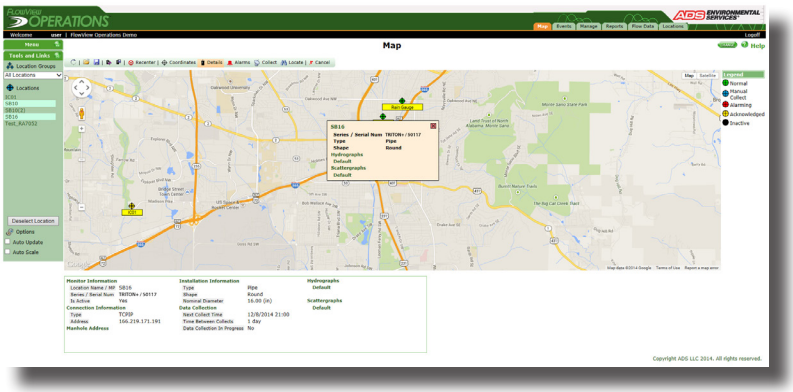
The ADS RainAlert III Rainfall Monitor with tipping bucket and sun shield, provides automated remote rainfall measurement and alarming.



Applications

The ADS RainAlert III rainfall monitor is used to collect and alarm on precipitation data for use in many applications, including the following:

- Precipitation analysis
- CSO and SSO monitoring
- Rehabilitation effectiveness monitoring
- Early warning and notification based on rain intensity
- Infiltration/Inflow programs
- Sewer capacity studies/Trending
- Sewer master plan studies



FlowView 2.3 Software Interface

The intuitive, graphical interface replicates client system maps for quick identification of system assets and provides drill-down functionality.

HARDWARE

Specifications

Enclosure
Polycarbonate enclosure reinforced with 10% glass fiber resin. NEMA Type 4X, IP67, and UL Rated. Access cover includes stainless steel latches and a continuous gasket.

Weight (including battery)
10 pounds (4.54 kg)

Dimensions
10.63 inches (270 mm) high x 7.09 inches (180 mm) wide x 4.53 inches (115 mm) deep

Operating Temperature
-4 to 140 degrees F (-20 to 60 degrees C)

Mounting
Optional sun shield designed for rooftop, ground, or pole-mount installation

Measurement Detail
0.01 inch/tip (United States)
0.1 mm/tip, 0.2 mm/tip, 0.5 mm/tip, 1.0 mm/tip (International)

Processor
Ultralow power ARM Cortex M4 microprocessor

Memory
1MB program memory, 256 KB RAM
8MB NV flash memory, 32KB NV FRAM

Data Storage
At a 5-minute Sample Rate:
3,784,704 bytes, 630,784 storage locations
Approximately 728 days for two stored entities (Rain and Rain Intensity)

Clock
Battery-backed real-time clock module

Firmware Upgrades
Remotely via wireless connection or locally via USB connection

Power
Replaceable 9V 60Ah alkaline battery pack or user-provided external power supply (6 to 24V DC, 1A)

Tipping Bucket Connection
2-Conductor 22 AWG wire provided for connection to tipping bucket rain gauge

Diagnostics
Two primary options for monitoring and acting on diagnostic information:

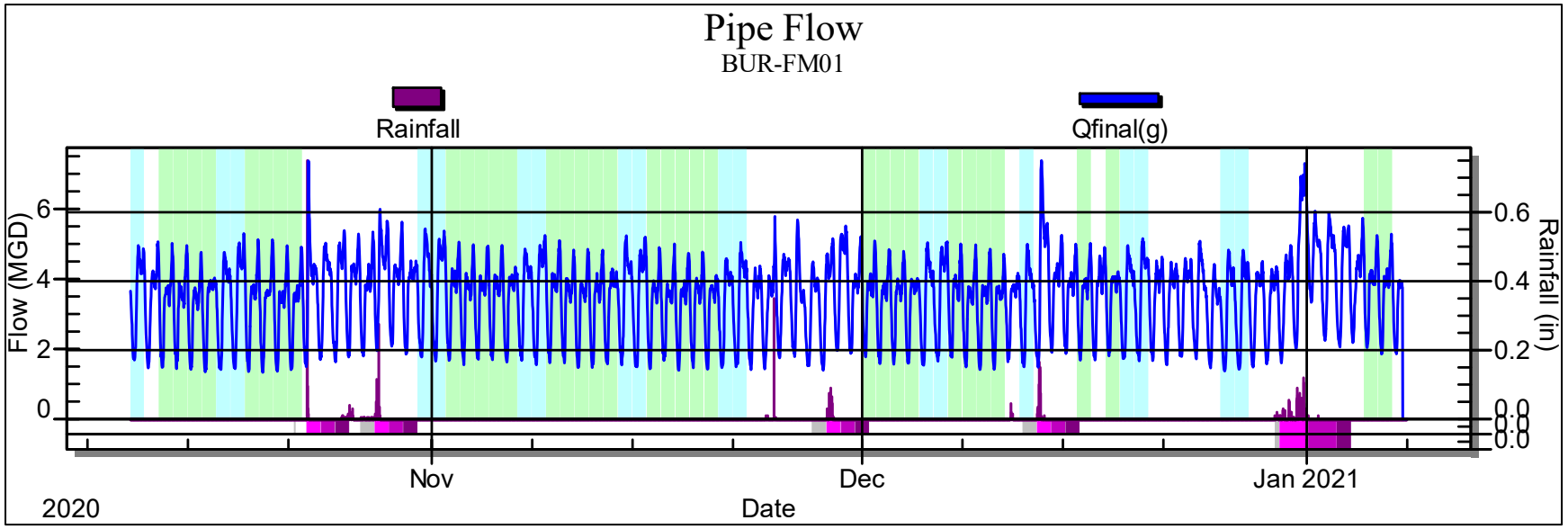
- Daily Check-In messages delivered automatically to user via text message and or email that provide battery status and other hardware alerts.
- Direct Calls to the unit through ADS Q*start* software for reading the latest monitor status and performing diagnostics to resolve problems.

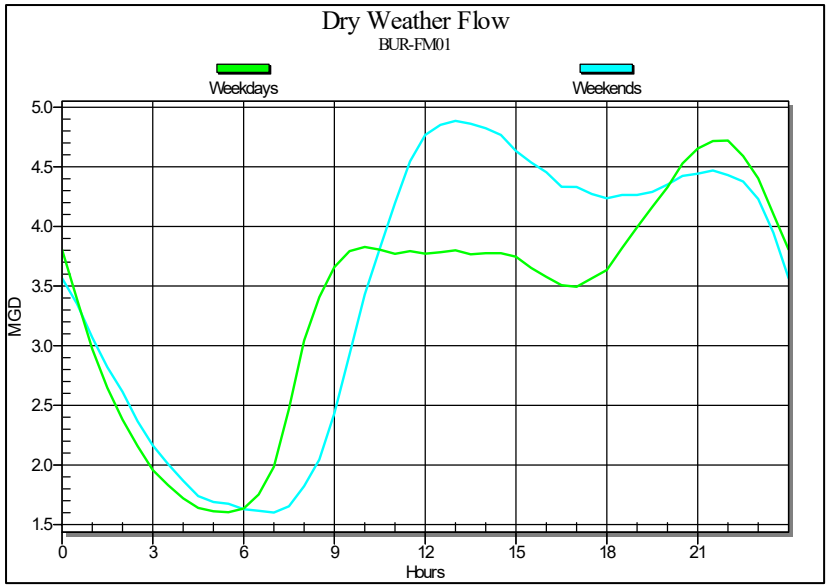
Antenna
Delivered with an internal quad-band slot type antenna. An SMA connector on the board is available for applications requiring an external antenna.

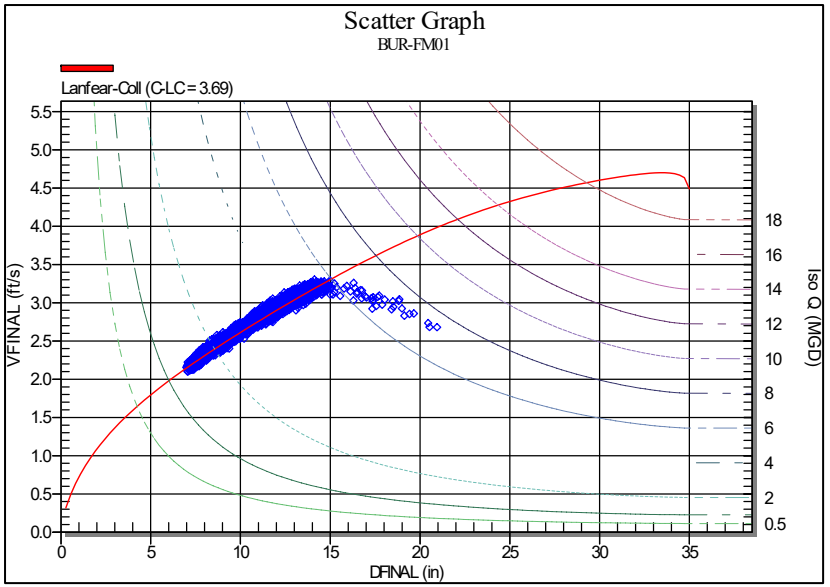
Cellular Modem
Third-party, FCC/IC/EC- and carrier-approved, global coverage, commercial UMTS/HSPA+/GSM modem.
FCC ID: R17HE910.

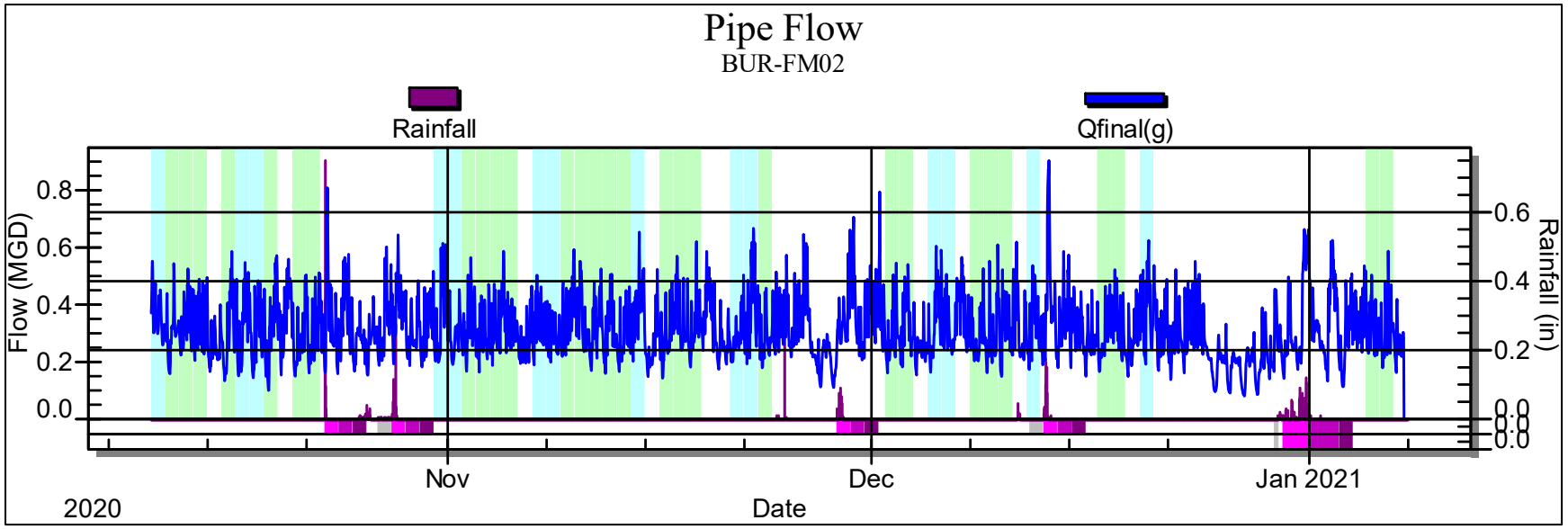
ADS LLC
340 The Bridge Street, Suite 204, Huntsville, AL 35806
Phone: 256.430.3366/ Fax: 256.430.6333
Toll Free: 1.800.633.7246

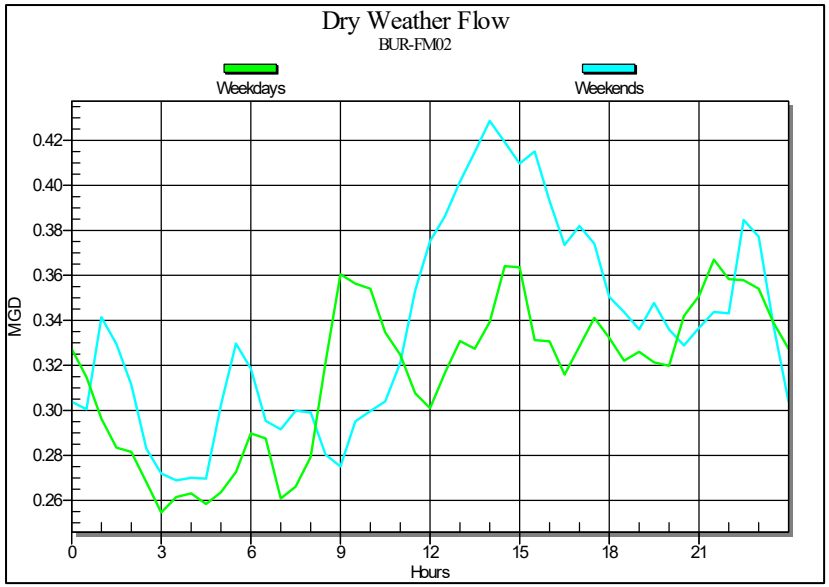
Appendix C – Flow Monitor RDII Performance Graphics

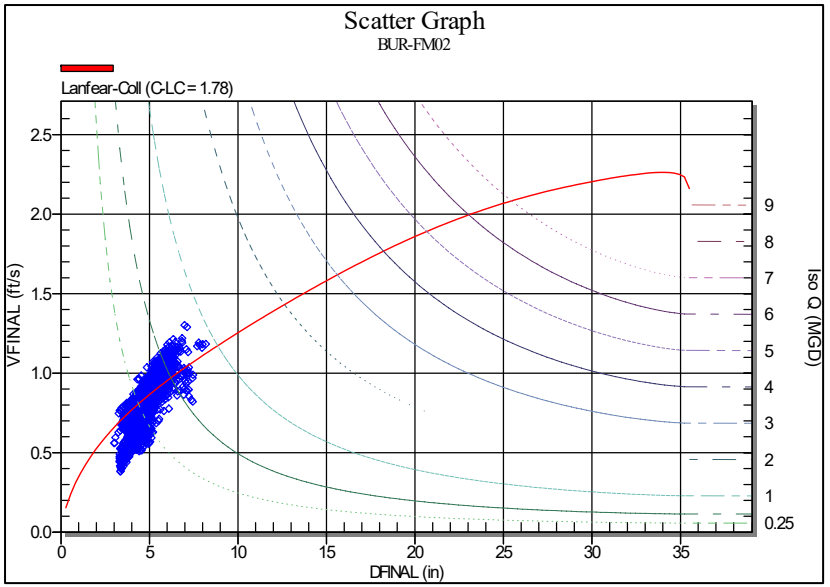

Pipe Flow
BUR-FM01
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
6
4
2
0
0.6
0.4
0.2
0.0
Nov
Dec
Jan 2021
2020
Date

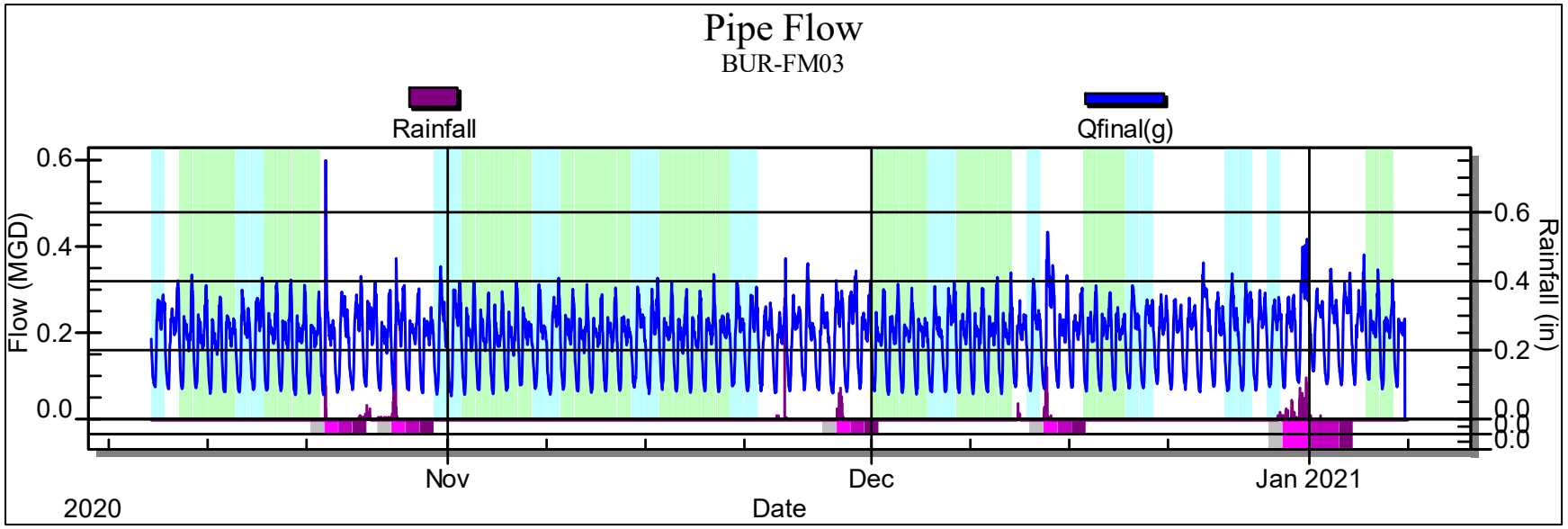

Dry Weather Flow
BUR-FM01
Weekdays
Weekends
MGD
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
3
6
9
12
15
18
21
Hours

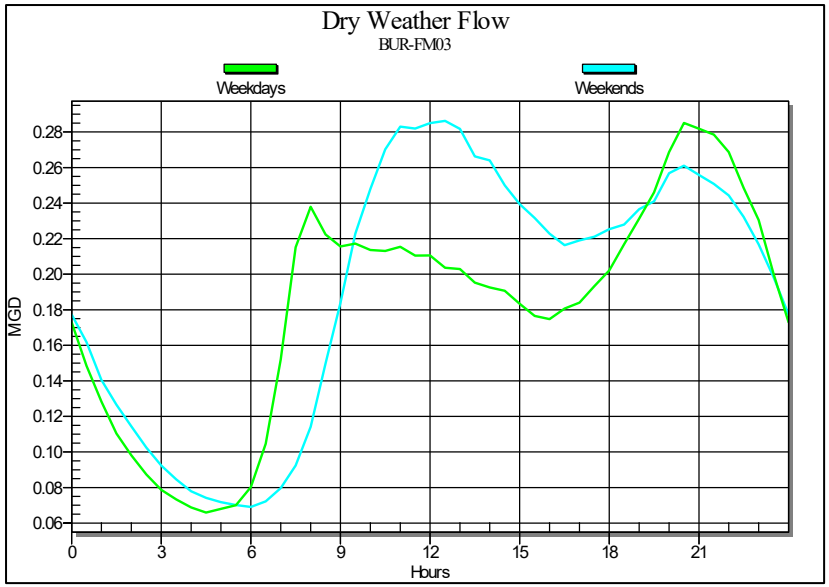

Scatter Graph
BUR-FM01
Lanfear-Coll (C-LC = 3.69)
VFINAL (ft/s)
Iso Q (MGD)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
18
16
14
12
10
8
6
4
2
0.5
0
5
10
15
20
25
30
35
DFINAL (in)

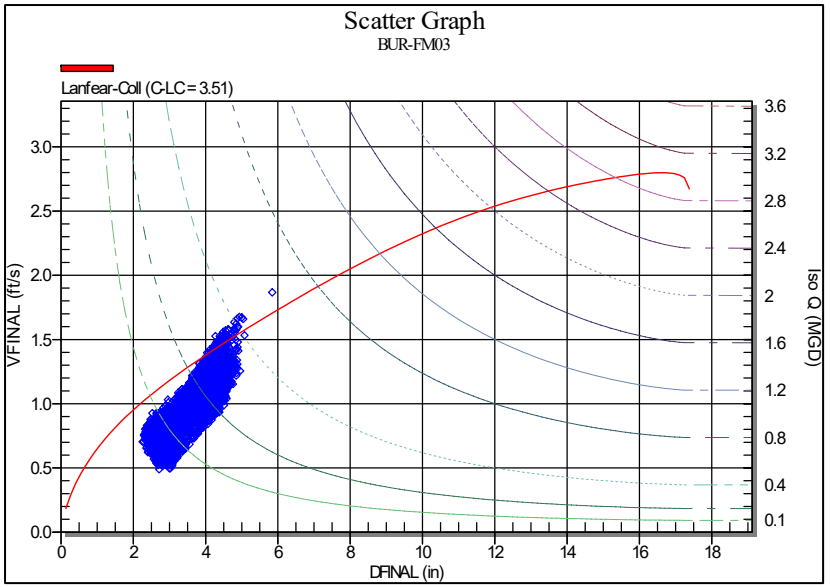

Pipe Flow
BUR-FM02
Rainfall
Qfinal(g)
Flow (MGD)
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
0.6
0.4
0.2
0.0
0.0
Nov
Dec
Jan 2021
2020
Date

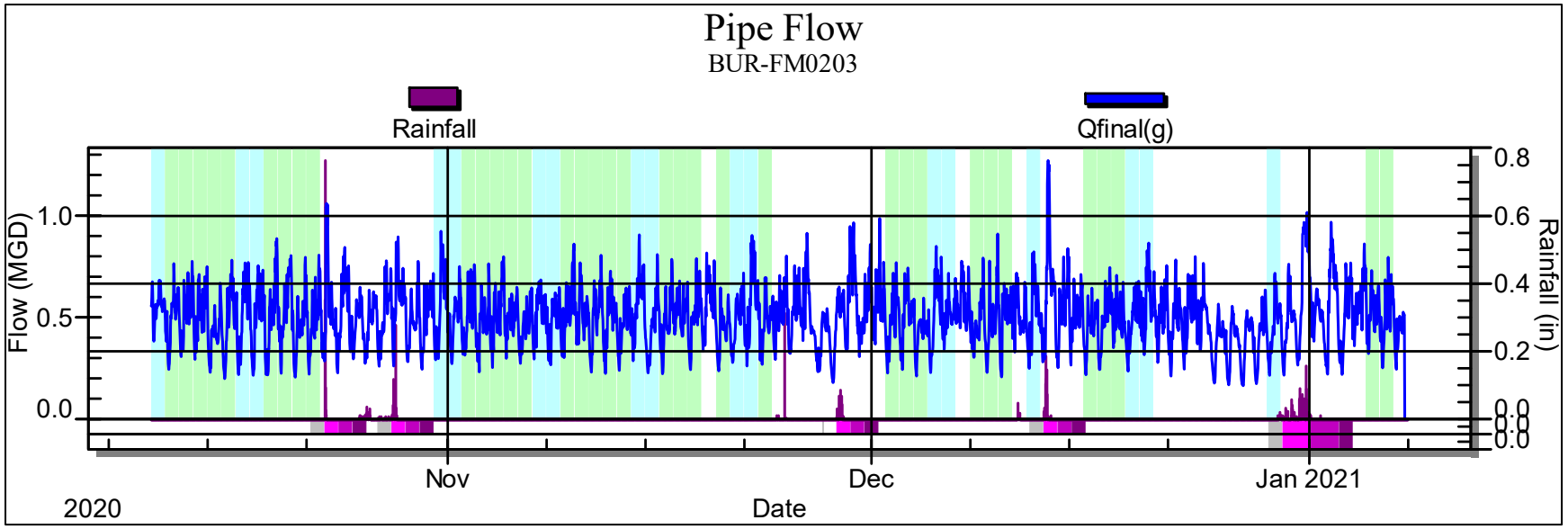

Dry Weather Flow
BUR-FM02
Weekdays
Weekends
MGD
0.42
0.40
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0
3
6
9
12
15
18
21
Hours

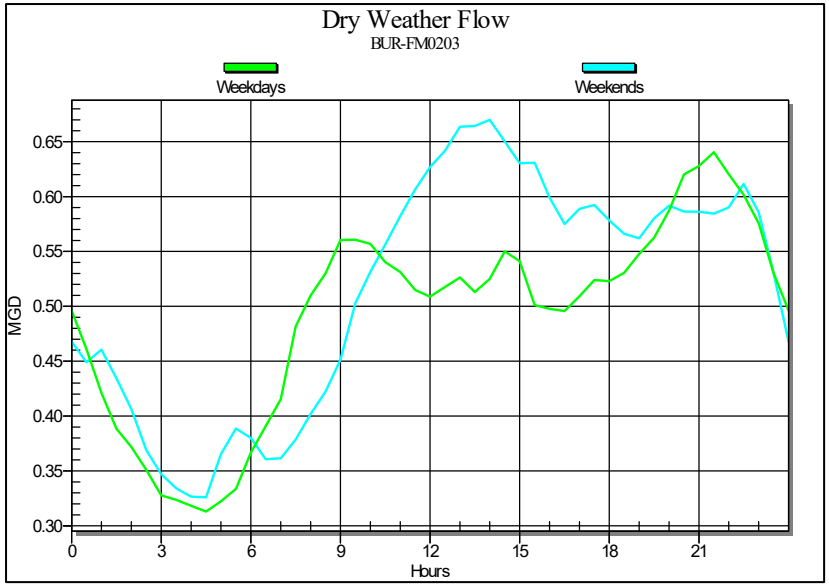

Scatter Graph
BUR-FM02
Lanfear-Coll (C-LC = 1.78)
VFINAL (ft/s)
2.5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
30
35
DFINAL (in)
Iso Q (MGD)
9
8
7
6
5
4
3
2
1
0.25

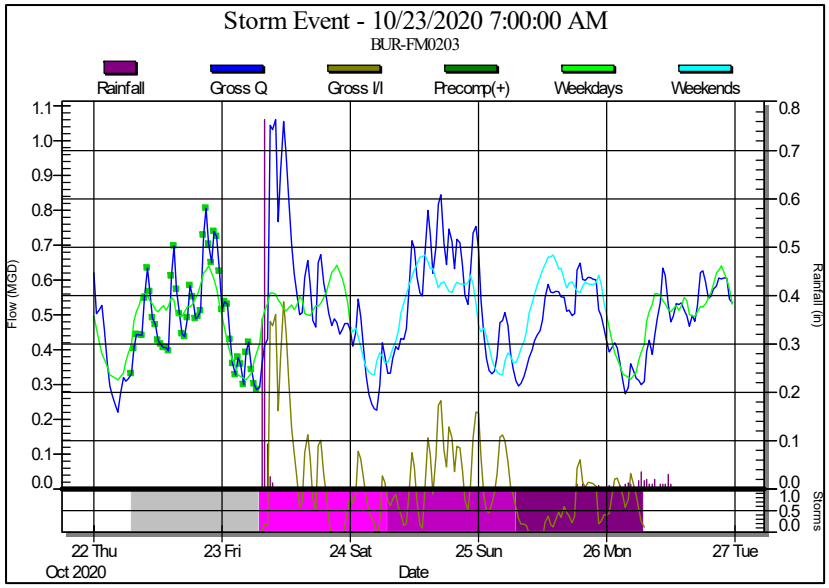

Pipe Flow
BUR-FM03
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.6
0.4
0.2
0.0
Nov
Dec
Jan 2021
2020
Date

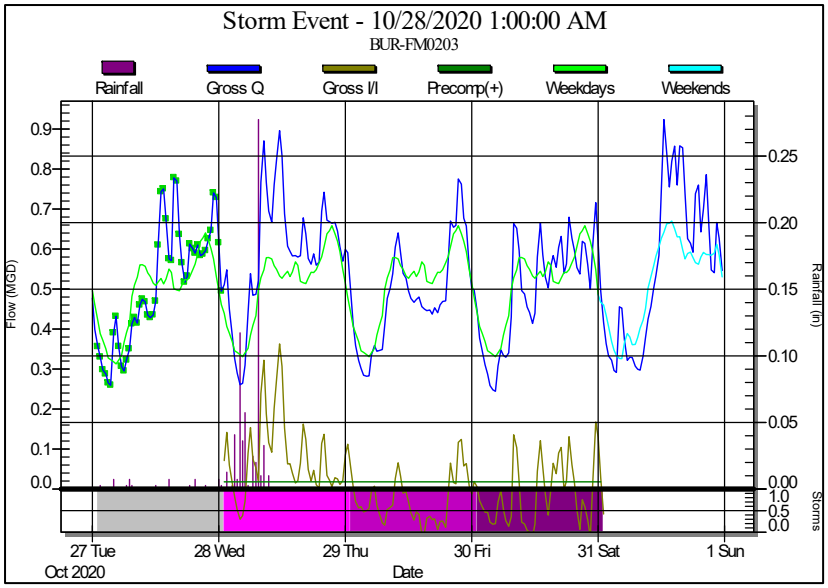

Dry Weather Flow
BUR-FM03
Weekdays
Weekends
MGD
Hours

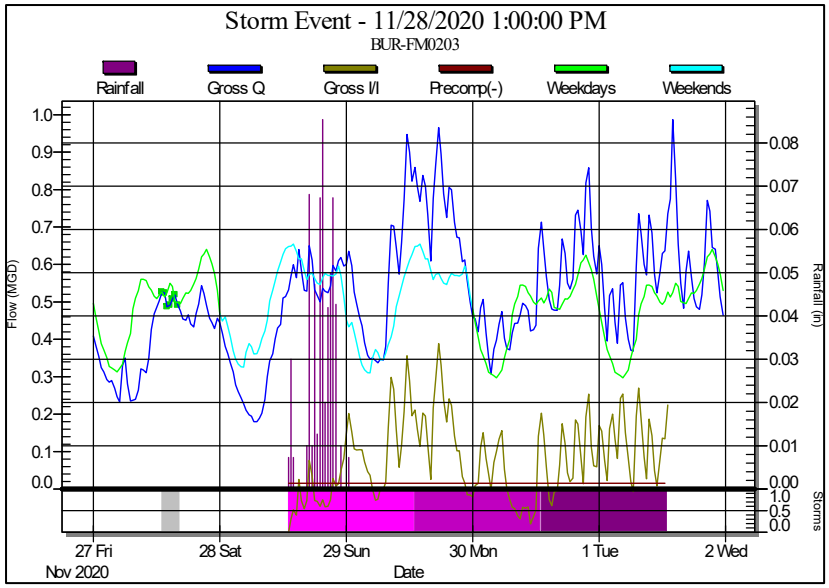

Scatter Graph
BUR-FM03
Lanfear-Coll (C-LC = 3.51)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

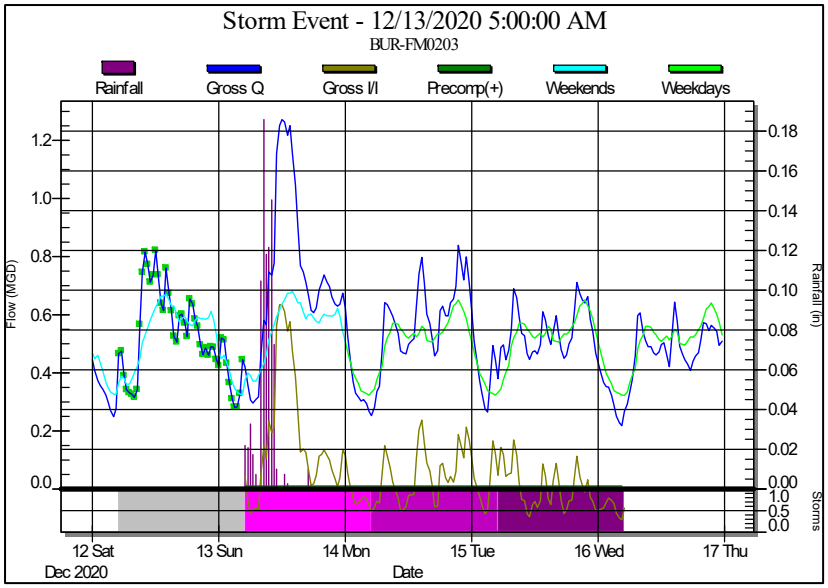

Pipe Flow
BUR-FM0203
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
0.8
0.6
0.4
0.2
0.0
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

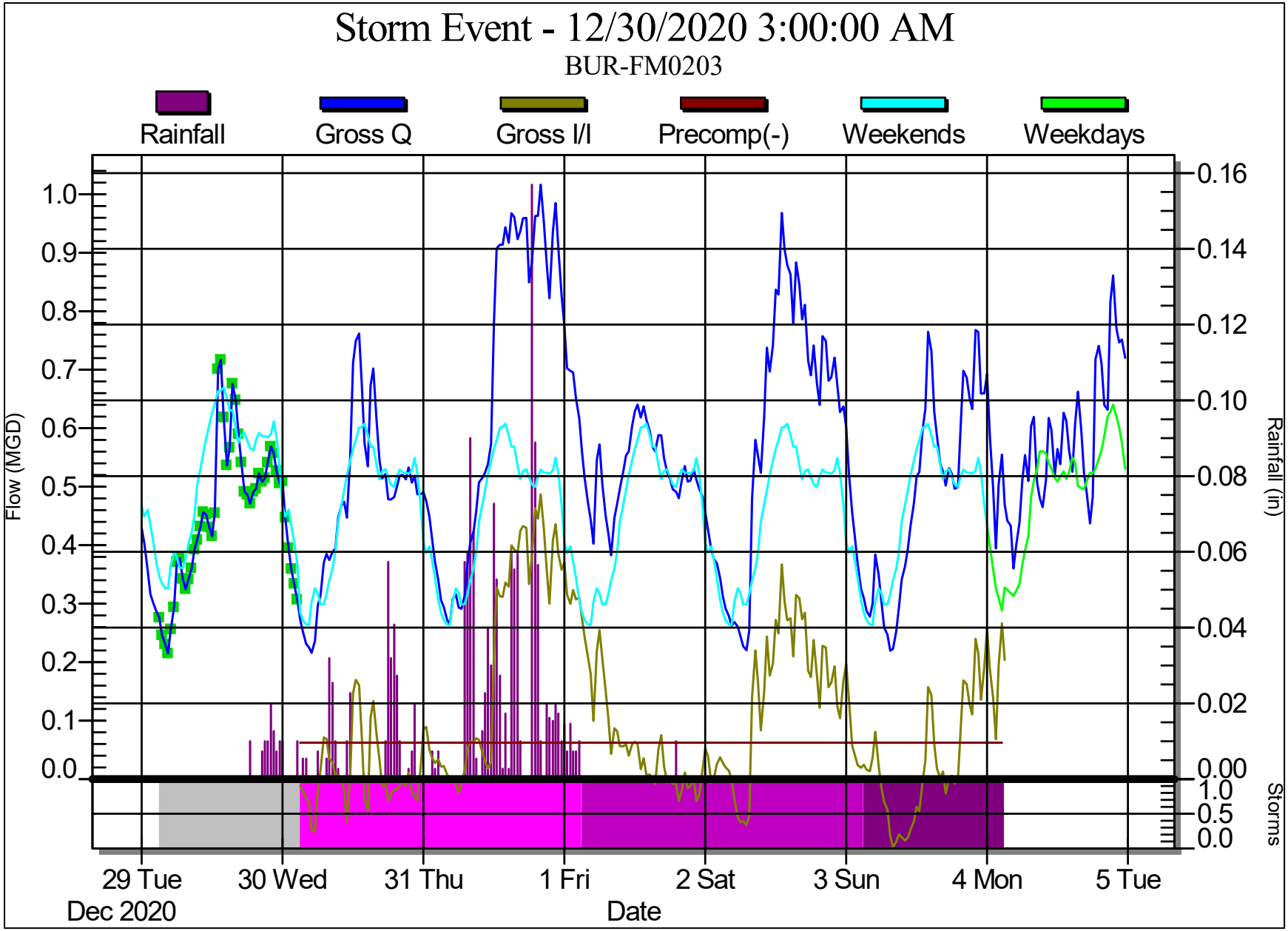

Dry Weather Flow
BUR-FM0203
Weekdays
Weekends
MGD
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0
3
6
9
12
15
18
21
Hours


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM0203
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM0203
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

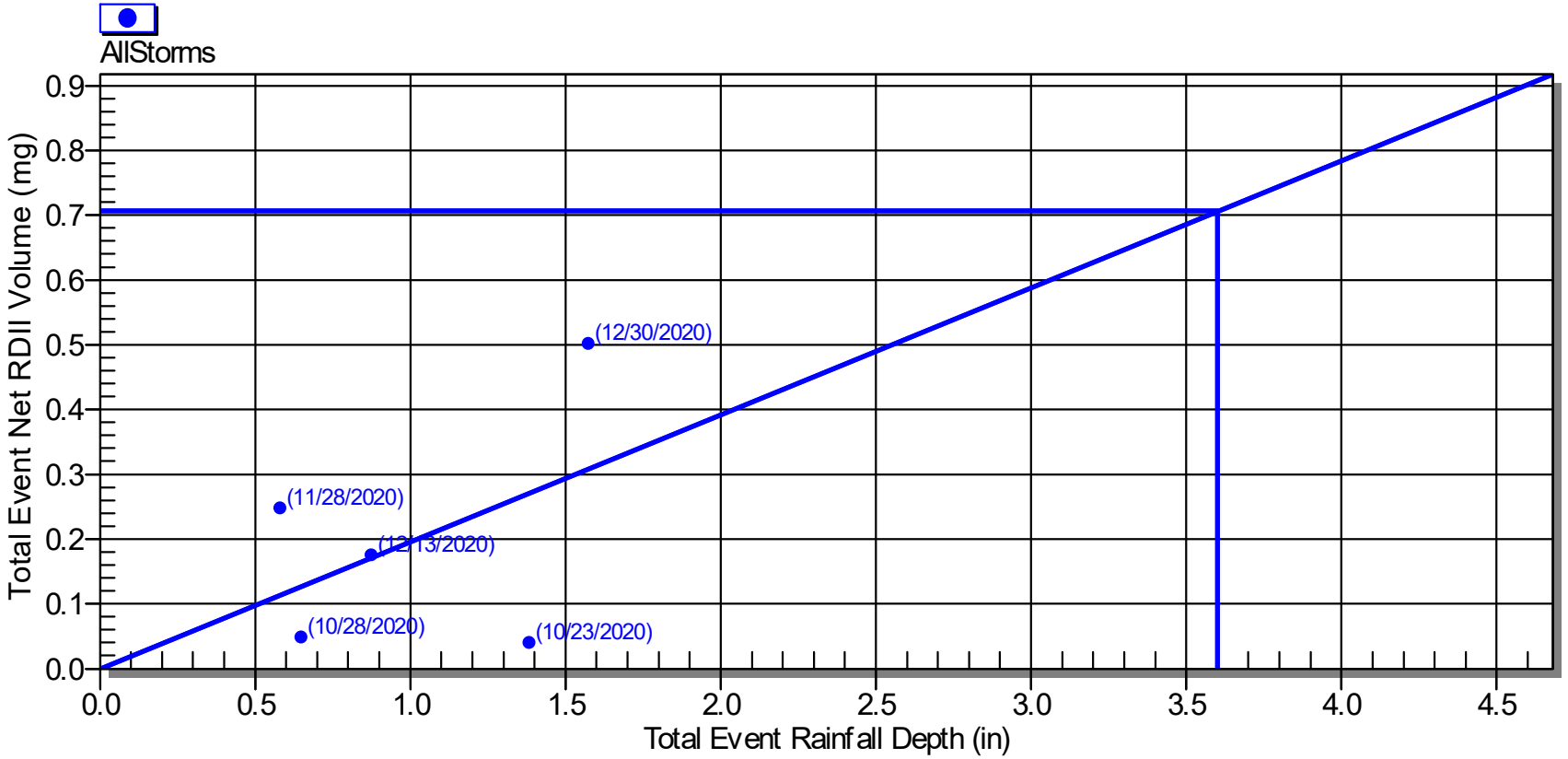

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM0203
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

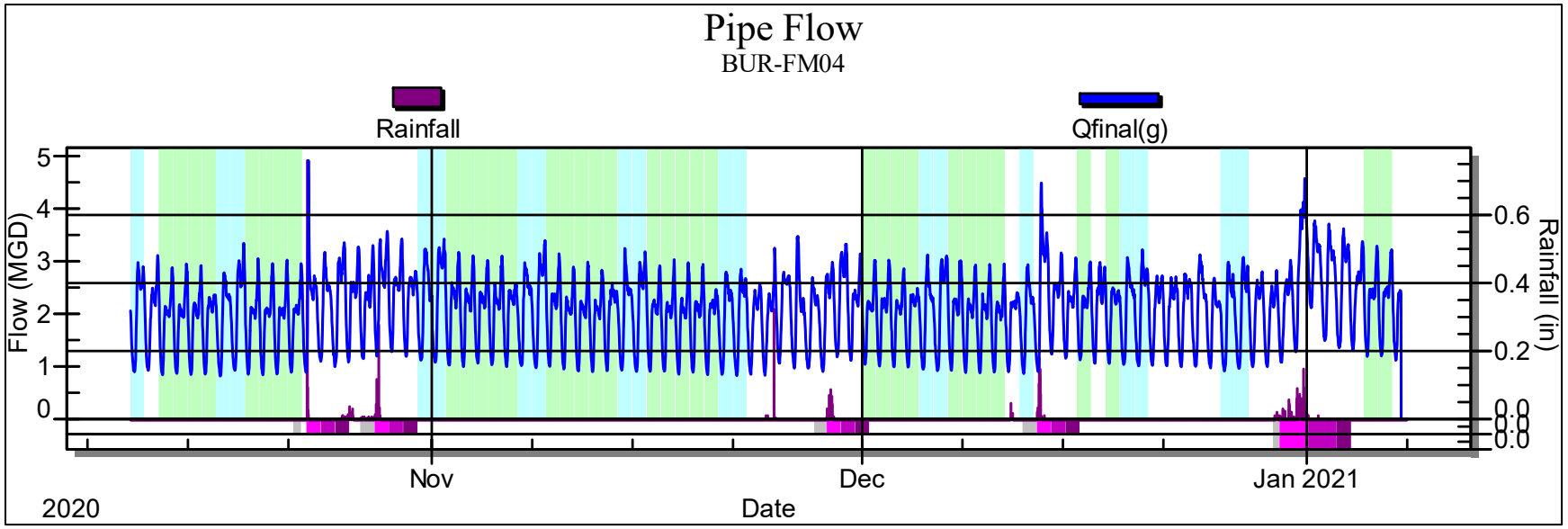

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM0203
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

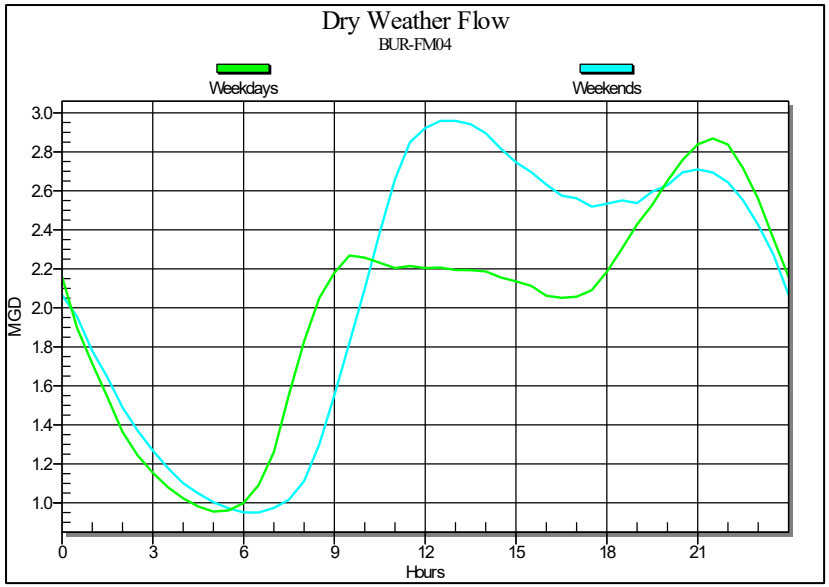

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM0203
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
1.0
0.5
0.0
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

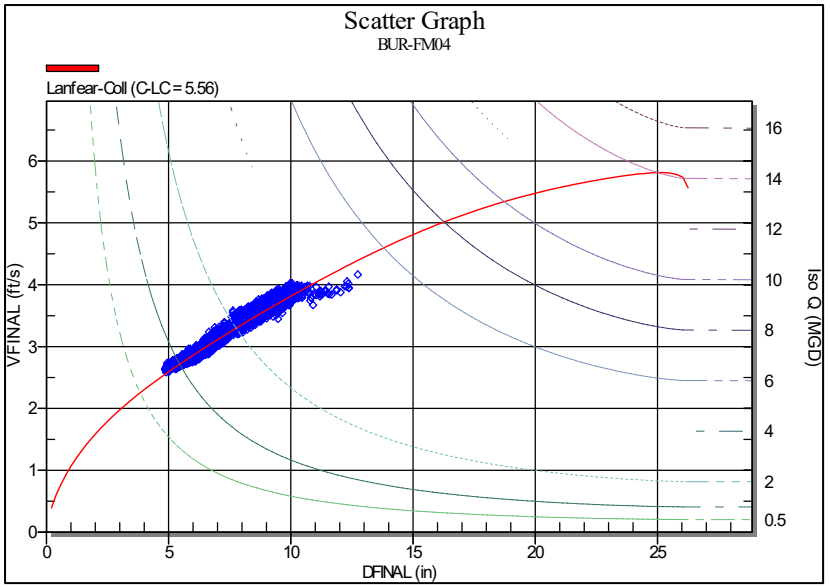
Q vs i - BUR-FM0203

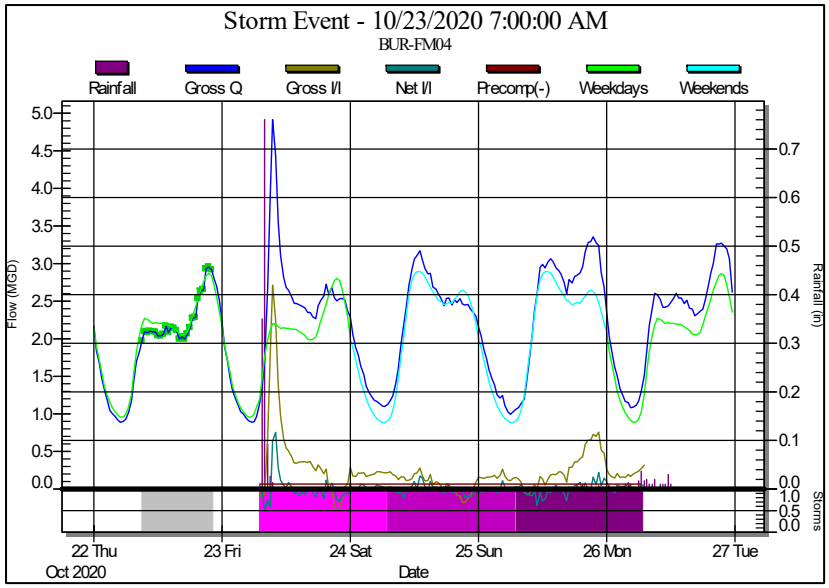
Total Event Net RDII Volume vs. Rainfall Depth

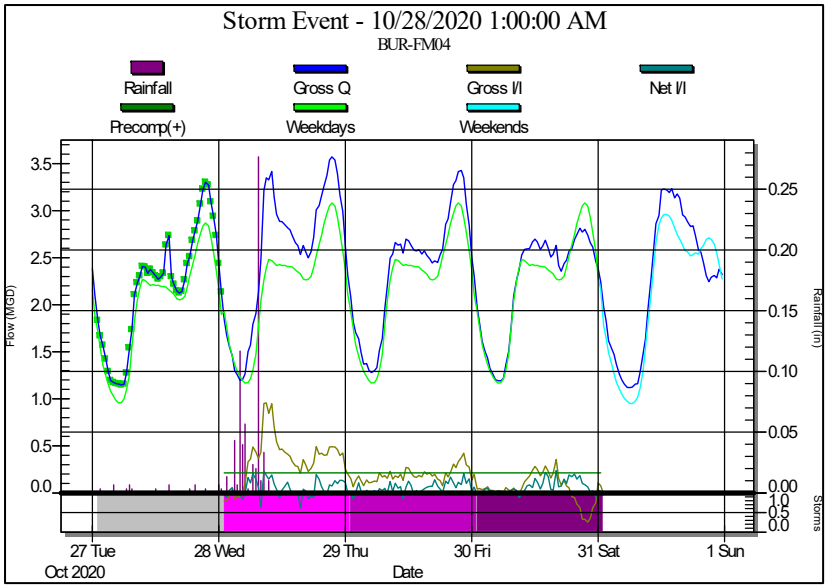


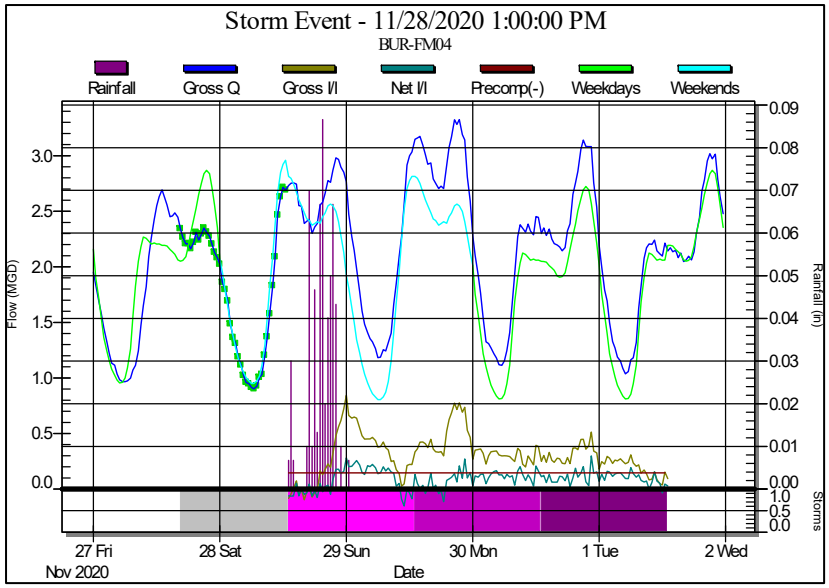

Pipe Flow
BUR-FM04
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

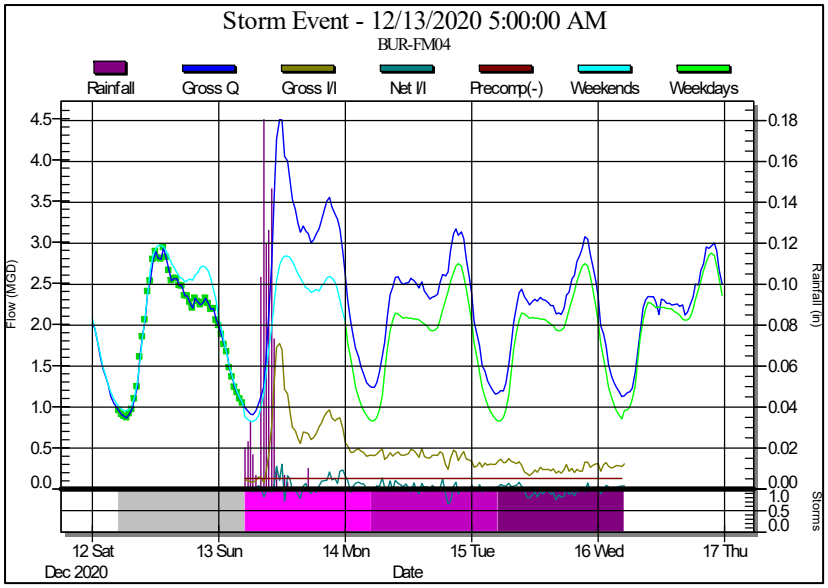

Dry Weather Flow
BUR-FM04
Weekdays
Weekends
MGD
Hours

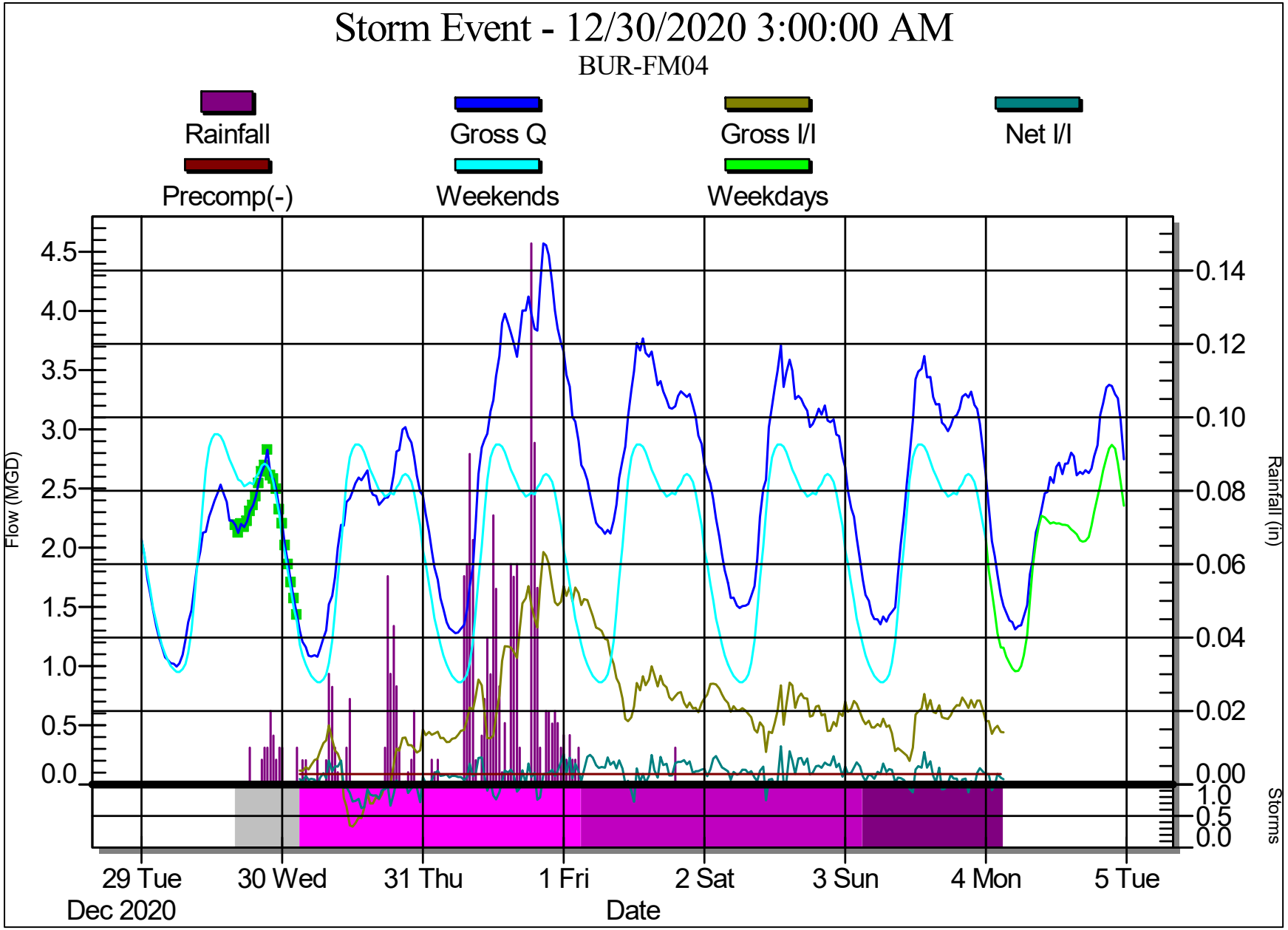

Scatter Graph
BUR-FM04
Lanfear-Coll (C-LC = 5.56)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM04
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM04
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

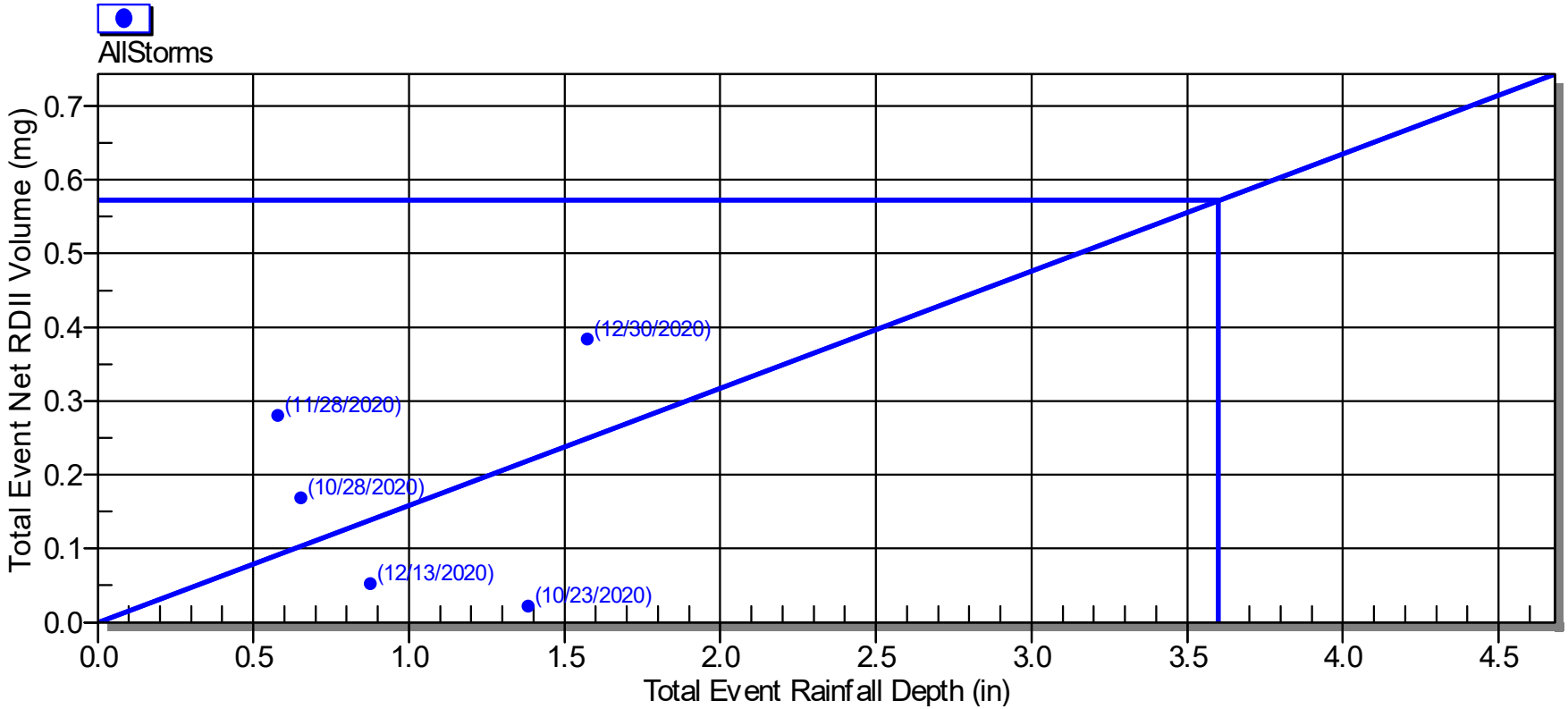

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM04
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

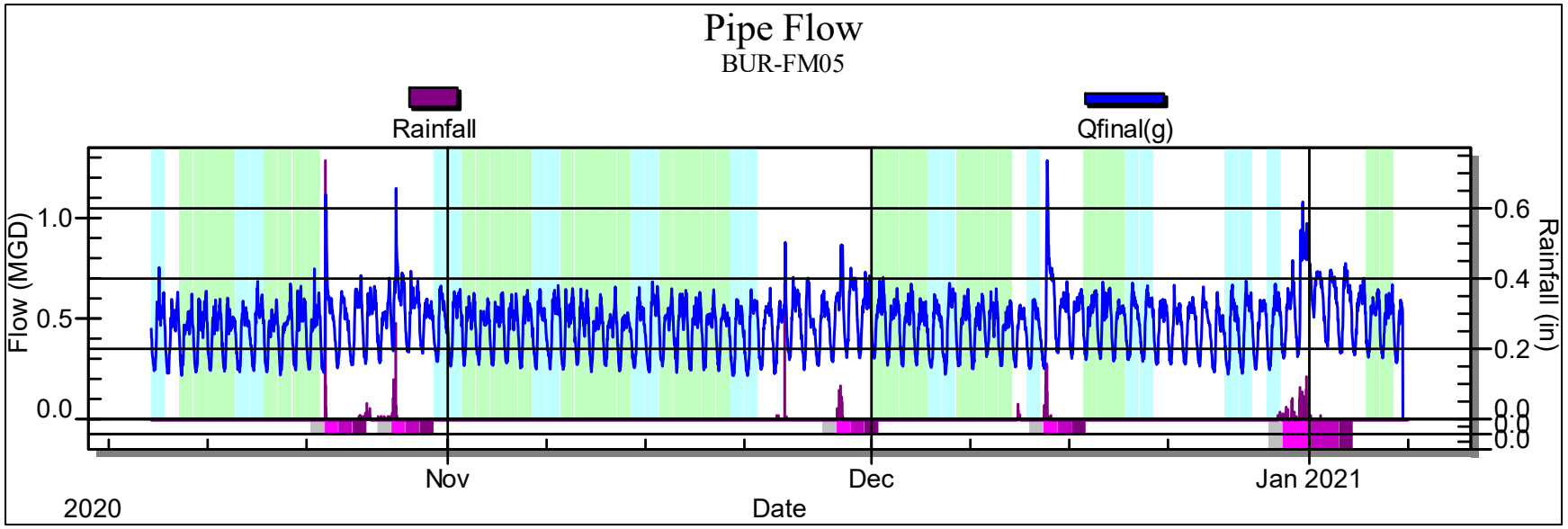

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM04
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

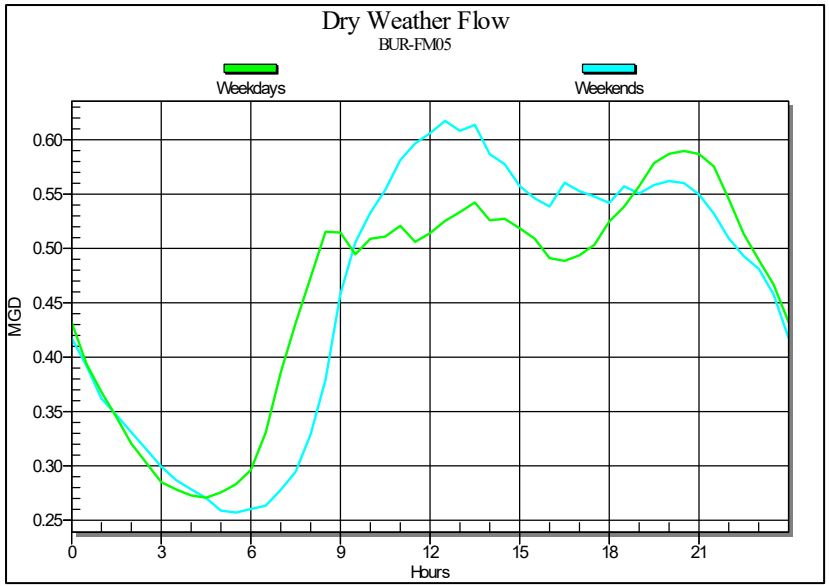

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM04
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1.0
0.5
0.0
Rainfall (in)
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

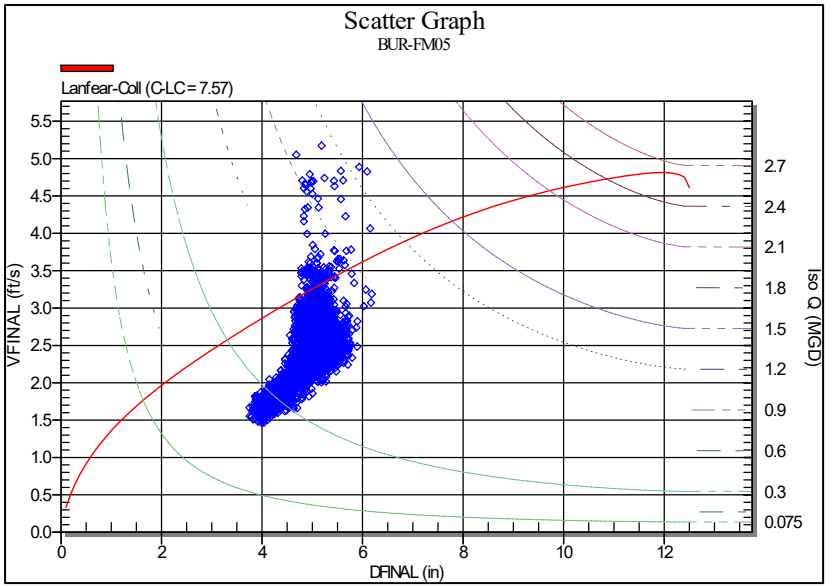
Q vs i - BUR-FM04

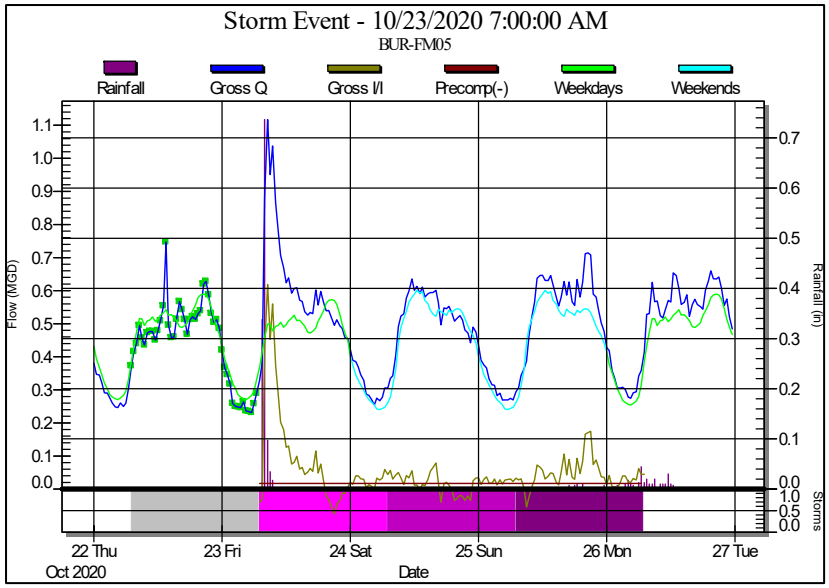
Total Event Net RDII Volume vs. Rainfall Depth

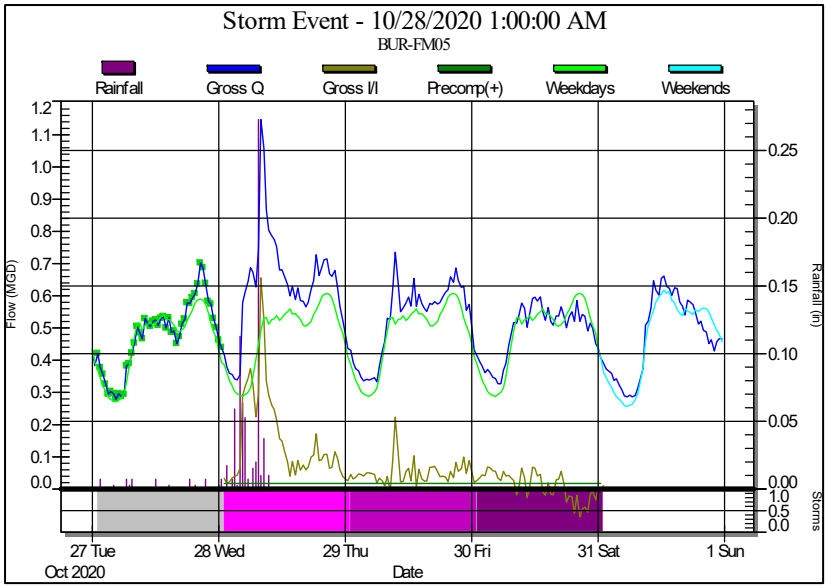


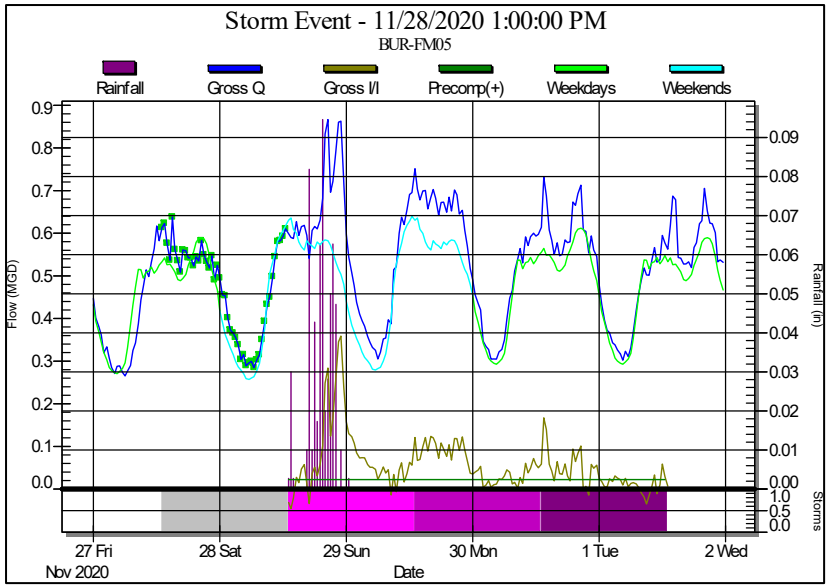

Pipe Flow
BUR-FM05
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
0.6
0.4
0.2
0.0
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

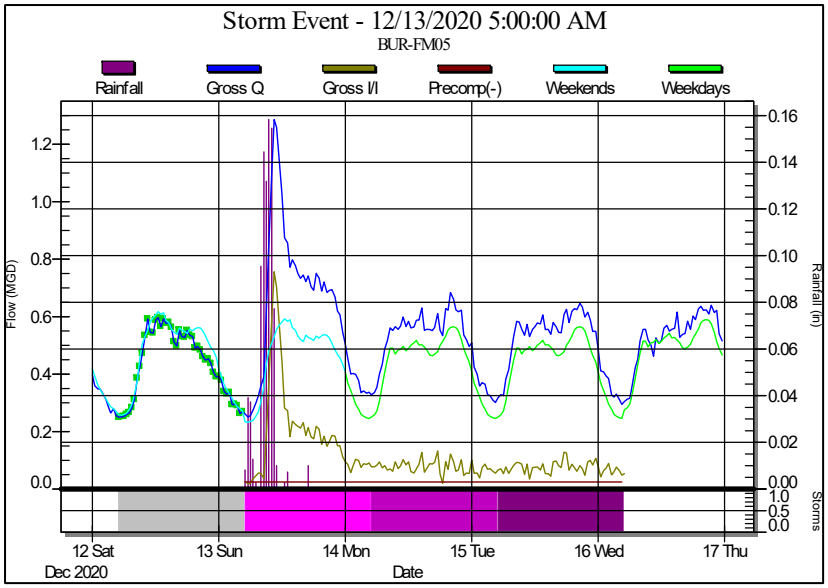

Dry Weather Flow
BUR-FM05
Weekdays
Weekends
MGD
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0
3
6
9
12
15
18
21
Hours

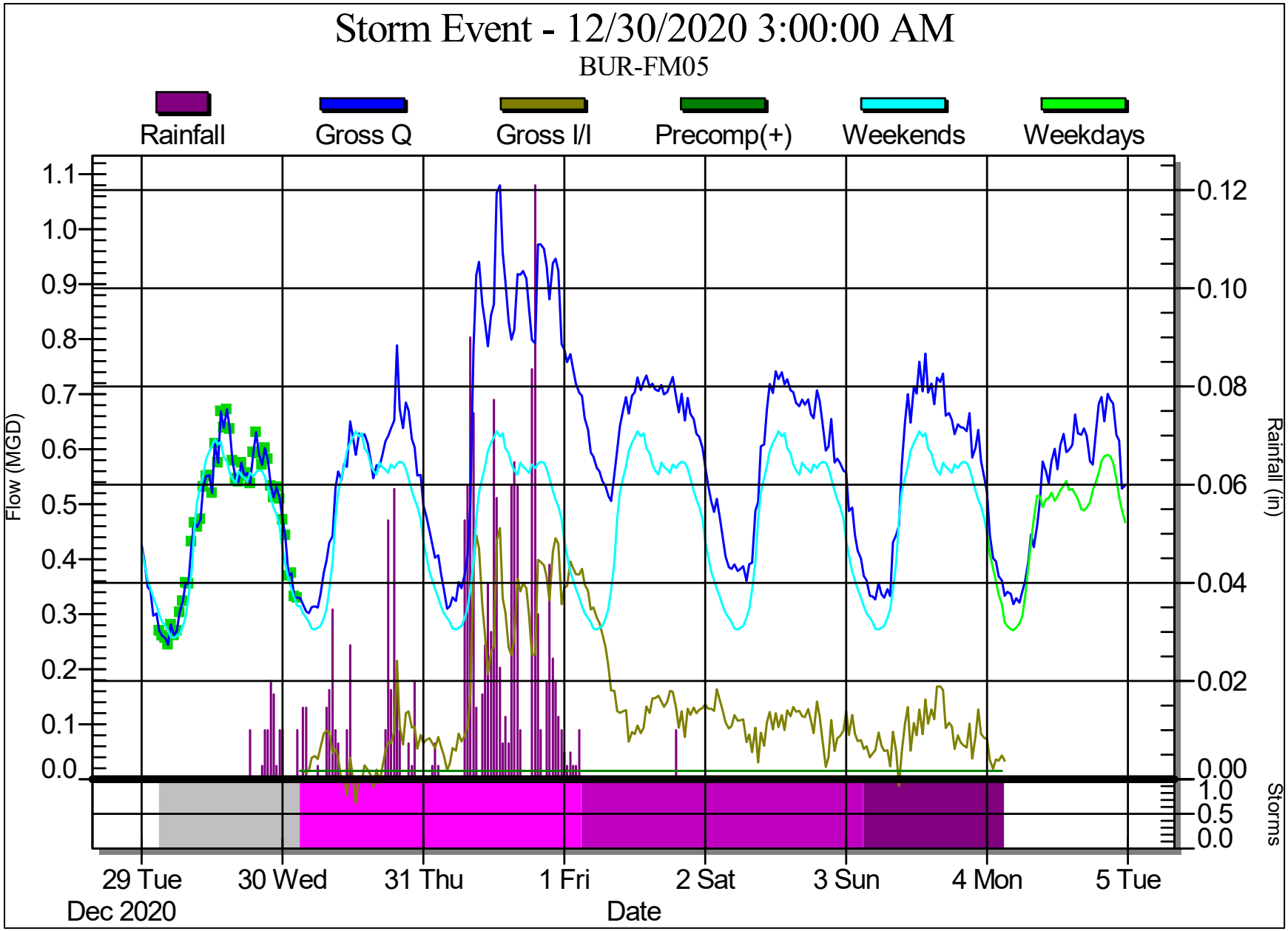

Scatter Graph
BUR-FM05
Lanfear-Coll (C-LC = 7.57)
VFINAL (ft/s)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
DFINAL (in)
Iso Q (MGD)
2.7
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.075


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM05
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM05
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

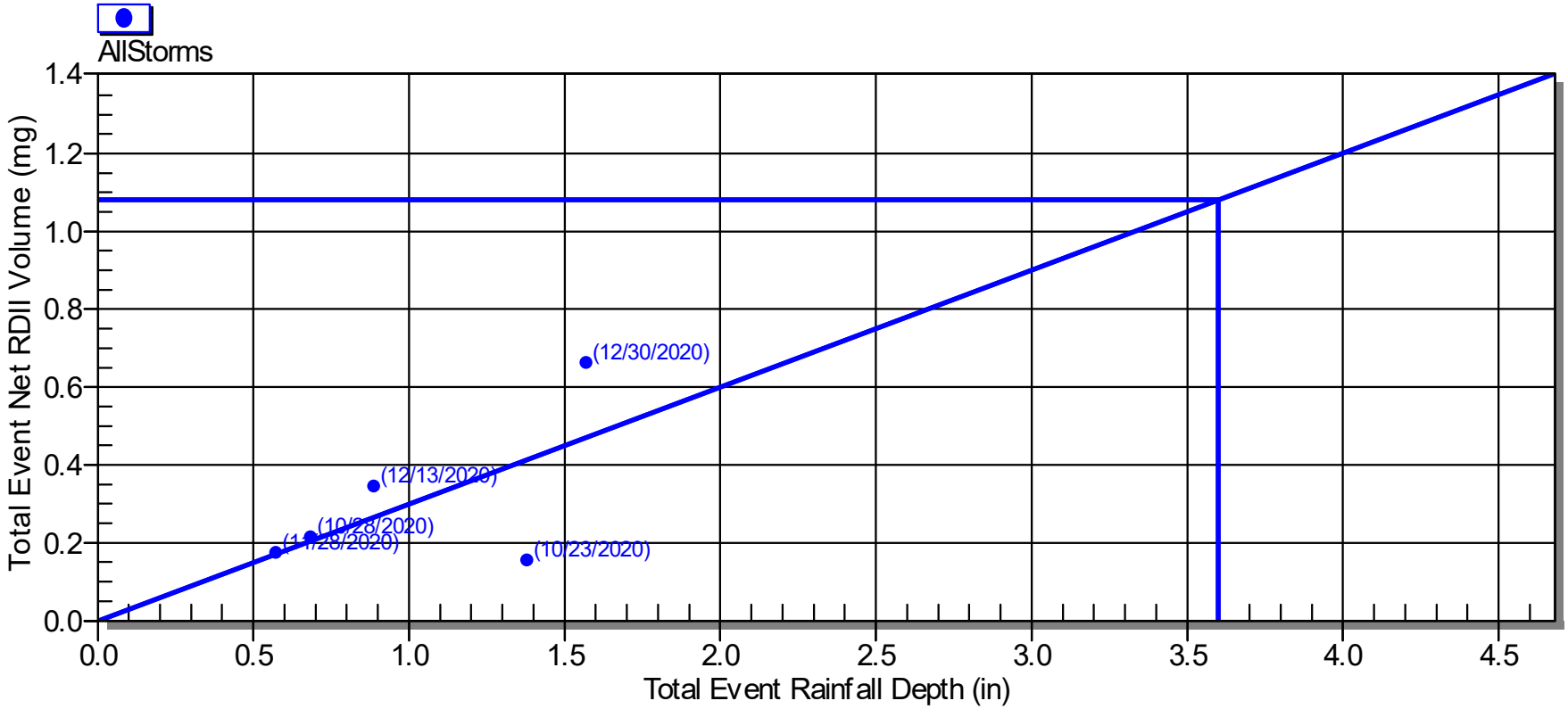

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM05
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

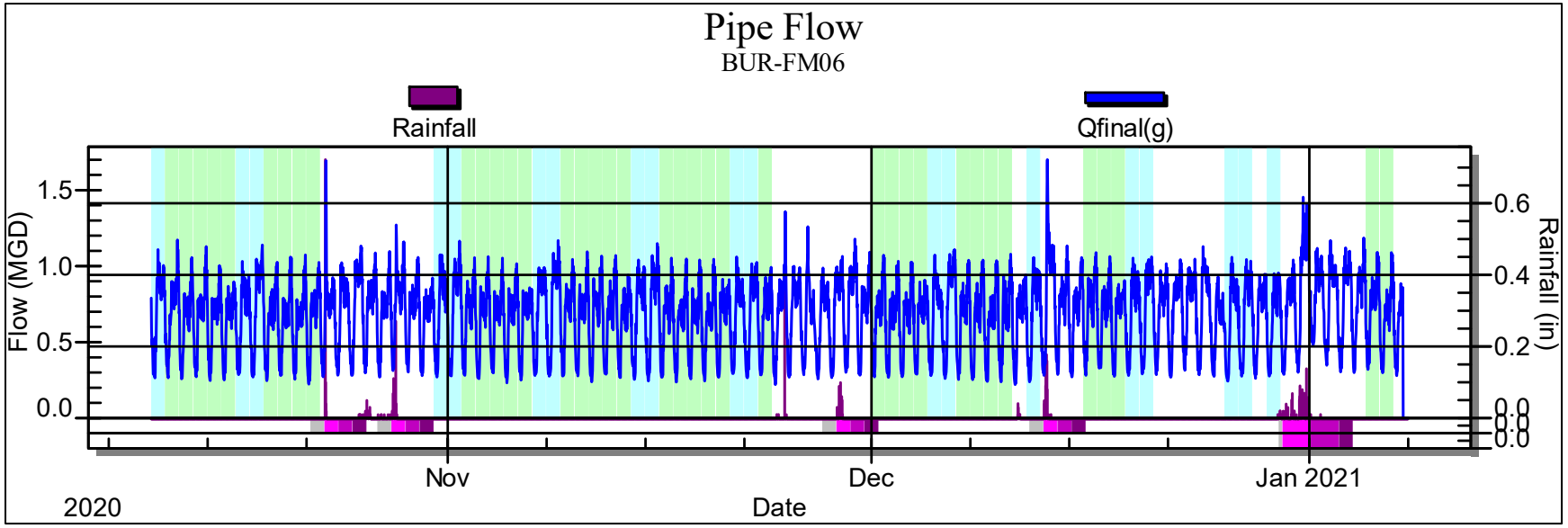

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM05
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

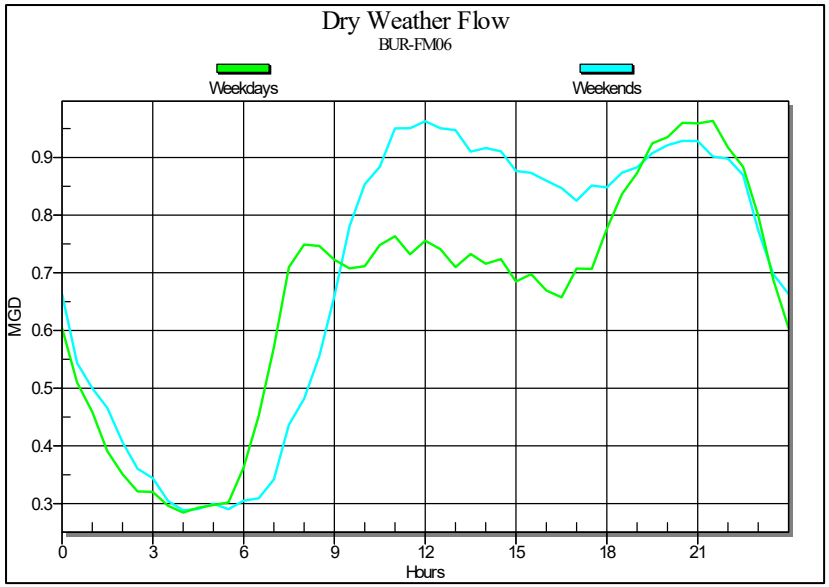

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM05
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekends
Weekdays
Flow (MGD)
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
1.0
0.5
0.0
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

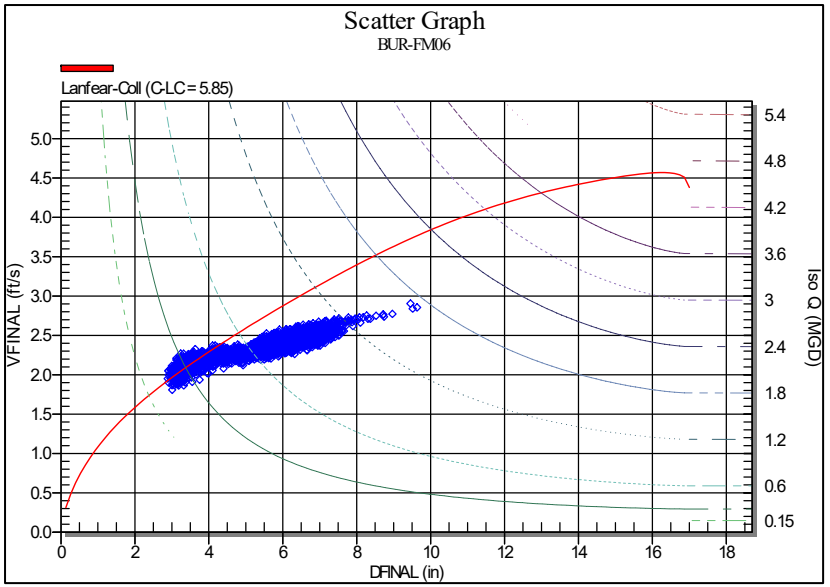
Q vs i - BUR-FM05

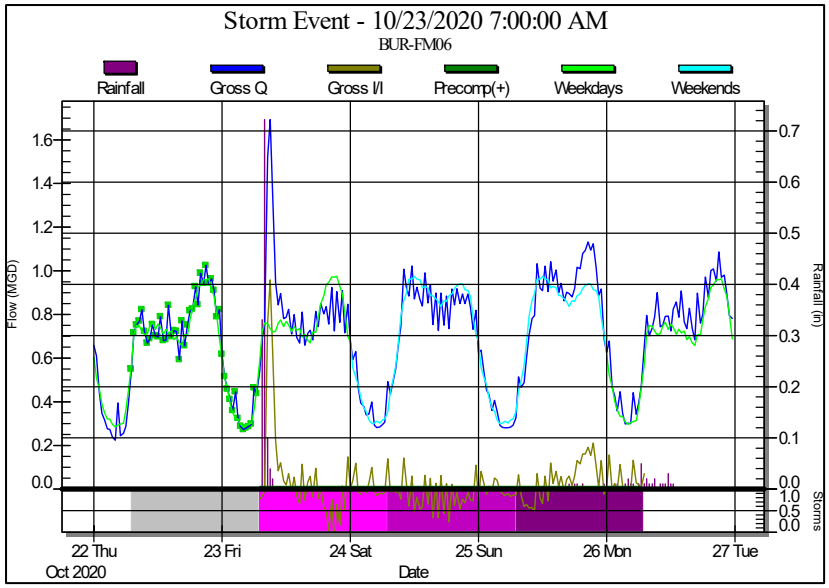
Total Event Net RDII Volume vs. Rainfall Depth

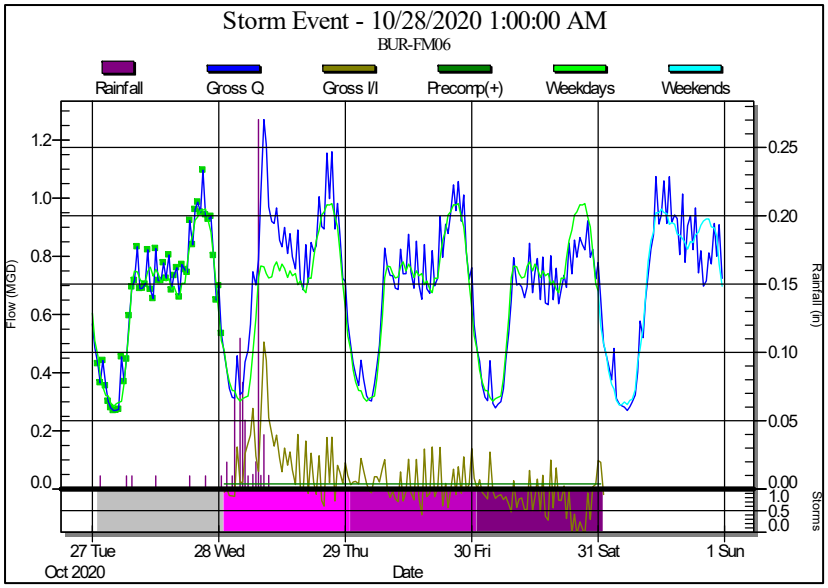


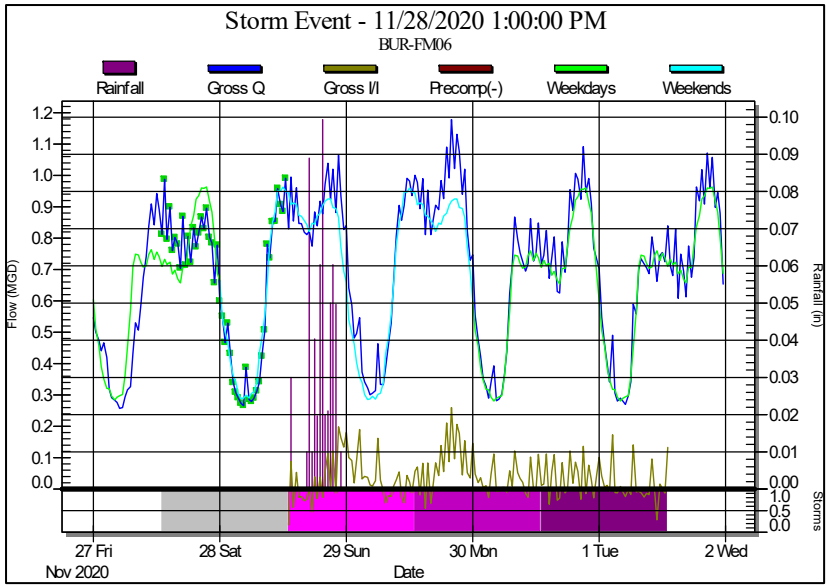

Pipe Flow
BUR-FM06
Rainfall
Qfinal(g)
Flow (MGD)
1.5
1.0
0.5
0.0
0.6
0.4
0.2
0.0
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

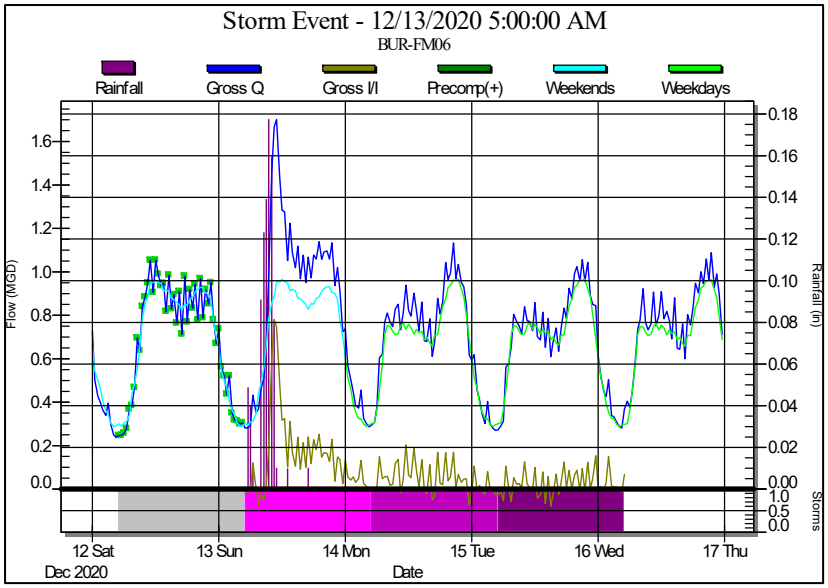

Dry Weather Flow
BUR-FM06
Weekdays
Weekends
MGD
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0
3
6
9
12
15
18
21
Hours

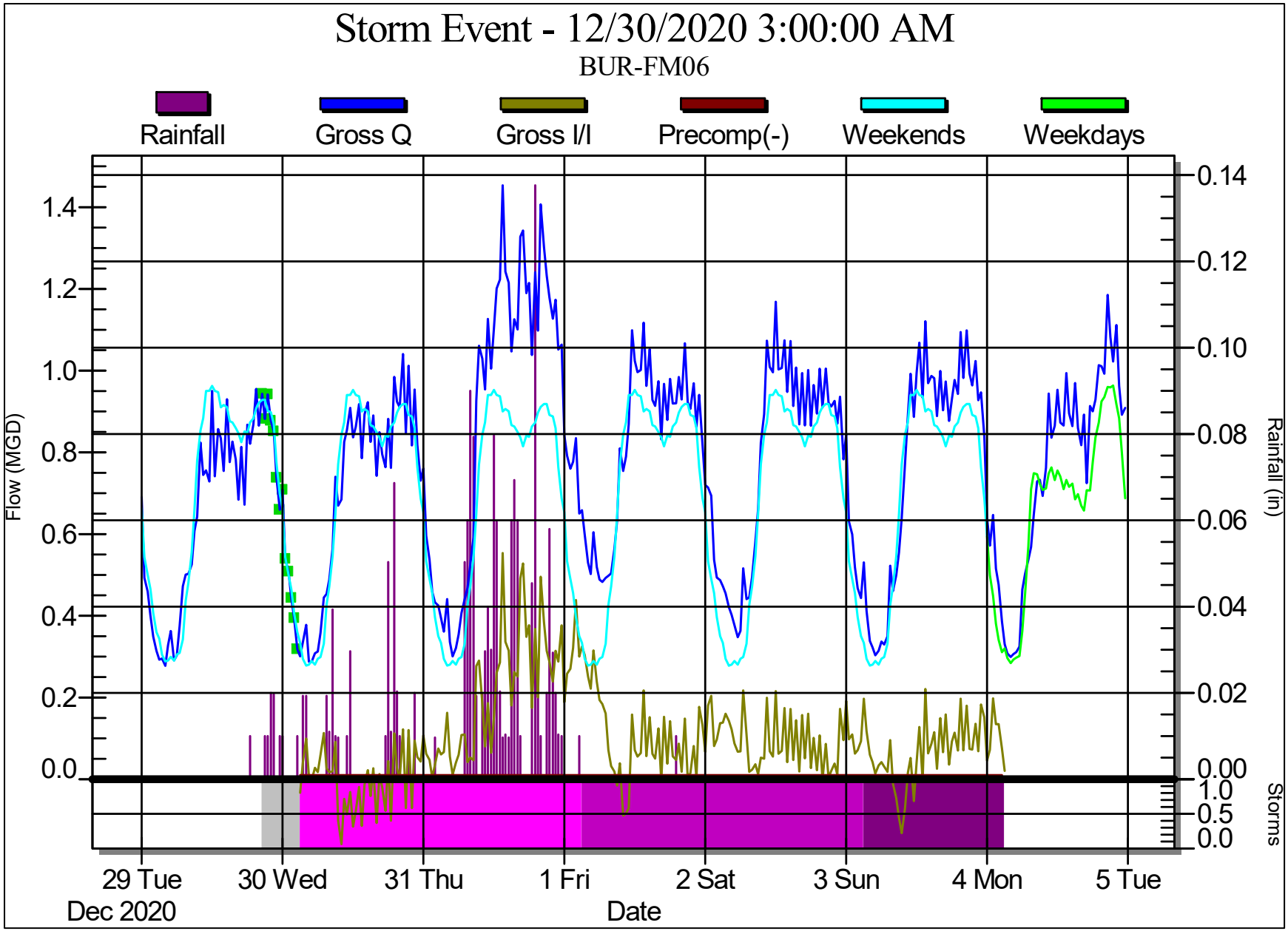

Scatter Graph
BUR-FM06
Lanfear-Coll (C-LC = 5.85)
VFINAL (ft/s)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
5.4
4.8
4.2
3.6
3
2.4
1.8
1.2
0.6
0.15
Iso Q (MGD)
0
2
4
6
8
10
12
14
16
18
DFINAL (in)


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM06
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM06
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

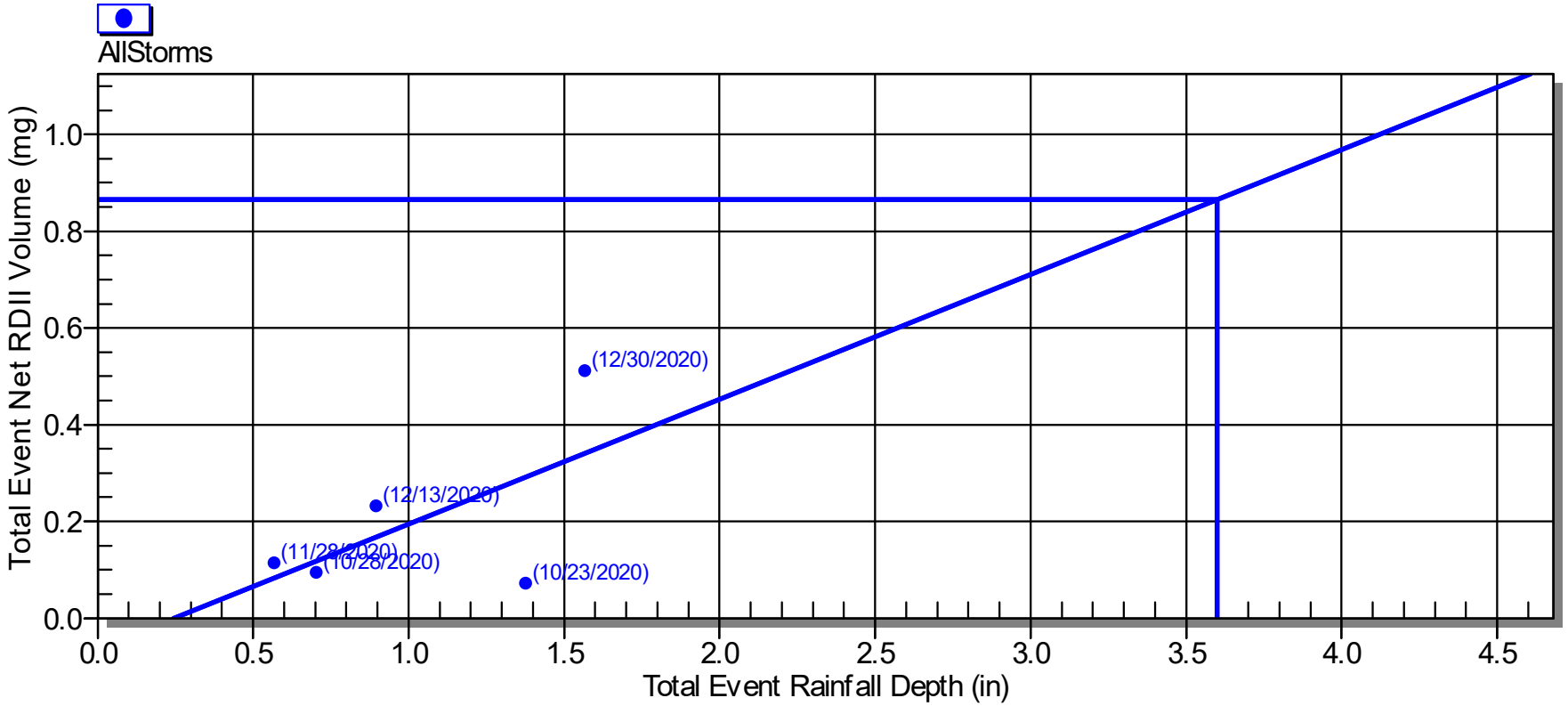

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM06
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

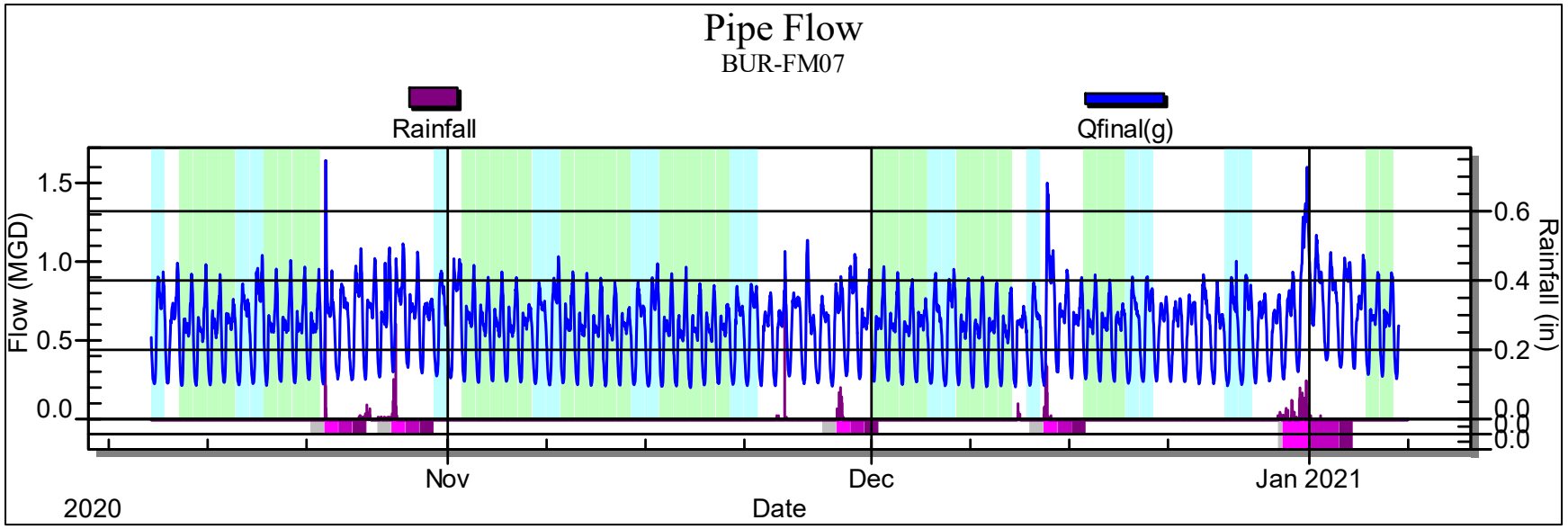

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM06
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

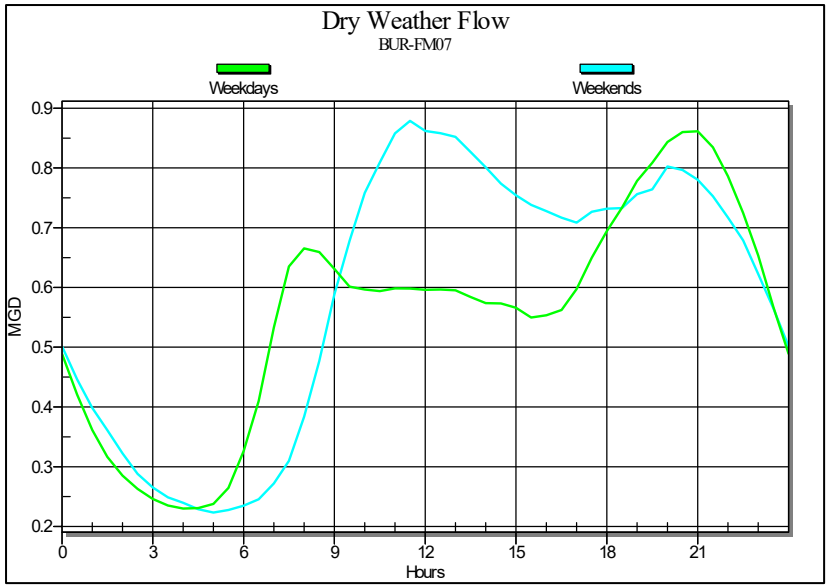

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM06
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
1.0
0.5
0.0
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

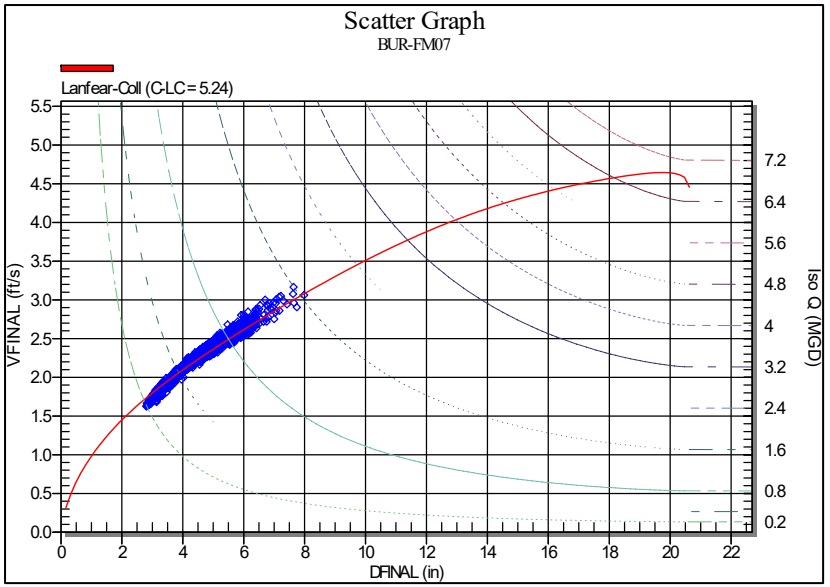
Q vs i - BUR-FM06

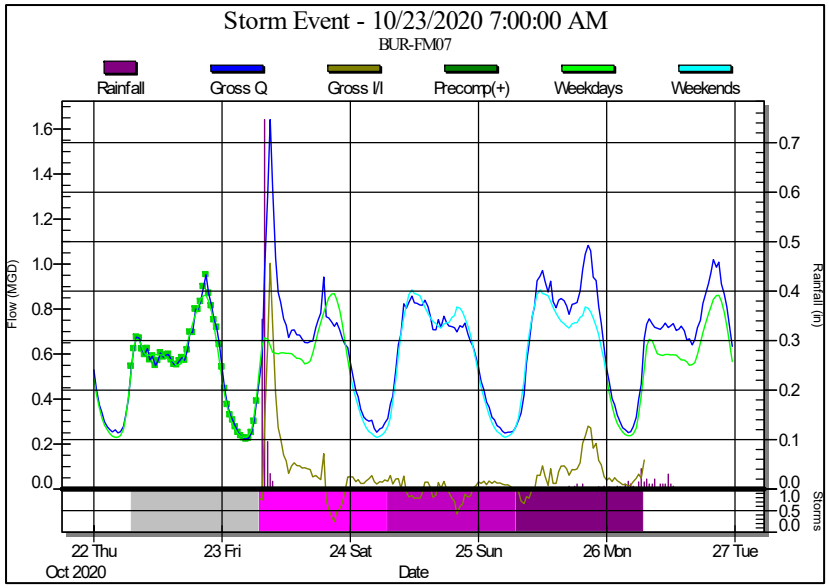
Total Event Net RDII Volume vs. Rainfall Depth

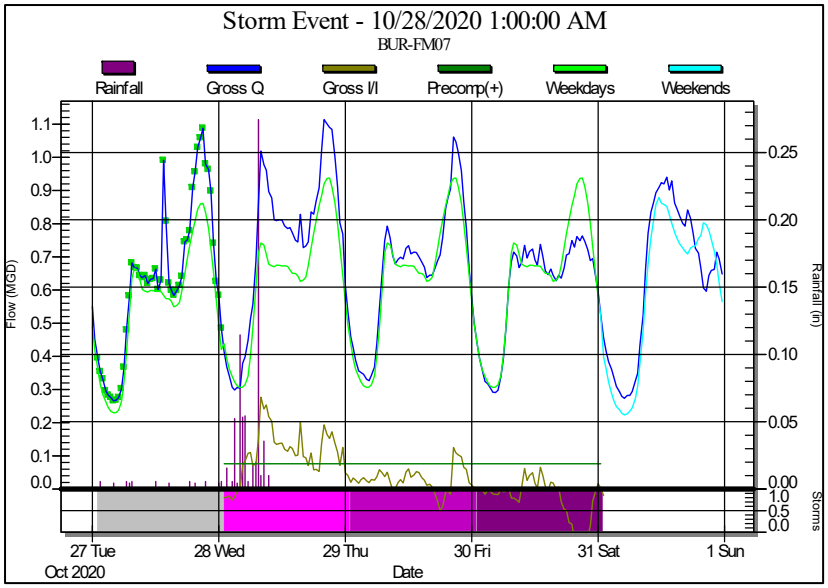


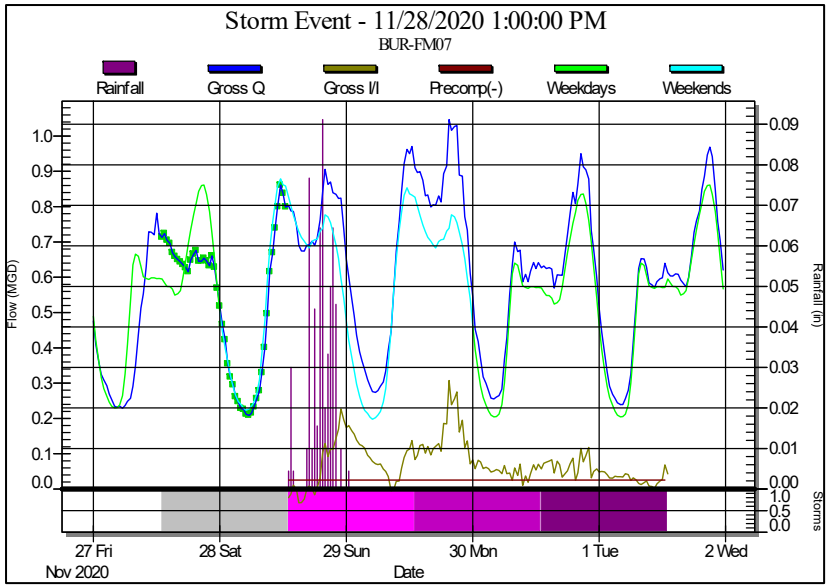

Pipe Flow
BUR-FM07
Rainfall
Qfinal(g)
Flow (MGD)
1.5
1.0
0.5
0.0
0.6
0.4
0.2
0.0
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

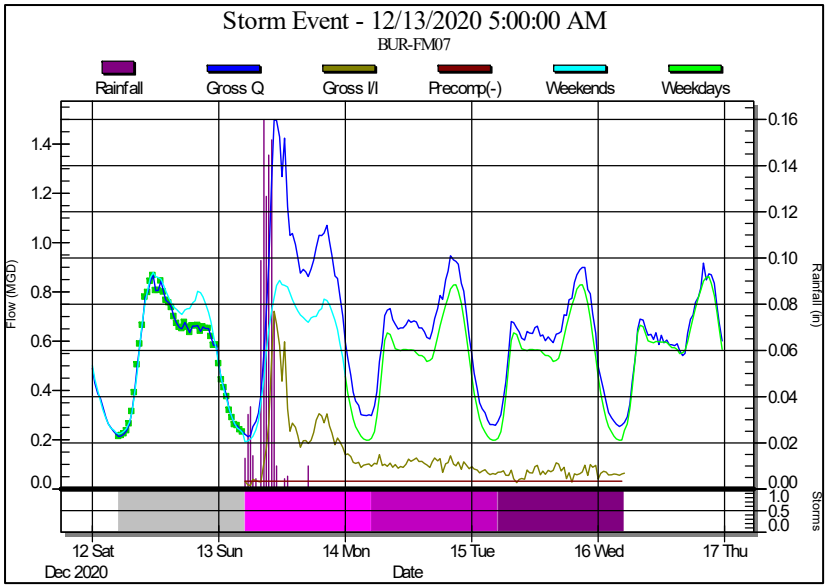

Dry Weather Flow
BUR-FM07
Weekdays
Weekends
MGD
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0
3
6
9
12
15
18
21
Hours

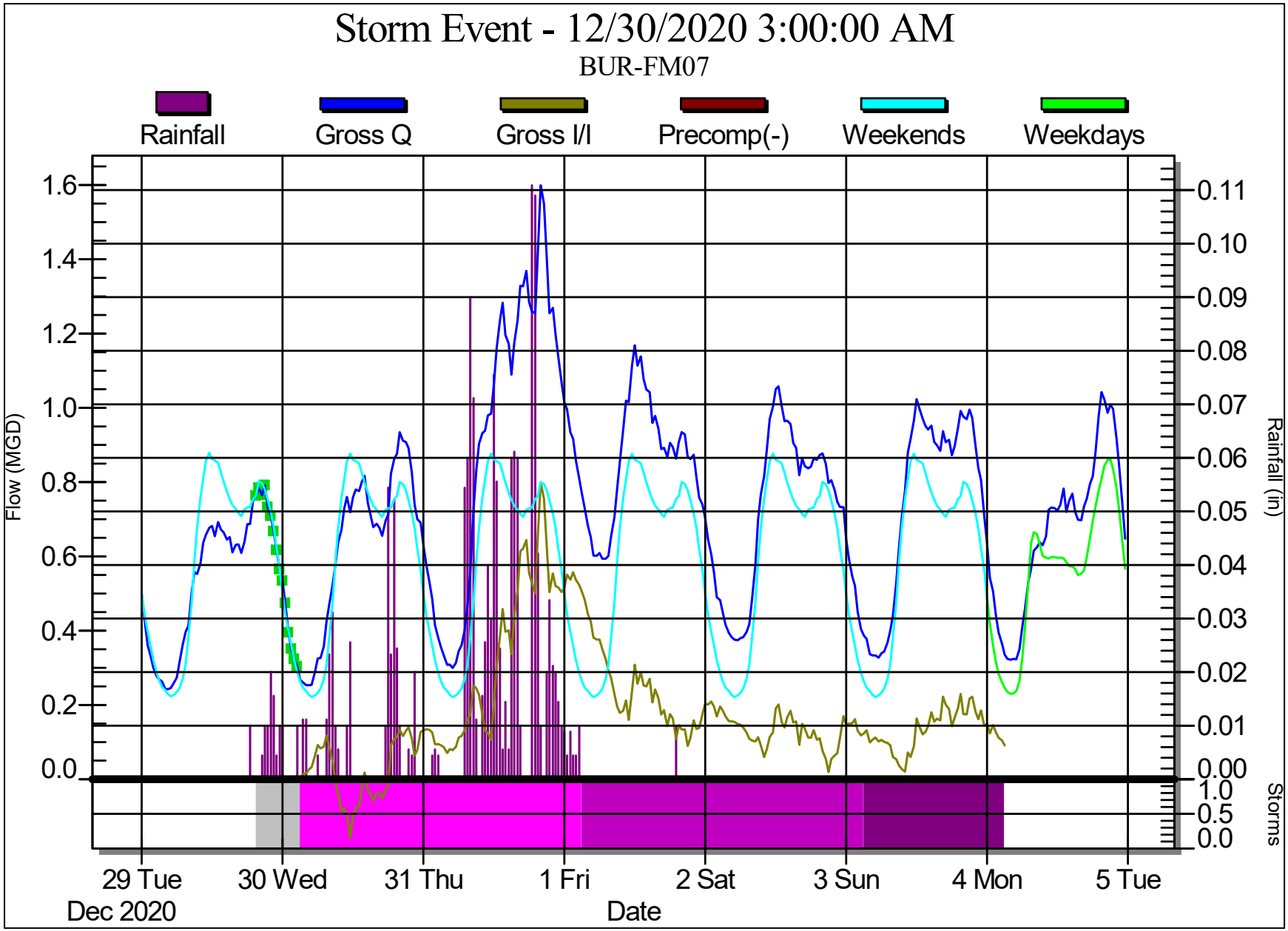

Scatter Graph
BUR-FM07
Lanfear-Coll (C-LC = 5.24)
VFINAL (ft/s)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
18
20
22
DFINAL (in)
7.2
6.4
5.6
4.8
4
3.2
2.4
1.6
0.8
0.2
Iso Q (MGD)


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM07
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM07
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

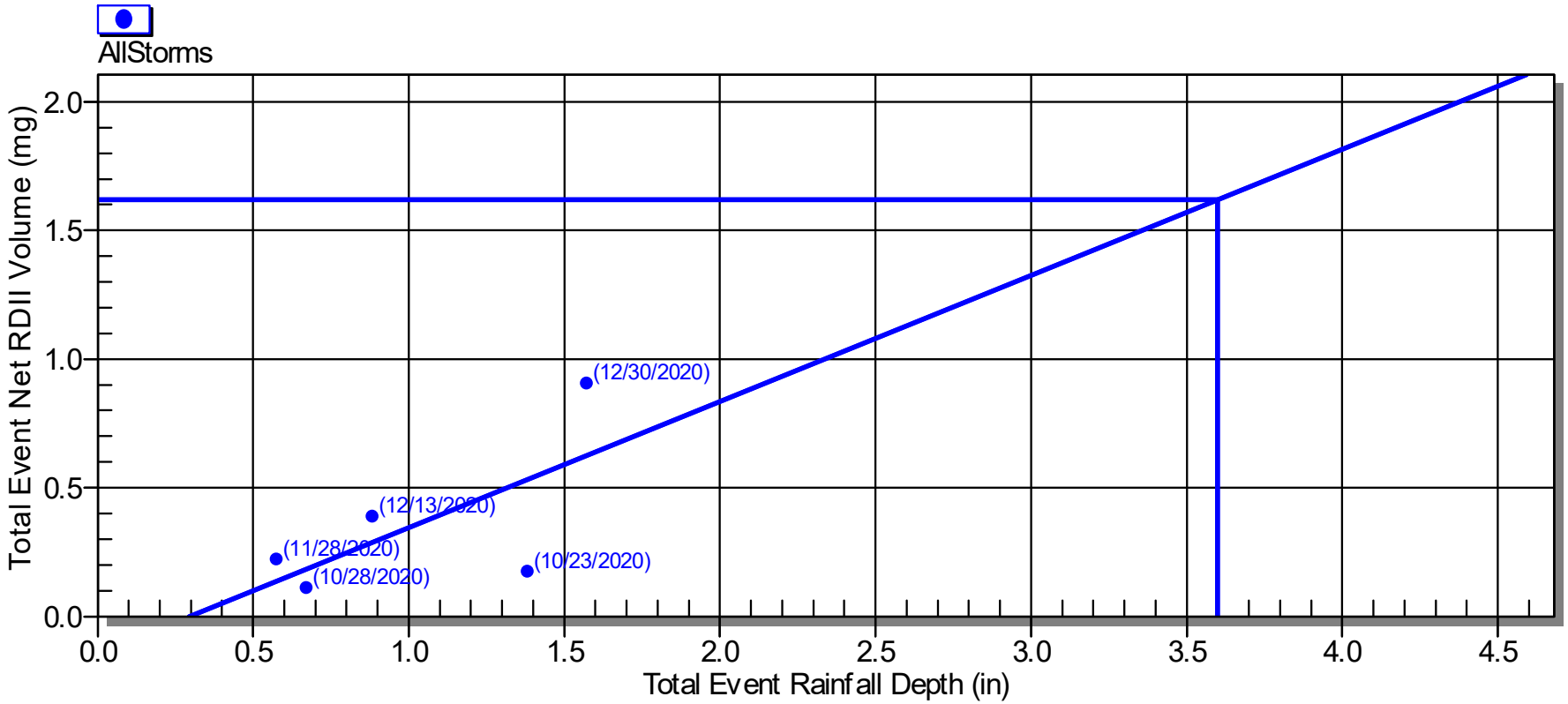

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM07
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

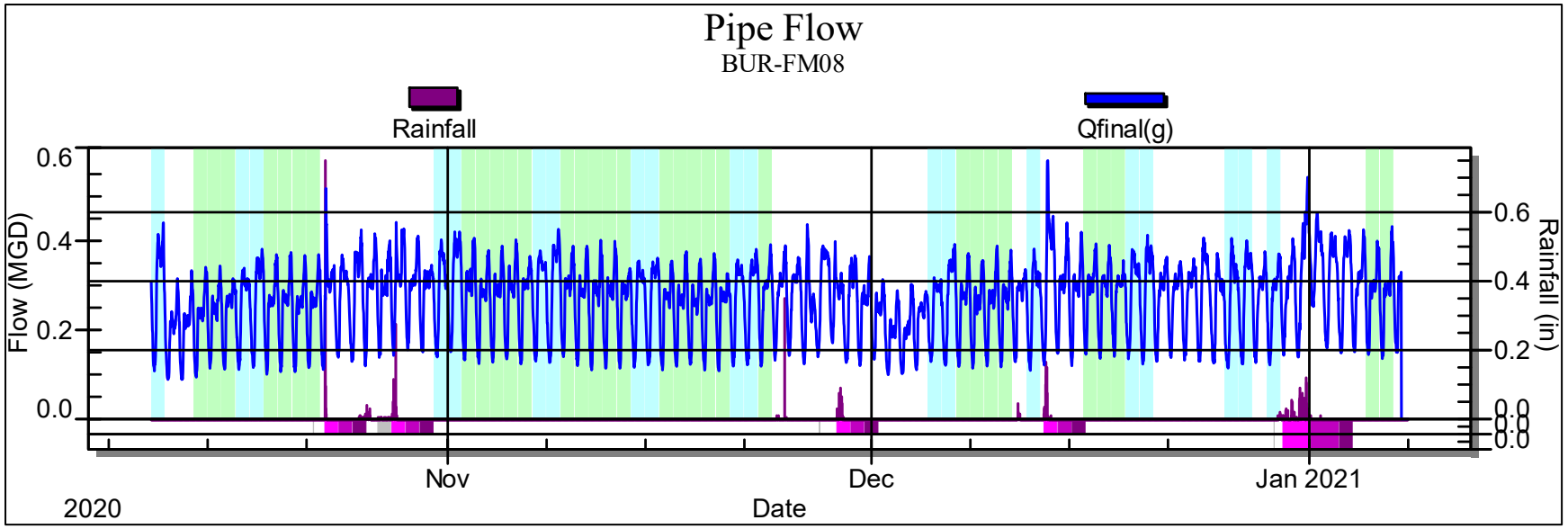

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM07
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

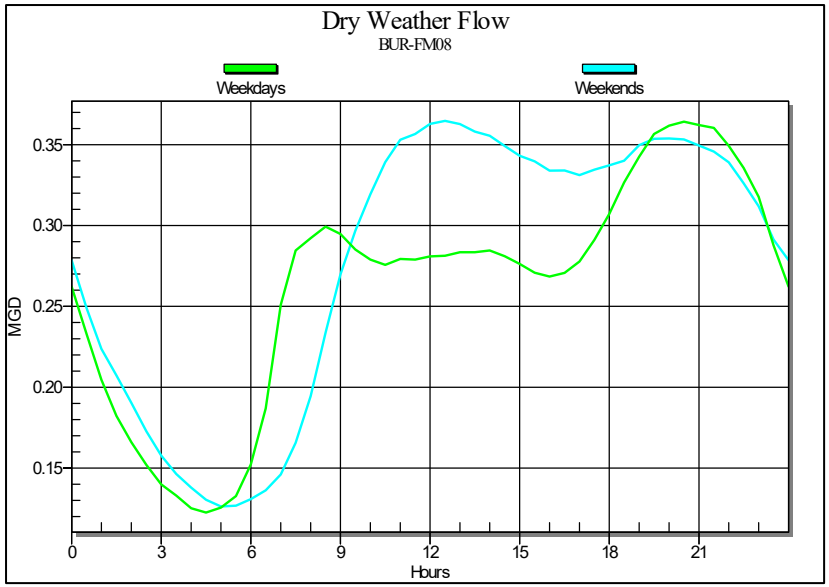

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM07
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Rainfall (in)
1.0
0.5
0.0
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

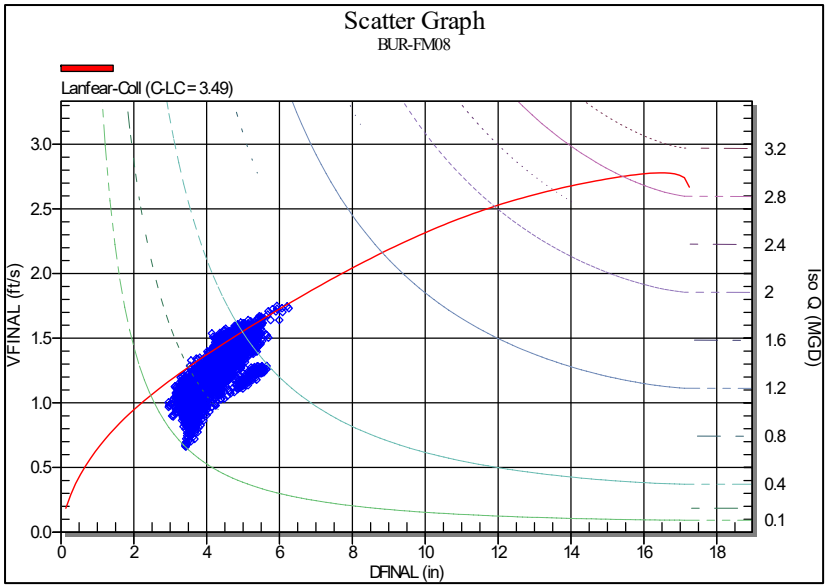
Q vs i - BUR-FM07

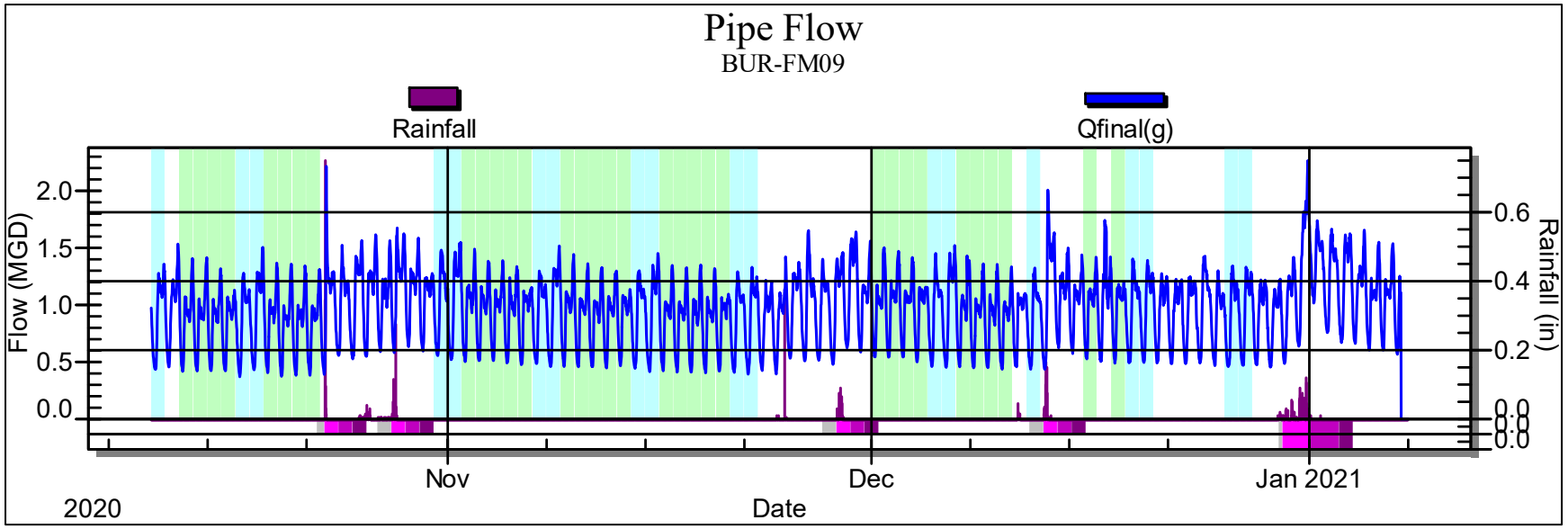
Total Event Net RDII Volume vs. Rainfall Depth

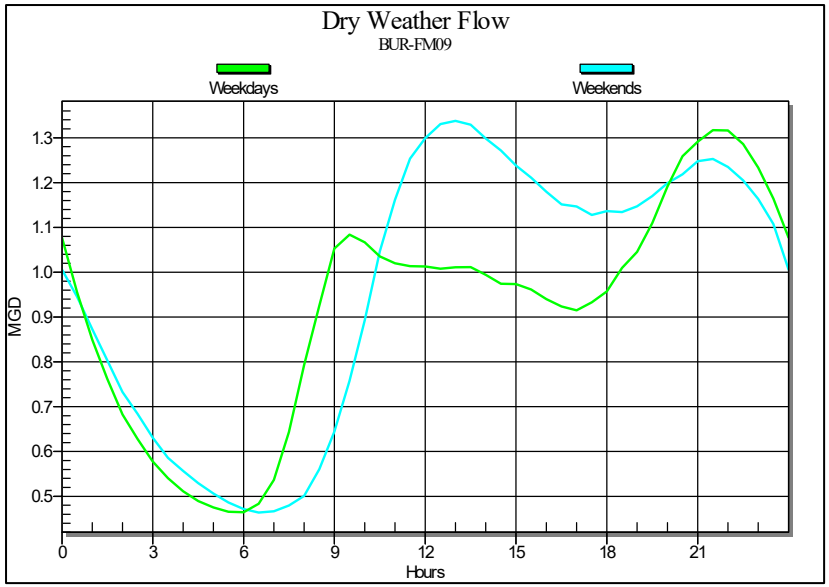


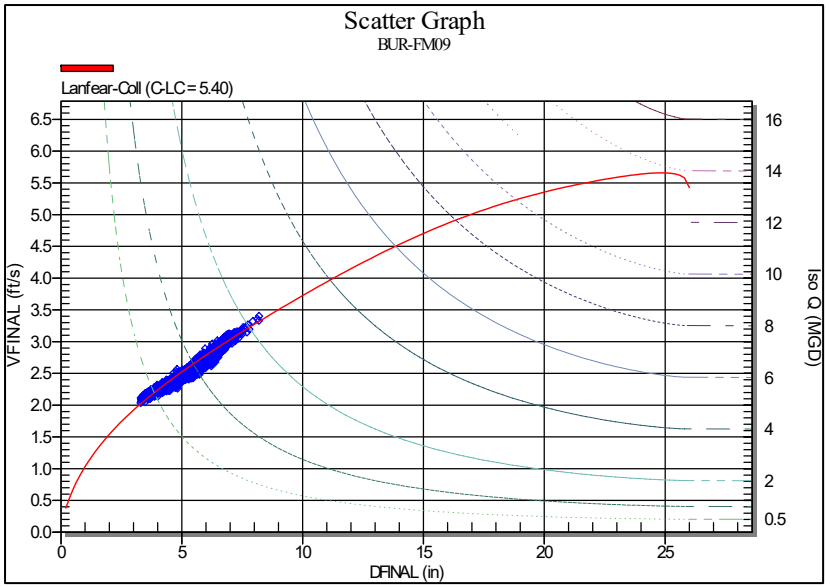

Pipe Flow
BUR-FM08
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.6
0.4
0.2
0.0
Nov
Dec
Jan 2021
2020
Date

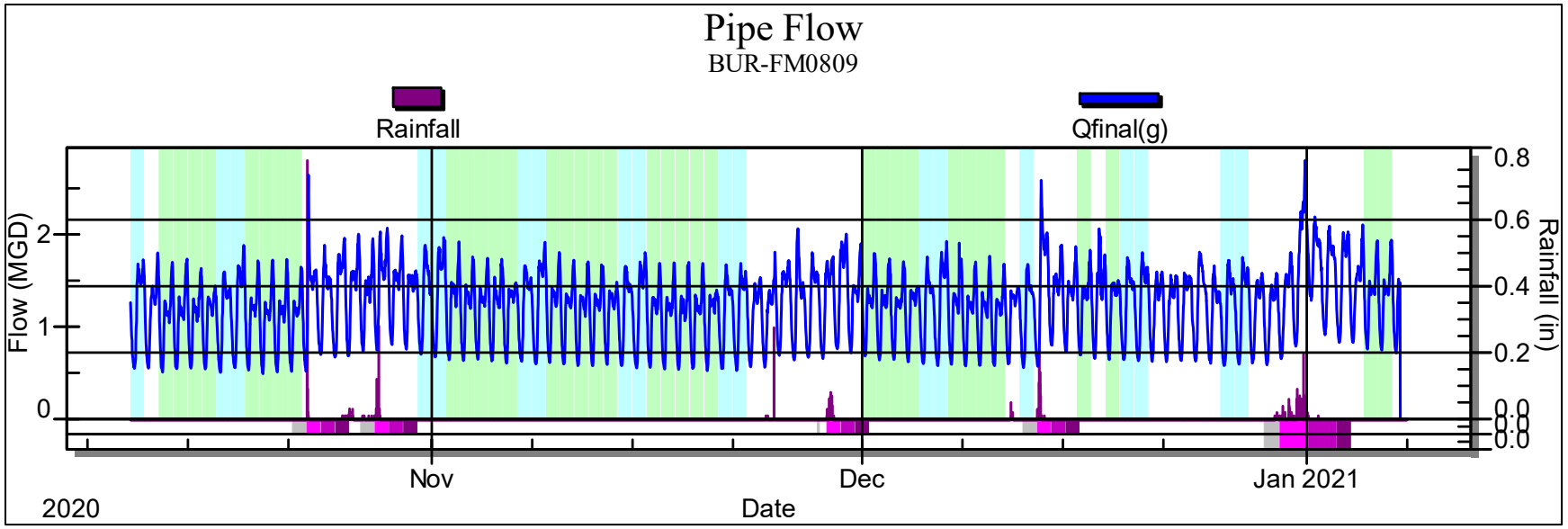

Dry Weather Flow
BUR-FM08
Weekdays
Weekends
MGD
0.35
0.30
0.25
0.20
0.15
0
3
6
9
12
15
18
21
Hours

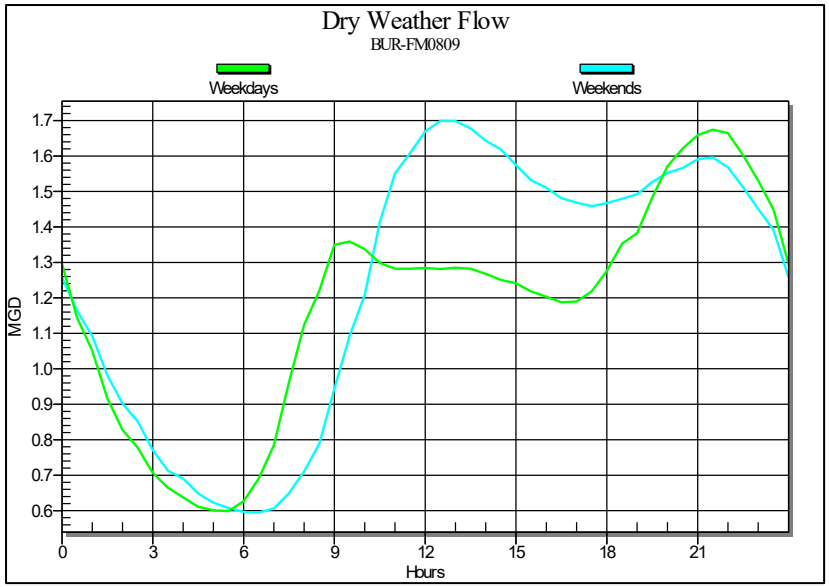

Scatter Graph
BUR-FM08
Lanfear-Coll (C-LC = 3.49)
VFINAL (ft/s)
Iso Q (MGD)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3.2
2.8
2.4
2
1.6
1.2
0.8
0.4
0.1
0
2
4
6
8
10
12
14
16
18
DFINAL (in)

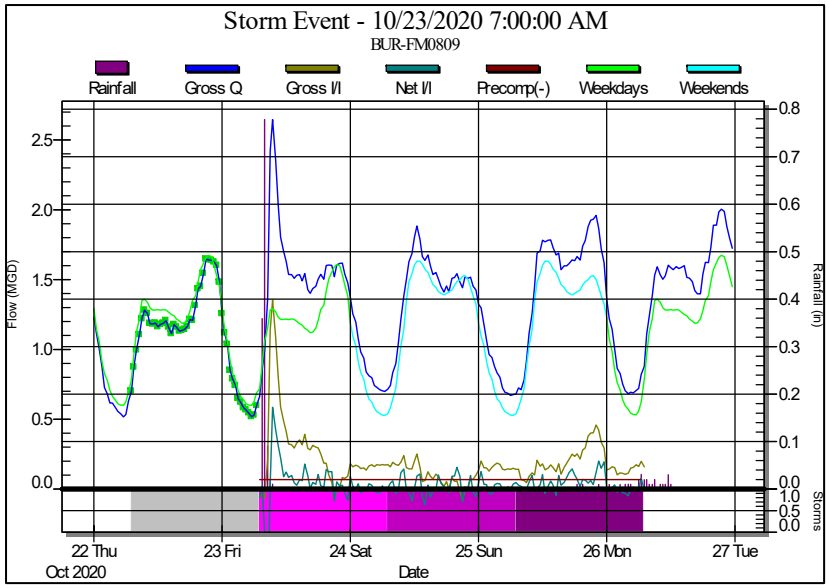

Pipe Flow
BUR-FM09
Rainfall
Qfinal(g)
Flow (MGD)
2.0
1.5
1.0
0.5
0.0
0.6
0.4
0.2
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

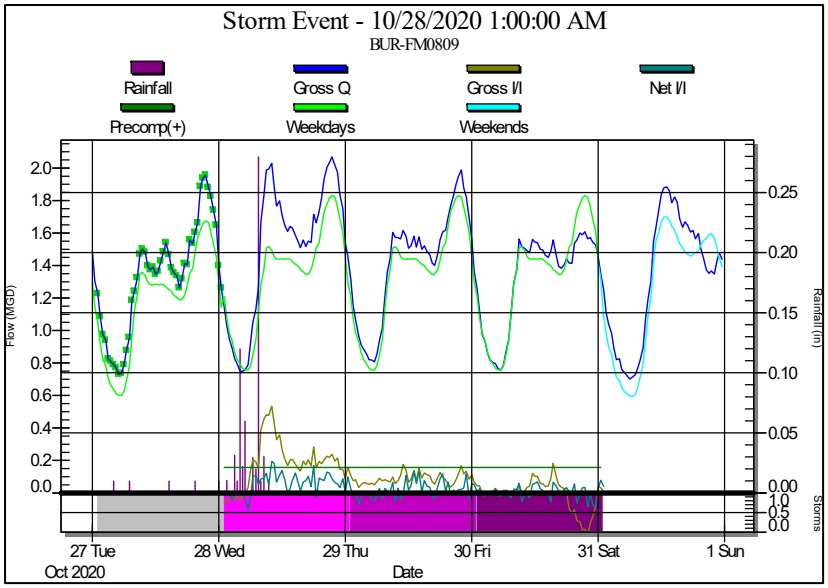

Dry Weather Flow
BUR-FM09
Weekdays
Weekends
MGD
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0
3
6
9
12
15
18
21
Hours

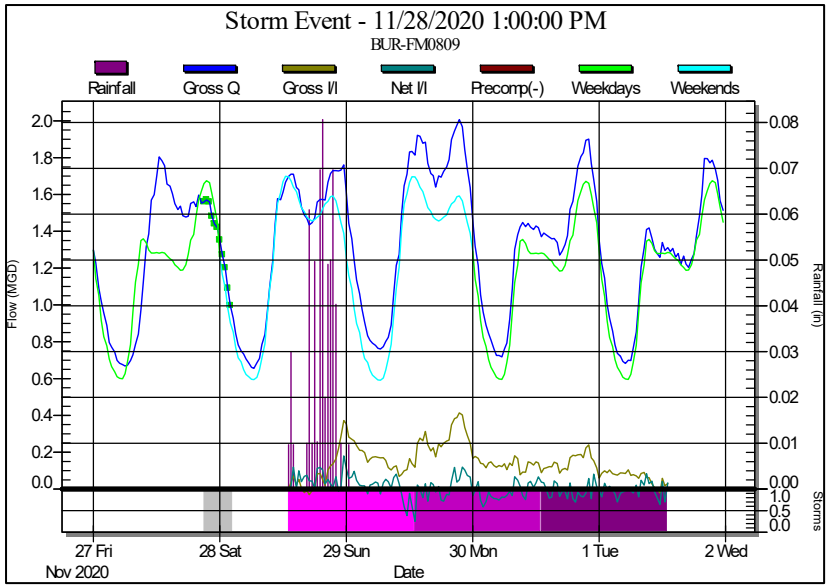

Scatter Graph
BUR-FM09
Lanfear-Coll (C-LC = 5.40)
VFINAL (ft/s)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
14
12
10
8
6
4
2
0.5
Iso Q (MGD)
0
5
10
15
20
25
DFINAL (in)

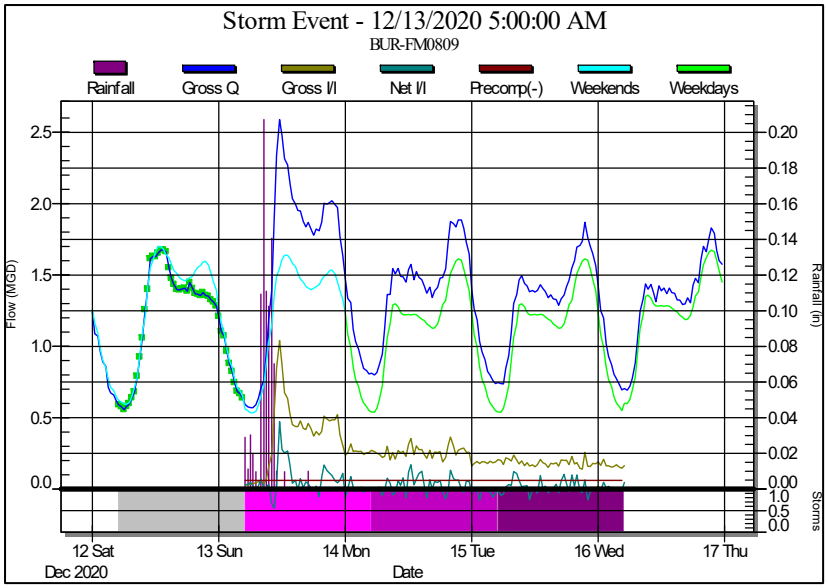

Pipe Flow
BUR-FM0809
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
2
1
0
0.8
0.6
0.4
0.2
0.0
0.0
Nov
Dec
Jan 2021
2020
Date

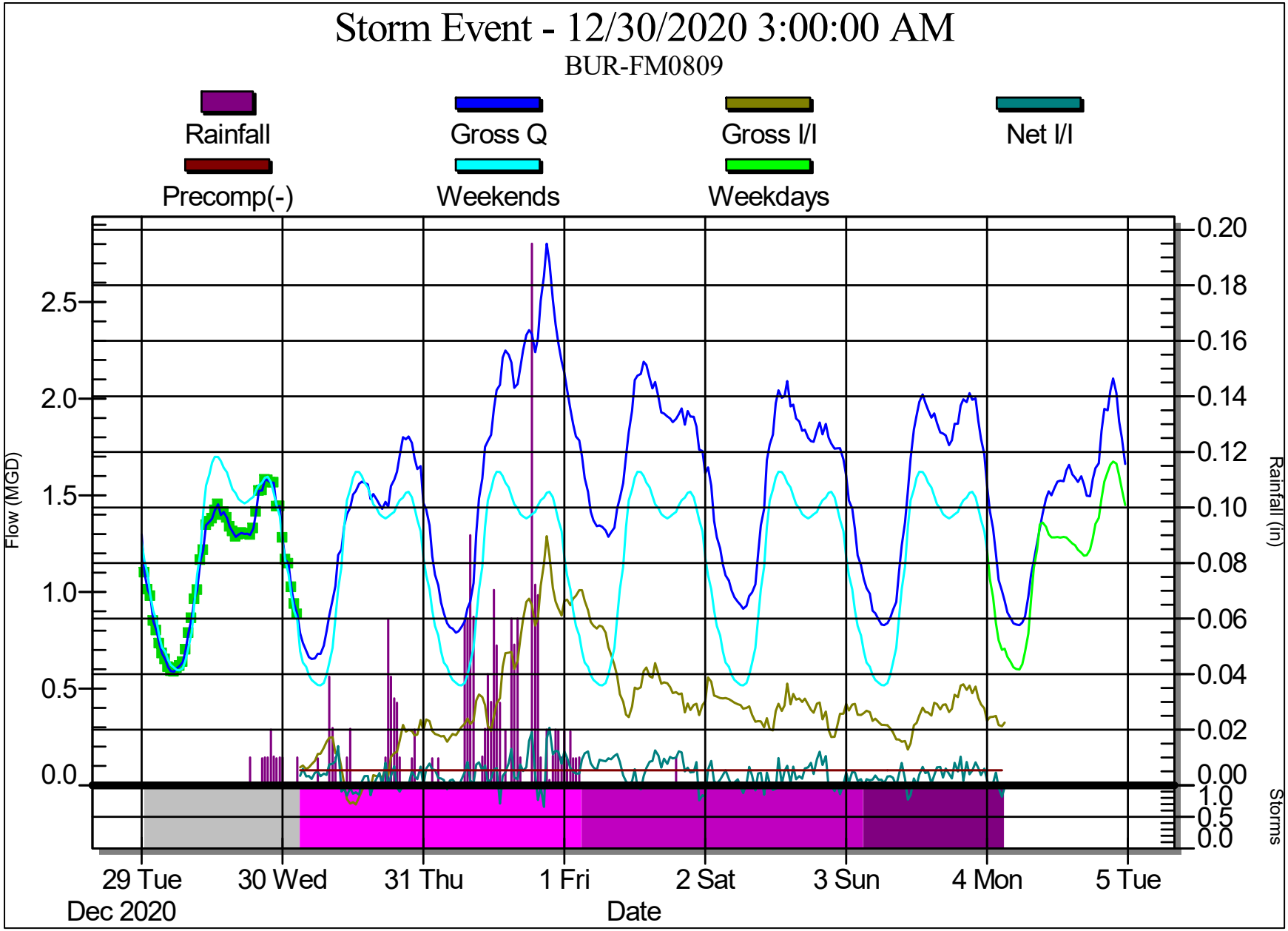

Dry Weather Flow
BUR-FM0809
Weekdays
Weekends
MGD
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0
3
6
9
12
15
18
21
Hours


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM0809
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM0809
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

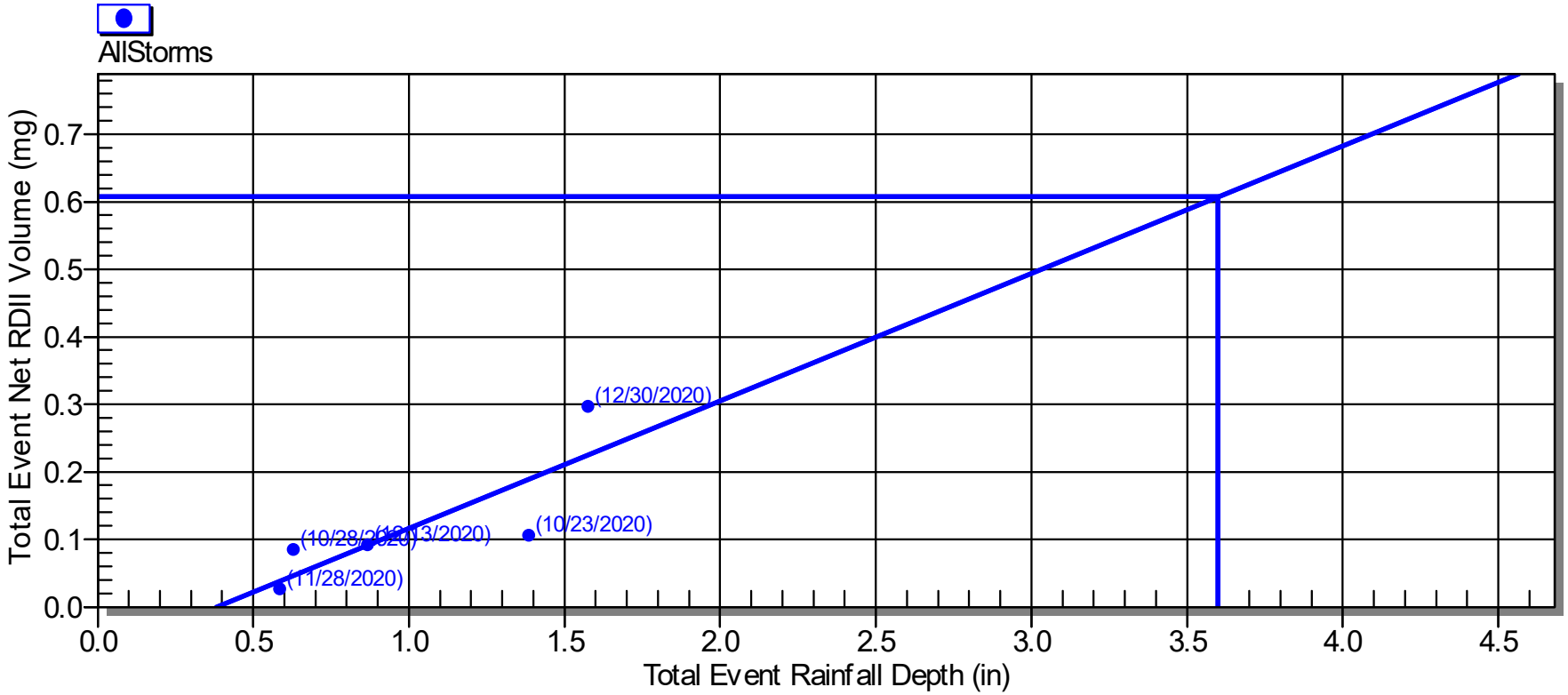

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM0809
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

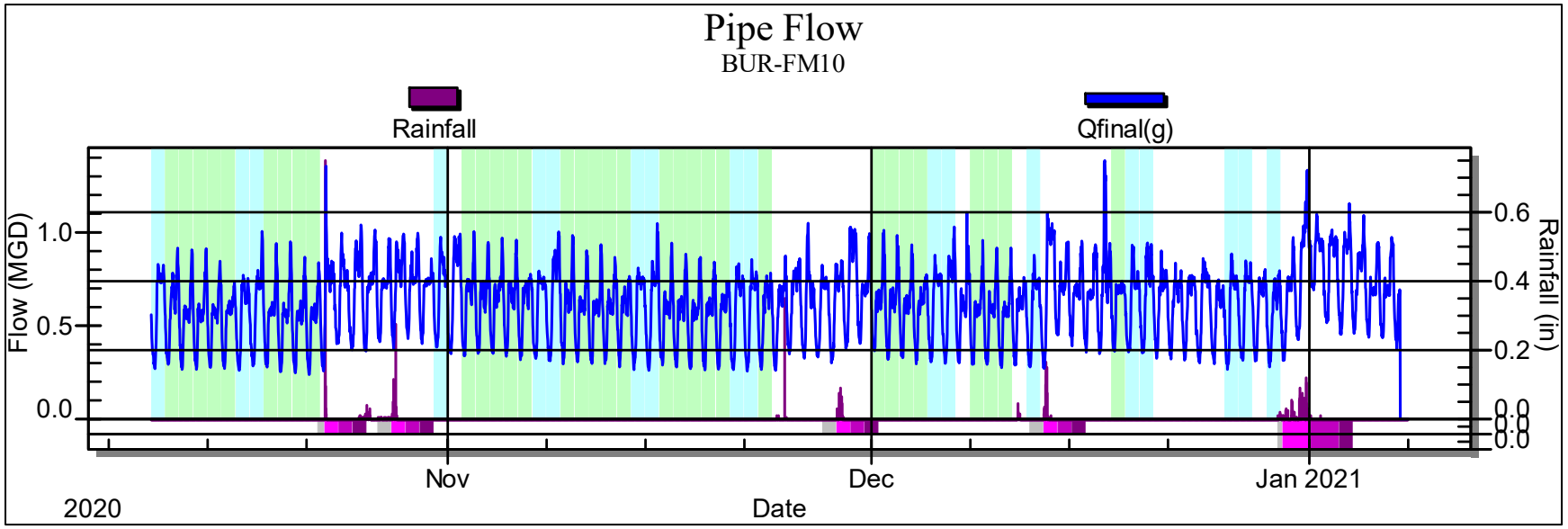

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM0809
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

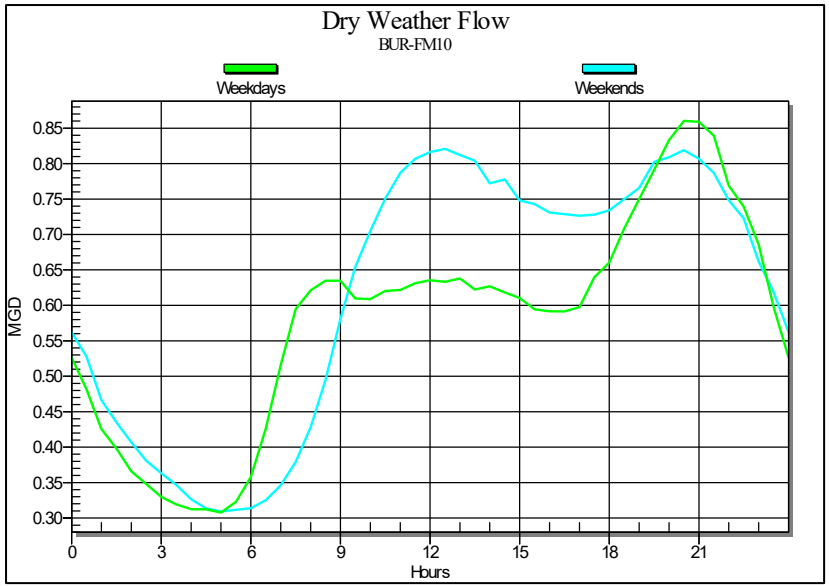

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM0809
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
2.5
2.0
1.5
1.0
0.5
0.0
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1.0
0.5
0.0
Rainfall (in)
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

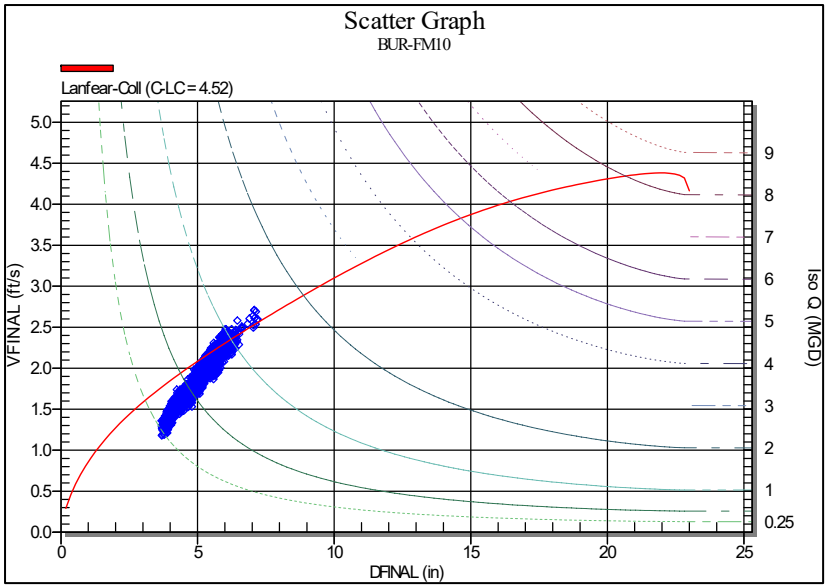
Q vs i - BUR-FM0809

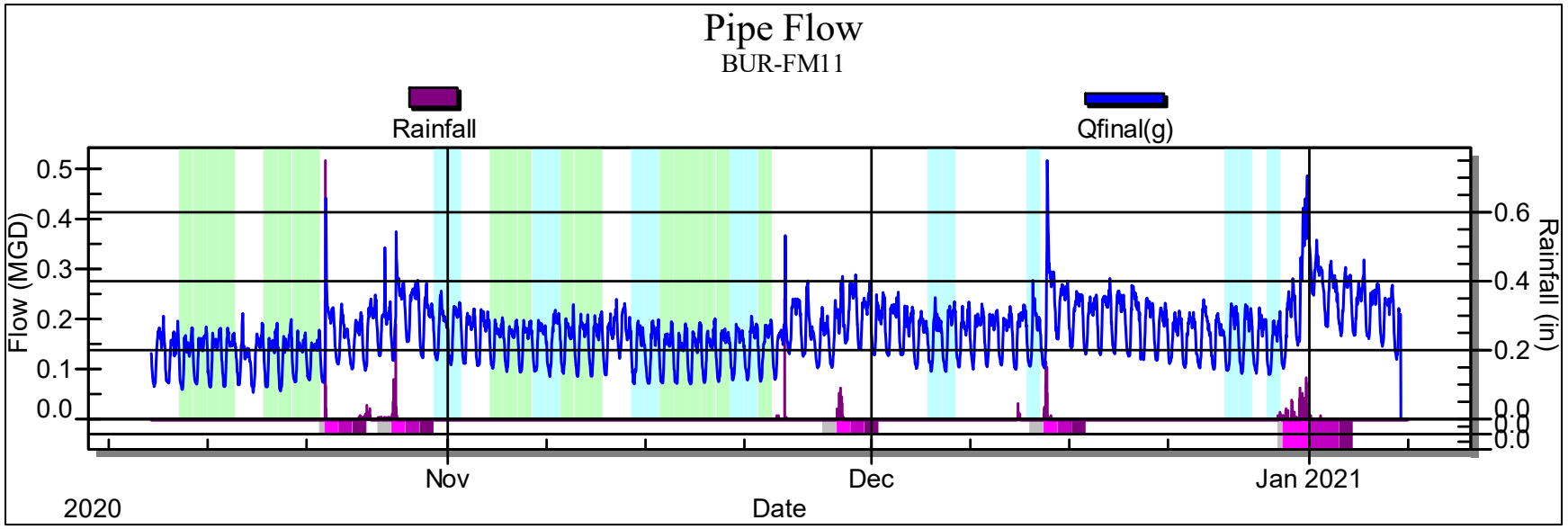
Total Event Net RDII Volume vs. Rainfall Depth

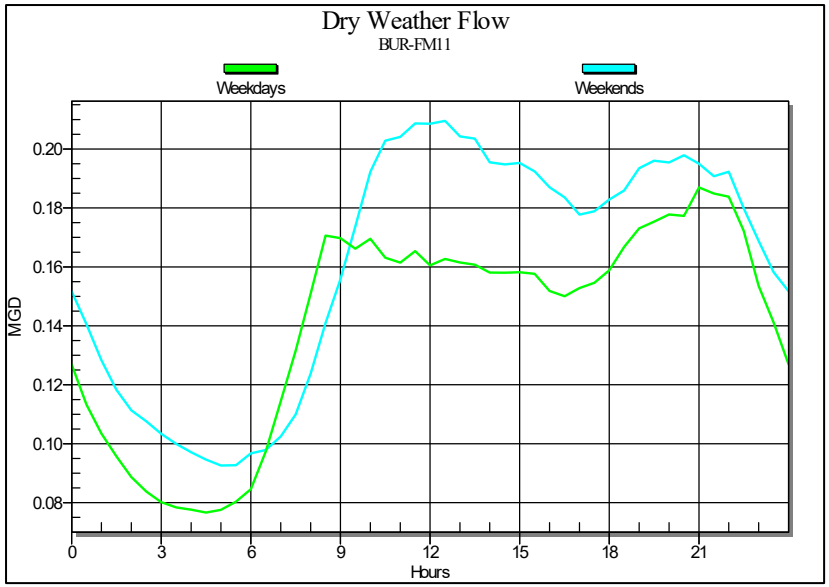


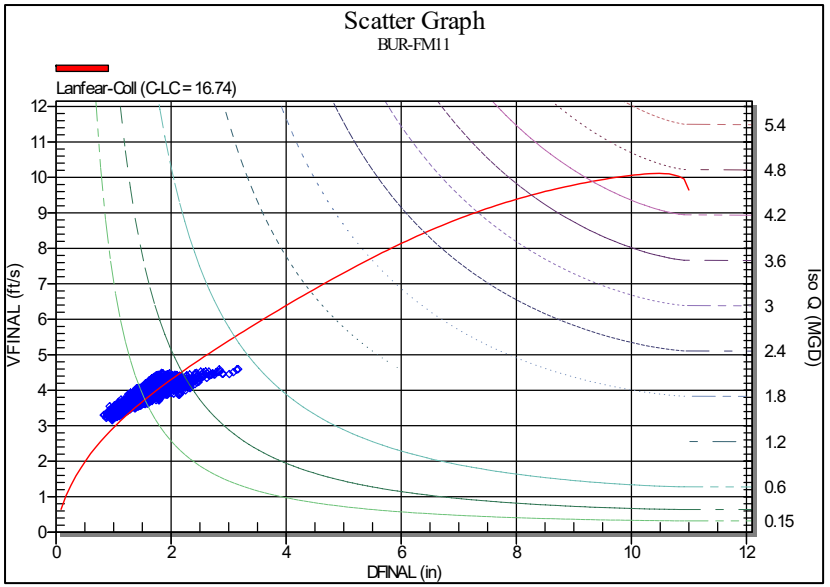

Pipe Flow
BUR-FM10
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
0.6
0.4
0.2
0.0
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

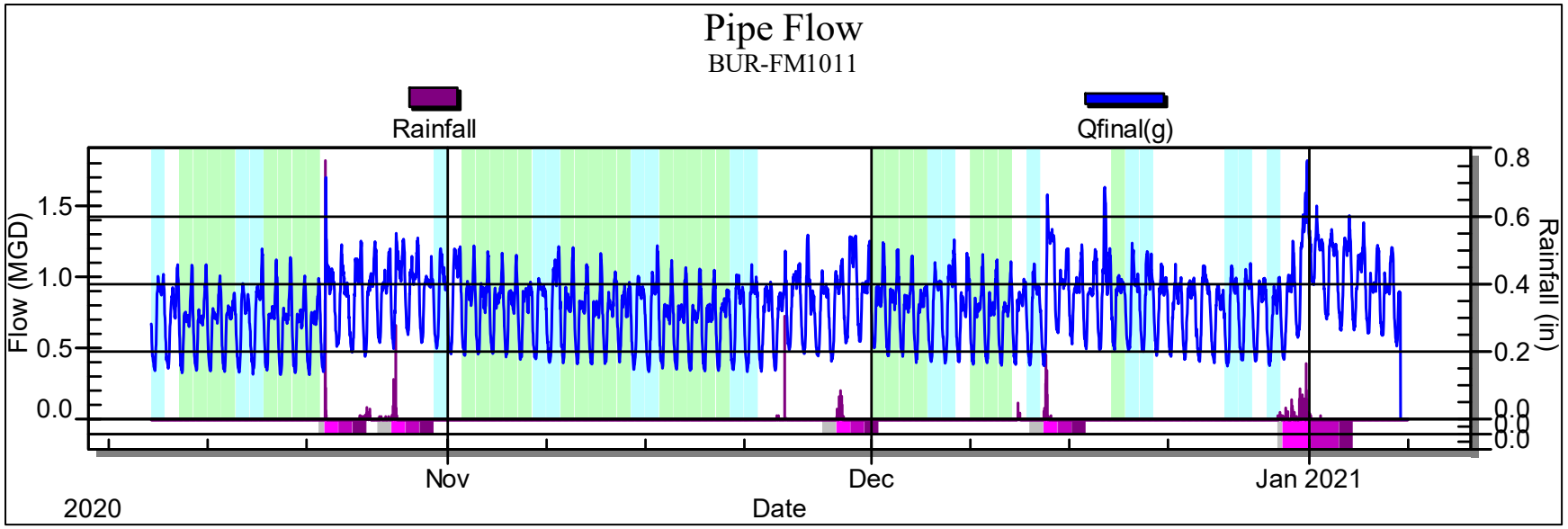

Dry Weather Flow
BUR-FM10
Weekdays
Weekends
MGD
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0
3
6
9
12
15
18
21
Hours

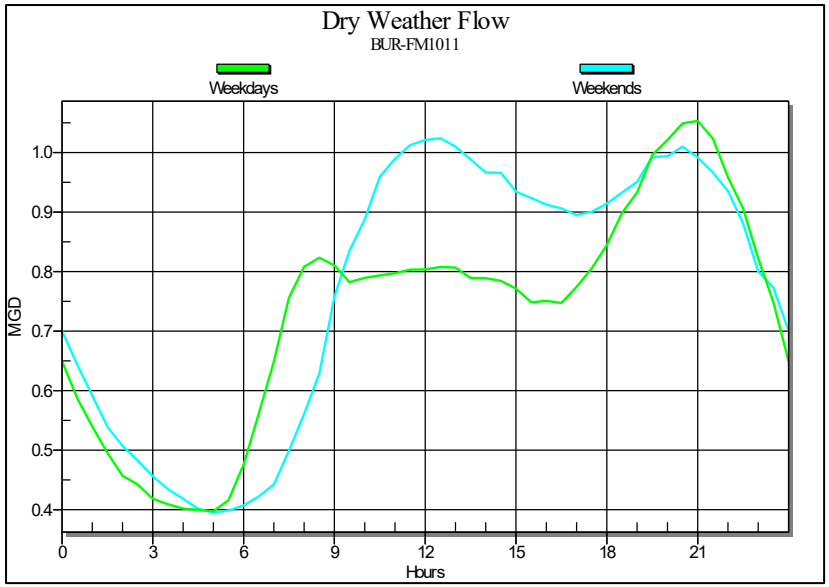

Scatter Graph
BUR-FM10
Lanfear-Coll (C-LC = 4.52)
VFINAL (ft/s)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
DFINAL (in)
9
8
7
6
5
4
3
2
1
0.25
Iso Q (MGD)

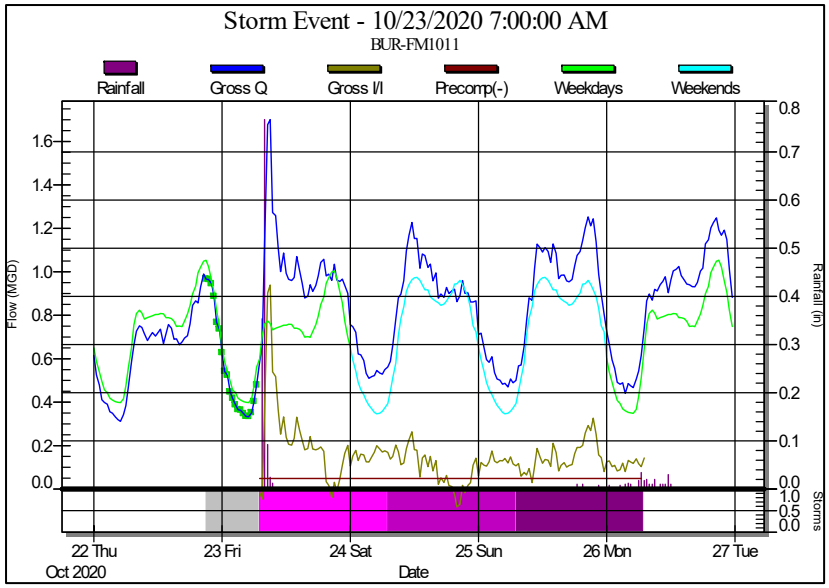

Pipe Flow
BUR-FM11
Rainfall
Qfinal(g)
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
0.0
0.6
0.4
0.2
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

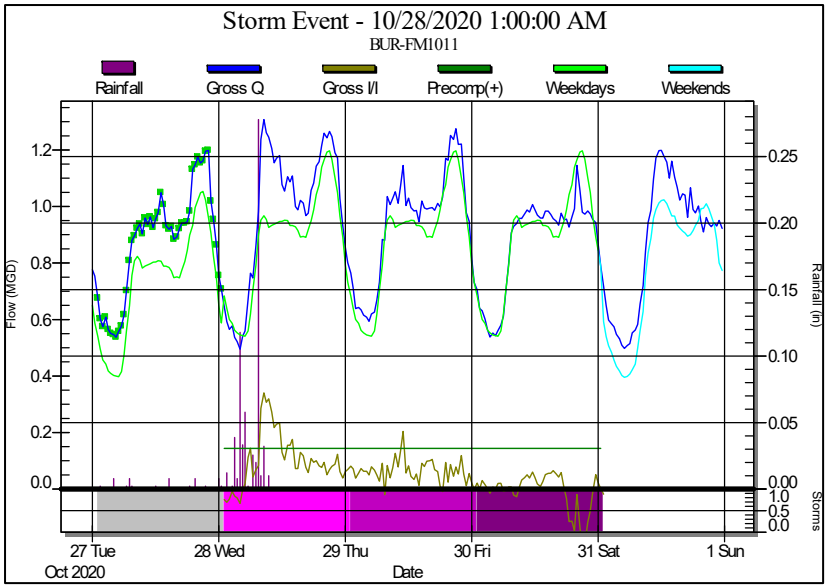

Dry Weather Flow
BUR-FM11
Weekdays
Weekends
MGD
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0
3
6
9
12
15
18
21
Hours

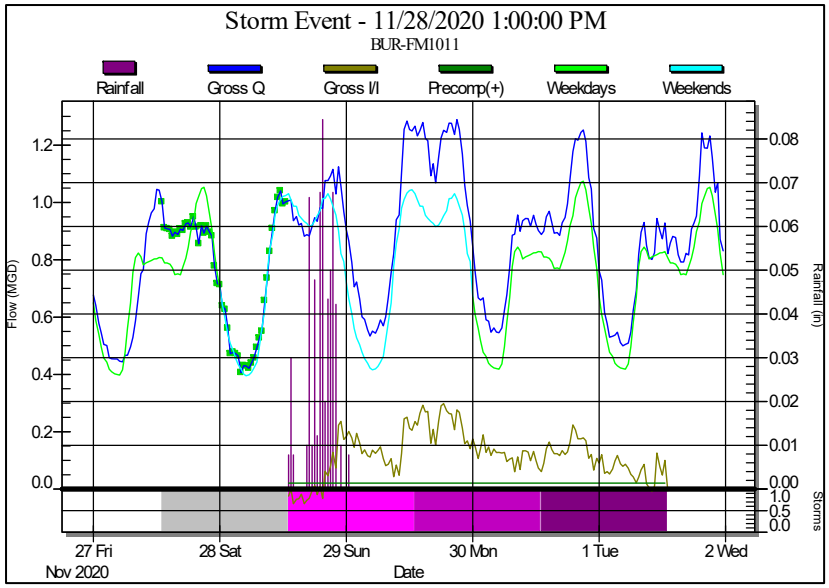

Scatter Graph
BUR-FM11
Lanfear-Coll (C-LC = 16.74)
VFINAL (ft/s)
12
11
10
9
8
7
6
5
4
3
2
1
0
0
2
4
6
8
10
12
DFINAL (in)
5.4
4.8
4.2
3.6
3
2.4
1.8
1.2
0.6
0.15
Iso Q (MGD)

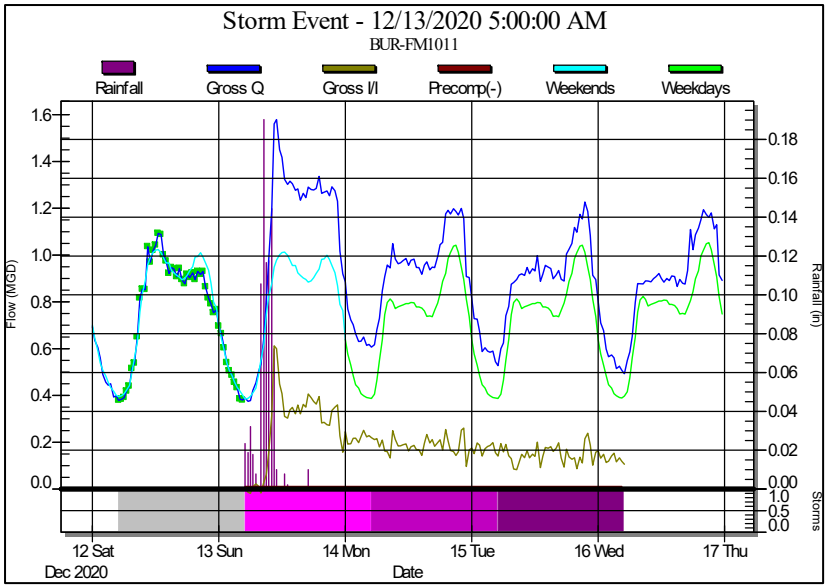

Pipe Flow
BUR-FM1011
Rainfall
Qfinal(g)
Flow (MGD)
1.5
1.0
0.5
0.0
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
Nov
Dec
Jan 2021
2020
Date

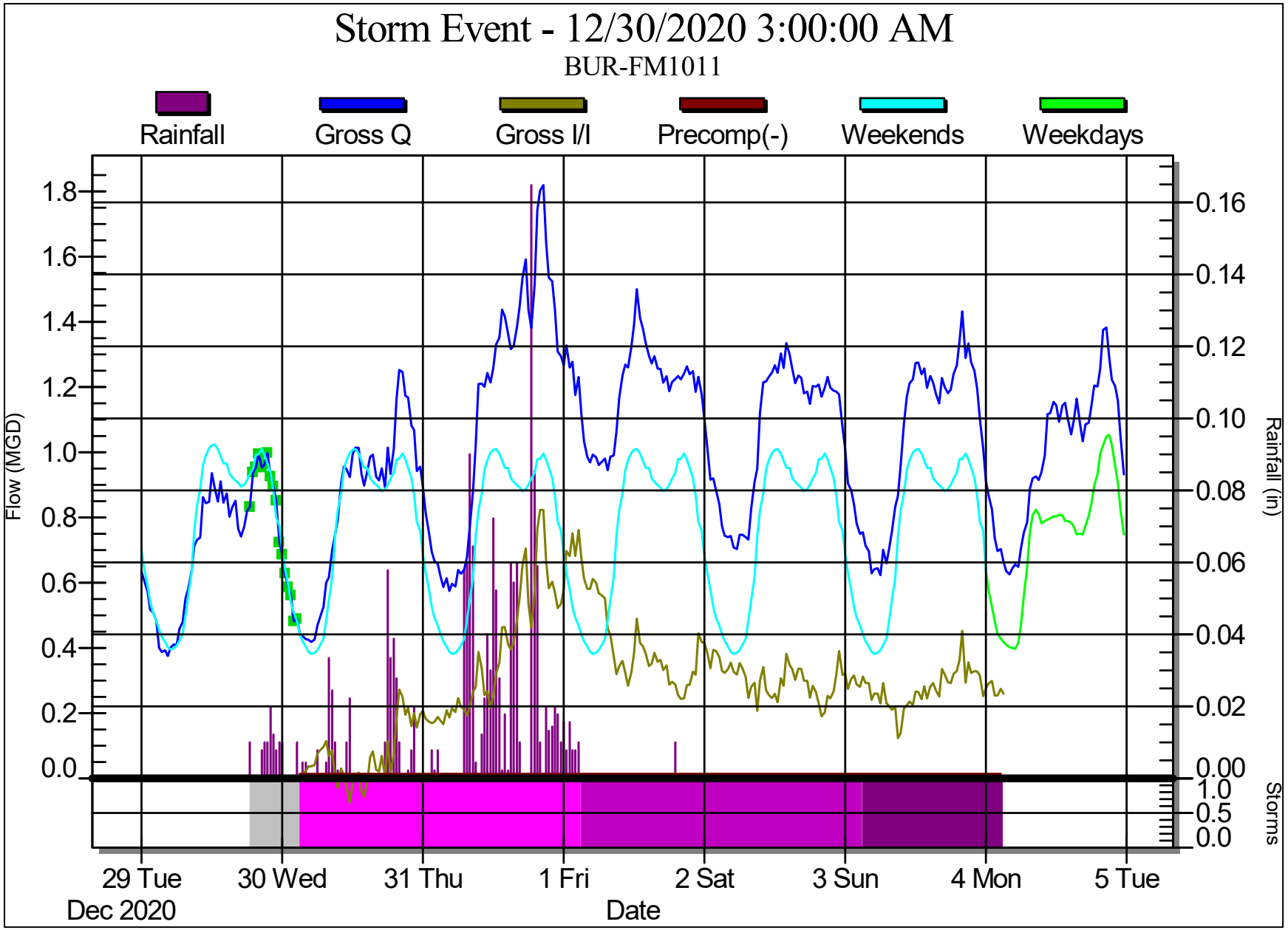

Dry Weather Flow
BUR-FM1011
Weekdays
Weekends
MGD
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
3
6
9
12
15
18
21
Hours


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM1011
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM1011
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

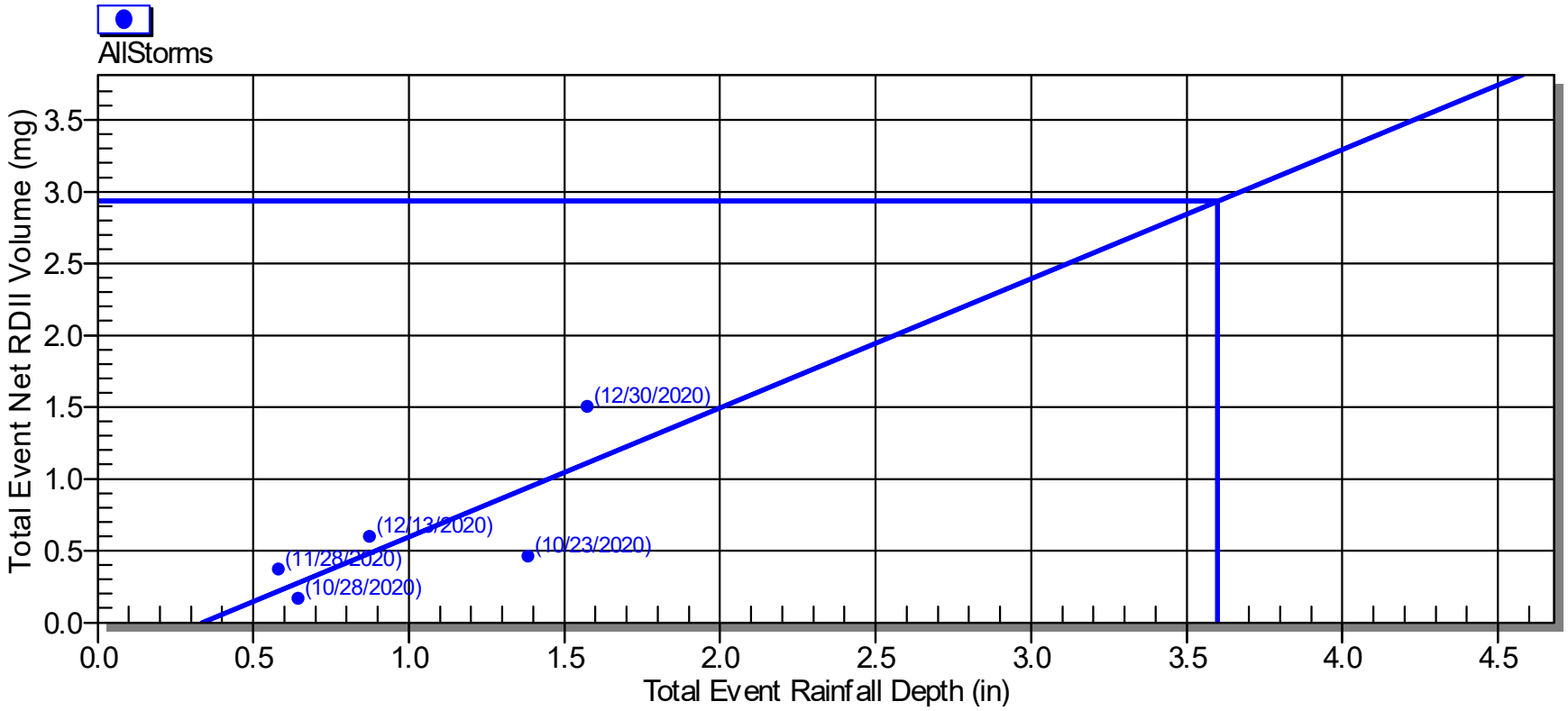

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM1011
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date

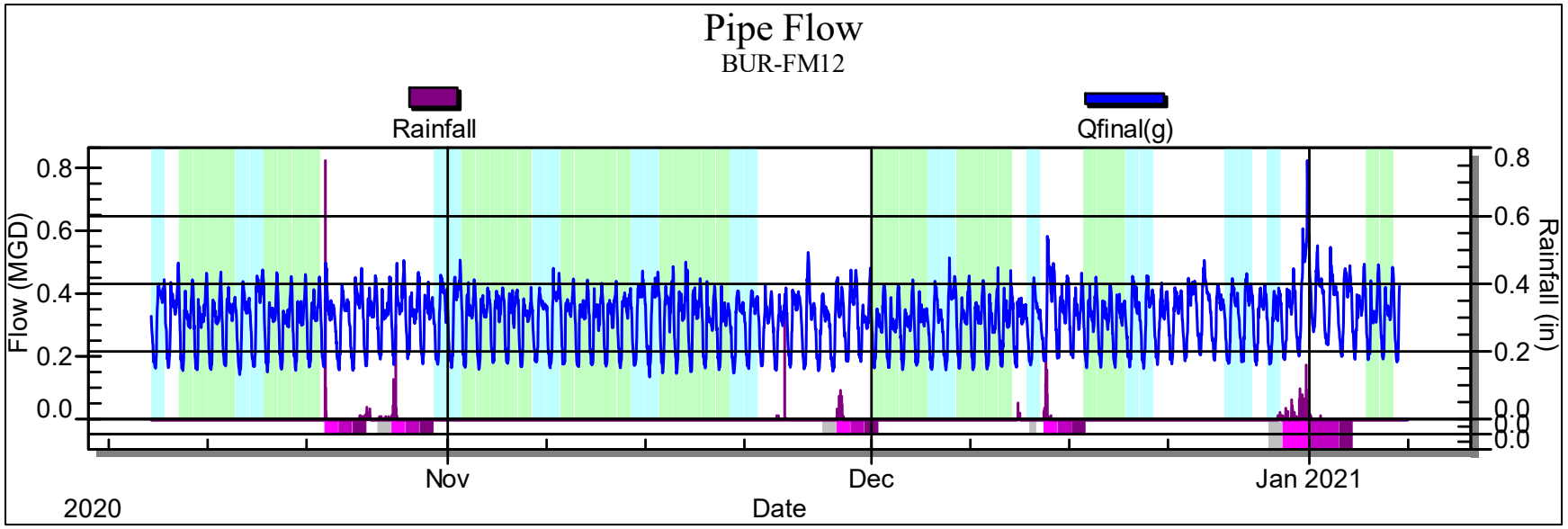

Storm Event - 12/13/2020 5:00:00 AM
BUR-FM1011
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date

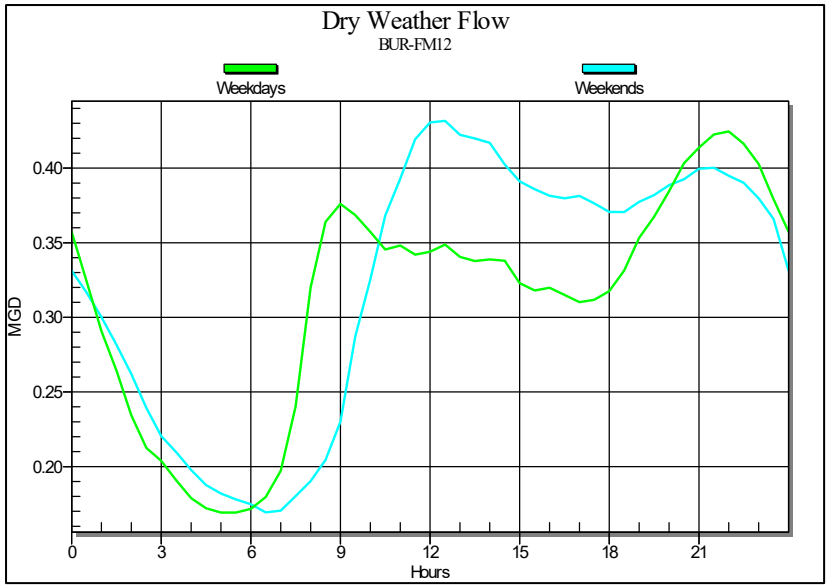

Storm Event - 12/30/2020 3:00:00 AM
BUR-FM1011
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Storms
1.0
0.5
0.0
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

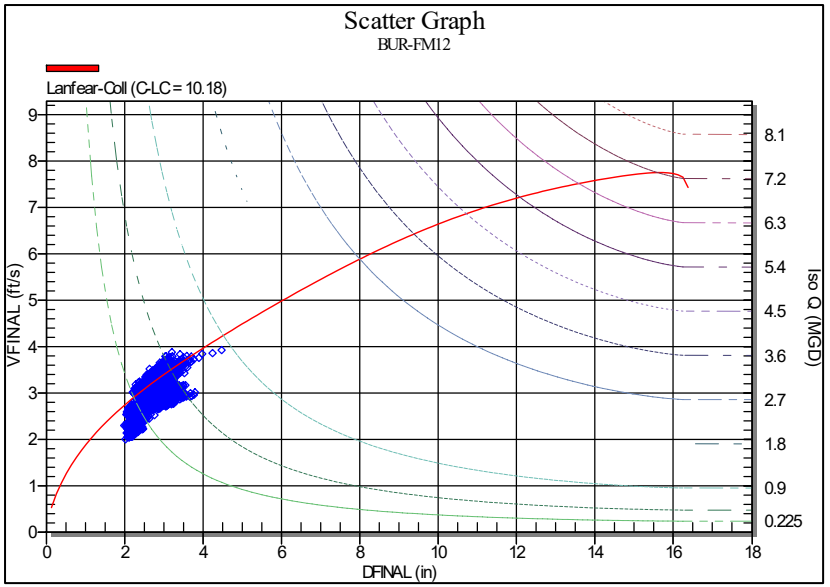
Q vs i - BUR-FM1011

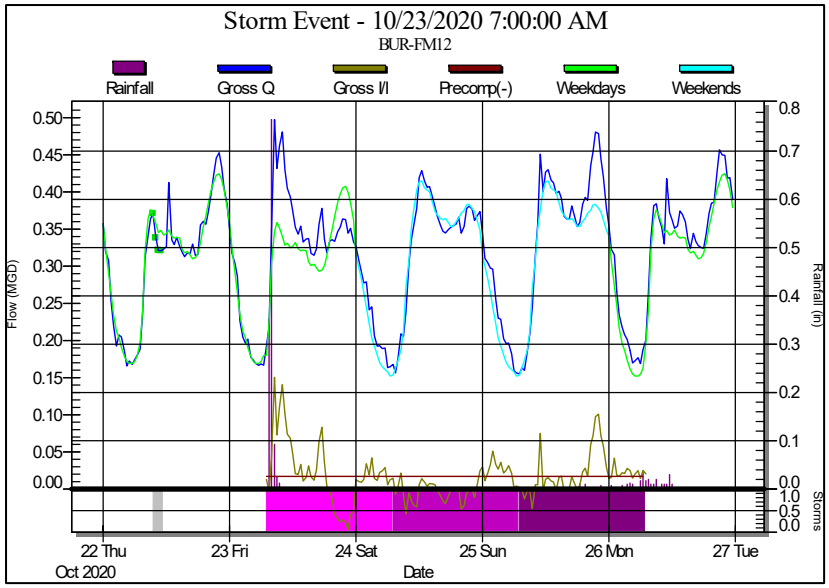
Total Event Net RDII Volume vs. Rainfall Depth

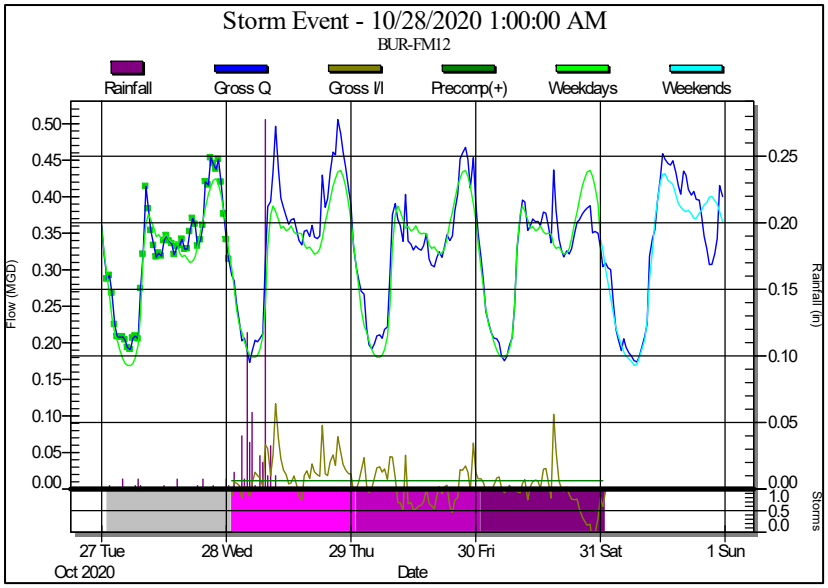


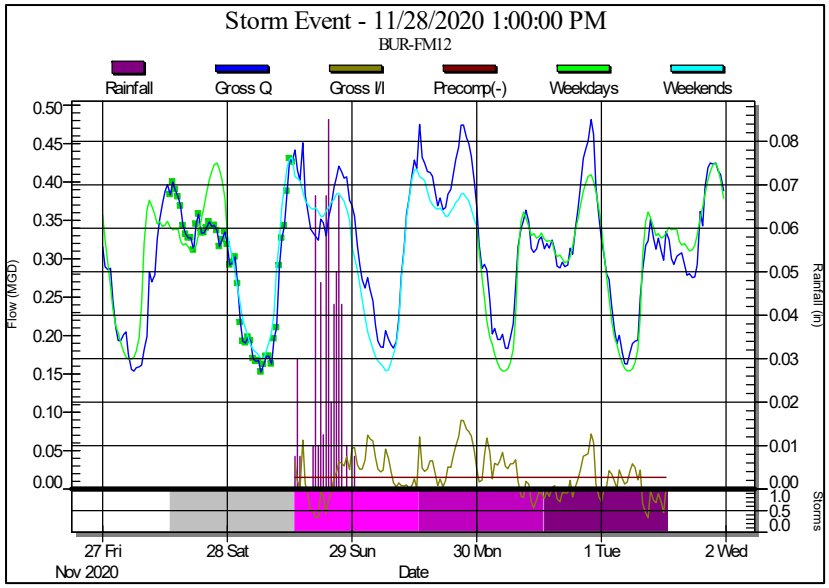

Pipe Flow
BUR-FM12
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.8
0.6
0.4
0.2
0.0
Nov
Dec
Jan 2021
2020
Date

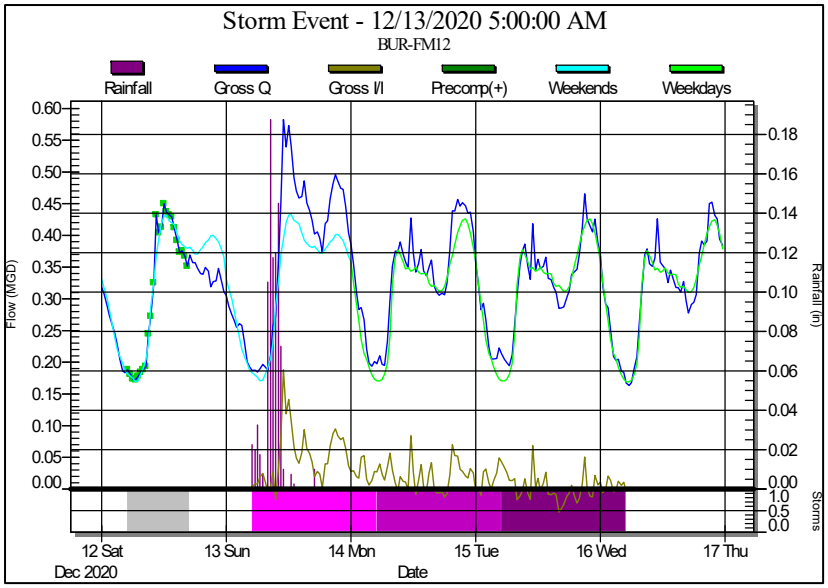

Dry Weather Flow
BUR-FM12
Weekdays
Weekends
MGD
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

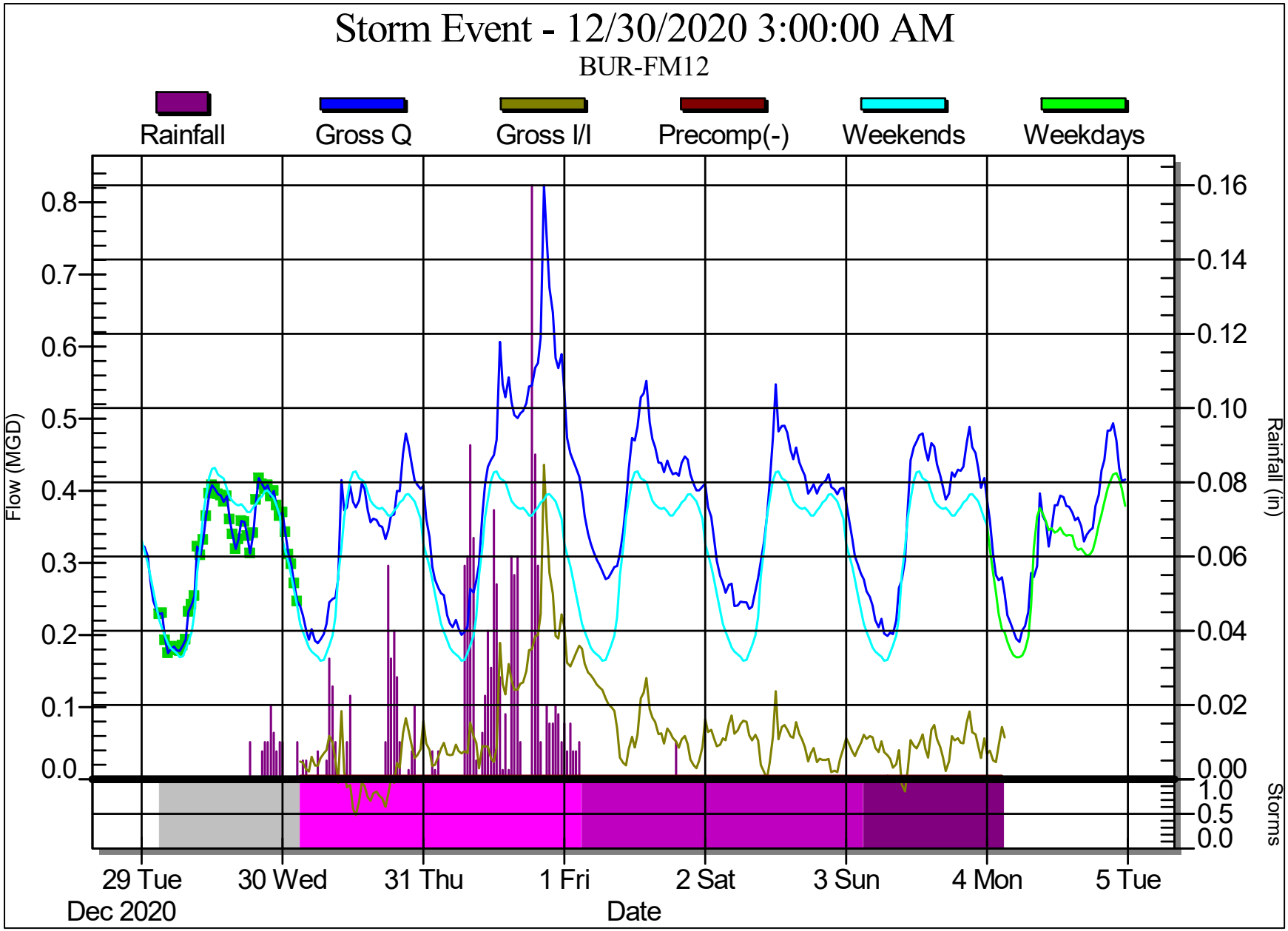

Scatter Graph
BUR-FM12
Lanfear-Coll (C-LC = 10.18)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)
0
2
4
6
8
10
12
14
16
18
8.1
7.2
6.3
5.4
4.5
3.6
2.7
1.8
0.9
0.225


Storm Event - 10/23/2020 7:00:00 AM
BUR-FM12
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
22 Thu
23 Fri
24 Sat
25 Sun
26 Mon
27 Tue
Oct 2020
Date


Storm Event - 10/28/2020 1:00:00 AM
BUR-FM12
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Tue
28 Wed
29 Thu
30 Fri
31 Sat
1 Sun
Oct 2020
Date

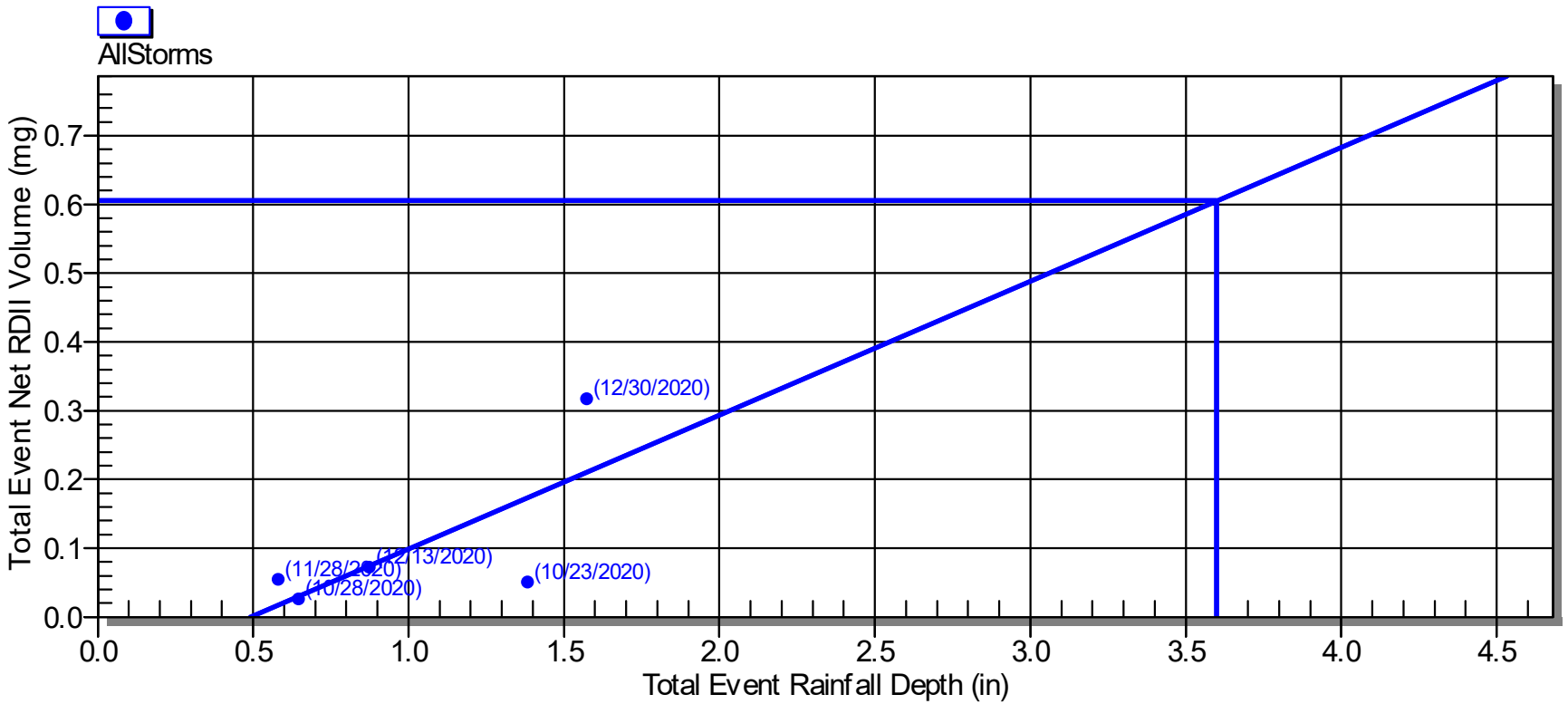

Storm Event - 11/28/2020 1:00:00 PM
BUR-FM12
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekdays
Weekends
Flow (MGD)
Rainfall (in)
Storms
27 Fri
28 Sat
29 Sun
30 Mon
1 Tue
2 Wed
Nov 2020
Date


Storm Event - 12/13/2020 5:00:00 AM
BUR-FM12
Rainfall
Gross Q
Gross I/I
Precomp(+)
Weekends
Weekdays
Flow (MGD)
Rainfall (in)
Storms
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
Dec 2020
Date


Storm Event - 12/30/2020 3:00:00 AM
BUR-FM12
Rainfall
Gross Q
Gross I/I
Precomp(-)
Weekends
Weekdays
Flow (MGD)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
1.0
0.5
0.0
Storms
29 Tue
Dec 2020
30 Wed
31 Thu
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
Date

Q vs i - BUR-FM12

Total Event Net RDII Volume vs. Rainfall Depth



APPENDIX H
WASTEWATER SYSTEM ANALYSIS MAPPING

FIGURE H-1

CITY OF BURLESON

WASTEWATER SYSTEM
FLOW METER LOCATIONS

LEGEND

- Flow Meter
- Rain Gauge
- Manhole
- Lift Station
- Under Design/Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- City Limit

Fort Worth Wastewater System

- Flow Meter
- Rain Gauge
- Wastewater Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

FLOW METER BASINS

- FM Basin 1
- FM Basin 2/3
- FM Basin 4
- FM Basin 5
- FM Basin 6
- FM Basin 7
- FM Basin 8/9
- FM Basin 10/11
- FM Basin 12

Alsbury #1
Lift Station

Rain Gauge 1
Centennial Park

Flow Meter 6
MH ID: SMH159
Pipe Diameter: 18"

Flow Meter 5
MH ID: SMH217
Pipe Diameter: 12"

Flow Meter 4
MH ID: SMH1433
Pipe Diameter: 27"

Flow Meter 1
MH ID: SMH1429
Pipe Diameter: 36"

Fort Worth
Rain Gauge

FTW Flow Meter 16
Pipe Diameter: 27"
Main #: M-257-E

Village Creek
WWTP

Flow Meter 2
MH ID: SMH10249
Pipe Diameter: 36"

Flow Meter 3
MH ID: SMH539
Pipe Diameter: 18"

Flow Meter 7
MH ID: SMH1540
Pipe Diameter: 21"

Flow Meter 9
MH ID: SMH1991
Pipe Diameter: 27"

Flow Meter 8
MH ID: SMH1996
Pipe Diameter: 18"

Rain Gauge 2
Chisenhall Park

Flow Meter 10
MH ID: SMH1307
Pipe Diameter: 24"

Flow Meter 11
MH ID: SMH1306
Pipe Diameter: 12"

Flow Meter 12
MH ID: SMH1076
Pipe Diameter: 15"

Mtn. Valley
Lift Station

Hidden Creek
Lift Station

FORT WORTH

CROWLEY

JOSHUA

BRIAROAKS

CROSS TIMBER

TARRANT CO.

JOHNSON CO.

0 1,300 2,600

SCALE IN FEET

Created by Freese and Nichols, Inc.
Date: Thursday, November 16, 2023
Location: R:\SI_WW_PLANNING\31_DELIVERABLES\03_FINAL_REPORT\FINAL_MP_REPORT\APPENDICES\Appendix_H\Figure_H-1\Flow_Meter_Locations.mxd
Updated: Tuesday, November 21, 2023 8:51:08 AM
User Name: DHRS

FIGURE H-2

CITY OF BURLESON

WASTEWATER SYSTEM MODEL VALIDATION RESULTS

LEGEND

- Flow Meter
- Rain Gauge
- Manhole
- Lift Station
- Under Design/Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- City Limit

Fort Worth Wastewater System

- Flow Meter
- Rain Gauge
- Wastewater Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

FLOW METER BASINS

- FM Basin 1
- FM Basin 2/3
- FM Basin 4
- FM Basin 5
- FM Basin 6
- FM Basin 7
- FM Basin 8/9
- FM Basin 10/11
- FM Basin 12

Alsbury #1
Lift Station

Rain Gauge 1
Centennial Park

FM #6 (18-inch Line)
MH ID: SMH159
Recorded Flow: 1.35 MGD
Modeled Flow: 1.70 MGD

FM #5 (12-inch Line)
MH ID: SMH217
Recorded Flow: 1.29 MGD
Modeled Flow: 1.29 MGD

FM #4 (27-inch Line)
MH ID: SMH1433
Recorded Flow: 4.92 MGD
Modeled Flow: 4.92 MGD

FM #1 (36-inch Line)
MH ID: SMH1429
Recorded Flow: 7.80 MGD
Modeled Flow: 9.41 MGD

FM #2 (36-inch Line)
MH ID: SMH10249
Recorded Flow: 0.90 MGD
Modeled Flow: 0.90 MGD

FM #3 (18-inch Line)
MH ID: SMH539
Recorded Flow: 0.60 MGD
Modeled Flow: 0.60 MGD

FTW Flow Meter 16
Pipe Diameter: 27"
Main #: M-257-E

Village Creek WWTP

Fort Worth
Rain Gauge

Fort Worth
Rain Gauge

FM #7 (21-inch Line)
MH ID: SMH1540
Recorded Flow: 1.64 MGD
Modeled Flow: 1.64 MGD

FM #9 (27-inch Line)
MH ID: SMH1991
Recorded Flow: 2.27 MGD
Modeled Flow: 2.73 MGD

FM #8 (18-inch Line)
MH ID: SMH1996
Recorded Flow: 0.58 MGD
Modeled Flow: 0.12 MGD

Rain Gauge 2
Chisenhall Park

FM #10 (24-inch Line)
MH ID: SMH1307
Recorded Flow: 1.35 MGD
Modeled Flow: 1.35 MGD

FM #11 (12-inch Line)
MH ID: SMH1306
Recorded Flow: 0.52 MGD
Modeled Flow: 0.52 MGD

FM #12 (15-inch Line)
MH ID: SMH1076
Recorded Flow: 0.82 MGD
Modeled Flow: 0.82 MGD

Mtn. Valley
Lift Station

Hidden Creek
Lift Station

CROWLEY
FORT WORTH
JOSHUA
CROSS TIMBER
BRIAROAKS
TARRANT CO.
JOHNSON CO.

0 1,300 2,600
SCALE IN FEET

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User Name: DHR5

FIGURE H-3

CITY OF BURLESON

WASTEWATER SYSTEM
RDII RANKING

LEGEND

- Road
- Railroad
- Stream
- Lake
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

NORMALIZED RDII

- Less than 2.00 gal/LF/in
- 2.00 - 3.00 gal/LF/in
- Greater than 3.00 gal/LF/in
- Indeterminate RDII

FM Basin 6
(1.53 gal/LF/in)

FM Basin 5
(3.84 gal/LF/in)

FM Basin 1

FM Basin 7
(2.65 gal/LF/in)

FM Basin 4
(1.32 gal/LF/in)

FM Basin 10/11
(5.09 gal/LF/in)

FM Basin 8/9
(1.62 gal/LF/in)

FM Basin 12
(1.91 gal/LF/in)

FM Basin 2/3
(1.21 gal/LF/in)

CROWLEY
FORT WORTH
TARRANT CO.
JOHNSON CO.
BRIAROAKS
CROSS TIMBER
JOSHUA
CLEBURNE
KEENE
ALVARADO

HWY 1187
W FM 1187
E FM 1187
S CROWLEY RD
IMC CARTAVE
WILDCAT WAY S
BURLESON RETTA RD
RETTA MANSFIELD RD
RENDON RD
Willow Branch
Village Creek
FM 2738
Valley Branch
Shannon Creek
E HIDDEN CREEK PKWY
E RENFRO ST
SE JOHN JONES DR
SW WILSHIRE BLVD
CHISHOLM TRAIL PKWY
F M RD 1902
W F M RD 917
W FM 917
W 14TH ST
S BROADWAY ST
N MAIN ST
Marys Branch
Chisholm Creek
Quil Miller Creek
FM 731
CONVEYOR DR
FM 2280
North Fork Nolan River
N CUMMINGS DR
Walnut Creek
E FM 917
FM 917
CTP TOLL
35W
174 TEXAS

0 5,000
SCALE IN FEET

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User Name: tdg39

FIGURE H-4

CITY OF BURLESON

WASTEWATER SYSTEM
EXISTING PEAK WET WEATHER q/Q ANALYSIS WITH OVERFLOWS

LEGEND

- Manhole
- Lift Station
- Under Design/Construction Wastewater Line
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Fort Worth Wastewater Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

THE CITY OF BURLESON TEXAS

FREESE AND NICHOLS

MODEL RESULTS

Manhole Results

- Overflow
- Surcharge Level ≤4' from MH Rim
- No Surcharge

Pipeline Results

- Surcharge Due to Downstream Restriction
- Exceeds Capacity

MAJOR BASINS

- Burleson Main
- Burleson West
- North Creek
- Quil Miller Creek
- Shannon Creek
- Town Creek
- Village Creek
- Willow Creek

Alsbury #1 Lift Station

Village Creek WWTP

Mtn. Valley Lift Station

Hidden Creek Lift Station

CROWLEY

FORT WORTH

JOSHUA

CROSS TIMBER

BRIAROAKS

TARRANT CO.

JOHNSON CO.

0 1,300 2,600

SCALE IN FEET

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APPENDIX I
ESTIMATED WASTEWATER CIP COST SHEETS

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-A**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Town Creek Basin 36/42-inch Parallel Interceptor**		

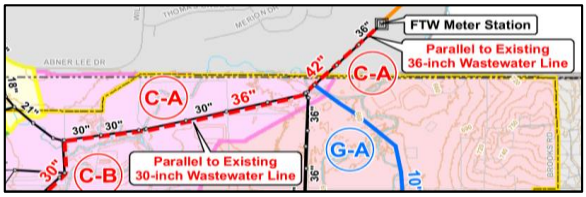
Project Description:

This project consists of the construction of a 36/42-inch wastewater line parallel to the existing 30/36-inch wastewater line along Village Creek from the existing 21/27/30-inch wastewater line intersection to the Fort Worth Meter Station near Southern Oaks Drive.

Project Drivers:

Model results indicate that the existing 30/36-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	42" Gravity Main	2,300	LF	$ 630	$ 1,449,000
2	36" Gravity Main	5,200	LF	$ 540	$ 2,808,000
3	72" Diameter Manhole	8	EA	$ 7,500	$ 60,000
4	50" Boring and Casing	150	LF	$ 1,000	$ 150,000
5	54" Boring and Casing	50	LF	$ 1,080	$ 54,000
				SUBTOTAL:	**$ 4,521,000**
		CONTINGENCY		30%	$ 1,356,300
				SUBTOTAL:	**$ 5,877,300**
		ENG/SURVEY		15%	$ 881,600
				SUBTOTAL:	**$ 6,758,900**
				Estimated Project Total:	**$ 6,758,900**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-B**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Town Creek Basin I-35W 36-inch Parallel Interceptor**		

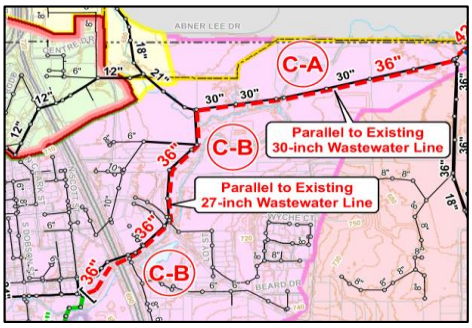
Project Description:

This project consists of the construction of a 36-inch wastewater line parallel to the existing 27-inch wastewater line along Village Creek from the existing 18-inch wastewater line on Scott Street to the proposed 30-inch parallel wastewater line.

Project Drivers:

Model results indicate that the existing 27-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	36" Gravity Main	5,100	LF	$ 540	$ 2,754,000
2	72" Diameter Manhole	7	EA	$ 7,500	$ 52,500
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	50" Boring and Casing	300	LF	$ 1,000	$ 300,000
				SUBTOTAL:	**$ 3,116,500**
		CONTINGENCY		30%	$ 935,000
				SUBTOTAL:	**$ 4,051,500**
		ENG/SURVEY		15%	$ 607,800
				SUBTOTAL:	**$ 4,659,300**
				Estimated Project Total:	**$ 4,659,300**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-C**	**Project Driver:**	**Future Capacity Restriction**
Project Name:	**Village Creek Basin 30/36-inch Wastewater Replacement**		

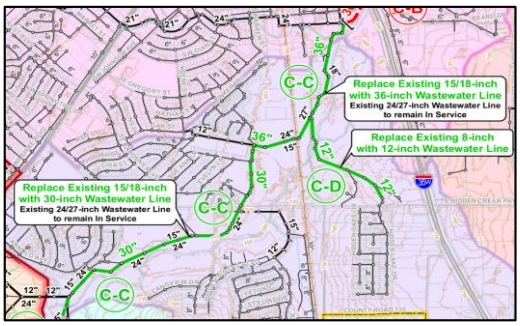
Project Description:

This project consists of the construction of a 30/36-inch wastewater line replacing the existing 15/18-inch wastewater line from the existing 12/15-inch wastewater line near Steven Street to the proposed 30-inch wastewater line near Scott Street.

Project Drivers:

Model results indicate that the existing 15/18-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	30" Gravity Main	7,600	LF	$ 450	$ 3,420,000
2	36" Gravity Main	5,100	LF	$ 540	$ 2,754,000
3	72" Diameter Manhole	16	EA	$ 7,500	$ 120,000
4	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
5	50" Boring and Casing	50	LF	$ 1,000	$ 50,000
				SUBTOTAL:	**$ 6,374,000**
		CONTINGENCY		30%	$ 1,912,200
				SUBTOTAL:	**$ 8,286,200**
		ENG/SURVEY		15%	$ 1,243,000
				SUBTOTAL:	**$ 9,529,200**
				Estimated Project Total:	**$ 9,529,200**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-D**	**Project Driver:**	**Future Capacity Restriction**
Project Name:	**Village Creek Basin 12-inch Wastewater Replacement**		

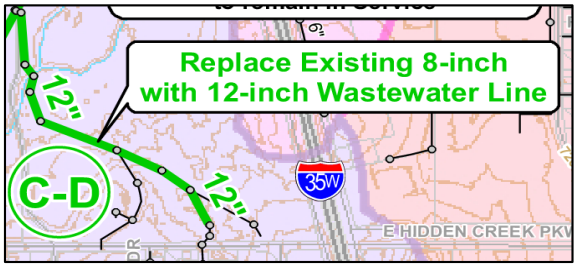
Project Description:

This project consists of the construction of a 12-inch wastewater line replacing the existing 6-inch wastewater line on Hidden Creek Parkway to the proposed 30-inch wastewater line on Dobson Street.

Project Drivers:

Model results indicate that the existing 8-inch wastewater line experiences surcharging under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	3,400	LF	$ 180	$ 612,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	20" Boring and Casing	50	LF	$ 400	$ 20,000
4	48" Diameter Manhole	7	EA	$ 6,000	$ 42,000
				SUBTOTAL:	**$ 684,000**
				CONTINGENCY 30%	$ 205,200
				SUBTOTAL:	**$ 889,200**
				ENG/SURVEY 15%	$ 133,400
				SUBTOTAL:	**$ 1,022,600**
				Estimated Project Total:	**$ 1,022,600**

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

City of Burleson

20-Year Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-E — **Project Driver:** Existing Capacity Restriction

Project Name: Town Creek Parkview Drive 10-inch Wastewater Replacement

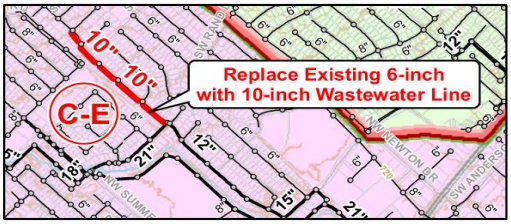
Project Description:

This project consists of the construction of a 10-inch wastewater line replacing the existing 6-inch wastewater line along Parkview Drive from the existing 6-inch wastewater line on Flagstone Drive to the existing 12-inch wastewater line near Rand Drive.

Project Drivers:

Model results indicate that the existing 6-inch line is over capacity under projected existing peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	2,100	LF	$ 150	$ 315,000
2	48" Diameter Manhole	5	EA	$ 6,000	$ 30,000
3	Concrete Pavement Repair	2,100	LF	$ 100	$ 210,000
				SUBTOTAL:	**$ 555,000**
		CONTINGENCY		30%	$ 166,500
				SUBTOTAL:	**$ 721,500**
		ENG/SURVEY		15%	$ 108,300
				SUBTOTAL:	**$ 829,800**
				Estimated Project Total:	**$ 829,800**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-F**	**Project Driver:**	**Future Capacity Restriction**
Project Name:	**Willow Creek Basin Wilshire Boulevard 24-inch Parallel Interceptor**		

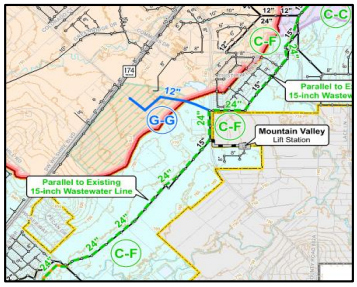
Project Description:

This project consists of the construction of a 24-inch wastewater line parallel to the existing 15-inch wastewater line near Wilshire Boulevard from the existing 15-inch wastewater line to the proposed 27-inch wastewater line near Country Road 714.

Project Drivers:

Model results indicate that the existing 15-inch line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	12,700	LF	$ 360	$ 4,572,000
2	60" Diameter Manhole	16	EA	$ 7,000	$ 112,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	36" Boring and Casing	50	LF	$ 720	$ 36,000
				SUBTOTAL:	**$ 4,730,000**
		CONTINGENCY		30%	$ 1,419,000
				SUBTOTAL:	**$ 6,149,000**
		ENG/SURVEY		15%	$ 922,400
				SUBTOTAL:	**$ 7,071,400**
				Estimated Project Total:	**$ 7,071,400**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-G**	**Project Driver:**	**Future Capacity Restriction**
Project Name:	**Willow Creek Basin Wilshire Boulevard 24-inch Parallel Interceptor**		

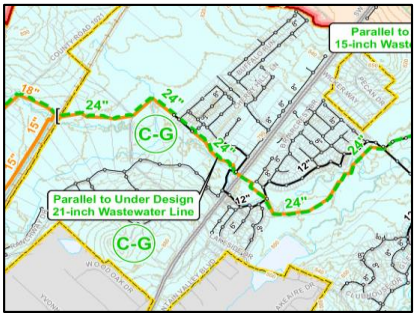
Project Description:

This project consists of the construction of a 24-inch wastewater line parallel to the under construction 21-inch wastewater line near Wilshire Boulevard from the BNSF Railroad to the proposed 24-inch parallel interceptor near Wicker Way.

Project Drivers:

Model results indicate that the under-construction 21-inch line experiences surcharging and overflows under projected 20-year peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	11,100	LF	$ 360	$ 3,996,000
2	60" Diameter Manhole	14	EA	$ 7,000	$ 98,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	36" Boring and Casing	150	LF	$ 720	$ 108,000
				SUBTOTAL:	**$ 4,212,000**
		CONTINGENCY		30%	$ 1,263,600
				SUBTOTAL:	**$ 5,475,600**
		ENG/SURVEY		15%	$ 821,400
				SUBTOTAL:	**$ 6,297,000**
				Estimated Project Total:	**$ 6,297,000**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-A**	**Project Driver:**	**Growth / Development**
Project Name:	**Quil Miller Creek Basin North 10-inch Collector Line**		

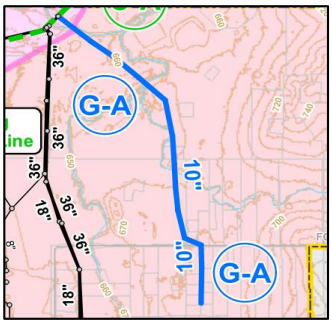
Project Description:

This project consists of the construction of a 10-inch wastewater line going northwest from Mockingbird Meadows Rd to the proposed 36-inch parallel line near the Southern Oaks Golf Course.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Quil Miller Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	5,900	LF	$ 150	$ 885,000
2	48" Diameter Manhole	12	EA	$ 6,000	$ 72,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	16" Boring and Casing	150	LF	$ 320	$ 48,000
				SUBTOTAL:	**$ 1,015,000**
		CONTINGENCY		30%	$ 304,500
				SUBTOTAL:	**$ 1,319,500**
		ENG/SURVEY		15%	$ 198,000
				SUBTOTAL:	**$ 1,517,500**
				Estimated Project Total:	**$ 1,517,500**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-B**	**Project Driver:**	**Growth / Development**
Project Name:	**Town Creek Basin East Hyder Ranch 15-inch Collector Line**		

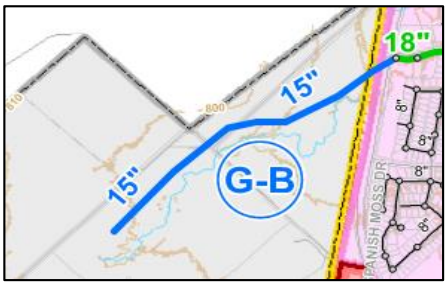
Project Description:

This project consists of the construction of a 15-inch wastewater line going east along Deer Creek from County Road 1016 to the proposed 18-inch wastewater line replacement on Summercrest Boulevard.

Project Drivers:

Future projections show growth of sewer customers in this area (Hyder Ranch) and the proposed line will serve new development in the Town Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	4,100	LF	$ 225	$ 922,500
2	48" Diameter Manhole	9	EA	$ 6,000	$ 54,000
3	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
4	26" Boring and Casing	50	LF	$ 520	$ 26,000
				SUBTOTAL:	**$ 1,022,500**
			CONTINGENCY	30%	$ 306,800
				SUBTOTAL:	**$ 1,329,300**
			ENG/SURVEY	15%	$ 199,400
				SUBTOTAL:	**$ 1,528,700**
				Estimated Project Total:	**$ 1,528,700**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-C**	**Project Driver:**	**Growth / Development**
Project Name:	**Shannon Creek Basin West Hyder Ranch 12-inch Collector Line**		

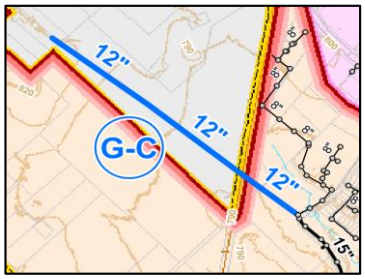
Project Description:

This project consists of the construction of a 12-inch wastewater line going southeast from County Road 1016 to the existing 15-inch wastewater line on Alsbury Boulevard.

Project Drivers:

Future projections show growth of sewer customers in this area (Hyder Ranch) and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	4,600	LF	$ 180	$ 828,000
2	48" Diameter Manhole	10	EA	$ 6,000	$ 60,000
3	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
				SUBTOTAL:	**$ 918,000**
		CONTINGENCY		30%	$ 275,400
				SUBTOTAL:	**$ 1,193,400**
		ENG/SURVEY		15%	$ 179,100
				SUBTOTAL:	**$ 1,372,500**
				Estimated Project Total:	**$ 1,372,500**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-D**	**Project Driver:**	**Growth / Development**
Project Name:	**Shannon Creek Basin SW Hulen Street 12-inch Collector Line**		

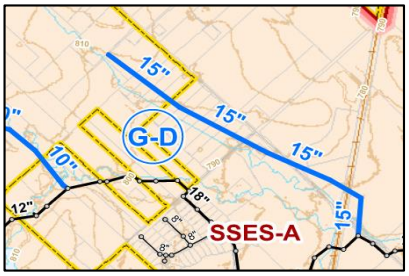
Project Description:

This project consists of the construction of a 12-inch collector going southeast along Hulen Street from Shannon Creek to the existing 12-inch wastewater line.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	5,700	LF	$ 180	$ 1,026,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	20" Boring and Casing	150	LF	$ 400	$ 60,000
4	48" Diameter Manhole	12	EA	$ 6,000	$ 72,000
				SUBTOTAL:	**$ 1,168,000**
		CONTINGENCY		30%	$ 350,400
				SUBTOTAL:	**$ 1,518,400**
		ENG/SURVEY		15%	$ 227,800
				SUBTOTAL:	**$ 1,746,200**
				Estimated Project Total:	**$ 1,746,200**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-E**	**Project Driver:**	**Growth / Development**
Project Name:	**Shannon Creek Basin 10-inch Collector Line**		

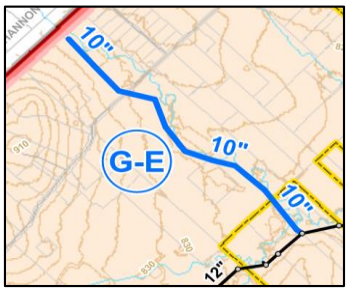
Project Description:

This project consists of the construction of a 10-inch wastewater line going southeast from Shannon Valley Drive to the existing 12-inch wastewater line near County Road 1020.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	4,800	LF	$ 150	$ 720,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	48" Diameter Manhole	10	EA	$ 6,000	$ 60,000
				SUBTOTAL:	**$ 790,000**
		CONTINGENCY		30%	$ 237,000
				SUBTOTAL:	**$ 1,027,000**
		ENG/SURVEY		15%	$ 154,100
				SUBTOTAL:	**$ 1,181,100**
				Estimated Project Total:	**$ 1,181,100**

Comments: The Engineer has no control over the cost and labor, materials, equipment, or over the Contractor's methods of determining

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-G**	**Project Driver:**	**Growth / Development**
Project Name:	**The Lakes 12-inch Collector Line**		

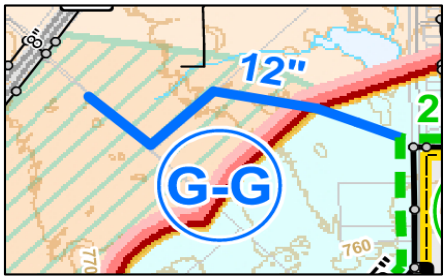
Project Description:

This project consists of the construction of a 12-inch wastewater line going east along County Road 920 from Wilshire Boulevard to the proposed 24-inch parallel line near John Jones Drive.

Project Drivers:

Future projections show growth of sewer customers in this area (The Lakes) and the proposed line will serve new development in the Shannon Creek and Willow Creek Basins. This development will require a transition of a portion of the Shannon Creek Basin to the Willow Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	3,000	LF	$ 180	$ 540,000
2	48" Diameter Manhole	6	EA	$ 6,000	$ 36,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 586,000**
		CONTINGENCY		30%	$ 175,800
				SUBTOTAL:	**$ 761,800**
		ENG/SURVEY		15%	$ 114,300
				SUBTOTAL:	**$ 876,100**
				Estimated Project Total:	**$ 876,100**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-H**	**Project Driver:**	**Growth / Development**
Project Name:	**Burleson Westside Business Park Lift Station Force Main / Collector**		

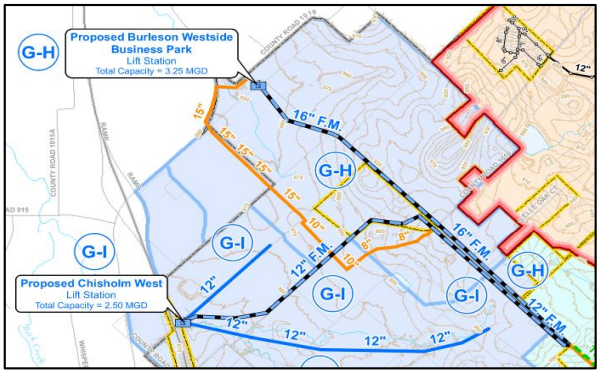
Project Description:

This project consists of the construction of the Westside Business Park Lift Station with a 3.25 MGD firm capacity near the Chisolm Summit/Burleson West Business Park developments near Chisholm Trail Parkway Toll Road. It also consists of the construction of a 16-inch force main from the proposed Burleson Westside Lift Station going southeast to the under construction 15-inch wastewater line along FM 914.

Project Drivers:

Future projections show growth of sewer customers in this area (Chisholm Summit/Burleson West Business Park) and the proposed improvements will serve the Burleson West Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 3.25 MGD	1	LS	$ 3,250,000	$ 3,250,000
2	16" Force Main < 8 feet deep	10,500	LF	$ 200	$ 2,100,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 5,360,000**
		CONTINGENCY		30%	$ 1,608,000
				SUBTOTAL:	**$ 6,968,000**
		ENG/SURVEY		15%	$ 1,045,200
				SUBTOTAL:	**$ 8,013,200**
				Estimated Project Total:	**$ 8,013,200**

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

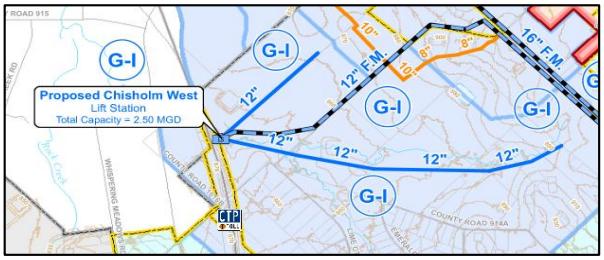
City of Burleson

20-Year Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-I**	**Project Driver: Growth / Development**
Project Name:	**Chisholm West Lift Station Force Main / Collector**	

Project Description:

This project consists of the construction of the Chisholm West Lift Station with a 2.5 MGD firm capacity near the Chisolm Summit development and the Chisholm Trail Parkway Toll Road. It also consists of the construction of a 12-inch force main from the proposed Chisholm West Lift Station going west to the under construction 15-inch wastewater line along FM 914. This project also consists of an 12-inch collector approximately 800 feet northeast of the Chisholm West Lift Station. This project also consists of a 12-inch collector along Rock Creek from County Road 914 to the proposed Chisolm West Lift Station.

Vicinity Map



Project Drivers:

Future projections show growth of sewer customers in this area (Chisholm Summit) and the proposed improvements will serve the Burleson West Basin. A lift station and force main is required to provide wastewater service due to local topology.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 2.50 MGD	1	LS	$ 2,500,000	$ 2,500,000
2	12" Force Main	12,100	LF	$ 150	$ 1,815,000
3	12" Gravity Main	10,800	LF	$ 180	$ 1,944,000
4	48" Diameter Manhole	22	EA	$ 6,000	$ 132,000
5	20" Boring and Casing	150	LF	$ 400	$ 60,000
6	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 6,461,000**
		CONTINGENCY		30%	$ 1,938,300
				SUBTOTAL:	**$ 8,399,300**
		ENG/SURVEY		15%	$ 1,259,900
				SUBTOTAL:	**$ 9,659,200**
				Estimated Project Total:	**$ 9,659,200**

Comments: The Engineer has no control over the cost and labor, materials, equipment, or over the Contractor's methods of determining

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-K**	**Project Driver:**	**Growth / Development**
Project Name:	**Quil Miller Creek I-35W 12/15-inch Interceptor**		

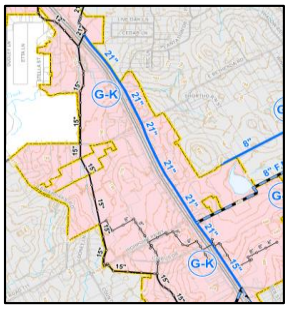
Project Description:

This project consists of the construction of a 12/15-inch wastewater line along I-35W going northeast from Cirrus Drive to the existing 21-inch wastewater line near Cedar Lane.

Project Drivers:

Future projections show growth of sewer customers in this area (Business Park/ Industrial Park/Martin Tract) and the proposed lines will serve new development in the Quil Miller Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	8,300	LF	$ 225	$ 1,867,500
2	12" Gravity Main	3,000	LF	$ 180	$ 540,000
3	60" Diameter Manhole	23	EA	$ 7,000	$ 161,000
4	24" Boring and Casing	50	LF	$ 480	$ 24,000
5	Concrete Pavement Repair	2,900	LF	$ 100	$ 290,000
				SUBTOTAL:	**$ 2,882,500**
		CONTINGENCY		30%	$ 864,800
				SUBTOTAL:	**$ 3,747,300**
		ENG/SURVEY		15%	$ 562,100
				SUBTOTAL:	**$ 4,309,400**
				Estimated Project Total:	**$ 4,309,400**

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

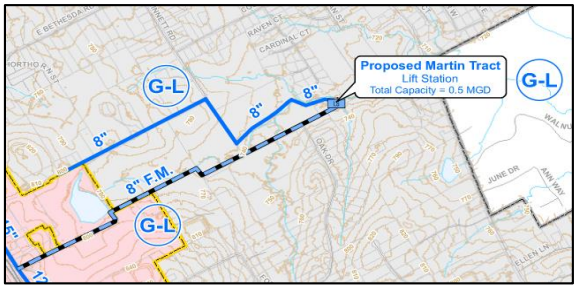
City of Burleson

20-Year Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-L**	**Project Driver: Growth / Development**
Project Name:	**Martin Tract Lift Station Force Main / Collector**	

Project Description:

This project consists of the construction of the Martin Tract Lift Station with a 0.5 MGD firm capacity near the Martin Tract development and I-35W. It also consists of the construction of an 8-inch force main from the proposed Martin Tract Lift Station going west to the proposed 15/21-inch wastewater line along I-35W. This project also consists of an 8-inch collector along County Road 518 going east to the proposed Martin Tract Lift Station.

Vicinity Map



Project Drivers:

Future projections show growth of sewer customers in this area (Martin Tract) and the proposed lines will serve development in the Quil Miller Creek Basin. A lift station and force main is required to provide wastewater service due to local topology.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 0.5 MGD	1	LS	$ 500,000	$ 500,000
2	8" Force Main	8,400	LF	$ 100	$ 840,000
3	8" Gravity Main	7,600	LF	$ 120	$ 912,000
4	48" Diameter Manhole	16	EA	$ 6,000	$ 96,000
5	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
6	16" Boring and Casing	100	LF	$ 320	$ 32,000
				SUBTOTAL:	**$ 2,400,000**
		CONTINGENCY		30%	$ 720,000
				SUBTOTAL:	**$ 3,120,000**
		ENG/SURVEY		15%	$ 468,000
				SUBTOTAL:	**$ 3,588,000**
				Estimated Project Total:	**$ 3,588,000**

Comments: The Engineer has no control over the cost and labor, materials, equipment, or over the Contractor's methods of determining

City of Burleson

20-Year Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-N — **Project Driver:** Growth / Development

Project Name: Industrial Park I Lift Station Force Main / Collector

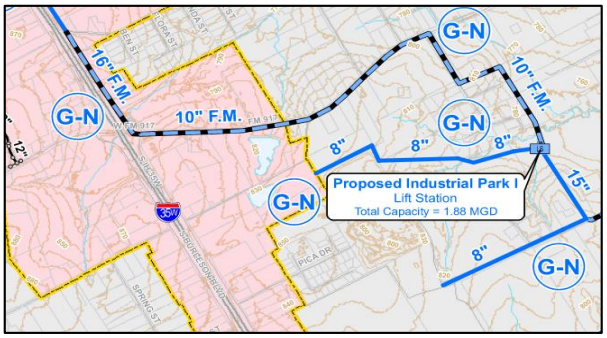
Project Description:

This project consists of the construction of the Industrial Park I Lift Station with a 1.88 MGD firm capacity near Woodwind Drive and Walnut Creek. It also consists of the construction of a 10-inch force main along FM 917 from the proposed Industrial Park I Lift Station going northwest to the proposed 12-inch wastewater line along I-35W. This project also consists of an 8-inch collector along Walnut Creek going east from FM 917 to the proposed Industrial Park I Lift Station. It also consists of an 8/15-inch collector along County Road 517 going northeast from the Walnut Creek branch to the proposed Industrial Park I Lift Station.

Project Drivers:

Future projections show growth of sewer customers in this area (Industrial Park) and the proposed lines will serve development in the Quil Miller Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 1.88 MGD	1	LS	$ 1,880,000	$ 1,880,000
2	10" Force Main < 8 feet deep	13,000	LF	$ 125	$ 1,625,000
3	8" Gravity Main	7,900	LF	$ 120	$ 948,000
4	15" Gravity Main	1,800	LF	$ 225	$ 405,000
5	48" Diameter Manhole	16	EA	$ 6,000	$ 96,000
6	60" Diameter Manhole	4	EA	$ 7,000	$ 28,000
7	Concrete Pavement Repair	600	LF	$ 100	$ 60,000
8	20" Boring and Casing	200	LF	$ 400	$ 80,000
9	16" Boring and Casing	100	LF	$ 320	$ 32,000
				SUBTOTAL:	**$ 5,154,000**
		CONTINGENCY		30%	$ 1,546,200
				SUBTOTAL:	**$ 6,700,200**
		ENG/SURVEY		15%	$ 1,005,100
				SUBTOTAL:	**$ 7,705,300**
				Estimated Project Total:	**$ 7,705,300**

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

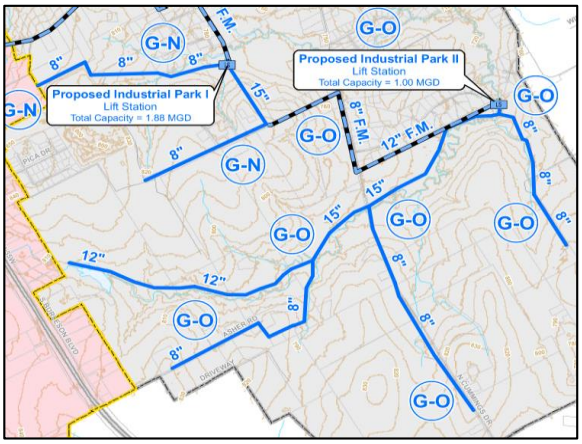
City of Burleson

20-Year Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-O**	**Project Driver: Growth / Development**
Project Name:	**Industrial Park II Lift Station Force Main / Collector**	

Project Description:

This project consists of the construction of the Industrial Park II Lift Station with a 1.00 MGD firm capacity near Country Manor Lane and the Walnut Creek branch. It also consists of the construction of an 8-inch force main along Country Manor Lane, Cummings Drive, and County Road 517 going northwest to the proposed 15-inch wastewater line on County Road 517. This project also consists of an 8/12-inch collector along Walnut Creek from Burleson Boulevard going east to the proposed Industrial Park II Lift Station. It also consists of an 8-inch collector along Asher Road going east to the proposed 8/12-inch collector along the Walnut Creek branch. It also consists of an 8-inch collector along Cummings drive going north to the proposed 12-inch collector along the Walnut Creek branch.

Vicinity Map



Project Drivers:

Future projections show growth of sewer customers in this area (Industrial Park) and the proposed lines will serve development in the Quil Miller Basin. A lift station and force main is required to provide wastewater service due to local topology.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 1.00 MGD	1	LS	$ 1,000,000	$ 1,000,000
2	8" Force Main	7,500	LF	$ 100	$ 750,000
3	12" Gravity Main	6,300	LF	$ 180	$ 1,134,000
4	8" Gravity Main	20,800	LF	$ 120	$ 2,496,000
5	48" Diameter Manhole	55	EA	$ 6,000	$ 330,000
6	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
7	20" Boring and Casing	150	LF	$ 400	$ 60,000
8	16" Boring and Casing	150	LF	$ 320	$ 48,000
				SUBTOTAL:	**$ 5,848,000**
		CONTINGENCY		30%	$ 1,754,400
				SUBTOTAL:	**$ 7,602,400**
		ENG/SURVEY		15%	$ 1,140,400
				SUBTOTAL:	**$ 8,742,800**
				Estimated Project Total:	**$ 8,742,800**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**SSES-A**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Shannon Creek (FM Basin 10/11) SSES**		

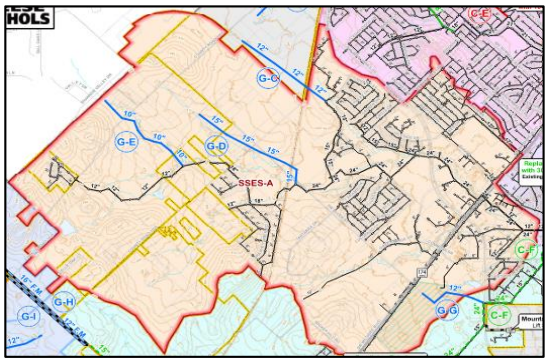
Project Description:

This project consists of SSES work in the Shannon Creek Basin (FM Basin 10/11). SSES budgetary costs include consulting services to program-manage the pre-inspection engineering, field coordination, post-inspection engineering analysis, and renewal CIP development. This project consists of condition assessment activities including manhole inspections, CCTV inspections, and smoke testing performed to identify sources of inflow and infiltration into the basin.

Project Drivers:

This project will identify sources of I/I and develop rehabilitation recommendations.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Manhole Inspection	627	EA	$ 250	$ 156,750
2	Smoke Testing	183,543	LF	$ 1	$ 146,834
3	CCTV Inspection	183,543	LF	$ 4	$ 734,172
4	Program Management	183,543	LF	$ 2	$ 275,315
				SUBTOTAL:	**$ 1,313,100**
		CONTINGENCY		30%	$ 394,000
				SUBTOTAL:	**$ 1,707,100**
		ENG/SURVEY		0%	$ -
				SUBTOTAL:	**$ 1,707,100**
				Estimated Project Total:	**$ 1,707,100**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**SSES-B**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Burleson Main (FM Basin 5) SSES**		

Project Description:

This project consists of SSES work in the Burleson Main Basin (FM Basin 5). SSES budgetary costs include consulting services to program-manage the pre-inspection engineering, field coordination, post-inspection engineering analysis, and renewal CIP development. This project consists of condition assessment activities including manhole inspections, CCTV inspections, and smoke testing performed to identify sources of inflow and infiltration into the basin.

Project Drivers:

This project will identify sources of I/I and develop rehabilitation recommendations.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Manhole Inspection	209	EA	$ 250	$ 52,250
2	Smoke Testing	78,118	LF	$ 1	$ 62,494
3	CCTV Inspection	78,118	LF	$ 4	$ 312,472
4	Program Management	78,118	LF	$ 2	$ 117,177
				SUBTOTAL:	**$ 544,400**
			CONTINGENCY	30%	$ 163,400
				SUBTOTAL:	**$ 707,800**
			ENG/SURVEY	0%	$ -
				SUBTOTAL:	**$ 707,800**
				Estimated Project Total:	**$ 707,800**

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

City of Burleson

20-Year Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**C-I**	**Project Driver:**	**Future Capacity Restriction**
Project Name:	**Willow Creek Basin Country Road 914 15-inch Parallel Interceptor**		

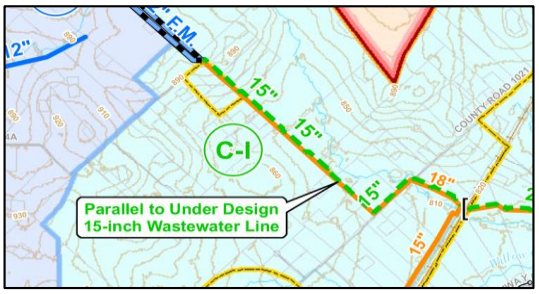
Project Description:

This project consists of the construction of a 15-inch wastewater line parallel to the under construction 15-inch wastewater line going south along Country Road 1021 and west on Country Road 914.

Project Drivers:

Model results indicate that the under-construction 15-inch line experiences surcharging and overflows under projected 20-year peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	6,600	LF	$ 225	$ 1,485,000
2	60" Diameter Manhole	14	EA	$ 7,000	$ 98,000
3	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
4	24" Boring and Casing	100	LF	$ 480	$ 48,000
				SUBTOTAL:	**$ 1,636,000**
		CONTINGENCY		30%	$ 490,800
				SUBTOTAL:	**$ 2,126,800**
		ENG/SURVEY		15%	$ 319,100
				SUBTOTAL:	**$ 2,445,900**
				Estimated Project Total:	**$ 2,445,900**

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

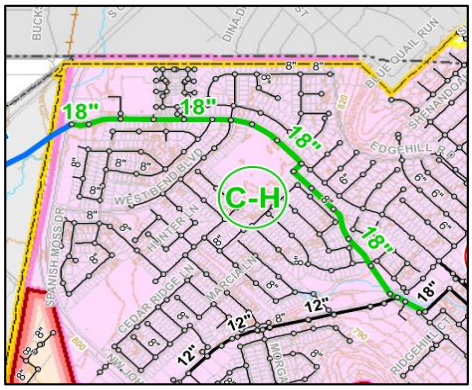
City of Burleson

20-Year Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-H**	**Project Driver: Future Capacity Restriction**
Project Name:	**Town Creek Basin East Hyder Ranch 18-inch Wastewater Replacement**	

Project Description:

This project consists of the construction of an 18-inch wastewater line going southeast from the proposed 15-inch wastewater line east of Hyder Ranch to the existing 15-inch wastewater line along Summercrest.

Vicinity Map



Project Drivers:

Model results indicate that the existing 12-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Existing Hydraulic Information	2040 Hydraulic Information
#N/A	#N/A

Downstream Projects Needed:

#N/A

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Gravity Main	7,500	LF	$ 270	$ 2,025,000
2	60" Diameter Manhole	10	EA	$ 7,000	$ 70,000
3	Concrete Pavement Repair	400	LF	$ 100	$ 40,000
				SUBTOTAL:	**$ 2,445,900**
		CONTINGENCY		30%	$ 733,800
				SUBTOTAL:	**$ 3,179,700**
		ENG/SURVEY		15%	$ 477,000
				SUBTOTAL:	**$ 3,656,700**
				Estimated Project Total:	**$ 3,656,700**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-A — **Project Driver:** Existing Capacity Restriction

Project Name: Town Creek Basin 42/48-inch Parallel Interceptor

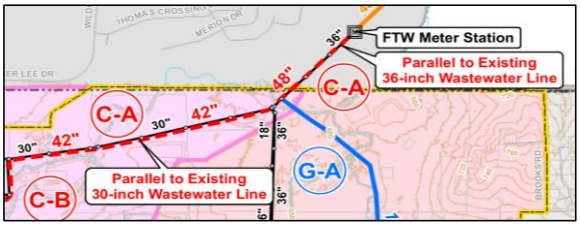
Project Description:

This project consists of the construction of a 42/48-inch wastewater line parallel to the existing 30/36-inch wastewater line along Village Creek from the existing 21/27/30-inch wastewater line intersection to the Fort Worth Meter Station near Southern Oaks Drive.

Project Drivers:

Model results indicate that the existing 30/36-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	48" Gravity Main	2,300	LF	$ 720	$ 1,656,000
2	42" Gravity Main	5,200	LF	$ 630	$ 3,276,000
3	72" Diameter Manhole	8	EA	$ 7,500	$ 60,000
4	54" Boring and Casing	150	LF	$ 1,080	$ 162,000
5	60" Boring and Casing	50	LF	$ 1,200	$ 60,000
				SUBTOTAL:	**$ 5,214,000**
			CONTINGENCY	30%	$ 1,564,200
				SUBTOTAL:	**$ 6,778,200**
			ENG/SURVEY	15%	$ 1,016,800
				SUBTOTAL:	**$ 7,795,000**
				Estimated Project Total:	**$ 7,795,000**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-B — **Project Driver:** Existing Capacity Restriction

Project Name: Town Creek Basin I-35W 36-inch Parallel Interceptor

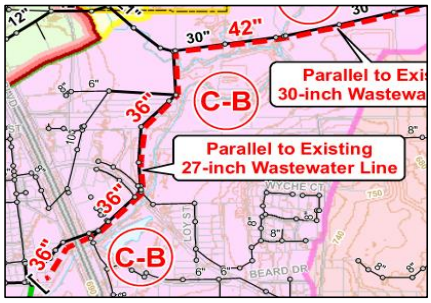
Project Description:

This project consists of the construction of a 36-inch wastewater line parallel to the existing 18/27-inch wastewater lines along Village Creek from the existing 18/27-inch wastewater lines on Scott Street to the proposed 27-inch parallel line.

Project Drivers:

Model results indicate that the existing 27-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	36" Gravity Main	5,100	LF	$ 540	$ 2,754,000
2	72" Diameter Manhole	7	EA	$ 7,500	$ 52,500
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	50" Boring and Casing	300	LF	$ 1,000	$ 300,000
				SUBTOTAL:	**$ 3,116,500**
		CONTINGENCY		30%	$ 935,000
				SUBTOTAL:	**$ 4,051,500**
		ENG/SURVEY		15%	$ 607,800
				SUBTOTAL:	**$ 4,659,300**
				Estimated Project Total:	**$ 4,659,300**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-C — **Project Driver:** Future Capacity Restriction

Project Name: Village Creek Basin 30/36-inch Wastewater Replacement

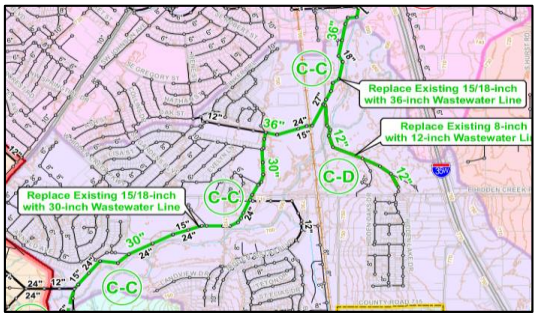
Project Description:

This project consists of the construction of a 30/36-inch-inch wastewater line going northeast along Village Creek from the existing 12/15-inch wastewater line near Steven Street to the proposed 30-inch interceptor near Scott Street.

Project Drivers:

Model results indicate that the existing 15/18-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	30" Gravity Main	7,600	LF	$ 450	$ 3,420,000
2	36" Gravity Main	5,100	LF	$ 540	$ 2,754,000
3	72" Diameter Manhole	16	EA	$ 7,500	$ 120,000
4	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
5	50" Boring and Casing	50	LF	$ 1,000	$ 50,000
				SUBTOTAL:	**$ 6,374,000**
			CONTINGENCY	30%	$ 1,912,200
				SUBTOTAL:	**$ 8,286,200**
			ENG/SURVEY	15%	$ 1,243,000
				SUBTOTAL:	**$ 9,529,200**
				Estimated Project Total:	**$ 9,529,200**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-D — **Project Driver:** Future Capacity Restriction

Project Name: Village Creek Basin 12-inch Wastewater Replacement

Project Description:

This project consists of the construction of a 12-inch wastewater line replacing the existing 6-inch wastewater line on Hidden Creek Parkway to the proposed 30-inch wastewater line on Dobson Street.

Project Drivers:

Model results indicate that the existing 8-inch wastewater line experiences surcharging under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	3,400	LF	$ 180	$ 612,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	20" Boring and Casing	50	LF	$ 400	$ 20,000
4	48" Diameter Manhole	7	EA	$ 6,000	$ 42,000
				SUBTOTAL:	**$ 684,000**
		CONTINGENCY		30%	$ 205,200
				SUBTOTAL:	**$ 889,200**
		ENG/SURVEY		15%	$ 133,400
				SUBTOTAL:	**$ 1,022,600**
				Estimated Project Total:	**$ 1,022,600**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-E — **Project Driver:** Existing Capacity Restriction

Project Name: Town Creek Parkview Drive 10-inch Wastewater Replacement

Project Description:

This project consists of the construction of a 10-inch wastewater line replacing the existing 6-inch wastewater line along Parkview Drive from the existing 6-inch wastewater line on Flagstone Drive to the existing 12-inch wastewater line near Rand Drive.

Project Drivers:

Model results indicate that the existing 6-inch line is over capacity under projected existing peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	2,100	LF	$ 150	$ 315,000
2	48" Diameter Manhole	5	EA	$ 6,000	$ 30,000
3	Concrete Pavement Repair	2,100	LF	$ 100	$ 210,000
				SUBTOTAL:	**$ 555,000**
			CONTINGENCY	30%	$ 166,500
				SUBTOTAL:	**$ 721,500**
			ENG/SURVEY	15%	$ 108,300
				SUBTOTAL:	**$ 829,800**
				Estimated Project Total:	**$ 829,800**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-F**	**Project Driver: Future Capacity Restriction**
Project Name:	**Willow Creek Basin Wilshire Boulevard 24-inch Parallel Interceptor**	

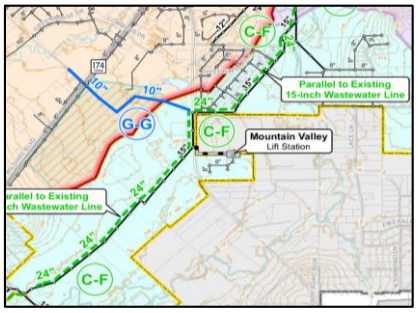
Project Description:

This project consists of the construction of a 24-inch wastewater line parallel to the existing 15-inch wastewater line near Wilshire Boulevard from the existing 15-inch wastewater line to the proposed 27-inch wastewater line near Country Road 714.

Project Drivers:

Model results indicate that the existing 15-inch line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	12,700	LF	$ 360	$ 4,572,000
2	60" Diameter Manhole	16	EA	$ 7,000	$ 112,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	36" Boring and Casing	50	LF	$ 720	$ 36,000
				SUBTOTAL:	**$ 4,730,000**
		CONTINGENCY		30%	$ 1,419,000
				SUBTOTAL:	**$ 6,149,000**
		ENG/SURVEY		15%	$ 922,400
				SUBTOTAL:	**$ 7,071,400**
				Estimated Project Total:	**$ 7,071,400**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-G**	**Project Driver: Future Capacity Restriction**
Project Name:	**Willow Creek Basin Wilshire Boulevard 24-inch Parallel Interceptor**	

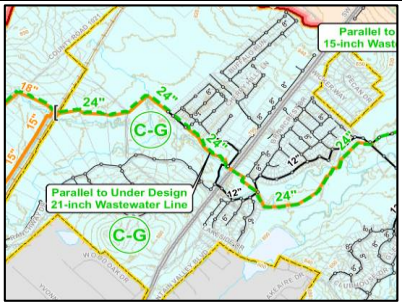
Project Description:

This project consists of the construction of a 24-inch wastewater line parallel to the under construction 21-inch wastewater line near Wilshire Boulevard from the under construction 18-inch wastewater line to the proposed 24-inch parallel interceptor near Wicker Way.

Project Drivers:

Model results indicate that the under-design 21-inch line experiences surcharging and overflows under projected peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	11,100	LF	$ 360	$ 3,996,000
2	60" Diameter Manhole	14	EA	$ 7,000	$ 98,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	36" Boring and Casing	150	LF	$ 720	$ 108,000
				SUBTOTAL:	**$ 4,212,000**
			CONTINGENCY	30%	$ 1,263,600
				SUBTOTAL:	**$ 5,475,600**
			ENG/SURVEY	15%	$ 821,400
				SUBTOTAL:	**$ 6,297,000**
				Estimated Project Total:	**$ 6,297,000**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: C-H — **Project Driver:** Future Capacity Restriction

Project Name: Town Creek Basin East Hyder Ranch 18-inch Wastewater Replacement

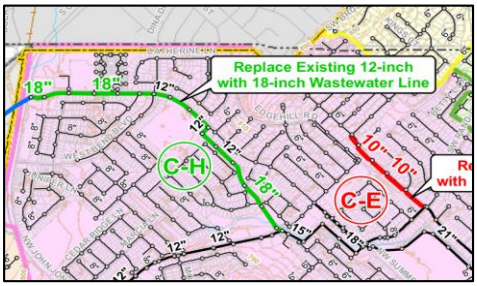
Project Description:

This project consists of the construction of an 18-inch wastewater line going southeast from the proposed 15-inch wastewater line east of Hyder Ranch to the existing 15-inch wastewater line along Summercrest.

Project Drivers:

Model results indicate that the existing 12-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Gravity Main	7,500	LF	$ 270	$ 2,025,000
2	60" Diameter Manhole	10	EA	$ 7,000	$ 70,000
3	Concrete Pavement Repair	400	LF	$ 100	$ 40,000
				SUBTOTAL:	**$ 2,135,000**
				CONTINGENCY 30%	$ 640,500
				SUBTOTAL:	**$ 2,775,500**
				ENG/SURVEY 15%	$ 416,400
				SUBTOTAL:	**$ 3,191,900**
				Estimated Project Total:	**$ 3,191,900**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-I**	**Project Driver: Future Capacity Restriction**
Project Name:	**Willow Creek Basin Country Road 914 15-inch Parallel Interceptor**	

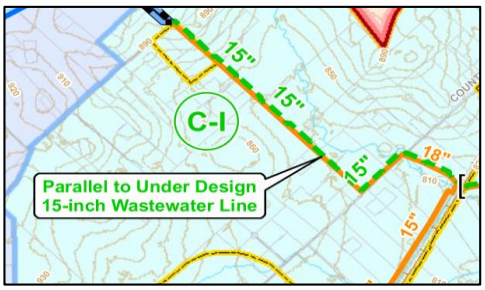
Project Description:

This project consists of the construction of a 15-inch wastewater line parallel to the under construction 15-inch wastewater line going south along Country Road 1021 and west along Country Road 914.

Project Drivers:

Model results indicate that the under-construction 15-inch line experiences surcharging and overflows under projected 20-year peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	6,600	LF	$ 225	$ 1,485,000
2	60" Diameter Manhole	14	EA	$ 7,000	$ 98,000
3	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
4	24" Boring and Casing	100	LF	$ 480	$ 48,000
				SUBTOTAL:	**$ 1,636,000**
			CONTINGENCY	30%	$ 490,800
				SUBTOTAL:	**$ 2,126,800**
			ENG/SURVEY	15%	$ 319,100
				SUBTOTAL:	**$ 2,445,900**
				Estimated Project Total:	**$ 2,445,900**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-J**	**Project Driver: Future Capacity Restriction**
Project Name:	**Quil Miller Creek Basin Southeast 24-inch Parallel Interceptor**	

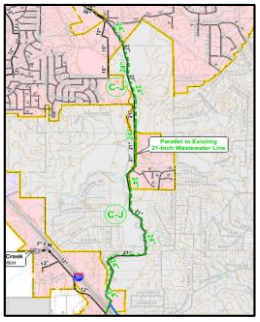
Project Description:

This project consists of the construction of a 24-inch wastewater line parallel to the existing 21-inch wastewater line near Interstate 35W from the existing 15-inch wastewater line near Cedar Lane to the existing 36-inch parallel west of South Fox Lane.

Project Drivers:

Model results indicate that the existing 21-inch wastewater line experiences surcharging and overflows under projected peak wet weather flows. The replacement line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Gravity Main	18,500	LF	$ 360	$ 6,660,000
2	60" Diameter Manhole	24	EA	$ 7,000	$ 168,000
3	36" Boring and Casing	150	LF	$ 720	$ 108,000
				SUBTOTAL:	**$ 6,936,000**
			CONTINGENCY	30%	$ 2,080,800
				SUBTOTAL:	**$ 9,016,800**
			ENG/SURVEY	15%	$ 1,352,600
				SUBTOTAL:	**$ 10,369,400**
				Estimated Project Total:	**$ 10,369,400**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**C-K**	**Project Driver: Future Capacity Restriction**
Project Name:	**Quil Miller Creek Basin Southeast 15-inch Parallel Interceptor**	

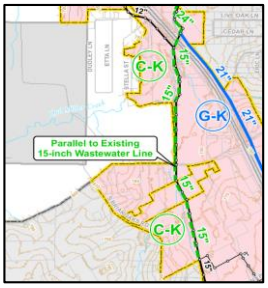
Project Description:

This project consists of the construction of a 15-inch wastewater line parallel to the existing 15-inch wastewater line near Interstate 35W from the existing 15-inch wastewater line near Looney Lane to the proposed 30-inch parallel west of Cedar Lane.

Project Drivers:

Model results indicate that the existing 15-inch line is over capacity under projected existing peak wet weather flows. The parallel line will increase the capacity of the wastewater system to convey projected peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	8,200	LF	$ 225	$ 1,845,000
2	60" Diameter Manhole	17	EA	$ 7,000	$ 119,000
3	26" Boring and Casing	100	LF	$ 520	$ 52,000
				SUBTOTAL:	**$ 2,016,000**
		CONTINGENCY		30%	$ 604,800
				SUBTOTAL:	**$ 2,620,800**
		ENG/SURVEY		15%	$ 393,200
				SUBTOTAL:	**$ 3,014,000**
				Estimated Project Total:	**$ 3,014,000**

Comments: FNI OPCC does not include any factors to account for the ongoing COVID-19 government enforced closures worldwide which could potentially impact material, equipment, and/or labor costs on the project. In addition, the impact on construction schedules due to the COVID-19 pandemic is unknown**.**

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-A**	**Project Driver: Growth / Development**
Project Name:	**Quil Miller Creek Basin North 10-inch Collector Line**	

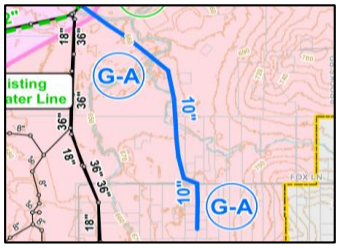
Project Description:

This project consists of the construction of a 10-inch wastewater line going northwest from Mockingbird Meadows Rd to the proposed 36-inch parallel line near the Southern Oaks Golf Course.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Quil Miller Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	5,900	LF	$ 150	$ 885,000
2	48" Diameter Manhole	12	EA	$ 6,000	$ 72,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
4	16" Boring and Casing	150	LF	$ 320	$ 48,000
				SUBTOTAL:	**$ 1,015,000**
		CONTINGENCY		30%	$ 304,500
				SUBTOTAL:	**$ 1,319,500**
		ENG/SURVEY		15%	$ 198,000
				SUBTOTAL:	**$ 1,517,500**
				Estimated Project Total:	**$ 1,517,500**

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

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-B**	**Project Driver:**	**Growth / Development**
Project Name:	**Town Creek Basin East Hyder Ranch 15-inch Collector Line**		

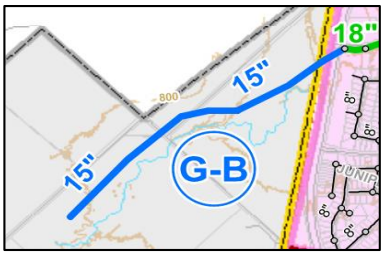
Project Description:

This project consists of the construction of a 15-inch wastewater line going east along Deer Creek from County Road 1016 to the proposed 18-inch wastewater line replacement on Summercrest Boulevard.

Project Drivers:

Future projections show growth of sewer customers in this area (Hyder Ranch) and the proposed line will serve new development in the Town Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	4,100	LF	$ 225	$ 922,500
2	48" Diameter Manhole	9	EA	$ 6,000	$ 54,000
3	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
4	26" Boring and Casing	50	LF	$ 520	$ 26,000
				SUBTOTAL:	**$ 1,022,500**
		CONTINGENCY		30%	$ 306,800
				SUBTOTAL:	**$ 1,329,300**
		ENG/SURVEY		15%	$ 199,400
				SUBTOTAL:	**$ 1,528,700**
				Estimated Project Total:	**$ 1,528,700**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-C**	**Project Driver: Growth / Development**
Project Name:	**Shannon Creek Basin West Hyder Ranch 12-inch Collector Line**	

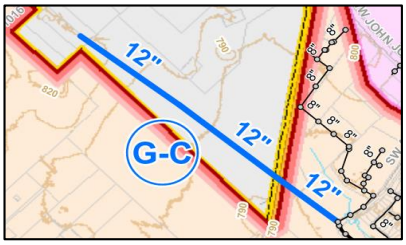
Project Description:

This project consists of the construction of a 12-inch wastewater line going southeast from County Road 1016 to the existing 15-inch wastewater line on Alsbury Boulevard.

Project Drivers:

Future projections show growth of sewer customers in this area (Hyder Ranch) and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	4,600	LF	$ 180	$ 828,000
2	48" Diameter Manhole	10	EA	$ 6,000	$ 60,000
3	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
				SUBTOTAL:	**$ 918,000**
		CONTINGENCY		30%	$ 275,400
				SUBTOTAL:	**$ 1,193,400**
		ENG/SURVEY		15%	$ 179,100
				SUBTOTAL:	**$ 1,372,500**
				Estimated Project Total:	**$ 1,372,500**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-D**	**Project Driver: Growth / Development**
Project Name:	**Shannon Creek Basin SW Hulen Street 15-inch Collector Line**	

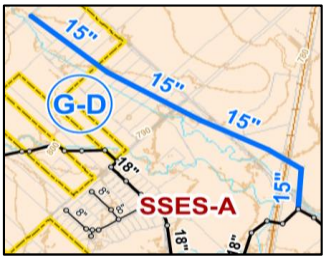
Project Description:

This project consists of the construction of a 15-inch collector going southeast along Hulen Street from Shannon Creek to the existing 12-inch wastewater line.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	5,700	LF	$ 225	$ 1,282,500
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	26" Boring and Casing	150	LF	$ 520	$ 78,000
4	48" Diameter Manhole	12	EA	$ 6,000	$ 72,000
				SUBTOTAL:	**$ 1,442,500**
		CONTINGENCY		30%	$ 432,800
				SUBTOTAL:	**$ 1,875,300**
		ENG/SURVEY		15%	$ 281,300
				SUBTOTAL:	**$ 2,156,600**
				Estimated Project Total:	**$ 2,156,600**

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

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-E**	**Project Driver:**	**Growth / Development**
Project Name:	**Shannon Creek Basin 10-inch Collector Line**		

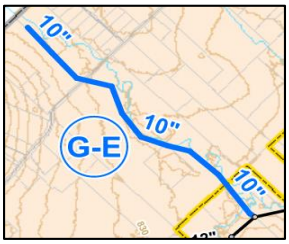
Project Description:

This project consists of the construction of a 10-inch wastewater line going southeast from Shannon Valley Drive to the existing 12-inch wastewater line near County Road 1020.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Gravity Main	4,800	LF	$ 150	$ 720,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
3	48" Diameter Manhole	10	EA	$ 6,000	$ 60,000
				SUBTOTAL:	**$ 790,000**
		CONTINGENCY		30%	$ 237,000
				SUBTOTAL:	**$ 1,027,000**
		ENG/SURVEY		15%	$ 154,100
				SUBTOTAL:	**$ 1,181,100**
				Estimated Project Total:	**$ 1,181,100**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-F — **Project Driver:** Growth / Development

Project Name: Shannon Creek Basin County Road 1020 12-inch Collector Line

Project Description:

This project consists of the construction of a 12-inch wastewater line going northeast along Shannon Creek from County Road 1020 to the existing 12-inch wastewater line on Falls Creek Court.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed line will serve new development in the Shannon Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	5,600	LF	$ 180	$ 1,008,000
2	20" Boring and Casing	200	LF	$ 400	$ 80,000
3	48" Diameter Manhole	12	EA	$ 6,000	$ 72,000
				SUBTOTAL:	**$ 1,160,000**
		CONTINGENCY		30%	$ 348,000
				SUBTOTAL:	**$ 1,508,000**
		ENG/SURVEY		15%	$ 226,200
				SUBTOTAL:	**$ 1,734,200**
				Estimated Project Total:	**$ 1,734,200**

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

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-G**	**Project Driver: Growth / Development**	
Project Name:	**The Lakes 12-inch Collector Line**		

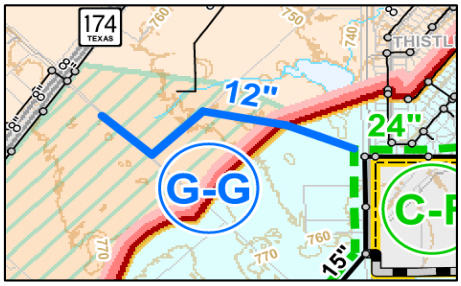
Project Description:

This project consists of the construction of a 12-inch wastewater line going east along Hulen Street from Wilshire Boulevard to the proposed 24-inch parallel line near John Jones Drive.

Project Drivers:

Future projections show growth of sewer customers in this area (The Lakes) and the proposed line will serve new development in the Shannon Creek and Willow Creek Basins. This development will require a transition of a portion of the Shannon Creek Basin to the Willow Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Gravity Main	3,000	LF	$ 180	$ 540,000
2	48" Diameter Manhole	6	EA	$ 6,000	$ 36,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 586,000**
		CONTINGENCY		30%	$ 175,800
				SUBTOTAL:	**$ 761,800**
		ENG/SURVEY		15%	$ 114,300
				SUBTOTAL:	**$ 876,100**
				Estimated Project Total:	**$ 876,100**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-H**	**Project Driver: Growth / Development**
Project Name:	**Burleson Westside Business Park Lift Station Force Main / Collector**	

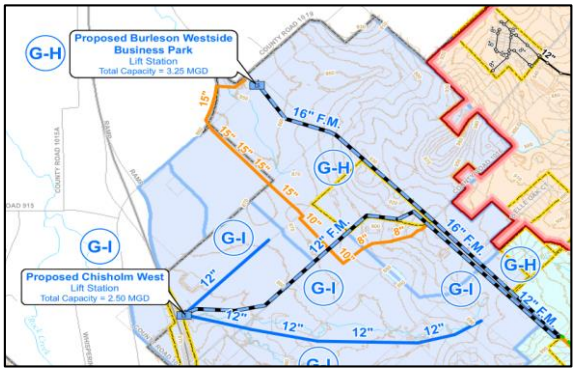
Project Description:

This project consists of the construction of the Westside Business Park Lift Station with a 3.25 MGD firm capacity near the Chisolm Summit/Burleson West Business Park developments near Chisholm Trail Parkway Toll Road. It also consists of the construction of a 16-inch force main from the proposed Burleson Westside Lift Station going southeast to the under construction 15-inch wastewater line along FM 914.

Project Drivers:

Future projections show growth of sewer customers in this area (Chisholm Summit/Burleson West Business Park) and the proposed improvements will serve the Burleson West Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 3.25 MGD	1	LS	$ 3,250,000	$ 3,250,000
2	16" Force Main < 8 feet deep	10,500	LF	$ 200	$ 2,100,000
3	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 5,360,000**
		CONTINGENCY		30%	$ 1,608,000
				SUBTOTAL:	**$ 6,968,000**
		ENG/SURVEY		15%	$ 1,045,200
				SUBTOTAL:	**$ 8,013,200**
				Estimated Project Total:	**$ 8,013,200**

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

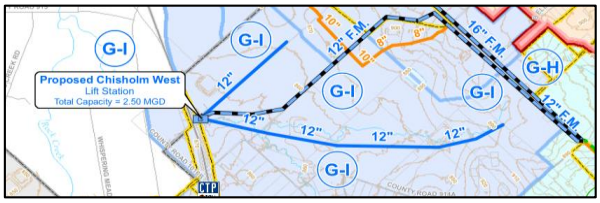
City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-I**	**Project Driver: Growth / Development**
Project Name:	**Chisholm West Lift Station Force Main / Collector**	

Project Description:

This project consists of the construction of the Chisholm West Lift Station with a 2.50 MGD firm capacity near the Chisolm Summit development and the Chisholm Trail Parkway Toll Road. It also consists of the construction of a 12-inch force main from the proposed Chisholm West Lift Station going west to the under construction 15-inch wastewater line along FM 914. This project also consists of an 12-inch collector approximately 800 feet northeast of the Chisholm West Lift Station. This project also consists of a 12-inch collector along Rock Creek from County Road 914 to the proposed Chisolm West Lift Station.

Vicinity Map



Project Drivers:

Future projections show growth of sewer customers in this area (Chisholm Summit) and the proposed improvements will serve the Burleson West Basin. A lift station and force main is required to provide wastewater service due to local topology.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 2.50 MGD	1	LS	$ 2,500,000	$ 2,500,000
2	12" Force Main	12,100	LF	$ 150	$ 1,815,000
3	12" Gravity Main	10,800	LF	$ 180	$ 1,944,000
4	48" Diameter Manhole	22	EA	$ 6,000	$ 132,000
5	20" Boring and Casing	150	LF	$ 400	$ 60,000
6	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 6,461,000**
		CONTINGENCY		30%	$ 1,938,300
				SUBTOTAL:	**$ 8,399,300**
		ENG/SURVEY		15%	$ 1,259,900
				SUBTOTAL:	**$ 9,659,200**
				Estimated Project Total:	**$ 9,659,200**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-J**	**Project Driver: Growth / Development**
Project Name:	**8-inch Wastewater Line in Southwest**	

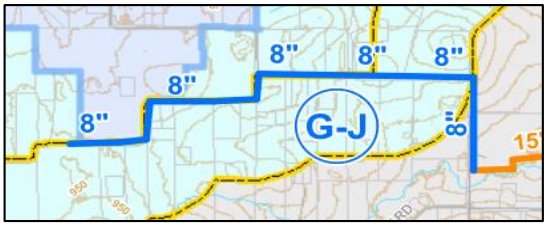
Project Description:

This project consists of an 8-inch collector along County Road 913 going east to the under construction 15-inch wastewater line along Willow Creek.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed lines will serve new development in the Willow Creek Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Gravity Main	7,200	LF	$ 120	$ 864,000
2	48" Diameter Manhole	15	EA	$ 6,000	$ 90,000
				SUBTOTAL:	**$ 954,000**
		CONTINGENCY		30%	$ 286,200
				SUBTOTAL:	**$ 1,240,200**
		ENG/SURVEY		15%	$ 186,100
				SUBTOTAL:	**$ 1,426,300**
				Estimated Project Total:	**$ 1,426,300**

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

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**G-K**	**Project Driver: Growth / Development**	
Project Name:	**Quil Miller Creek I-35W 15/21-inch Interceptor**		

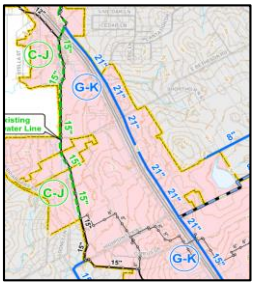
Project Description:

This project consists of the construction of a 15/21-inch wastewater line along I-35W going northeast from Cirrus Drive to the existing 15-inch wastewater line near Cedar Lane.

Project Drivers:

Future projections show growth of sewer customers in this area (Business Park/ Industrial Park/Martin Tract) and the proposed lines will serve new development in the Quil Miller Basin.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Gravity Main	1,900	LF	$ 225	$ 427,500
2	21" Gravity Main	9,400	LF	$ 315	$ 2,961,000
3	60" Diameter Manhole	23	EA	$ 7,000	$ 161,000
4	26" Boring and Casing	50	LF	$ 520	$ 26,000
5	Concrete Pavement Repair	2,900	LF	$ 100	$ 290,000
				SUBTOTAL:	**$ 3,865,500**
		CONTINGENCY		30%	$ 1,159,700
				SUBTOTAL:	**$ 5,025,200**
		ENG/SURVEY		15%	$ 753,800
				SUBTOTAL:	**$ 5,779,000**
				Estimated Project Total:	**$ 5,779,000**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-L — **Project Driver:** Growth / Development

Project Name: Martin Tract Lift Station Force Main / Collector

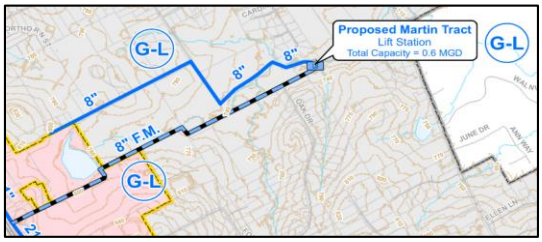
Project Description:

This project consists of the construction of the Martin Tract Lift Station with a 0.6 MGD firm capacity near the Martin Tract development and I-35W. It also consists of the construction of an 8-inch force main from the proposed Martin Tract LS going west to the proposed 15/21-inch wastewater line along I-35W. This project also consists of an 8-inch collector along County Road 518 going east to the proposed Martin Tract LS.

Project Drivers:

Future projections show growth of sewer customers in this area (Martin Tract) and the proposed lines will serve development in the Quil Miller Creek Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 0.6 MGD	1	LS	$ 600,000	$ 600,000
2	8" Force Main	8,400	LF	$ 100	$ 840,000
3	8" Gravity Main	7,600	LF	$ 120	$ 912,000
4	48" Diameter Manhole	16	EA	$ 6,000	$ 96,000
5	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
6	16" Boring and Casing	100	LF	$ 320	$ 32,000
				SUBTOTAL:	**$ 2,500,000**
		CONTINGENCY		30%	$ 750,000
				SUBTOTAL:	**$ 3,250,000**
		ENG/SURVEY		15%	$ 487,500
				SUBTOTAL:	**$ 3,737,500**
				Estimated Project Total:	**$ 3,737,500**

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

City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-M**	**Project Driver: Growth / Development**
Project Name:	**I-35 West Lift Station Force Main / Collector**	

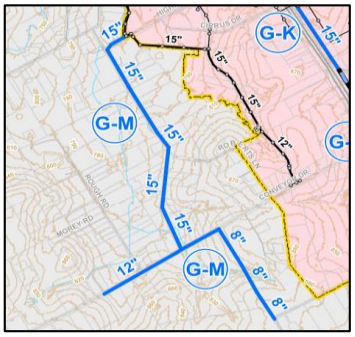
Project Description:

This project consists of an 8/12/15-inch collector along Briar Oaks Road going northwest to the 15-inch wastewater line at Highpoint Parkway.

Project Drivers:

Future projections show growth of sewer customers in this area and the proposed lines will serve future development in the Quil Miller Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Gravity Main	3,600	LF	$ 120	$ 432,000
2	12" Gravity Main	1,900	LF	$ 180	$ 342,000
3	15" Gravity Main	6,100	LF	$ 225	$ 1,372,500
4	48" Diameter Manhole	11	EA	$ 6,000	$ 66,000
5	60" Diameter Manhole	13	EA	$ 7,000	$ 91,000
6	Concrete Pavement Repair	600	LF	$ 100	$ 60,000
7	26" Boring and Casing	50	LF	$ 520	$ 26,000
8	16" Boring and Casing	100	LF	$ 320	$ 32,000
				SUBTOTAL:	**$ 2,421,500**
		CONTINGENCY		30%	$ 726,500
				SUBTOTAL:	**$ 3,148,000**
		ENG/SURVEY		15%	$ 472,200
				SUBTOTAL:	**$ 3,620,200**
				Estimated Project Total:	**$ 3,620,200**

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

City of Burleson

Buildout Capital Improvement Cost Estimate — **2023 Dollars**

Construction Project Number: G-N — **Project Driver:** Growth / Development

Project Name: Industrial Park I Lift Station Force Main / Collector

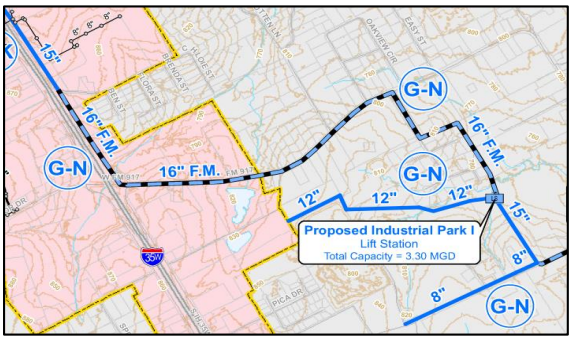
Project Description:

This project consists of the construction of the Industrial Park I Lift Station with a 3.30 MGD firm capacity near Woodwind Drive and Walnut Creek. It also consists of the construction of a 16-inch force main along FM 917 from the proposed Industrial Park I Lift Station going northwest to the proposed 15-inch wastewater line along I-35W. This project also consists of an 12-inch collector along Walnut Creek going east from FM 917 to the proposed Industrial Park I Lift Station. It also consists of an 8/15-inch collector along County Road 517 going northeast from the Walnut Creek branch to the proposed Industrial Park I Lift Station.

Project Drivers:

Future projections show growth of sewer customers in this area (Industrial Park) and the proposed lines will serve development in the Quil Miller Basin. A lift station and force main is required to provide wastewater service due to local topology.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 3.30 MGD	1	LS	$ 3,300,000	$ 3,300,000
2	16" Force Main < 8 feet deep	13,000	LF	$ 200	$ 2,600,000
3	8" Gravity Main	3,100	LF	$ 120	$ 372,000
4	12" Gravity Main	7,900	LF	$ 180	$ 1,422,000
5	15" Gravity Main	1,800	LF	$ 225	$ 405,000
6	48" Diameter Manhole	22	EA	$ 6,000	$ 132,000
7	60" Diameter Manhole	4	EA	$ 7,000	$ 28,000
8	20" Boring and Casing	200	LF	$ 400	$ 80,000
9	16" Boring and Casing	100	LF	$ 320	$ 32,000
10	Concrete Pavement Repair	600	LF	$ 100	$ 60,000
				SUBTOTAL:	**$ 8,431,000**
			CONTINGENCY	30%	$ 2,529,300
				SUBTOTAL:	**$ 10,960,300**
			ENG/SURVEY	15%	$ 1,644,100
				SUBTOTAL:	**$ 12,604,400**
				Estimated Project Total:	**$ 12,604,400**

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

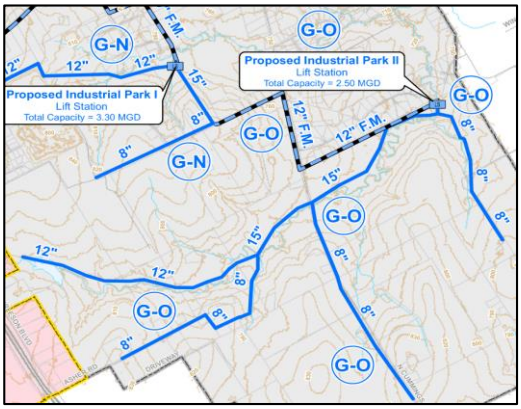
City of Burleson

Buildout Capital Improvement Cost Estimate		**2023 Dollars**
Construction Project Number:	**G-O**	**Project Driver: Growth / Development**
Project Name:	**Industrial Park II Lift Station Force Main / Collector**	

Project Description:

This project consists of the construction of the Industrial Park II Lift Station with a 2.50 MGD firm capacity near Country Manor Lane and the Walnut Creek branch. It also consists of the construction of an 8-inch force main along Country Manor Lane, Cummings Drive, and County Road 517 going northwest to the proposed 8/15-inch wastewater line on County Road 517. This project also consists of a 12/15-inch collector along Walnut Creek from Burleson Boulevard going east to the proposed Industrial Park II Lift Station. It also consists of an 8-inch collector along Asher Road going east to the proposed 12/15-inch collector along the Walnut Creek branch. It also consists of an 8-inch collector along Cummings drive going north to the proposed 12-inch collector along the Walnut Creek branch.

Vicinity Map



Project Drivers:

Future projections show growth of sewer customers in this area (Industrial Park) and the proposed lines will serve development in the Quil Miller Basin. A lift station and force main is required to provide wastewater service due to local topology.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 2.50 MGD	1	LS	$ 2,500,000	$ 2,500,000
2	12" Force Main	7,500	LF	$ 150	$ 1,125,000
3	8" Gravity Main	14,800	LF	$ 120	$ 1,776,000
4	12" Gravity Main	6,000	LF	$ 180	$ 1,080,000
5	15" Gravity Main	6,000	LF	$ 225	$ 1,350,000
6	48" Diameter Manhole	42	EA	$ 6,000	$ 252,000
7	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
8	26" Boring and Casing	200	LF	$ 520	$ 104,000
9	16" Boring and Casing	100	LF	$ 320	$ 32,000
10	60" Diameter Manhole	12	EA	$ 7,000	$ 84,000
				SUBTOTAL:	**$ 8,333,000**
			CONTINGENCY	30%	$ 2,499,900
				SUBTOTAL:	**$ 10,832,900**
			ENG/SURVEY	15%	$ 1,625,000
				SUBTOTAL:	**$ 12,457,900**
				Estimated Project Total:	**$ 12,457,900**

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

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**SSES-A**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Shannon Creek (FM Basin 10/11) SSES**		

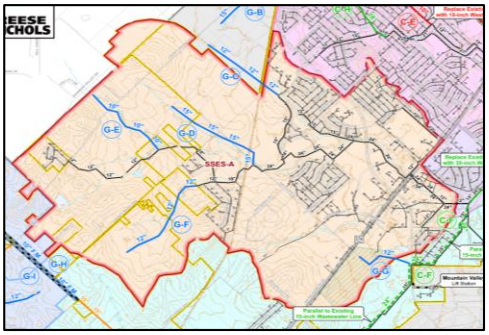
Project Description:

This project consists of SSES work in the Shannon Creek Basin (FM Basin 10/11). SSES budgetary costs include consulting services to program-manage the pre-inspection engineering, field coordination, post-inspection engineering analysis, and renewal CIP development. This project consists of condition assessment activities including manhole inspections, CCTV inspections, and smoke testing performed to identify sources of inflow and infiltration into the basin.

Project Drivers:

This project will identify sources of I/I and develop rehabilitation recommendations.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Manhole Inspection	627	EA	$ 250	$ 156,750
2	Smoke Testing	183,543	LF	$ 1	$ 146,834
3	CCTV Inspection	183,543	LF	$ 4	$ 734,172
4	Program Management	183,543	LF	$ 2	$ 275,315
				SUBTOTAL:	**$ 1,313,100**
		CONTINGENCY		30%	$ 394,000
				SUBTOTAL:	**$ 1,707,100**
		ENG/SURVEY		0%	$ -
				SUBTOTAL:	**$ 1,707,100**
				Estimated Project Total:	**$ 1,707,100**

Comments: FNI OPCC does not include any factors to account for the ongoing COVID-19 government enforced closures worldwide which could potentially impact material, equipment, and/or labor costs on the project. In addition, the impact on construction schedules due to the COVID-19 pandemic is unknown**.**

City of Burleson

Buildout Capital Improvement Cost Estimate			**2023 Dollars**
Construction Project Number:	**SSES-B**	**Project Driver:**	**Existing Capacity Restriction**
Project Name:	**Burleson Main (FM Basin 5) SSES**		

Project Description:

This project consists of SSES work in the Burleson Main Basin (FM Basin 5). SSES budgetary costs include consulting services to program-manage the pre-inspection engineering, field coordination, post-inspection engineering analysis, and renewal CIP development. This project consists of condition assessment activities including manhole inspections, CCTV inspections, and smoke testing performed to identify sources of inflow and infiltration into the basin.

Project Drivers:

This project will identify sources of I/I and develop rehabilitation recommendations.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Manhole Inspection	209	EA	$ 250	$ 52,250
2	Smoke Testing	78,118	LF	$ 1	$ 62,494
3	CCTV Inspection	78,118	LF	$ 4	$ 312,472
4	Program Management	78,118	LF	$ 2	$ 117,177
				SUBTOTAL:	**$ 544,400**
			CONTINGENCY	30%	$ 163,400
				SUBTOTAL:	**$ 707,800**
			ENG/SURVEY	0%	$ -
				SUBTOTAL:	**$ 707,800**
				Estimated Project Total:	**$ 707,800**

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

APPENDIX J
WASTEWATER TRIGGERS SUMMARY

Appendix J
Wastewater CIP Trigger Summary

Project Information				Existing						20-Year						Buildout					
				A	B	B / A	A - B	--	--	C	D	D / C	C - A	--	--	E	F	F / E	E - C	--	--
Project ID	Project Driver	20-Year Size	Buildout Size	Minimum Pipe Capacity Constraint (MGD)	Existing Peak Wet Weather Flow (MGD)	Existing Utilization (q/Q)	Available Peak Wet Weather Flow Capacity (MGD)	Additional Single Family Homes Equivalent	Additional Non-Residential Acreage Equivalent	Minimum Pipe Capacity Constraint (MGD)	20-Year Peak Wet Weather Flow (MGD)	20-Year Utilization (q/Q)	20-Year CIP Total Available Capacity Added (MGD)	Single Family Homes Equivalent	Non-Residential Acreage Equivalent	Minimum Pipe Capacity Constraint (MGD)	Buildout Peak Wet Weather Flow (MGD)	Buildout Utilization (q/Q)	Buildout CIP Total Available Capacity Added (MGD)	Single Family Homes Equivalent	Non-Residential Acreage Equivalent
C-A	Existing Capacity Restriction	Gravity 36/42-inch	Gravity 42/48-inch	30/36-inch (Existing)						30/36-inch (Existing) + Parallel 36/42-inch (Proposed)						30/36-inch (Existing) + Parallel 42/48-inch (Proposed)					
				11.51	12.76	**111%**	**0.00**	**0**	**0**	34.14	35.01	103%	22.63	27,732	14,790	42.89	42.17	98%	8.75	10,723	5,718
C-B	Existing Capacity Restriction	Gravity 36-inch		27-inch (Existing)						27-inch (Existing) + Parallel 36-inch (Proposed)						27-inch (Existing) + Parallel 36-inch (Proposed)					
				7.14	8.76	**123%**	**0.00**	**0**	**0**	32.12	23.79	74%	24.98	30,612	16,326	32.12	27.98	87%	0.00	0	0
C-C	Future Capacity Restriction	Gravity 30/36-inch		15/18-inch (Existing)						24/27-inch (Existing) + Parallel 30/36-inch (Proposed)						24/27-inch (Existing) + Parallel 30/36-inch (Proposed)					
				7.37	3.50	47%	3.87	4,742	2,529	21.11	16.23	77%	13.74	16,838	8,980	21.11	20.29	96%	0.00	0	0
C-D	Future Capacity Restriction	Gravity 12-inch		8-inch (Existing)						12-inch (Proposed)						12-inch (Proposed)					
				0.29	0.16	55%	0.13	159	84	0.87	0.39	45%	0.58	710	379	0.87	0.42	48%	0.00	0	0
C-E	Existing Capacity Restriction	Gravity 10-inch		6-inch (Existing)						10-inch (Proposed)						10-inch (Proposed)					
				0.25	0.35	**140%**	**0.00**	**0**	**0**	0.98	0.36	37%	0.73	894	477	0.98	0.36	37%	0.00	0	0
C-F	Future Capacity Restriction	Gravity 24-inch		15-inch (Existing)						15-inch (Existing) + Parallel 24-inch (Proposed)						15-inch (Existing) + Parallel 24-inch (Proposed)					
				1.61	0.87	54%	0.74	906	483	10.74	9.77	91%	9.13	11,188	5,967	10.74	10.87	101%	0.00	0	0
C-G	Future Capacity Restriction	Gravity 24-inch		21-inch (Under Design/Construction)						21-inch (Under Design/Construction) + Parallel 24-inch (Proposed)						21-inch (Under Design/Construction) + Parallel 24-inch (Proposed)					
				3.82	0.30	8%	3.52	4,313	2,300	7.21	6.32	88%	3.39	4,154	2,215	7.21	7.22	100%	0.00	0	0
C-H	Future Capacity Restriction	Gravity 18-inch		12/15-inch (Existing)						18-inch (Proposed)						18-inch (Proposed)					
				1.08	0.70	65%	0.38	465	248	3.19	2.47	77%	2.54	3,115	1,661	3.19	2.56	80%	2.42	2,960	1,578
C-I	Future Capacity Restriction	Gravity 15-inch		15-inch (Under Design/Construction)						15-inch (Under Design/Construction) + Parallel 15-inch (Proposed)						15-inch (Under Design/Construction) + Parallel 15-inch (Proposed)					
				4.19	0.00	0%	4.19	5,134	2,738	6.58	6.31	96%	2.39	2,928	1,562	6.58	6.31	96%	0.00	0	0
C-J	Future Capacity Restriction	N/A	Gravity 24-inch	21-inch (Existing)						21-inch (Existing)						21-inch (Existing) + Parallel 24-inch (Proposed)					
				1.40	0.48	34%	0.92	1,127	601	Improvement Not Triggered						7.64	5.91	77%	7.64	9,362	4,993
C-K	Future Capacity Restriction	N/A	Gravity 15-inch	15-inch (Existing)						15-inch (Existing)						15-inch (Existing) + Parallel 15-inch (Proposed)					
				1.13	0.35	31%	0.78	955	509	Improvement Not Triggered						2.23	1.3	58%	2.23	2,732	1,457
G-A	Growth / Development	Gravity 10-inch		Future Development						10-inch (Proposed)						10-inch (Proposed)					
										0.83	0.56	67%	0.83	1,017	542	0.83	0.75	90%	0.00	0	0
G-B	Growth / Development	Gravity 15-inch		Future Development						15-inch (Proposed)						15-inch (Proposed)					
										1.87	1.72	92%	1.87	2,291	1,222	1.87	1.82	97%	0.00	0	0
G-C	Growth / Development	Gravity 12-inch		Future Development						12-inch (Proposed)						12-inch (Proposed)					
										1.03	0.68	66%	1.03	1,262	673	1.03	0.75	73%	0.00	0	0
G-D	Growth / Development	Gravity 12-inch	Gravity 15-inch	Future Development						12-inch (Proposed)						15-inch (Proposed)					
										1.48	0.91	61%	1.48	1,813	967	2.68	1.55	58%	1.20	1,470	784
G-E	Growth / Development	Gravity 10-inch		Future Development						10-inch (Proposed)						10-inch (Proposed)					
										0.92	0.31	34%	0.92	1,127	601	0.92	0.38	41%	0.00	0	0
G-F	Growth / Development	N/A	Gravity 12-inch	Future Development						12-inch (Proposed)						12-inch (Proposed)					
										Improvement Not Triggered						1.01	0.90	89%	1.01	1,237	660
G-G	Growth / Development	Gravity 12-inch		Future Development						12-inch (Proposed)						12-inch (Proposed)					
										1.56	0.61	39%	1.56	1,911	1,019	1.56	0.61	39%	0.00	0	0
G-H	Growth / Development	Force Main 16-inch Lift Station 3.25 MGD		Future Development						8/10/12/15-inch (Under Design/Construction)						8/10/12/15-inch (Under Design/Construction)					
										1.63	1.07	66%	1.63	1,997	1,065	1.63	1.11	**68%**	**0.00**	**0**	**0**
G-I	Growth / Development	Gravity 12-inch Force Main 12-inch Lift Station 2.50 MGD		Future Development						12-inch (Proposed)						12-inch (Proposed)					
										2.13	1.16	54%	2.13	2,610	1,392	2.13	1.29	61%	0.00	0	0
G-J	Growth / Development	N/A	Gravity 8-inch	Future Development						8-inch (Proposed)						8-inch (Proposed)					
										Improvement Not Triggered						0.97	0.54	56%	0.97	1,188	633
G-K	Growth / Development	Gravity 12/15-inch	Gravity 15/21-inch	Future Development						12/15-inch (Proposed)						15/21-inch (Proposed)					
										3.10	2.56	83%	3.10	3,799	2,026	7.59	4.16	55%	4.49	5,502	2,934
G-L	Growth / Development	Gravity 8-inch Force Main 8-inch Lift Station 0.5 MGD	Gravity 8-inch Force Main 8-inch Lift Station 0.6 MGD	Future Development						8-inch (Proposed)						8-inch (Proposed)					
										0.66	0.49	74%	0.66	808	431	0.66	0.57	86%	0.00	0	0
G-M	Growth / Development	N/A	Gravity 8/12/15-inch	Future Development						8/12/15-inch (Proposed)						8/12/15-inch (Proposed)					
										Improvement Not Triggered						1.87	0.34	18%	1.87	2,291	1,222
G-N	Growth / Development	Gravity 8/15-inch Force Main 10-inch Lift Station 1.88 MGD	Gravity 8/12/15-inch Force Main 16-inch Lift Station 3.3 MGD	Future Development						8/15-inch (Proposed)						8/12/15-inch (Proposed)					
										0.45	0.17	38%	0.45	551	294	1.34	0.54	40%	0.89	1,090	581
G-O	Growth / Development	Gravity 8/12-inch Force Main 8-inch Lift Station 1.0 MGD	Gravity 8/12/15-inch Force Main 12-inch Lift Station 2.5 MGD	Future Development						8/12-inch (Proposed)						8/12/15-inch (Proposed)					
										1.78	0.44	25%	1.78	2,181	1,163	3.22	1.72	53%	1.44	1,764	941

The capital improvement project capacities shown in this table are for planning purposes only and are based on high level assumptions and matching existing grades/elevations. Actual pipe grade, capacity, and alignment will be determined at the time of the engineering design.