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Innovative approaches
Practical results
Outstanding service

2015 Water & Wastewater Master Plan Update

Prepared for:

City of Burleson

Prepared by:

FREESE AND NICHOLS, INC.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109
817-735-7300

FNI Project Number: BUR14337

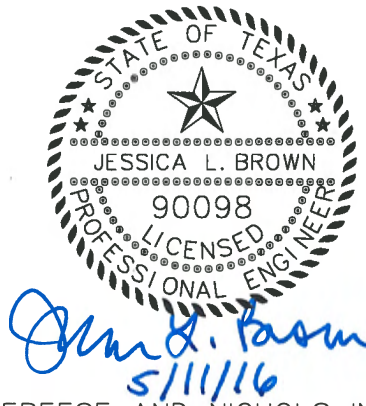
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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Freese and Nichols, Inc. (FNI) was retained by the City of Burleson to prepare an update of its Water and Wastewater Master Plan consisting of detailed land use planning of identified growth corridor areas, updated water and wastewater models, growth related capacity improvements and rehabilitation of existing system deficiencies. This report presents the approach, findings and results of the water and wastewater hydraulic analysis performed by FNI for the City. The purpose of the project was to develop population, water demand and wastewater flow projections, and determine system improvements necessary to continue providing high quality service to existing customers and ensure adequate facilities are in place to serve future development. All of these focus areas went into the development of a comprehensive Capital Improvement Plan (CIP), which prioritizes improvements based on their condition and capacity. To develop a plan to meet future projected water demands and wastewater flows, a hydraulic computer model of both systems was developed. FNI utilized the Innovyze® *H_2OMap Water* and *H_2OMap Sewer* software packages for modeling the water and wastewater systems.

1.2 Population, Water Demands and Wastewater Flows

The total population within Burleson's city limits is projected to increase from 41,118 in 2015 to 82,590 by 2035. For the next 10 years, the City's average annual growth rate is expected to be 3%. This growth rate is expected to increase to 4% by the year 2025. The primary influencing factors for this increase in growth is the recently constructed Chisholm Trail Parkway that is in the southwestern section of the City. FNI conducted a detailed Land Use Planning Study of the areas along the Chisolm Trail Parkway and I-35W corridors. The City of Burleson is anticipating high density residential and non-residential growth in these areas. Because other entities have water 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. The water system served population for the City of Burleson along with the projected water demands is shown in **Table 1-1**. The future water service area is limited to the City's current water CCN boundary.

Table 1-1 Projected Water Demands

Year	Served Population	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
Existing*	36,495	5.9	13.2	24.5
2020	38,492	6.4	14.4	26.7
2025	41,804	7.0	15.7	29.1
Buildout	53,110	8.8	19.8	36.6

*Projected planning demand for dry weather conditions

Previous Master Plans included the City of Burleson expanding its service area boundary beyond its current limits. In discussions with city staff, it appears unlikely that the current service area will not be expanded, and the water system improvements identified by FNI do not expand the water service area.

For the future wastewater service area, there is significant anticipated growth and expansion of the system limits and sizing. The future service area includes much of the undeveloped area identified in the Land Use Planning Corridor Study performed by FNI as part of this study. Future service area projections also assume that some of the residents with septic sewer systems will connect to the City of Burleson's wastewater collection system. The wastewater system served population and projected wastewater flows are shown in **Table 1-2**.

Table 1-2 Projected Wastewater Flows

Year	Served Population	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
Existing	39,788	4.0	13.6
2020	45,940	4.7	16.1
2025	53,508	5.6	19.1
2035	82,590	8.5	29.0

1.3 Water Capital Improvement Plan

The analysis performed with the hydraulic water model aided in identifying the improvements needed to supply future demands throughout the City. Growth is anticipated in the Lower and Upper Pressure Planes, which will require the expansion of both the storage and pumping facilities which supply these areas. One of the most critical improvements is the addition of pumping capacity in the Lower Pressure Plane. To meet the projected demands, FNI identified a two phase expansion of the Industrial Pump Station at Alsbury to supply the Lower Plane. Additionally, the Mountain Valley Pressure Plane is scheduled to be permanently merged with the Upper Pressure Plane into one large pressure plane. Other improvements include a second ground storage tank at the Hulen Pump Station site, and an expansion of the Hulen High Pump Station to supply the Upper Pressure Plane. The primary water facility improvements identified for the distribution system include:

- New 3.0 Million Gallon (MG) Ground Storage Tank (GST) at the Hulen Pump Station site
- New 2.0 MG Lower Pressure Plane Elevated Storage Tank (EST) at the Turkey Peak site
- Industrial Pump Station Expansion
- New 0.75 MG Upper Pressure Plane EST at the Mountain Valley site
- Hulen High Pump Station Expansion
- Decommissioning of the Alsbury Pump Station
- Relocating the Brushy Mound Pump Station and ground storage tank capacity to the Turkey Peak site

Due to the lack of future service area expansion, the proposed water service area will not require any additional pressure planes. CIP projects were developed to improve system looping throughout the City, boost transmission capacity, and increase fire flow protection. **Table 1-3** summarizes the cost for all CIP projects in a certain planning period based on current year 2016 dollars. **Figure 6-1** shows the water CIP projects; and detailed costs for each project can be found in **Appendix G**.

Table 1-3 Water System Capital Improvements Costs

Planning Period	Total Cost
Existing to 2020	$ 8,223,610
2020 to 2025	$ 13,496,800
2025 to Buildout	$ 5,757,720
TOTAL	**$ 27,478,130**

1.4 Wastewater Capital Improvement Plan

The proposed wastewater collection system CIP provides recommended projects along with the costs for the 2020, 2025 and 2035 time periods. The wastewater CIP has two drivers: projects needed to alleviate existing deficiencies and projects needed to serve future growth. The Quil Miller wastewater trunk line allows for growth in the area east of Interstate I-35W. Several CIP projects will tie into the Quil Miller line including the diverted flow from the decommissioning of the Buffalo Ridge and Mockingbird Lift Stations along I-35W. Another goal of the wastewater CIP is to provide service to the Chisholm Trail Parkway corridor. This is accomplished through a new lift station and force main located in the southwestern region of the City. The majority of the projects identified in the wastewater CIP were developed to extend service to areas of new growth, as well as convert existing private septic system users to the City's centralized collection system. **Table 1-4** summarizes the cost for all CIP projects in each planning period based on current year 2016 dollars. **Figure 10-1** shows the wastewater CIP projects, and detailed costs for each project can be found in **Appendix H**.

Table 1-4 Wastewater System Capital Improvements Costs

Planning Period	Total Cost
Existing to 2020	$ 10,394,670
2020 to 2025	$ 7,401,040
2025 to 2035	$ 15,553,260
TOTAL	**$ 33,348,970**

2.0 POPULATION AND LAND USE

2.1 Historical Population

The historical population is referenced from the City of Burleson's 2009 Comprehensive Plan, as well as data collected from the North Central Texas Council of Governments (NCTCOG). The City of Burleson's recent growth rates are lower than those experienced in 2001, but the City is still growing and has maintained a 2% to 3% growth rate over the last two years in a recovering economy. As part of the overall Master Plan Update process, the City of Burleson tasked FNI with performing a detailed analysis of two undeveloped corridors within Burleson's Extraterritorial Jurisdiction (ETJ). The first area surrounds the newly constructed Chisolm Trail Parkway on the City's western edge. A portion of the highway frontage is within Burleson's city limits. The second identified area is along Highway I-35W in the southeastern portion of Burleson. Similar to the Chisolm Trail area, portions of the highway frontage roads are in Burleson's city limits. Future land uses within these areas include residential (low/medium/high density), commercial, retail and industrial land uses. A detailed breakdown of this analysis in included in **Appendix A**.

The City of Burleson does not provide water and sewer 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 2000 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. The historical populations and growth are shown in **Table 2-1**. The City of Burleson also provided information on existing parcel area and land use type. From this information, it was determined that a population of 3.2 people/connection for low density residential and 2.5 people/connection for high density residential would be used to estimate future single family and multi-family apartment residences.

Table 2-1 Historical Population Growth

Year	City Population	Average Annual Population Growth Rate
2000	20,976	--
2001	23,063	10%
2002	24,330	5%
2003	25,978	7%
2004	27,766	7%
2005	29,391	6%
2006	31,266	6%
2007	31,650	1%
2008	33,250	5%
2009	34,350	3%
2010	36,690	7%
2011	36,990	1%
2012	38,130	3%
2013	39,010	2%
2014	39,920	2%
2015	41,118	3%
Average		**5%**

2.2 Population and Commercial Growth Projections

FNI worked with City staff and utilized information from the City's most recent comprehensive plan and draft NCTCOG projections by TSZ to develop and distribute the projected populations and commercial growth. Summaries of these projections are shown in **Table 2-2** and **Table 2-3**. These projections are citywide and were used as the basis for developing projections for the water and sewer service areas.

Table 2-2 Projected Population Growth

Year	City Population	Average Annual Growth Rate
2015	41,118	3%
2020	47,667	3%
2025	55,795	4%
2035	82,590	4%

The projected growth rates are in line with historical growth as well as the detailed land use planning study conducted by FNI.

Table 2-3 Projected Commercial Growth

Year	City Commercial Acres	Average Annual Growth Rate
2015	3,788	-
2020	4,492	4%
2025	5,087	3%
2035	5,807	1%

The population growth through the planning years was determined by evaluating historical trends and working with City of Burleson staff to identify areas of potential growth for the 2020, 2025 and 2035 planning periods. **Appendix B** contains mapping which shows the total population of each individual TSZ. A detailed breakdown of the total population, water service area and sewer service area populations for each TSZ is seen in **Table 2-4**.

Table 2-4 Total, Water Served, Sewer Served Population and Served Commercial Acres by TSZ

	Total TSZ Population					Water Served Population				Sewer Served Population				Water Served Commercial Acres				Sewer Served Commercial Acres			
TSZ ID	2015	2020	2025	2035	Buildout	2015	2020	2025	Buildout	2015	2020	2025	2035	2015	2020	2025	Buildout	2015	2020	2025	2035
10860	2,750	3,181	3,241	3,835	3,835	2,750	3,181	3,241	3,335	2,750	3,181	3,241	3,835	22	22	22	22	22	22	22	22
10861	4,622	4,950	5,144	5,416	5,958	4,622	4,950	5,144	5,958	4,622	4,950	5,144	5,416	48	50	52	55	48	53	54	54
10862	0	0	0	0	0	0	0	0	0	0	0	0	0	130	147	160	177	130	143	151	166
16006	0	83	88	114	125	0	0	0	0	0	83	88	114	0	0	0	0	0	0	0	8
16007	6,587	6,689	6,903	7,179	9,476	6,587	6,689	6,903	7,179	6,587	6,689	6,903	7,179	108	112	116	117	108	115	117	117
16008	2,297	2,397	2,540	2,590	2,849	2,297	2,397	2,540	2,849	2,297	2,397	2,540	2,590	39	49	55	95	39	43	49	66
16009	1,420	1,540	1,612	1,644	1,808	1,420	1,540	1,612	1,808	1,420	1,540	1,612	1,644	16	17	20	20	16	18	20	20
16014	590	719	813	1,276	1,685	0	0	0	0	220	524	650	1,276	0	0	0	0	31	42	53	60
16026	2,934	3,582	4,344	5,468	7,940	2,347	2,686	3,258	5,955	2,934	3,582	4,344	5,468	98	139	167	251	98	127	148	194
16027	2,111	2,156	2,186	2,205	2,426	2,111	2,156	2,186	2,426	2,111	2,156	2,186	2,205	20	22	26	26	20	22	24	26
16028	3,401	3,753	4,091	5,328	7,033	2,721	3,002	3,273	4,626	3,401	3,753	4,091	5,328	102	127	144	168	102	112	140	156
16029	1,814	1,814	1,814	1,820	2,002	1,814	1,814	1,814	2,002	1,814	1,814	1,814	1,820	75	88	93	97	75	82	88	97
16030	2,637	2,679	2,721	2,793	3,686	2,637	2,679	2,721	3,686	2,637	2,679	2,721	2,793	108	143	169	206	108	141	159	183
16031	154	208	234	255	280	154	208	234	280	154	208	234	255	29	33	37	37	29	32	35	37
16032	632	653	677	796	1,302	316	326	338	651	632	653	677	796	35	35	35	35	47	55	56	58
16033	70	494	655	898	1,186	70	494	655	949	70	494	655	898	158	177	201	230	158	174	193	222
16034	2,168	2,400	2,779	3,774	4,981	867	960	1,112	1,594	2,168	2,400	2,779	3,774	30	34	39	41	33	58	76	159
16035	261	372	521	654	863	0	0	0	0	60	272	417	654	0	0	0	0	39	46	53	57
16049	0	250	987	3,103	9,957	0	0	0	0	0	182	790	2,793	0	0	0	0	0	63	93	238
16050	582	618	1,441	3,015	20,874	252	315	410	504	387	450	1,153	2,714	33	42	56	83	101	141	174	240
16052	1,351	1,612	1,962	3,357	4,532	1,092	1,451	1,766	3,263	1,351	1,612	1,962	3,357	103	105	108	110	103	113	119	125
16053	538	679	735	800	1,156	538	552	581	595	538	679	735	800	8	8	9	10	75	82	86	91
16054	216	237	268	829	3,836	0	0	0	0	216	237	214	829	0	0	0	0	0	20	30	61
16055	0	824	1,481	3,259	10,112	0	0	0	0	0	601	1,185	2,933	0	0	0	0	0	74	152	383
16062	917	1,439	1,629	2,454	2,699	917	1,439	1,629	1,629	830	1,049	1,303	2,209	28	32	35	44	36	40	49	68
16063	0	237	268	330	547	0	0	0	0	0	173	214	297	0	0	0	0	0	0	20	46
16066	0	0	369	3,169	18,997	0	0	0	0	0	0	295	2,852	0	0	0	0	77	109	135	152
16067	0	0	0	0	1,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16070	0	0	270	2,617	10,940	0	0	0	0	0	0	216	2,355	0	0	0	0	0	32	129	648
16071	0	0	232	400	944	0	0	0	0	0	0	186	360	0	0	0	0	0	46	104	341
16075	0	0	0	337	1,706	0	0	0	0	0	0	0	303	0	0	0	0	0	12	26	109
16078	0	0	0	0	1,103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16079	0	0	0	0	1,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16080	0	0	0	0	1,019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16081	0	0	0	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16082	0	0	0	550	4,079	0	0	0	0	0	0	0	495	0	0	0	0	0	0	0	2
16086	0	0	0	0	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16087	0	0	0	0	643	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40089	426	581	617	679	996	0	0	0	0	188	424	494	611	0	0	0	0	38	42	50	66
40090	0	0	0	0	635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40958	0	0	0	0	0	0	0	0	0	0	0	0	0	47	51	54	60	47	54	55	57
41052	0	0	0	0	463	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41054	540	572	633	662	728	540	572	633	728	540	572	633	662	62	78	82	107	62	68	77	94
41055	1,062	1,612	1,998	2,655	3,505	531	806	999	1,402	1,062	1,612	1,998	2,655	73	89	98	132	75	82	100	136
41056	1,038	1,336	1,906	5,581	30,236	35	275	755	1,691	799	974	1,525	5,023	13	16	19	28	95	112	121	140
41057	0	0	544	1,940	15,004	0	0	0	0	0	0	435	1,746	0	0	0	0	0	0	25	50
41165	0	0	0	658	677	0	0	0	0	0	0	0	592	0	0	0	0	0	0	10	35
41180	0	0	92	150	797	0	0	0	0	0	0	74	135	0	0	0	0	0	0	0	1
TOTAL	41,118	47,667	55,795	82,590	207,454	34,618	38,492	41,804	53,110	39,788	45,940	53,508	79,766	1,385	1,616	1,797	2,151	1,812	2,375	2,993	4,785

The future 5 and 10-year residential growth rate is anticipated to remain at 3%. This growth rate is expected to increase to 4% by the year 2025. The primary influencing factors for this decision are the anticipated Chisholm Trail Parkway project that is projected to be developed in the southwestern section of the city and the proposed growth along the I-35W corridor.

2.3 Projected Water and Wastewater Served Populations and 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. Due to this, it was necessary to develop three separate sets of population projections: a city population, a water service area population, and a sewer service area population.

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 sewer service area was identified. Future service area projections assume that some of the residents with septic sewer systems will connect to the City of Burleson's wastewater collection system. **Appendix B** contains mapping showing water and wastewater service populations and non-residential acreage served by TSZ for the City of Burleson.

3.0 WATER DEMANDS

The City of Burleson's water distribution system was evaluated under four demand conditions: average day, maximum day, maximum day plus fire flow and peak hour. Average day use is the total annual water use divided by the number of days in the year. Average day demands are 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 water lines, ground storage tanks and pump stations. Maximum day plus fire flow includes the addition of a 1,500 gpm fire flow demand with the maximum day demand. Peak hour use is the peak rate at which water is consumed during one hour in the year and is used to size elevated storage tanks as well as additional pump station sizing. These demands represent the range of conditions typically encountered in water distribution systems.

3.1 Historical Water Demands

The historical water billing data provided by Burleson was used in developing the existing water demand by land use type. The 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 represented 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 basis. The non-residential demand includes all industrial, retail and commercial demands and is represented 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** summarizes the historical demands and the maximum day to average day peaking and usage factors.

Table 3-1 Historical Water Demands

Year	Overall Population	Water Served Population	Overall Avg. Day Demand (mgd)	Overall Avg. Day Per Capita (gpcd)*	Overall Max. Day Demand (mgd)	Overall Max. Day/Avg. Day Ratio
2000	20,976	20,276	3.1	153	6.5	2.1
2001	23,063	22,363	2.9	131	7.7	2.6
2002	24,330	23,630	2.9	124	6.2	2.1
2003	25,978	25,278	3.1	123	8.1	2.6
2004	27,766	27,066	3.0	111	6.4	2.1
2005	29,391	28,691	3.9	135	7.3	1.9
2006	31,266	30,366	4.4	143	8.8	2.0
2007	31,650	30,550	3.6	118	7.2	2.0
2008	33,250	31,950	4.6	144	9.4	2.0
2009	34,350	32,661	4.4	135	9.8	2.2
2010	36,690	33,774	4.1	121	9.6	2.3
2011	36,990	33,993	5.0	147	12.1	2.4
2012	38,130	34,548	4.3	124	9.8	2.3
2013	39,010	35,277	4.2	119	6.8	1.6
2014	39,920	36,100	5.2	145	12.0	2.3
2015	41,280	36,495	4.1	113	7.6	1.9
			Average	**131**		**2.2**

*Determined by served population

The overall average day demand ranged from 2.9 MGD in 2001 to 5.2 MGD in 2014. The average day water demand was converted into a per capita water demand by dividing the water usage by the estimated served population. The overall average day demand per capita usage varied from a low of 111 gpcd in 2004 to a peak of 153 gpcd in 2000, with an overall average of 132 gpcd. There was a significant drop in the overall average day demand per capita usage in 2007 due to restrictions prohibiting outdoor watering between 10 am and 6pm established in 2006 (as wholesale customers of the City of Fort Worth). Although the average gpcd since 2006 is also 132 gpcd, the maximum in that period is 147 gpcd. The maximum day demand ranged from 6.2 MGD in 2002 to 12.1 MGD in 2011. The overall maximum day to average day ratio represents the difference between the day of highest demand compared to the annual average day demand. The average overall maximum day to average day demand ratio was 2.2.

FNI calculated the existing residential, commercial and industrial water usage to develop a future projection for each land use type. Residential water demands were developed using historical trends, growth patterns and the most recent billing records. The commercial and industrial water demands were developed using the 2014 billing meters and the parcel acreage data provided by the City. The average commercial and industrial usage was divided by the average commercial/industrial acreage to determine a gallon per acre day (gpad) value. This value was used to establish a baseline for typical commercial water usage in under average day conditions.

3.2 Projected Water Demands

Projected water demands were estimated based on projected residential population and future commercial growth. The average day usage rates are 135 gallons per capita day (gpcd) for new residential growth and 750 gallons per acre day (gpad) for new commercial growth. 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. A summary of the projected 5 year, 10 year and buildout water demands city wide is shown in **Table 3-2**. A detailed summary of the projected water demands by pressure plane and factors used in calculating these demands is shown in **Table 3-3**.

Table 3-2 City Wide Projected Water Demands

Year	Served Population	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
Existing	36,595	5.9	13.2	24.5
2020	38,492	6.4	14.4	26.7
2025	41,804	7.0	15.7	29.1
Buildout	53,110	8.8	19.8	36.6

Table 3-3 Projected Water Demands by Pressure Plane

2015								
Customer Base	Served Population	Developed Non-Residential Acres	Avg Day Usage Rates	Avg Day Demand (MGD)	Max Day/ Avg Day Ratio	Max Day Demand (MGD)	Peak Hour/ Max Day Ratio	Peak Hour Demand (MGD)
Lower Residential	28,776	-	135 gpcd	3.9	2.25	8.7	1.85	16.2
Lower Commercial	-	1,037	750 gpd/acre	0.8	2.25	1.7	1.85	3.2
Total Lower Plane	**28,776**	**1,037**	**-**	**4.7**	**-**	**10.5**	**-**	**19.4**
Upper/Mtn Valley Residential	7,819	-	135 gpcd	1.1	2.25	2.4	1.85	4.4
Upper/Mtn Valley Commercial	-	209	750 gpd/acre	0.2	2.25	0.4	1.85	0.7
Total Upper/Mtn Valley Plane	**7,819**	**209**	**-**	**1.2**	**-**	**2.7**	**-**	**5.0**
Total Burleson	**36,595**	**1,246**	**--**	**5.9**	**--**	**13.2**	**--**	**24.5**
2020								
Customer Base	Served Population	Developed Non-Residential Acres	Avg Day Usage Rates	Avg Day Demand (MGD)	Max Day/ Avg Day Ratio	Max Day Demand (MGD)	Peak Hour/ Max Day Ratio	Peak Hour Demand (MGD)
Lower Residential	29,832	-	135 gpcd	4.0	2.25	9.1	1.85	16.8
Lower Commercial	-	1,341	750 gpd/acre	1.0	2.25	2.3	1.85	4.2
Total Lower Plane	**29,832**	**1,341**	**-**	**5.0**	**-**	**11.3**	**-**	**20.9**
Upper/Mtn Valley Residential	8,660	-	135 gpcd	1.2	2.25	2.6	1.85	4.9
Upper/Mtn Valley Commercial	-	275	750 gpd/acre	0.2	2.25	0.5	1.85	0.9
Total Upper/Mtn Valley Plane	**8,660**	**275**	**-**	**1.4**	**-**	**3.1**	**-**	**5.7**
Total Burleson	**38,492**	**1,616**	**--**	**6.4**	**--**	**14.4**	**--**	**26.7**
2025								
Customer Base	Served Population	Developed Non-Residential Acres	Avg Day Usage Rates	Avg Day Demand (MGD)	Max Day/ Avg Day Ratio	Max Day Demand (MGD)	Peak Hour/ Max Day Ratio	Peak Hour Demand (MGD)
Lower Residential	31,809	-	135 gpcd	4.3	2.25	9.7	1.85	17.9
Lower Commercial	-	1,482	750 gpd/acre	1.1	2.25	2.5	1.85	4.6
Total Lower Plane	**31,809**	**1,482**	**-**	**5.4**	**-**	**12.2**	**-**	**22.5**
Upper/Mtn Valley Residential	9,995	-	135 gpcd	1.3	2.25	3.0	1.85	5.6
Upper/Mtn Valley Commercial	-	315	750 gpd/acre	0.2	2.25	0.5	1.85	1.0
Total Upper/Mtn Valley Plane	**9,995**	**315**	**-**	**1.6**	**-**	**3.6**	**-**	**6.6**
Total Burleson	**41,804**	**1,797**	**--**	**7.0**	**--**	**15.7**	**--**	**29.1**
Buildout								
Customer Base	Served Population	Developed Non-Residential Acres	Avg Day Usage Rates	Avg Day Demand (MGD)	Max Day/ Avg Day Ratio	Max Day Demand (MGD)	Peak Hour/ Max Day Ratio	Peak Hour Demand (MGD)
Lower Residential	39,937	-	135 gpcd	5.4	2.25	12.1	1.85	22.4
Lower Commercial	-	1,732	750 gpd/acre	1.3	2.25	2.9	1.85	5.4
Total Lower Plane	**39,937**	**1,732**	**-**	**6.7**	**-**	**15.1**	**-**	**27.8**
Upper/Mtn Valley Residential	13,173	-	135 gpcd	1.8	2.25	4.0	1.85	7.4
Upper/Mtn Valley Commercial	-	419	750 gpd/acre	0.3	2.25	0.7	1.85	1.3
Total Upper/Mtn Valley Plane	**13,173**	**419**	**-**	**2.1**	**-**	**4.7**	**-**	**8.7**
Total Burleson	**53,110**	**2,151**	**--**	**8.8**	**--**	**19.8**	**--**	**36.6**

4.0 EXISTING WATER DISTRIBUTION SYSTEM

The City of Burleson does not operate any water treatment facilities or groundwater wells. The City of Burleson purchases water from the City of Fort Worth with delivery points at the Alsbury, Industrial and Hulen Pump Stations. The existing water distribution system includes three elevated storage tanks, seven ground storage tanks 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 detailed description of the existing facilities within each of the three 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. Water is delivered to Burleson from the City of Fort Worth's Southside II Pressure Plane. The LPP is supplied water from the Alsbury, Industrial and Hulen Low Pump Stations. From this point; the water is then pumped into the LPP and to the Brushy Mound ground storage tanks and the Turkey Peak ground storage tank. These ground storage tanks are at an elevation where they serve as elevated storage for the LPP. The Alsbury Pump Station is an inline booster pump station and contains two 1,740 gallons per minute (gpm) pumps and one 800 gpm pump. The Industrial Pump Station includes two 2.0 MG GSTs and three 1,400 gpm pumps, which are supplied by the GSTs. The Hulen Low Pump Station consists of a 2.0 MG GST shared with the High Pump Station and three 1,780 gpm pumps. The Brushy Mound site contains two 0.42 MG GSTs. The City also has the ability to transfer water from the Upper Pressure Plane (UPP) to the LPP through two transfer valves. One is located along the pressure plane boundary between the 0.75 MG UPP Turkey Peak EST and the 0.42 Turkey Peak GST, 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 part of the city, generally being the area west of Wilshire Blvd. and Alsbury Blvd. Water is delivered by the City of Fort Worth from their Southside III Pressure Plane to the GST at the Hulen Pump Station. The Hulen High Pump Station consists of a shared 2.0 MG GST and three 1,780 gpm pumps. The Hulen Pump Station serves two primary functions: supply water to the UPP and supply water to the Mountain Valley GST. Water from the Hulen Pump Station is supplied to the Mountain Valley GST through a 16-inch/12-inch water line along Hulen Road and Wilshire Blvd. The Turkey Peak EST serves as the only source of elevated storage for the upper pressure plane. The tank capacity is 0.75 MG and has an overflow elevation of 1,000 feet. The Brushy Mound Pump Station has three 1,050 gpm pumps but is rarely used since the Hulen High Pump Station was constructed.

4.1.3 Mountain Valley Pressure Plane

The Mountain Valley Pressure Plane (MVPP) includes the southwestern portion of the city. Water is supplied to the MVPP from the Hulen Pump Station in the UPP. The Mountain Valley Pump Station consists of a 0.3 MG GST and two pumps rated at 1,200 gpm and 500 gpm. In the far southern portion of the water system is the 0.3 MG Mountain Valley EST. The tank has an overflow elevation of 1,034 feet and currently serves as the only elevated tank in the MVPP.

The City can operate the system as two or three pressure planes. This is achieved by bypassing the Mountain Valley GST and Pump Station and merging the MVPP with the UPP. As part of the water system analysis, FNI evaluated the feasibility of making this change part of normal operations. The results can be found in the water system analysis section of this report.

Table 4-1 Existing System Tank Facilities

GROUND STORAGE TANKS			
Pressure Plane	**Ground Storage Tank Name**	**Capacity (MG)**	**Overflow Elevation**
LPP	Industrial PS GST 1	2.0	739’
LPP	Industrial PS GST 2	2.0	739’
	Lower Pressure Plane TOTAL	**4.0**	
UPP	Hulen PS GST	2.0	876’
	Upper Pressure Plane TOTAL	**2.0**	
MVPP	Mountain Valley PS GST	0.3	876’
	Mountain Valley Pressure Plane TOTAL	**0.3**	
	Total Ground Storage	**6.3**	
ELEVATED STORAGE TANKS			
Pressure Plane	**Elevated Storage Tank Name**	**Capacity (MG)**	**Overflow Elevation**
LPP	Brushy Mound 1	0.42	894’
LPP	Brushy Mound 2	0.42	894’
LPP	Turkey Peak	0.42	894’
LPP	Hidden Creek EST	1.00	894’
	Lower Pressure Plane TOTAL	**2.26**	
UPP	Turkey Peak EST	0.75	1,000’
	Upper Pressure Plane TOTAL	**0.75**	
MVPP	Mountain Valley EST	0.30	1,034’
	Mountain Valley Pressure Plane TOTAL	**0.30**	
	Total Elevated Storage	**3.31**	

Table 4-2 Existing System Pumping Facilities

Pressure Plane	Pump Station Name	No. of Pumps	Rated Capacity
LPP	Alsbury PS	2	1,740 GPM
LPP	Alsbury PS	1	800 GPM
LPP	Industrial PS	3	1,400 GPM
LPP	Hulen Low PS	3	1,780 GPM
	Lower Pressure Plane Total Pumping Capacity		19.9 MGD
	Lower Pressure Plane Firm Pumping Capacity		**17.3 MGD**
UPP	Brushy Mound PS	3	1,050 GPM
UPP	Hulen High PS	3	1,780 GPM
	Upper Pressure Plane Total Pumping Capacity		12.2 MGD
	Upper Pressure Plane Firm Pumping Capacity		**9.7 MGD**
MVPP	Mountain Valley PS	1	1,200 GPM
MVPP	Mountain Valley PS	1	500 GPM
	Mountain Valley Pressure Plane Total Pumping Capacity		2.4 MGD
	Mountain Valley Pressure Plane Firm Pumping Capacity		**1.5 MGD**

FIGURE 4-1

CITY OF BURLESON

EXISTING WATER SYSTEM

LEGEND

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

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

10 MGD Supply from Fort Worth (SS3)

Supply from Fort Worth (SS2)

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

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

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

UPP to LPP Transfer Valve

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

UPP to LPP Transfer Valve

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

0.72 MGD Mountain Valley
Pump Station

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

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

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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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 program is a standalone software package that graphically models a water distribution system utilizing a GIS type interface and the industry standard EPANET hydraulic calculation engine. The H2OMap Water 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 8,637 pipes, ranging in size from 2-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. **Table 4-3** shows the initial Hazen-Williams coefficients used for the model. Some of the roughness coefficients were adjusted during model calibration based on model results.

Table 4-3 Initial Hazen Williams Pipe Roughness Coefficients

Pipe Material	Before 1960	1961-1970	1971-1980	1981-1990	1991-2010	No Year
Concrete	100	110	120	125	130	100
Cast Iron	90	100	110	115	120	100
Ductile Iron	100	110	120	125	130	100
Unknown	100	110	120	125	130	100
PVC	110	120	130	135	140	110

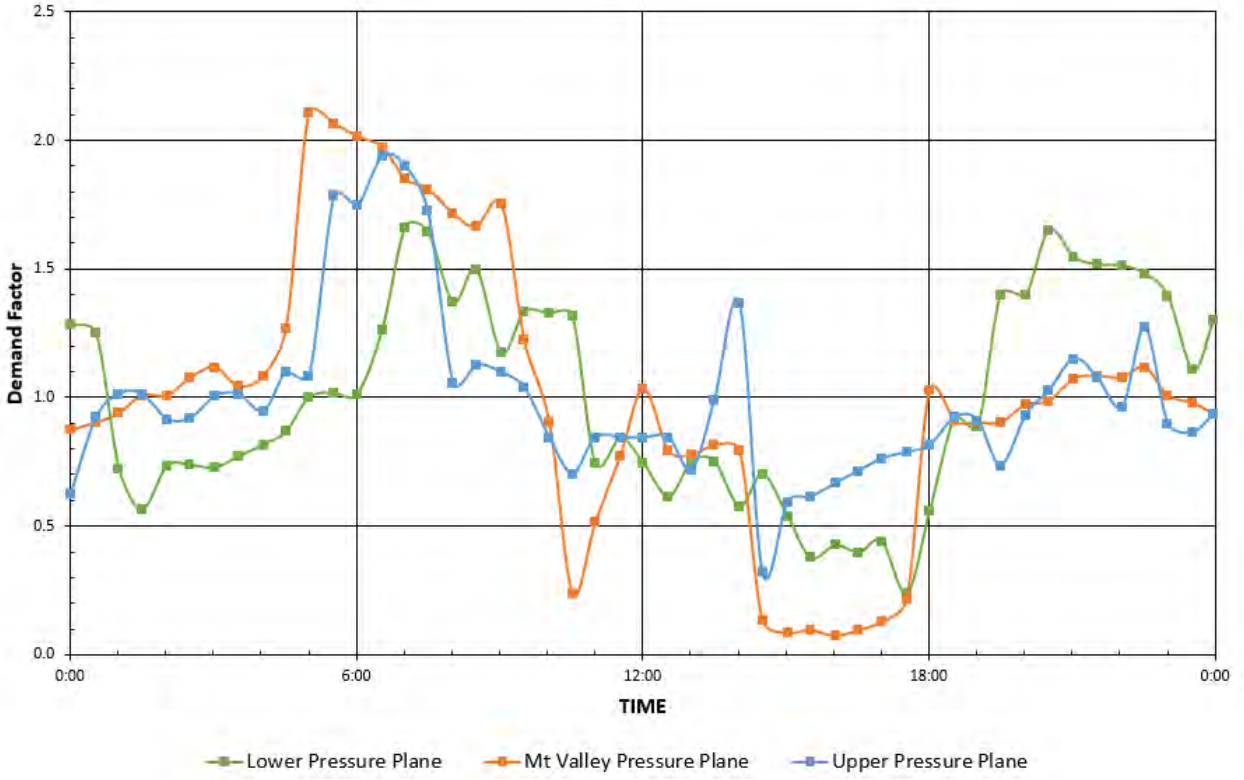
4.2.2 Pressure Testing and Calibration

Field pressure monitoring was conducted from August 5 through August 25, 2014, in order to gather information to simulate summer or high demand conditions. System pressure was monitored simultaneously at 10 locations across the city. The locations of the pressure testing sites are shown on **Figure C-1** in **Appendix C**. Five locations in the LPP, three locations in the UPP and two locations in the MVPP were monitored. **Appendix C** contains graphs of each of the individual pressure recorder readings and summaries. To calibrate the water system model, FNI matched the modeled system pressures to within 5 psi of the observed pressures during the pressure testing.

In order to verify that the hydraulic model accurately represents actual distribution system operation, an extended period model calibration was performed. 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 12:00 am on August 7th to 12:00 am on August 8th 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 in 30-minute intervals during the pressure testing period. The SCADA reports included ground and elevated storage tank levels, transfer valve status and on/off status for system pumps. Pump station flow and tank level data was utilized to calculate an overall diurnal curve by examining water going into (supply) and out of (demand) the distribution system. The calculated total system demand for August 7th was 7.16 MGD with a peak of 15.10 MGD and a minimum demand of 0.92 MGD. **Figure 4-2** shows the calculated system diurnal curves by pressure plane for August 7, 2014.

Figure 4-2 System Diurnal Curves by Pressure Plane, August 7, 2014



The calculated diurnal reflects high usage in the early morning hours, which is likely related to irrigation. Diurnal factors for the 24-hour period in the LPP range from 0.24 to 1.66. Diurnal factors for the 24-hour period in the UPP range from 0.32 to 1.94. Diurnal factors for the 24-hour period in the MVPP range from 0.07 to 2.11. **Appendix D** contains calibration charts showing modeled versus SCADA recorded values for pump station flows, tank levels, and field recorded pressures.

4.3 Water System Design Criteria

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 issues with pressures occur, if tanks are filling or draining properly and if the pumping facilities are adequate to meet the required demand at acceptable pressure. FNI developed design criteria to use to properly identify the need, timing and size of capital improvement projects.

Water transmission lines shall be sized to maintain a minimum of 35 psi throughout the system during peak hour demand conditions. Transmission lines (12-inch lines and greater) shall be designed for a maximum pipeline velocity of 5 feet/second and a maximum friction loss of 5 feet per 1,000 feet of pipeline length. Distribution lines (smaller than 12-inch lines) shall be designed for a maximum pipeline velocity of 7 feet/second and a maximum friction loss of 7 feet per 1,000 feet of pipeline length.

The City is required to meet the TCEQ minimum elevated storage capacity requirement of 100 gallons per connection. The amount of elevated storage affects the required TCEQ minimum pumping capacity as discussed further in the required pumping text. If the elevated storage meets or exceeds 200 gallons/connection, the required pumping decreases from 2.0 gpm/connection to 0.6 gpm/connection. The amount of storage to meet this optional requirement is included in **Table 4-4**. The number of connections per pressure plane from the water billing data was used to calculate the TCEQ minimum required storage. A comparison of the City's existing elevated storage by pressure plane to TCEQ requirements is shown in **Table 4-4**.

Table 4-4 Existing Water Distribution System Elevated Storage Capacity

Pressure Plane	Estimated Connections*	Existing Elevated Storage (MG)	TCEQ Requirement 100 gal/con (MG)	Optional TCEQ Requirement 200 gal/con** (MG)
Lower	10,816	2.26	1.08	2.16
Upper	2,943	0.75	0.29	0.59
Mountain Valley	678	0.30	0.07	0.14
Total	**14,437**	**3.31**	**1.44**	**2.89**

*Based on billing meter data and information from city staff

For performing fire flow analysis, the Texas Commission on Environmental Quality (TCEQ) states that a minimum pressure of 20 psi must be maintained at the location of the fire flow demand and a pressure of 35 psi maintained in the throughout the rest of the system.

For ground storage tanks, FNI recommends that the capacity be sized so a tank can supply maximum day demands for ten hours, so as to have sufficient capacity to ride through a temporary interruption in supply from the City of Fort Worth. The City must also meet the TCEQ total storage capacity requirement of 200 gallons per connection. The recommended criterion of ten hours of storage capacity during maximum day demands is more conservative and was used to size the recommended ground storage capacity.

The firm pumping capacity is defined as the total available pumping capacity with the largest pump out of service. In addition to storage requirements, the City is also required to meet the pumping capacity requirements presented in **Table 4-5**. Existing pumping capacity was evaluated and is summarized in **Table 4-6**.

Table 4-5 TCEQ Pumping Requirements

Condition	Pumping Capacity Requirement*
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 with the largest pump out of service

*Capacity requirement from TAC §290.45(b)(2)(F)

Table 4-6 TCEQ Pumping Capacity Requirements for Existing System

Pressure Plane	Estimated Connections	Existing Firm Capacity (MGD)	TCEQ Requirement 0.6 gpm/con* (MGD)	TCEQ Requirement 2.0 gpm/con** (MGD)
Lower	10,816	9.50	9.35	31.15
Upper	2,943	5.00	2.54	8.48
Mountain Valley	678	1.50	0.59	1.95
Total	**14,437**	**16.00**	**12.47**	**41.58**

*EST capacity greater than 200 gal/connection
**EST capacity less than 200 gal/connection

From **Table 4-4**, Burleson does have greater than 200 gallons per connection in the LPP and UPP, so Condition 1 from **Table 4-6** is satisfied.

4.4 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: peak hour pressures, water line headlosses/velocities and available fire flow. A 24-hour extended period simulation (EPS) was performed for each operating scenario. By examining the water system under these operating conditions, it is possible to determine where issues with pressures occur, if tanks are filling or draining properly, and if the pumping facilities are adequate to meet the required demand at acceptable pressure. **Appendix E** contains all of the mapping showing the water system analyses.

4.4.1 Hydraulic Analysis

Color-coded pressure maps were prepared to illustrate the residual pressure calculated at model junctions. The maps helped identify potential problem areas in the system and were used as a tool to ensure 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. The peak hour is defined at the greatest amount of water used in one hour during the year. 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 40 psi; however, a large portion of the pressure plane experience pressures between 40 and 60 psi. The higher pressures are seen in the UPP and MVPP with the highest pressures located on the discharge sides of both the Hulen and the Mountain Valley Pump Stations. FNI performed an analysis of Burleson's water distribution system under both two plane and three plane operations to determine if merging the LPP and MVPP would meet TCEQ minimum pressure requirements. Model results indicate that only a couple of nodes along Country Vista Circle have pressures below 35 psi. This could potentially be resolved by keeping a slightly higher water level in the UPP EST. The maps showing the maximum and minimum pressures can be found in **Appendix E**.

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. Under the maximum day demand scenario, large areas of low pressures (less than 40 psi) were observed around the edges of the LPP bordering the UPP and the distribution system lines which feed the Brushy Mound tanks. There were few distribution system water mains which violated the selected design criteria and were scattered throughout the City. Mapping was created to highlight the areas which violate the design velocity and headloss criteria and can be found in **Appendix E**. The model results for the existing system do not show any large diameter lines to be in violation of high velocities, and very few lines violate the headloss criteria.

4.4.2 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 **Appendix E**. Areas with small mains in the model (less than 6-inches) and dead end mains 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 Pressure Plane Delineation

Currently the City operates in three pressure planes: the Lower Pressure Plane, Upper Pressure Plane and Mountain Valley Pressure Plane. Each pressure plane is designed to maintain an adequate range of pressures throughout its service area by using elevated tanks and pumps to maintain a consistent flow of water.

The Mountain Valley Pressure Plane, which encompasses the City's southwestern area, is planned to be combined with the Upper Pressure Plane. Combining the existing UPP and MVPP will require a larger Mountain Valley EST that matches the 1,000' overflow elevation of the existing Turkey Peak EST. The future pressure plane delineation is shown on **Figure 6-1**.

5.2 Future Recommended Pumping and Storage Capacities

FNI created graphs of each pressure plane's ground and elevated storage and pumping capacity. The vertical bars represent the water demand for the planning period, and the capacity of the system at the given time is shown in red. The capacity changes over time with the expansion or decommissioning of facilities in order to meet the demands. The future system capacities are based on the criteria from **Section 4.3**. FNI calculated estimated number of connections for the future planning periods using the existing connections from **Table 4-4** as a base condition. **Table 5-1** provides a summary of the projected connections by pressure plane for the City of Burleson and serves as the basis for the future pumping and storage requirements.

Table 5-1 Future Estimated Connections by Pressure Plane

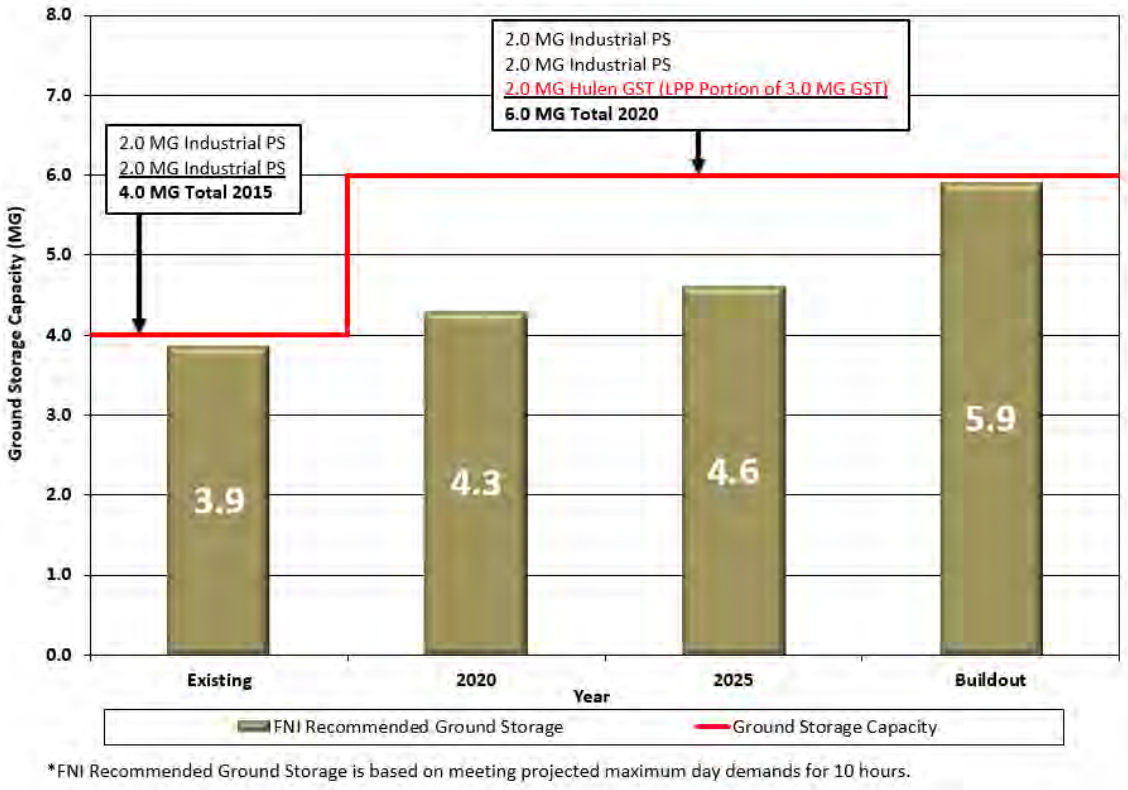
Lower Pressure Plane			Upper/Mountain Valley Pressure Plane		
Planning Period	**Projected Population**	**Estimated Connections**	**Planning Period**	**Projected Population**	**Estimated Connections**
Existing	26,619	10,816	Existing	9,591	3,621
2020	29,118	11,199	2020	10,865	4,024
2025	31,005	11,925	2025	13,135	4,865
Buildout	40,536	15,591	Buildout	17,759	6,577

The future system capacities are discussed in detail in the following sections.

5.2.1 Lower Pressure Plane Future System Capacities

In the existing system analysis, the LPP has the capacity to meet the required ground storage requirements of 10 hours of maximum day demands; however, the existing LPP EST and firm pumping facilities do not meet the minimum requirements to supply the LPP long term. In the 2020-2025 planning period, FNI recommends a 6.0 MGD expansion of the Industrial Pump Station. As a result of the expanded pump station, the Alsbury Booster Pump Station is recommended to be decommissioned. This will reduce the amount of peaking off Fort Worth's system and provide potential cost savings for the City. Other future improvements needed to meet minimum requirements through buildout are: an additional 2.0 MG of ground storage in 2020 located at the Hulen Pump Station, which provides storage for both the LPP and UPP, and a second Industrial Pump Station expansion of 4.0 MGD in buildout. **Figures 5-1**, **5-2**, and **5-3** show the LPP future ground storage, elevated storage, and firm pumping capacities. Finally, the existing ground storage tanks at Brushy Mound and Turkey Peak which act as elevated storage for the LPP are recommended to be abandoned with a new ground tank at Turkey Peak to replace these facilities as well as serve new growth in the pressure plane.

Figure 5-1 Lower Pressure Plane Required Ground Storage Capacity



*FNI Recommended Ground Storage is based on meeting projected maximum day demands for 10 hours.

Figure 5-2 Lower Pressure Plane Required Elevated Storage Capacity

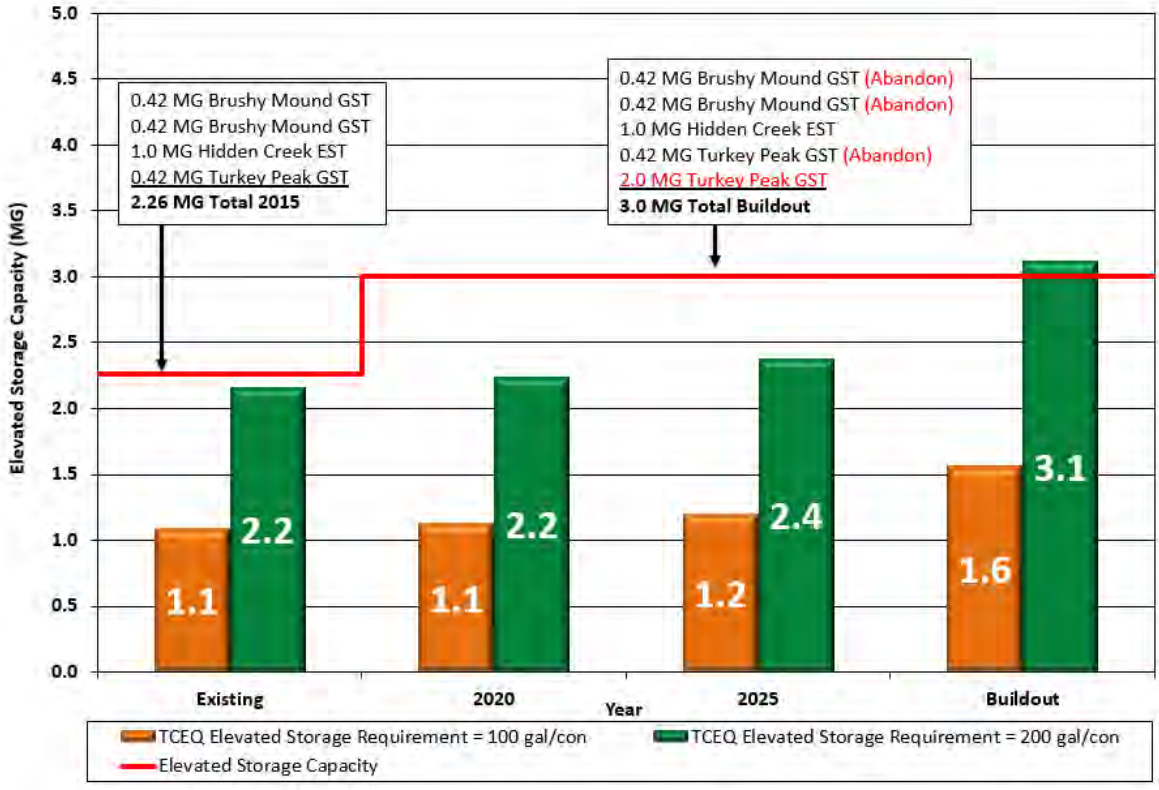
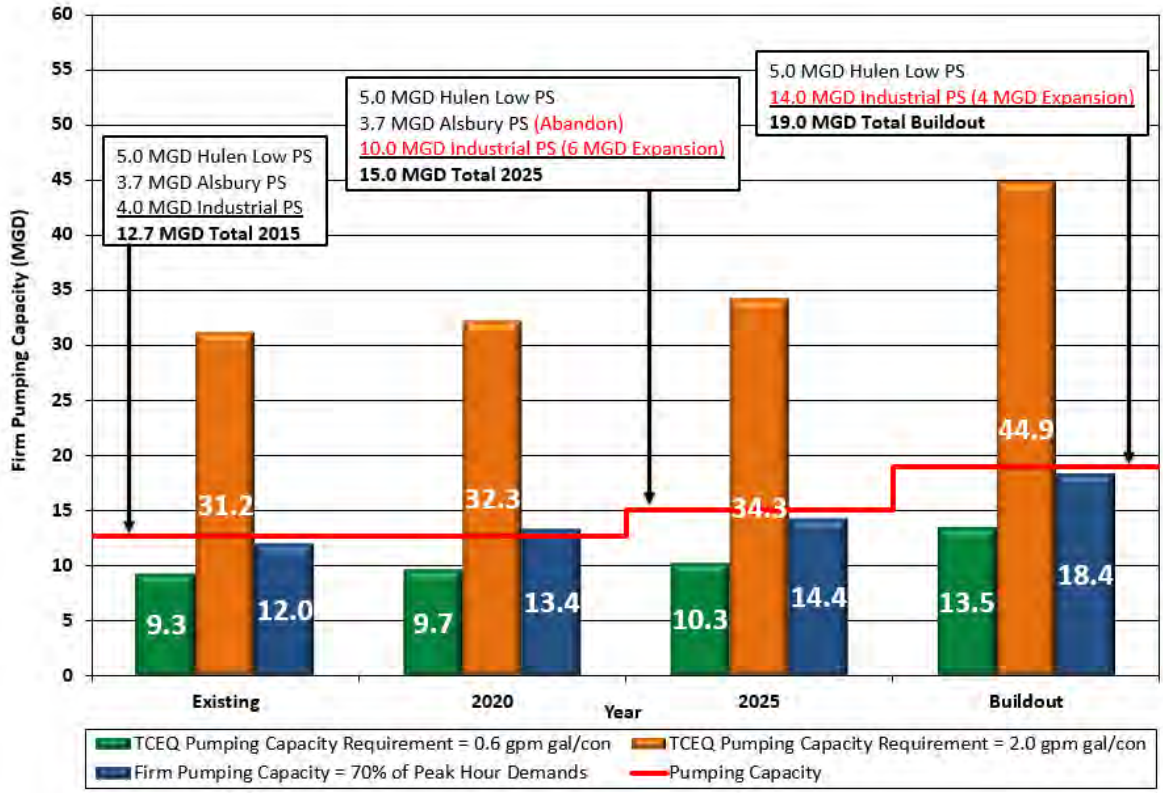


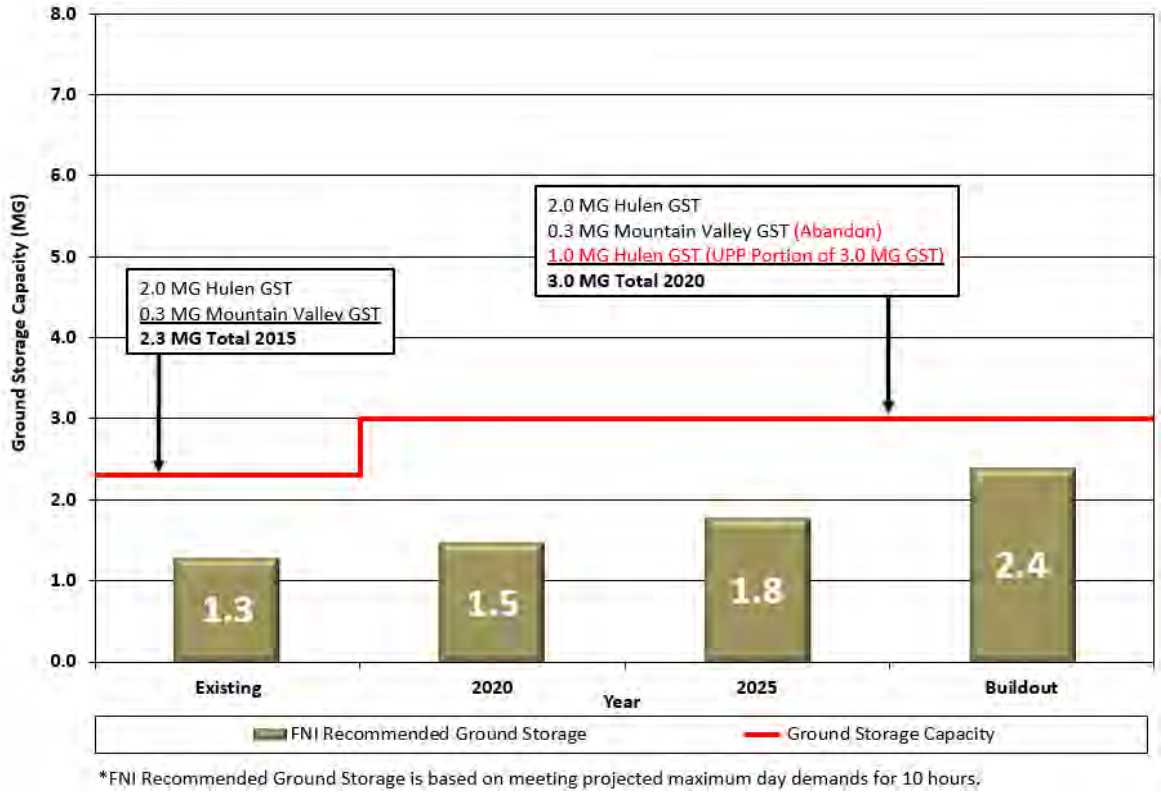
Figure 5-3 Lower Pressure Plane Required Firm Pumping Capacity



5.2.2 Upper Pressure Plane Future System Capacities

The UPP water system has adequate capacity to meet all existing demand requirements, but improvements will be necessary to meet future water needs. **Figure 5-4** shows the UPP ground storage needs for future conditions. The existing Mountain Valley EST will be removed, and a new tank will be built to match the overflow elevation of the Turkey Peak EST of 1,000 feet, as seen in **Figure 5-5**. The new 0.75 MG elevated storage tank will supply the UPP through buildout. **Figure 5-6** shows a 2.5 MGD pump station expansion at the Hulen Pump Station for a total firm pumping capacity of 7.5 MGD to meet the pumping requirements of the combined UPP and MVPP through buildout. The Mountain Valley Pump Station can either be abandoned or kept for emergency purposes.

Figure 5-4 Upper Pressure Plane Required Ground Storage Capacity



*FNI Recommended Ground Storage is based on meeting projected maximum day demands for 10 hours.

Figure 5-5 Upper Pressure Plane Required Elevated Storage Capacity

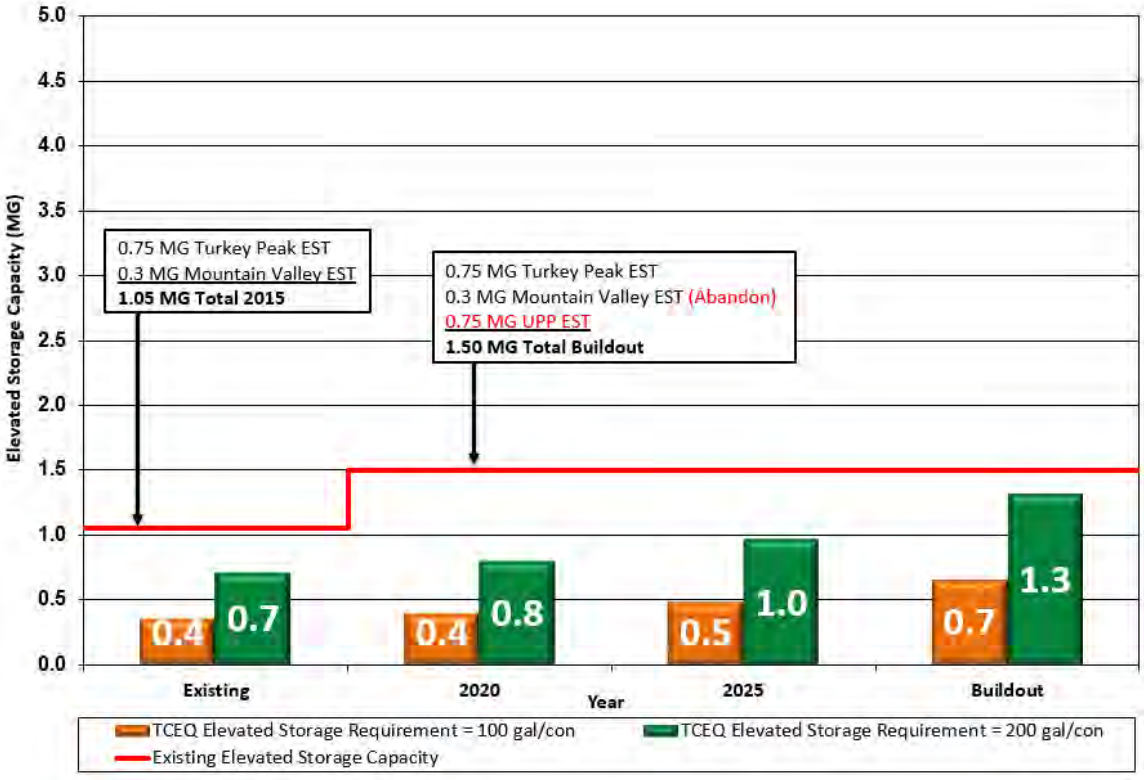
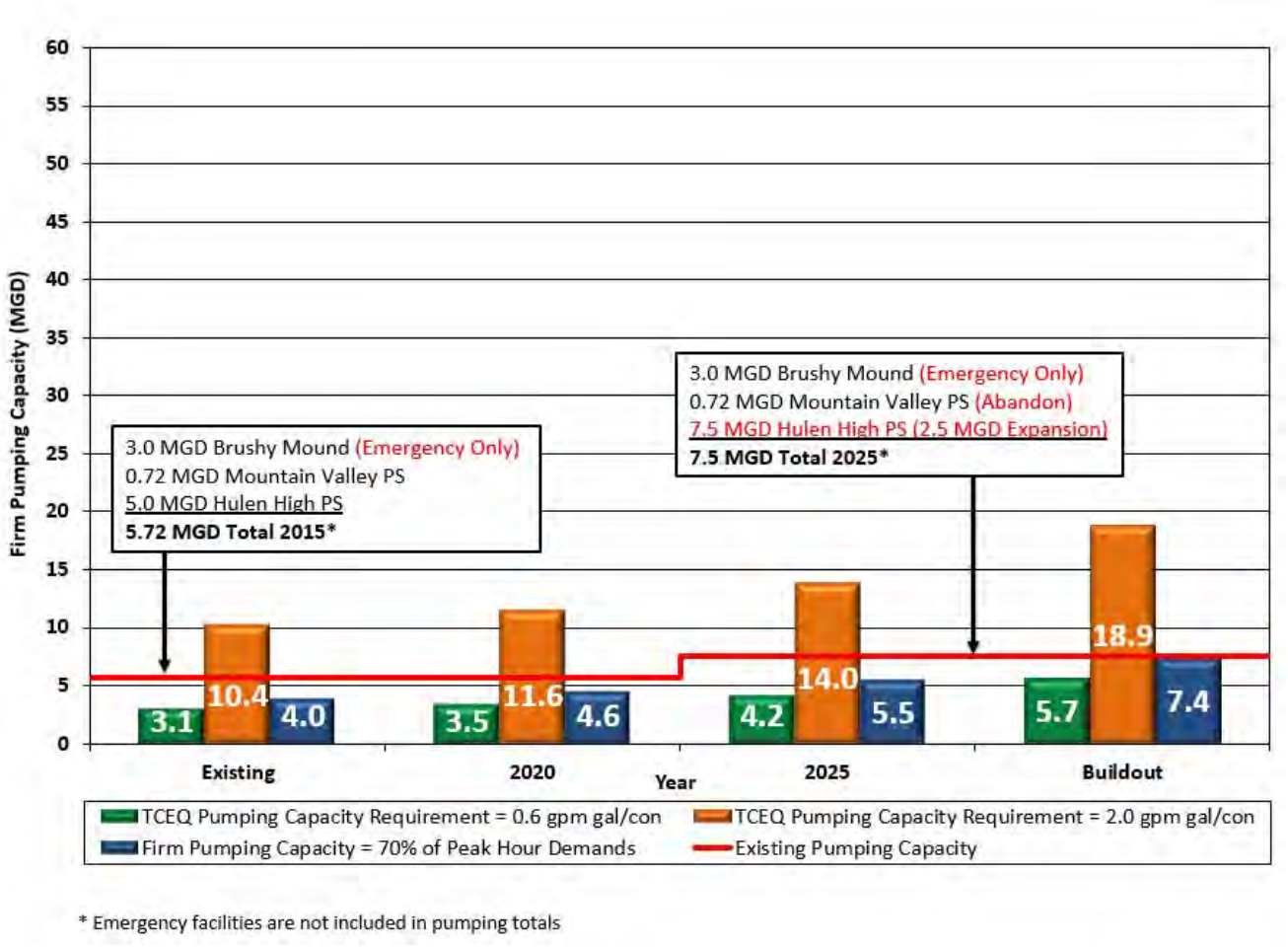


Figure 5-6 Upper Pressure Plane Required Firm Pumping Capacity



* Emergency facilities are not included in pumping totals

6.0 WATER SYSTEM CAPITAL IMPROVEMENT PLAN

Figure 6-1 illustrates the proposed capital improvement projects. **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 existing conditions and should be adjusted in the future to reflect the current construction environment. **Appendix G** contains a detailed cost description for each individual project.

6.1 Existing through 2020 Water System Improvements

These projects provide an initial basis for the short term planning period model and CIP. Some projects may be initiated due to development or rehabilitation and consequently start sooner than is required. These projects were assigned to the appropriate planning period based on hydraulic necessity and not on actual timing of construction. **Project A** on **Figure 6-1** is the design and construction of a new 3.0 MG GST at the Hulen Pump Station facility site. 2.0 MG of the tank's capacity will be allocated to serve demand in the LPP, and the remaining 1.0 MG of tank capacity will be allocated to serve the UPP. The additional ground storage will aid the City in reaching the desired level of service of meeting maximum day demands for 10 hours through projected buildout conditions.

1. **2.0 MG Turkey Peak Ground Storage Tank Replacement, Abandoning the Brushy Mound GSTs, Moving the Brushy Mound Pump Station to the Turkey Peak facility site (Project 1)**

   This project is intended to increase the available elevated storage capacity for the LPP to meet future needs by replacing the existing Turkey Peak GST with a larger tank. This project will replace the Brushy Mound GSTs and will be constructed with a similar head range as the Hidden Creek EST to allow both to cycle more closely together. The project also calls for abandoning the Brushy Mound site by removing the existing ground storage tanks, and moving the pump station to the Turkey Peak site which will serve as emergency supply into the UPP from the LPP.

2. 16-inch Lower Pressure Plane Transmission Line (Project 2)

This project is the construction of a 16-inch transmission line from the Turkey Peak tank site in the UPP to the existing 20-inch line along Wilshire Boulevard in the LPP. This project will improve the transmission capacity from elevated storage and allow enough capacity for replacing the Turkey Peak Ground Storage Tank with a larger tank in the future.

3. Improve System Looping, Transmission Capacity and Fire Protection (Projects 3, 4 and 5)

These projects were identified to extend water service to existing and future development and provide a looped system to increase fire flow protection and reduce water quality issues.

4. 0.75 MG Mountain Valley Elevated Storage Tank Replacement (Project 6)

This project is intended to increase the available elevated storage capacity for the UPP to meet future needs by replacing the existing Mountain Valley EST with a larger tank that matches the overflow elevation of the Turkey Peak UPP EST.

6.2 2021 through 2025 Water System Improvements

The projects in this planning period are based on the projected 2025 demands and should be reviewed as conditions change.

1. Offsite Water Supply from Fort Worth (Project 7)

This project is for cost participation in an offsite water supply line from the City of Fort Worth. The proposed 20/24-inch water line is from Risinger Road to the wholesale meter at Alsbury Boulevard and will provide additional water to the Industrial Pump Station for a total supply of 10.0 MGD from the City of Fort Worth to that site. The amount of supply added is currently being discussed between Fort Worth and Burleson.

2. Industrial Pump Station Expansion Improvements (Project 8)

The Industrial Pump Station will need to be expanded to meet increasing LPP demands. Project 7 identifies the need for the Industrial Pump Station to increase

the pumping capacity by 6.0 MGD. This expansion will bring the Industrial Pump Station Capacity to a total of 10.0 MGD.

3. **Upper Pressure Plane 16-inch water line (Project 9)**

Project 9 extends the existing 16-inch UPP transmission line from the Hulen High Pump Station to the 12-inch line along Wilshire Boulevard on the downstream end of the Mountain Valley Pump Station. This project is necessary for extending the UPP boundary when the Mountain Valley Pump Station is permanently taken out of service.

4. **Improve System Looping, Transmission Capacity and Fire Protection (Projects 10, 11 and 13)**

These projects were identified to extend water service to future development and provide a looped system to increase fire flow protection and reduce water quality issues.

5. **2.5 MGD Hulen High Pump Station Expansion (Project 12)**

Project 12 identifies the need for increasing the Hulen High Pump Station pumping capacity by 2.5 MGD. This expansion will bring the Hulen High Pump Station to a total capacity of 10.0 MGD and firm capacity of 7.5 MGD.

6.3 2026 through Buildout Water System Improvements

1. **Improve System Looping, Transmission Capacity and Fire Protection (Projects 14, 15, 16 and 18)**

These projects were identified to serve future development and provide a looped system to increase fire flow protection and reduce water quality issues.

2. **Industrial Pump Station Expansion Improvements (Project 17)**

Project 17 identifies the need for the Industrial Pump Station to increase the pumping capacity by 4.0 MGD. This expansion will bring the Industrial Pump Station to a total capacity of 16.0 MGD and firm capacity of 14.0 MGD.

FIGURE 6-1

CITY OF BURLESON

WATER SYSTEM
CAPITAL IMPROVEMENTS

LEGEND

- Under Design Ground Storage Tank Improvement
- 2020 Pump Station Improvement
- 2020 Ground Storage Tank Improvement
- 2020 Elevated Storage Tank
- 2025 Pump Station Improvement
- 2025 Elevated Storage Tank Improvement
- Buildout Pump Station Improvement
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station
- 2020 Water Line Improvement
- 2025 Water Line Improvement
- Buildout Water Line Improvement
- Existing 10" and Larger Water Line
- Existing 8" and Smaller Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

FREESE AND NICHOLS

Burleson TEXAS

7 Fort Worth System Off-Site Improvement

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

8 **3.5 MGD Alsbury #1**
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps
Abandon Pump Station

8 **17** **4.0 MGD Alsbury #2**
Pump Station
(3) 1,400 GPM Pumps
6.0 MGD Pump Station Expansion
4.0 MGD Pump Station Expansion

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

1 **3.0 MGD Brushy Mound**
Pump Station
Move to Turkey Peak Site
Backup Facility

1 **(2) 0.42 MG Brushy Mound**
Ground Storage Tanks
Overflow Elev. = 894'
Abandon Ground Storage Tanks

1 **0.42 MG Turkey Peak**
Ground Storage Tank
Overflow Elev. = 894'
Replace with 2.0 MG Ground Storage Tank
Overflow Elev. = 894'

UPP to LPP Transfer Valve

2 **0.75 MG Turkey Peak**
Elevated Storage Tank
Overflow Elev. = 1,000'

3.0 MG Hulen Pump Station
Ground Storage Tank
Overflow Elev. = 876'

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

12 **5.0 MGD Hulen High**
Pump Station
(3) 1,780 GPM Pumps
2.5 MGD Pump Station Expansion

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

4 **UPP to LPP Transfer Valve**

0.72 MGD Mountain Valley
Pump Station
(Backup Facility)

0.3 MG Mountain Valley
Ground Storage Tank
Overflow Elev. = 876'
(Backup Facility)

6 **0.3 MG Mountain Valley**
Elevated Storage Tank
Overflow Elev. = 1,034'
Replace with 0.75 MG Elevated Storage Tank
Overflow Elev. = 1,000'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,200 2,400
SCALE IN FEET

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Table 6-1 Water System Capital Improvements Projects Summary

	Proj. No.	Water System Capital Improvement Plan Project	Estimated Cost
Existing-2020	1	2.0 MG Turkey Peak Ground Storage Tank Replacement, Abandoning the Brushy Mound GSTs, Moving the Brushy Mound Pump Station to the Turkey Peak facility site	$ 2,654,400
	2	16-inch Lines along McNair Rd. to the Turkey Peak EST	$ 1,680,340
	3	8-inch and 12-inch lines from Hidden Vistas Blvd to Dobson Road	$ 768,100
	4	16-inch Lines from Wilshire Blvd. to FM 731	$ 846,720
	5	10-inch Lines south of Crowley Plover Rd. and along Renfro St.	$ 436,800
	6	Mountain Valley EST 0.75 MG Replacement	$ 1,837,250
Total Existing-2020			**$ 8,223,610**
2021-2025	7	Offsite Water Supply from Fort Worth	$ 5,501,000
	8	6.0 MGD Alsbury #2 Pump Station Expansion	$ 1,908,480
	9	16-inch Line along Wilshire Blvd.	$ 1,128,960
	10	16-inch Lines southeast of Wilshire Blvd.	$ 2,117,810
	11	12-inch Lines from Hulen St. to Wilshire Blvd	$ 687,460
	12	2.5 MGD Hulen High Pump Station Expansion	$ 698,880
	13	12-inch Lines along I-35 and Hurst Rd	$ 1,454,210
Total 2021-2025			**$ 13,496,800**
2026-Buildout	13	12-inch Lines along I-35 and Hurst Rd	$ 1,110,150
	14	12-inch Lines east of Mtn Valley GST	$ 513,410
	15	12-inch Lines from St. Andrews Dr. to Fairway View Dr. and Morningside Dr	$ 981,120
	16	12-inch Line along Country Rd. 714	$ 698,880
	17	4.0 MGD Alsbury #2 Pump Station Expansion	$ 1,227,080
	18	12-inch Lines along County Road 802	$ 1,227,080
Total 2026-Buildout			**$ 5,757,720**
City of Burleson Water System Total			**$ 27,478,130**

7.0 WASTEWATER FLOWS

7.1 Historical Wastewater Flows

FNI reviewed the historical cumulative monthly wastewater flows provided by the City from 2000 through 2014. From this data, a monthly average daily flow was calculated for each year in MGD and gpcd. The data from 2000 to 2014 is summarized in **Table 7-1**.

Table 7-1 Historical Wastewater Flows

Year	Population	Served Population	Average Daily Flow (MGD)	Overall Per-Capita Wastewater Flow (gpcd)	Peak Day Flow (MGD)	Average Daily/Peak Daily Flow	Yearly Rainfall Totals (in)
2000	20,976	20,431	1.9	91	4.6	2.4	40.2
2001	23,063	22,463	2.5	109	6.1	2.4	36.3
2002	24,330	23,697	2.5	104	8.1	3.2	45.2
2003	25,978	25,303	2.4	92	5.5	2.3	33.4
2004	27,766	27,044	2.5	91	8.5	3.4	52.3
2005	29,391	28,627	2.5	85	5.0	2.0	18.0
2006	31,266	30,453	2.4	77	4.7	1.9	36.5
2007	33,359	32,492	3.4	101	7.8	2.3	49.7
2008	34,908	34,000	2.9	83	7.7	2.7	24.4
2009	36,028	35,091	3.4	94	12.7	3.8	49.9
2010	36,690	35,736	3.8	104	14.2	3.7	40.3
2011	36,990	36,028	3.2	87	9.8	3.1	24.1
2012	38,130	37,139	3.5	92	12.3	3.5	29.9
2013	39,010	37,996	3.3	85	9.7	2.9	32.1
2014	39,920	38,882	3.7	95	12.6	3.4	24.4
			Average	**93**		**2.9**	**35.8**

FNI used data from 2008 through 2013, to calculate a return rate ratio of water supplied in the distribution system to the amount of wastewater discharged to the collection system. During the colder winter months, the rate of return is closer to 100%. This is primarily due to a significant reduction in outdoor irrigation during cooler months. During the summer months, the return rate decreases as more water is used for irrigation and other outdoor activities. From historical records, the annual average calculated rate of return for the City of Burleson is 79%. Typically, wastewater collection

systems see a return rate of 65% to 80% of water usage. With the return rate in the average range, it does not appear that there is an excessive amount of infiltration/inflow caused by poor pipe condition. This rate of return was also utilized in the existing system load distribution. The rate of return was applied to the average water billing consumption for each customer, yielding an estimated wastewater load per customer.

7.2 Peak Wet Weather to Average Dry Weather Peaking Factor

FNI utilized historical wastewater flow records from the City to determine historical average daily wastewater flows and wet weather peaking factors. The peaking factor is a ratio of the annual peak wastewater flow day divided by the calculated annual average daily wastewater flow. Typical peaking factor values range from 2.5 to 4.0. From **Table 7-1**, the historical calculated peaking factor is 2.9. The peaking factor is used in determining peak wet weather flow projections to properly size pipes and lift stations for future planning periods, so the system is able to function properly during high wastewater flows.

7.3 Projected Wastewater Flows

The estimated existing and projected wastewater flows were calculated using the projected populations, projected commercial and industrial growth and historical flow data. The existing average day flow is 80 gpcd for residential growth and 450 gpad for commercial growth. The recommended wet weather peaking factor for the City of Burleson is 3.4. This value is consistent with previously documented factors within the past five years, as seen on **Table 7-1**. FNI recommends using the 80 gpcd and 450 gpad for all future planning periods. **Table 7-2** provides a detailed projection of wastewater flows by major wastewater basin for the existing, 2020, 2025 and 2035 planning periods.

Table 7-2 Projected Wastewater Flows by Major Wastewater Basin

Basin	Served Population	Average Day Domestic Flow (80 gpcd)	Developed Non-Residential Acres	Avg. Day Flow Comm & Ind (450 gpd/acre) (MGD)	Total Avg. Day Flow (MGD)	Dry Weather to Wet Weather Peaking Factor	Peak Wet Weather Flow (MGD)
2015							
North Creek	7,033	0.56	237	0.11	0.67	3.4	2.28
Burleson Main	3,305	0.26	85	0.04	0.30	3.4	1.03
Town Creek	12,915	1.03	418	0.19	1.22	3.4	4.15
Quil Miller Creek	3,392	0.27	361	0.16	0.43	3.4	1.48
Shannon Creek	5,759	0.46	224	0.10	0.56	3.4	1.91
Village Creek	3,844	0.31	152	0.07	0.38	3.4	1.28
Willow Creek	3,540	0.28	334	0.15	0.43	3.4	1.47
Total	**39,788**	**3.18**	**1,812**	**0.82**	**4.0**		**13.6**
2020							
North Creek	7,773	0.62	261	0.12	0.74	3.4	2.51
Burleson Main	3,554	0.28	93	0.04	0.33	3.4	1.11
Town Creek	13,620	1.09	471	0.21	1.30	3.4	4.43
Quil Miller Creek	5,508	0.44	627	0.28	0.72	3.4	2.46
Shannon Creek	6,733	0.54	269	0.12	0.66	3.4	2.24
Village Creek	4,138	0.33	178	0.08	0.41	3.4	1.40
Willow Creek	4,613	0.37	475	0.21	0.58	3.4	1.98
Total	**45,940**	**3.7**	**2,375**	**1.1**	**4.7**		**16.1**
2025							
North Creek	8,025	0.64	271	0.12	0.76	3.4	2.60
Burleson Main	3,766	0.30	104	0.05	0.35	3.4	1.18
Town Creek	14,245	1.14	518	0.23	1.37	3.4	4.67
Quil Miller Creek	7,749	0.62	961	0.43	1.05	3.4	3.58
Shannon Creek	8,455	0.68	326	0.15	0.82	3.4	2.80
Village Creek	4,415	0.35	206	0.09	0.45	3.4	1.52
Willow Creek	6,853	0.55	607	0.27	0.82	3.4	2.79
Total	**53,508**	**4.3**	**2,993**	**1.3**	**5.6**		**19.1**
2035							
North Creek	8,874	0.71	289	0.13	0.84	3.4	2.86
Burleson Main	3,905	0.31	124	0.06	0.37	3.4	1.25
Town Creek	15,086	1.21	591	0.27	1.47	3.4	5.01
Quil Miller Creek	17,889	1.43	2143	0.96	2.40	3.4	8.14
Shannon Creek	13,694	1.10	420	0.19	1.28	3.4	4.37
Village Creek	5,408	0.43	228	0.10	0.54	3.4	1.82
Willow Creek	14,910	1.19	989	0.45	1.64	3.4	5.57
Total	**79,766**	**6.4**	**4,785**	**2.2**	**8.5**		**29.0**

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 ultimately to Fort Worth's Village Creek Wastewater Treatment Plant. The City of Burleson's service area is divided into seven major wastewater basins: North Creek, Burleson Main, Town Creek, Quil Miller, Shannon Creek, Village Creek and Willow Creek. The City's current wastewater system GIS shows a range of pipes from 2-inch collector lines to 36-inch interceptors. **Figure 8-1** shows the existing wastewater system.

8.2 Wastewater Model Update and Verification

The 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 larger lines have been added since the previous Master Plan. The wastewater model contains approximately half of the City's GIS lines. The City provided as-built drawings for the major sewer 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.

For the existing system, sub-catchments were utilized from the previous Master Plan for each manhole using the Thiessen polygons method. The Thiessen polygons method creates a unique area capturing all of the flow a manhole should receive from the upstream connections. Once the sub-catchments were created, the calculated wastewater loads were distributed throughout the system. FNI applied the calculated percent return ratio to the City's water billing meter information in order to create wastewater loads. A percent return rate of 79% was used as discussed in **Section 7.1**.

Wastewater loads were updated throughout the model based on the water meter records provided by the City and applying the calculated return rate.

FNI calibrated the wastewater model to match existing conditions using wholesale meter data from the City of Fort Worth as well as four flow meters installed by the City of Burleson. The locations of these flow meters can be found in **Appendix F**. From the historical records and other information, FNI used a citywide gpcd and gpad to calculate each basin's flow rate to match the City's overall metered flow. The primary components of the wastewater flows in sanitary sewers during dry weather periods are domestic wastewater, industrial wastewater and groundwater infiltration. Other dry weather loads can include water from public fountain drains, pools, cooling water discharges and other intermittent industrial/commercial discharges. The principal sources of domestic sanitary sewer loads are residential areas and commercial developments. FNI utilized the flow monitoring data from August 17, 2014, when the City had a total calculated flow of 9.77 MGD. This represented the highest flow value during the flow monitoring period. **Figure F-2** in **Appendix F** shows the model verification results.

FIGURE 8-1

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM

LEGEND

- Manhole
- Lift Station
- 8" and Smaller Gravity Main
- 10" and Larger Gravity Main
- 8" and Smaller Force Main
- 10" and Larger Force Main
- Road
- Railroad
- 10-Foot Contour
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

MAJOR BASINS

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

Village Creek WWTP

Crowley

Fort Worth

Rendon CDP

Joshua

Briar Oaks

Cross Timber

TARRANT CO.
JOHNSON CO.

0 1,500 3,000

SCALE IN FEET

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8.3 Wastewater System Design Criteria

FNI has established design criteria for future wastewater lines and facilities. Criteria was developed for sizing sewer 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 sewer 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.

The design criteria for lift station wet wells are to provide adequate volumes to limit pump cycling to once every 10 minutes. Based on this criterion, the required operating volume for each pump can be calculated as:

$$V = \frac{t * Q}{4}$$

Where:
t = Maximum pump cycling time (10 minutes)
Q = Lead pump discharge rate (gpm)
V = Required wet well volume between pump start and stop elevation

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 100 psi and to allow a minimum of 2-feet per second scouring velocity during a single pump operation.

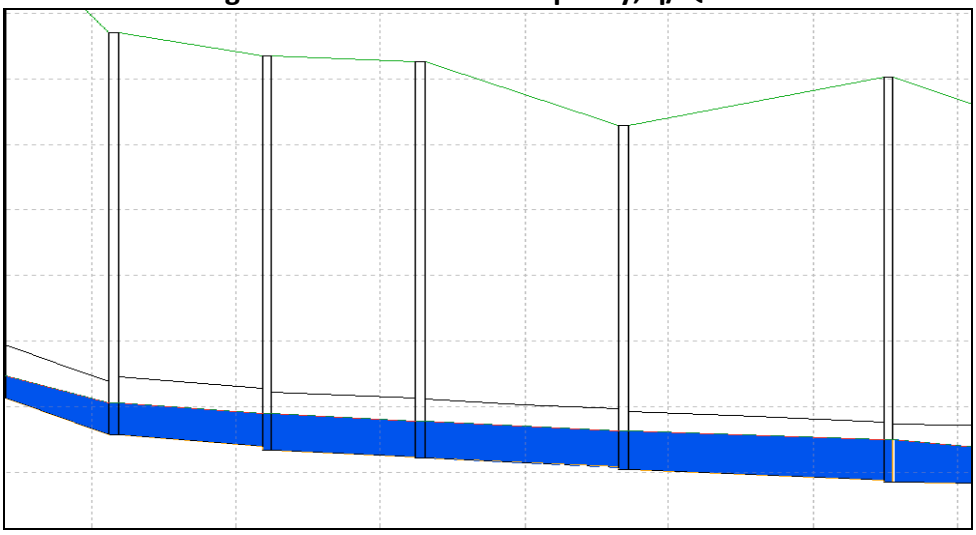
8.4 Existing Wastewater System Analysis

In order to evaluate the existing wastewater collection system, FNI met with City staff and operations personnel. They identified areas of concern and potential problem areas based on existing conditions and future development. The culmination of the analysis was the use of the model to determine the deficiencies of the system under peak wet weather conditions.

The first parameter that was analyzed was the performance of the system during average dry weather conditions. 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. A q/Q less than 1.0 is acceptable, while lines that have a q/Q greater than 1.0 are more likely to surcharge or overflow during peak wet weather conditions.

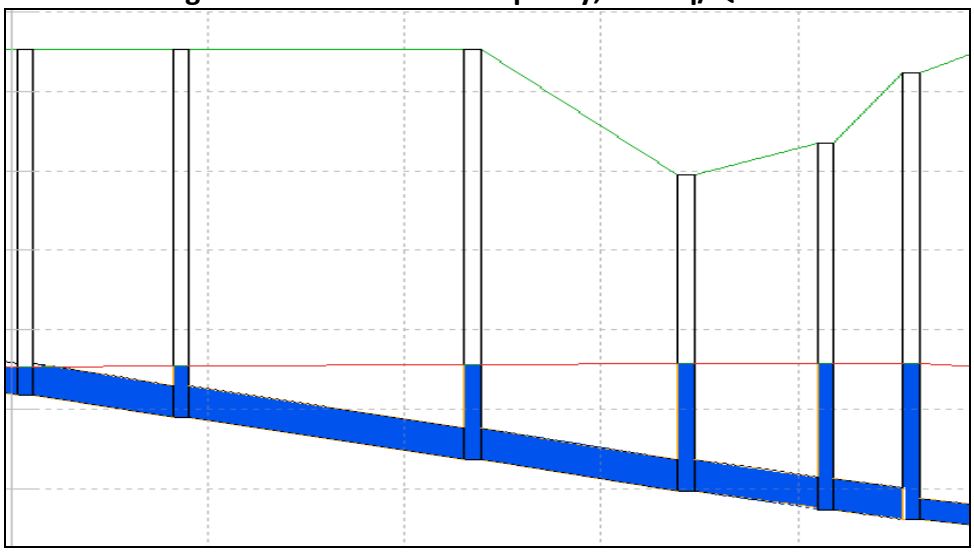
The q/Q ratio indicates whether the flow rate in the system has exceeded the capacity of the network and causes surcharging. A q/Q less than 1.0 indicates that the pipe is not surcharged and not over capacity, as shown in **Figure 8-2**. A q/Q between 1.0 and 2.0 indicates that the wastewater level at the upstream and/or downstream end of the pipe has reached the upper limit of the pipe height. Surcharging in this section is indicative of a pipe that is over capacity, as shown in **Figure 8-3**. A q/Q greater than 2.0 indicates the pipe is over capacity and in need of additional conveyance capacity as shown in **Figure 8-4**.

Figure 8-2 Full Flow Capacity, q/Q < 1.0



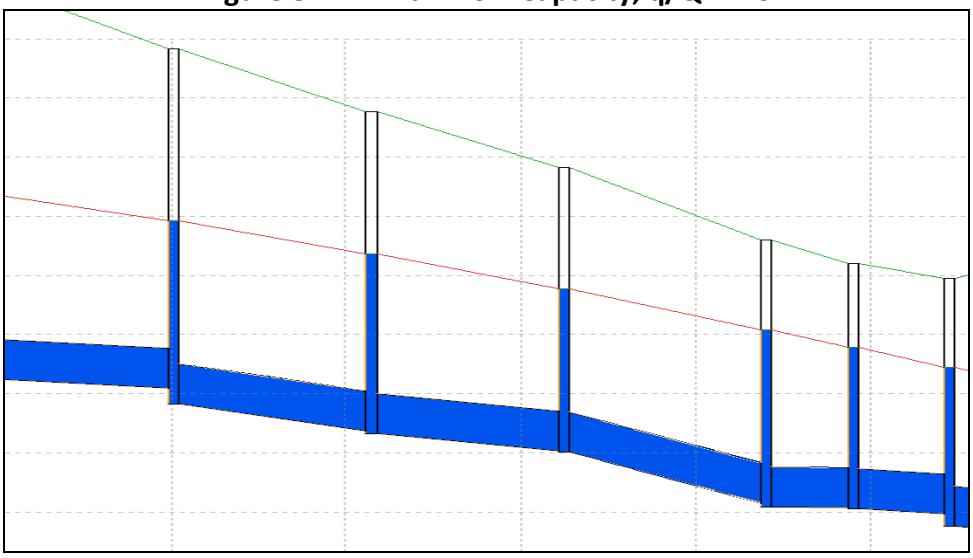
*q/Q < 1.0, the pipe is not surcharged.

Figure 8-3 Full Flow Capacity, 1.0 < q/Q < 2.0



*1.0 < q/Q < 2.0, Hydraulic gradient is less than or equal to pipe gradient.

Figure 8-4 Full Flow Capacity, q/Q > 2.0



*q/Q > 2.0, Hydraulic gradient is greater than pipe gradient.

Figure F-4 in **Appendix F** shows the q/Q ratio for every modeled pipe in the system, along with the areas in the system that are in need of additional capacity. 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 orange could potentially surcharge and overflow during a storm event as well. As a result of this, many lines which tie into these large interceptors could become backed up and surcharge. The main interceptor in the North Creek and Burleson Main sewer basins shows some surcharging pipe segments. The new system improvements should be sized for future 2035 projected flow conditions.

These surcharged conditions are believed to be partially due to capacity restrictions downstream in the collection system in the larger lines. This is substantiated from the observed data of extended depths during wet weather conditions at these locations. Specific details regarding proposed improvements for each of these basins are discussed in the wastewater CIP analysis, **Section 10**, of this report.

9.0 FUTURE WASTEWATER SYSTEM ANALYSIS

Once the wastewater model was developed to represent existing and future loading conditions, the future capital improvement projects were analyzed and phased into the planning timeframe in which they become hydraulically necessary. The future wastewater collection system has been designed and laid out with the following design considerations: to utilize gravity interceptors as much as possible and to avoid developed parcels where possible for new wastewater lines.

In areas when the natural topography does not able gravity flow, FNI has called for the use of a lift station and force mains to convey flow uphill and against gravity's pull. This occurred in the City's far southwestern corner where growth is anticipated in the proposed Chisholm Trail Parkway corridor. The natural ground elevations prohibit a practical gravity flow option; therefore, a lift station and force main are proposed to convey flow to the existing system.

The goal of the capital improvements is to address existing deficiencies in the system, as well as, meet future loading on the wastewater collection system. Additionally, a goal of this master plan is to provide major interceptors to areas with existing septic systems to enable connecting to the City's centralized wastewater collection system.

10.0 WASTEWATER SYSTEM CAPITAL IMPROVEMENT PLAN

Figure 10-1 illustrates the proposed wastewater capital improvement projects. **Table 10-1** provides a cost summary for each project and corresponds with the numbered projects in **Figure 10-1**. All project costs shown in this report are based on construction costs representing 2016 conditions and should be adjusted in the future to reflect current construction environment. **Appendix H** contains a detailed cost description of each individual project.

10.1 Existing through 2020 Wastewater System Improvements

These projects provide an initial basis for the short term existing system through 2020 planning period model and CIP. These projects were assigned to the appropriate planning period based on need of the project and not on actual timing of construction.

1. **15-inch Sewer Extension in the Southern Portion of the Quil Miller Sewer Basin (Project 1)**

   This project is the construction of a 15-inch sewer extension which starts in an undeveloped region of the Quil Miller sewer basin, continues across County Road 711 and connects to the existing 15-inch interceptor in the southern part of the Quil Miller sewer basin. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

2. **1.0 MGD Lift Station, a 10-inch Force Main, and a 10/12-inch Sewer Interceptor in the Burleson West Basin (Project 2)**

   This project is the construction of a 10-inch sewer interceptor conveying wastewater flow from the Burleson West basin into a 1.0 MGD Lift Station facility which lifts wastewater flow through a 10-inch force main and gravity flows into a 12-inch interceptor. The natural ground elevations prohibit a practical gravity flow option; therefore, this project will convey the flow to the existing system.

3. **10-inch Sewer Extension from SE John Jones Dr. to Tantarra Dr. (Project 3)**

   10-inch sewer extension from the 24-inch sewer line at SE John Jones Dr. to Tantarra Dr. The proposed line will cross Wilshire and Hulen Street and continue

further west towards the Tantarra development. The proposed line will serve growth in an area which will be experiencing growth in the very near future. Ultimately, the line will provide service to the Tantarra Development as well as any new construction along the path of the line.

4. **10-inch Parallel Sewer Interceptor Northwestern Town Creek Basin (Project 4)**

   This project is the construction of a 10-inch parallel sewer interceptor along Parkview Drive from Flagstone Street to Rand Drive. Model results show the current line will become insufficient in the future periods to convey all the required flow. The parallel line will alleviate future hydraulic issues.

5. **24-inch Sewer Interceptor from Oakbrook Dr. to 24-inch Interceptor North of Village Creek (Project 5)**

   This project is the construction of a 24-inch sewer interceptor parallel to the existing 15-inch line conveying wastewater flow from the Willow Creek basin. The line begins at the existing 24-inch line just north of Village Creek and travels to the intersection of two existing 12-inch lines as well as a proposed 15-inch line. Model results indicate that while the existing 15-inch line functions properly in the 2010 and existing system wet weather conditions, by 2020 the line experiences surcharging and overflows. The parallel line alleviates the load on the existing line and provides capacity for the future as well.

6. **10-inch Sewer Extensions in the Central Region of Willow Creek Basin (Project 6)**

   This project is the construction of a 10-inch sewer extension beginning in an undeveloped region of the Willow Creek sewer basin, continues across County Road 1021, and connects to the under design 15-inch interceptor. The purpose of this line is to provide sanitary sewer service to an area which will experience growth in future planning periods.

10.2 2021 through 2025 Wastewater System Improvements

The projects in this planning period are based on the projected 2025 demands and should be reviewed as conditions change.

1. **2.5 MGD Lift Station, a 12-inch Force Main, and a 12-inch Sewer Interceptor in Southwestern Burleson (Project 7)**

This project is the construction of a 2.5 MGD Lift Station facility and a 12-inch force main which lifts flow from the Chisholm Trail Parkway corridor and gravity flows into a 12-inch interceptor. The natural ground elevations prohibit a practical gravity flow option; therefore, this project will convey the flow to the existing system.

2. **12-inch Sewer Interceptor along Chisholm Trail Parkway Corridor (Project 8)**

This project is the construction of a 12-inch sewer collector which runs parallel to the proposed Chisholm Trail Parkway to the proposed Chisholm Trail lift station. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

3. **12-inch Sanitary Sewer Interceptor along the East Side of Interstate-35W (Project 9)**

This project is the construction of a 12-inch sanitary sewer line which crosses Interstate 35 at Bethesda Road and runs along the east side of Interstate 35 to County Road 518. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

4. **8-inch Sanitary Sewer Interceptor along the East Side of Interstate-35W (Project 10)**

This project is the construction of an 8-inch sanitary sewer line which runs along the east side of Interstate 35 from the existing 8-inch interceptor at County Road 711 to Conveyor Drive. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

5. **12-inch Sewer Interceptor in Southwestern Shannon Creek Sewer Basin (Project 11)**

This project is the construction of a 12-inch sewer interceptor which runs from an undeveloped portion of the Shannon Creek sewer basin and connects to the existing 12-inch line at Falls Creek Court. This line provides flow conveyance for the surrounding area which is projected to experience growth within the future planning periods.

6. **12-inch Sewer Extension from 24-inch Collector Main in the Northern Shannon Creek Basin (Project 12)**

This project is the construction of a 12-inch sewer extension of service from the existing 24-inch interceptor in the Shannon Creek basin. The City is expected to see growth in the area in the near future and the proposed line will provide sewer service to new residents in the area.

7. **12-inch Sanitary Sewer Interceptor along the East Side of Interstate-35W (Project 13)**

This project is the construction of a 12-inch sanitary sewer line which runs along the east side of Interstate 35 from the existing 21-inch interceptor to County Road 602. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

10.3 2026 to 2035 Wastewater System Improvements

1. **36-inch and 42-inch Sewer Interceptor in Northeastern Town Creek Basin (Project 14)**

This project is the construction of a 36-inch and 42-inch sewer interceptor parallel to the existing Village Creek Wastewater Relief interceptor to the discharge meter station in the northeastern region of the Town Creek sewer basin. During future planning period simulations, the existing line was experiencing backwater conditions, surcharging and overflows. The 36-inch and 42-inch parallel line provides capacity for the future planning periods.

2. **30-inch Sewer Interceptor in Central Town Creek Basin (Project 15)**

This project is the construction of a 30-inch sewer interceptor from Rigney Street to the junction of multiple sewer interceptors in the northeast Town Creek basin area. Model results show the current line will become insufficient in the future periods to convey all the required flow. The parallel line will allow for proper conveyance of wastewater flow through a critical area of the City's infrastructure.

3. **12/15-inch Sewer Interceptor from the Existing 15-inch line to South of FM 731 (Project 16)**

This project is a 12/15-inch sewer interceptor from the existing 15-inch interceptor at the far north end of the Willow Creek Sewer Basin to the south of FM 731 in the proposed sewer service area. The purpose of this project is to provide sanitary sewer service to customers previously on private septic systems and to accommodate new growth in the area.

4. **10-inch Sanitary Sewer Extension in the Southern Area of Willow Creek basin (Project 17)**

This project is a 10-inch sewer extension to the southern and eastern regions of the Willow Creek sewer basin. The line begins at FM 731 and connects to the proposed 12-inch interceptor directly to the north. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

5. **10-inch Sewer Extension from the 36-inch Village Creek Wastewater Relief Line to Mockingbird Meadows (Project 18)**

This project is the construction of a 10-inch sewer extension from the existing 36-inch Village Creek Wastewater Relief interceptor to Fox Lane then continuing along Mockingbird Meadows. This project will serve new growth in the northwest portion of the Quil Miller basin. Additionally, the line will provide an option to users of privately operated septic systems.

6. **8-inch Sewer Interceptor in Southeastern Willow Creek Sewer Basin (Project 19)**

This project is the construction of an 8-inch sewer interceptor in southeastern Willow Creek basin along a Village Creek tributary. The purpose of this project is to connect existing homes in the City's sanitary sewer system and to accommodate growth in the area.

7. **10-inch Sewer Extension in the Southern Area of Willow Creek Basin (Project 20)**

This project is the construction of a 10-inch sewer extension beginning just north of County Road 802 and connects to a 15-inch sewer interceptor in the southern region of the Willow Creek basin. The purpose of this project is to extend the City's

sewer service to accommodate new growth and existing customers converting from private septic systems.

8. **10-inch Sewer Extension in the Southern Portion of the Quil Miller Sewer Basin (Project 21)**

   This project is the construction of a 10-inch sewer extension which starts in an undeveloped region of the Quil Miller sewer basin, continues across Briaroaks Road, and connects to the existing 15-inch interceptor. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

9. **10-inch Sewer Interceptor in Western Shannon Creek Sewer Basin (Project 22)**

   This project is the construction of a 10-inch sewer extension of the under design 15-inch line which runs from an undeveloped region along Shannon Creek to the existing 18-inch line. This line extends out approximately to County Road 1016 and will provide sanitary sewer service to existing development and to accommodate growth in the area.

10. **10-inch Sewer Extension in the Southwestern Area of Willow Creek Basin (Project 23)**

    This project is the construction of a 10-inch sewer extension from the south of Caddo Peak Trail to the proposed 15-inch line near County Road 1021. This line provides flow conveyance for the surrounding area which is projected to experience growth within the future planning periods.

11. **10-inch Sewer Interceptor along Chisholm Trail Parkway Corridor (Project 24)**

    This project is the construction of a 10-inch sewer collector which runs parallel to the proposed Chisholm Trail Parkway and connects to the proposed 12-inch interceptor. The purpose of this line is to convey flow from new customers along the proposed highway corridor to the proposed Chisholm Trail Lift Station.

12. **10-inch Parallel Line in the Northeastern Area of Village Creek Sewer Basin (Project 25)**

This project is the construction of a 10-inch parallel sewer interceptor along Dobson St. under Village Creek and connects to the existing 18-inch Village Creek Sanitary Sewer Outfall line. In future model simulations, the existing downstream line runs full and creates surcharging and overflows in the existing line. The parallel line creates more capacity for extreme situations and eliminates all hydraulic issues.

13. 10-inch Sewer Extension in the Southern Portion of the Quil Miller Sewer Basin (Project 26)

This project is the construction of a 10-inch sewer extension which starts east of County Road 711 and connects to the proposed 15-inch interceptor. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

14. 12-inch/15-inch Sanitary Sewer Extension in the Southern Portion of the Quil Miller Sewer Basin (Project 27)

This project is the construction of a 12-inch/15-inch sewer interceptor starting near Conveyor Drive and connects to the existing 15-inch line in the southern part of the Quil Miller sewer basin. The purpose of this line is to extend the City's sewer service to accommodate new growth and existing customers converting from private septic systems.

15. 8-inch Sewer Interceptor in Eastern Willow Creek Sewer Basin (Project 28)

This project is the construction of an 8-inch sewer interceptor which starts along Jayme Court, crosses Diamond Lane and Lace Lane before connecting to the 15-inch sewer interceptor. The purpose of this project is to connect existing homes in the City's sanitary sewer system and to accommodate growth in the area.

16. 12-inch Sewer Extension in the Southern Portion of the Quil Miller Sewer Basin (Project 29)

This project is the construction of a 12-inch sewer extension which starts at Conveyor Drive and connects to the proposed 15-inch interceptor. Future

projections call for growth of sewer customers in this area, and the proposed line will serve this region.

17. 8-inch Sewer Interceptor along the East Side of Interstate-35W (Project 30)

This project is the construction of an 8-inch sewer interceptor which runs along the east side of Interstate 35 from Asher Road and connects to the existing 8-inch interceptor. Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

FIGURE 10-1

CITY OF BURLESON

WASTEWATER SYSTEM CAPITAL IMPROVEMENTS

LEGEND

- 2020 Lift Station Improvement
- 2025 Lift Station Improvement
- Existing Lift Station
- Existing Manhole
- Under Design/ Construction Line
- 2020 Wastewater Line Improvement
- 2025 Wastewater Line Improvement
- 2035 Wastewater Line Improvement
- 2020 Force Main Improvement
- 2025 Force Main Improvement
- Existing 8" and Smaller Wastewater Line
- Existing 10" and Larger Wastewater Line
- Existing 8" and Smaller Force Main
- Existing 10" and Larger Force Main
- Road
- Railroad
- Index Contour (50')
- Intermediate Contour (10')
- Stream
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

FREESE AND NICHOLS

Burleson TEXAS

MAJOR BASINS

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

Proposed Burleson West Lift Station
Firm Capacity = 1.00 MGD

Proposed Chisholm Trail Lift Station
Firm Capacity = 2.50 MGD

Village Creek WWTP

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

Table 10-1 Wastewater System Capital Improvements Projects Summary

	Proj. No.	Wastewater Collection System Capital Improvement Plan Project	Estimated Cost
Existing-2020	1	15-inch Sewer Extension in the southern portion of the Quil Miller sewer basin	$ 585,990
	2	1.00 MGD Lift Station, a 10-inch Force Main, and a 10/12/15-inch Sewer Interceptor in west Burleson	$ 4,466,120
	3	10-inch Sewer Extension from SE John Jones Dr. to Tantarra Dr.	$ 861,510
	4	10-inch Parallel Sewer Interceptor northwestern Town Creek basin	$ 420,680
	5	24-inch Sewer Interceptor from Oakbrook Dr. to 24-inch Interceptor north of Village Creek	$ 3,041,610
	6	10-inch Sewer Extensions in the central region of Willow Creek basin	$ 1,018,760
		Total Existing-2020	**$ 10,394,670**
2021-2025	7	2.50 MGD Lift Station, a 12-inch Force Main, and a 12-inch Sewer Interceptor in southwestern Burleson	$ 3,113,920
	8	12-inch Sewer Interceptor along Chisholm Trail Parkway Corridor	$ 829,790
	9	12-inch Sanitary Sewer Interceptor along the east side of Interstate-35	$ 1,026,550
	10	8-inch Sanitary Sewer Interceptor along the east side of Interstate-35	$ 568,520
	11	12-inch Sewer Interceptor in southwestern Shannon Creek sewer basin	$ 667,700
	12	12-inch Sewer Extension from 24-inch collector main in the northern Shannon Creek basin	$ 782,480
	13	12-inch Sanitary Sewer Interceptor along the east side of Interstate-35	$ 412,080
		Total 2021-2025	**$ 7,401,040**
2026-2035	14	36-inch and 42-inch Sewer Interceptor in northeastern Town Creek basin	$ 2,593,390
	15	30-inch Sewer Interceptor in central Town Creek basin	$ 1,958,750
	16	12/15-inch Sewer Interceptor from the existing 15-inch line to south of FM 731	$ 1,327,070
	17	10-inch Sanitary Sewer Extension in the southern area of Willow Creek basin	$ 633,030
	18	10-inch Sewer Extension from the 36-inch Village Creek Wastewater Relief Line to Mockingbird Meadows	$ 649,160
	19	8-inch Sewer Interceptor in southeastern Willow Creek sewer basin	$ 310,470
	20	10-inch Sewer Extension in the southern area of Willow Creek basin	$ 987,170
	21	10-inch Sewer Extension in the southern portion of the Quil Miller sewer basin	$ 452,930
	22	10-inch Sewer Interceptor in western Shannon Creek sewer basin	$ 303,750
	23	10-inch Sewer Extension in the southwestern area of Willow Creek basin	$ 830,600
	24	10-inch Sewer Interceptor along Chisholm Trail Parkway Corridor	$ 790,950
	25	10-inch Parallel Line in the northeastern area of Village Creek sewer basin	$ 294,340
	26	10-inch Sewer Extension in the southern portion of the Quil Miller sewer basin	$ 531,560
	27	12-inch/15-inch Sanitary Sewer Extension in the southern portion of the Quil Miller sewer basin	$ 1,437,140
	28	8-inch Sewer Interceptor in eastern Willow Creek sewer basin	$ 566,100
	29	12-inch Sewer Extension in the southern portion of the Quil Miller sewer basin	$ 905,730
	30	8-inch Sewer Interceptor along the east side of Interstate-35	$ 981,120
		Total 2026-2035	**$ 15,553,260**
		City of Burleson Wastewater System Total	**$ 33,348,970**

APPENDIX A
LAND USE PLANNING CORRIDOR STUDY MEMORANDUM

MEMORANDUM

Innovative approaches
Practical results
Outstanding service

4055 International Plaza, Suite 200 • Fort Worth, Texas 76109 • 817-735-7300 • fax 817-735-7492 www.freese.com

TO: Bradley Ford, City of Burleson

CC: Aaron Russell P.E., City of Burleson
Laura Melton, P.E., City of Burleson

FROM: Erica Craycraft-Bartlett, ACIP, Freese and Nichols, Inc.
Jessica Brown, P.E., Freese and Nichols, Inc.
Andrew Franko, P.E., Freese and Nichols, Inc.

SUBJECT: Land Use Planning for Highway 121 and I-35W Corridors

PROJECT: 2015 Water and Wastewater Master Plan Update

Introduction

As part of the overall Master Plan Update process, the City of Burleson tasked Freese and Nichols, Inc. (FNI) to perform a detailed analysis of two undeveloped corridors within Burleson's Extra Territorial Jurisdiction (ETJ). The first area surrounds the newly constructed State Highway 121 or Chisolm Trail Parkway on the City's western edge. Burleson currently has a portion of the highway frontage within its city limits. The second identified area is along the existing I-35W in the southwestern portion of Burleson. Similar to the Chisolm Trail area, Burleson has portions of highway frontage roads included in its city limits. Future land uses within these areas include residential (low/medium/high density), commercial, retail, and industrial land uses. **Figure 1** and **Figure 2** show the two corridor study areas with future land use. FNI provided a parcel-by-parcel analysis of anticipated future development based on existing land uses, available city planning documents, and other known information about development in these areas.

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Location: H:\URBAN_PLANNING\working\ChisholmTrailConceptPlan6Areas11x17.mxd
Updated: Tuesday, June 16, 2015 4:22:09 PM

Note:
A concept plan shall not constitute zoning district regulations or establish zoning district boundaries.

Urban Residential

Urban Residential with Office

Mixed Use Center

Commercial Node

FIGURE 1
City of Burleson
Conceptual Plan for Chisolm Trail Study Area

LEGEND

- Site Plan Boundaries
- Study Area
- Burleson City Limits
- Thoroughfares
- Trails

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mixed Use
- Public/Semi-Public
- Office
- Retail
- Commercial
- Industrial

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Date: June 16, 2015

FREESE AND NICHOLS

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Updated: Tuesday, June 16, 2015 4:23:45 PM

Business Park Expansion Area

New Industrial Park

Note:
A concept plan shall not constitute zoning district regulations or establish zoning district boundaries.

FIGURE 2
City of Burleson
Conceptual Plan for I-35 West Study Area

- Site Plan Boundaries

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mixed Use
- Public/Semi-Public
- Office
- Retail
- Commercial
- Industrial
- Study Area
- Burleson City Limits
- Thoroughfares
- Trails

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SCALE IN FEET

Date: June 16, 2015

FREESE AND NICHOLS

Population and Employment Projections for Special Study Areas

The purpose of this task is to establish population and employment projections for the two study areas identified in **Figure 1** and **Figure 2**. FNI's methodology is as follows:

1. To establish the current population and employment estimate, FNI began with NCTCOG's 2013-2035 population and employment projections by TSZ for each of the two areas. FNI used a linear projection between 2013 and 2035 to estimate the 2015 numbers.
2. To refine the 2015 estimates, FNI calculated the percentage of each TSA that is inside the study areas. FNI adjusted the TSZ numbers based on this percentage to only include the land within the study areas. (Note that this process did not include an estimate of current population and employment based on aerial counts.)
3. FNI calculated the ultimate build-out for each TSZ portions within the study areas assuming complete redevelopment. FNI used the following formulas:
    - Population: *Acres x Dwelling Units per Acre x Occupancy x Persons per Household*
    - Employment: *Acres x Floor Area Ratio x Square Feet per Employee*
4. Next, FNI projected the growth rate for each TSZ portion for the 2015-2025 year period and for the 2025-2035 year period. These growth rates were determined based on NCTCOG's growth rates, the indicated land use types, and the existing development as shown on an aerial image.

Note that these projections are only for the areas of the TSZs that are included in the study areas; these projections are not for the entire TSZs. **Table 1** provides a summary of the population and employment projections for the two study areas.

Table 1 – Summary of Population and Employment Projections

	Study Area	2015	2025	2035	Build Out
Pop	West/Chisholm Trail	3,238	7,243	17,536	79,251
	East/IH35	3,367	9,017	19,604	48,146
Emp	West/Chisholm Trail	625	5,318	24,007	42,400
	East/IH35	1,351	9,915	22,473	37,092

Special Study Areas

The following land use types are included in the special study area plans:

Low Density Residential




This category refers to single family homes that are generally included in typical suburban subdivisions. This type of housing currently composes a large portion of Burleson's existing housing stock. In terms of development density, two to four dwelling units per acre are appropriate for this category.

Medium Density Residential




Medium density residential refers to townhouses, patio homes, and duplexes. These units allow for a "full life cycle" of housing, and commonly provide areas for "empty nesters" who may not want the maintenance of a single family home, and for young families who may find a townhome more affordable than a single family home. This category is intended to provide for about ten to fourteen dwelling units per acre on average.

High Density Residential




High density residential generally refers to multi-story apartment or condominium complexes. These complexes should include community amenities, such as fitness facilities, common active recreation areas, and dedicated open space areas. The typical residential density for this area is 30+ dwelling units per acre.

Mixed Use




Mixed land uses should primarily be in the form of vertical mixed use, but certain areas may be appropriate for horizontal mixed use. This type of development should be pedestrian-oriented with a focus on a central theme—like restaurants, entertainment, or retail. Residential lofts and attached residential units in these types of developments are desirable to sustain and encourage a vibrant street-life and generate activity for the businesses. Residential densities within these developments are typically 30+ dwelling units per acre. This type of development offers a range of benefits, including flexibility of building space, long-term viability of business districts, higher-quality high density residences, increasing pedestrian activity, improved public safety with additional “eyes on the street”, reduction in vehicular trips, and minimizing land use consumption.

Public/Semi-Public





This designation is representative of uses that are governmental or institutional in nature. These uses are generally permitted within any area; therefore, the areas shown on the Future Land Use Map include the uses that are currently in existence, specifically Caddo Grove Elementary and RC Loflin Middle School.

Office




This land use type is intended for businesses such as banks and places of work for doctors, lawyers, engineers, real estate professionals, architects, etc. Smaller scale offices are generally compatible with residential areas, with the exception of high-rise office buildings.

Retail





This land use type is intended to provide for a variety of restaurants, shops, grocery stores, and personal service establishments. Retail businesses generally require greater visibility than do other types of nonresidential land use. In response to this need, retail land uses have been designated in the high-traffic areas of Burleson, along IH-35 and the Chisholm Trail.

Commercial





This land use can be a combination of hotels, equipment sales, service uses, automobile related uses, building material sales, and business services. Businesses engaged in light manufacturing may also be appropriate for this type of land use and may have a limited amount of outside storage.

Industrial



This land use is suitable for indoor manufacturing, processing, assembling, packaging and fabricating previously prepared materials, as well as warehousing. This category is typically auto-oriented with large parking lots, with some commercial uses. Large tracts of land with easy access to roadway transportation are becoming increasingly hard to find for the industrial business community. However, these businesses can be advantageous for a municipality in terms of providing employment and an increased tax base.

Concept Plans

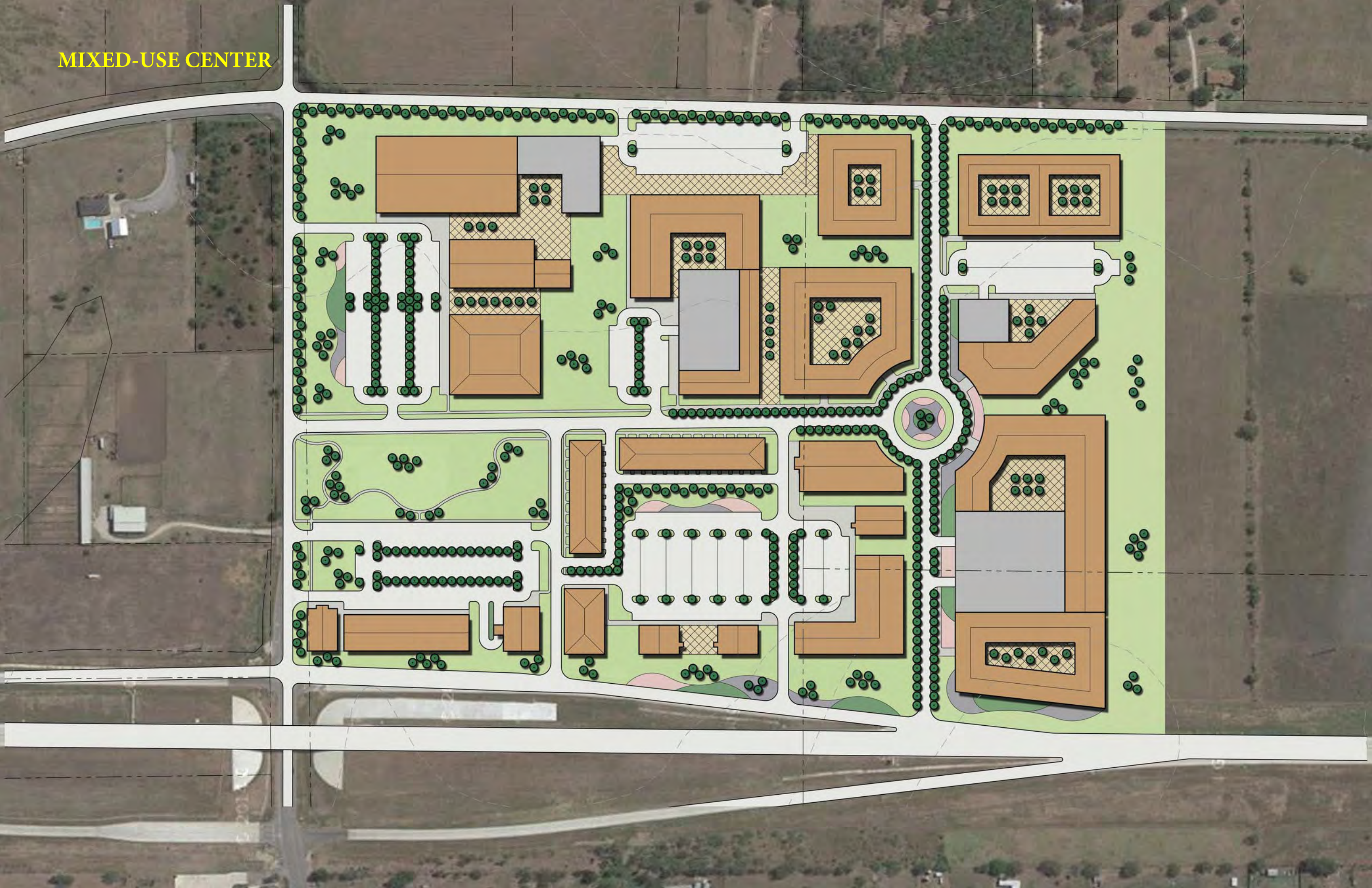
For the different land uses shown on Figures 1 and 2, FNI developed an overhead conceptual vision of potential future development in the corridor study areas. The plans show potential circulation routes, ingress/egress, and the mixture of land uses. The concept plans can be seen following pages for the land use types listed below:

- Business Park
- Commercial Node
- Mixed-Use Center
- New Industrial
- Urban Residential and Business
- Urban Residential

BUSINESS PARK

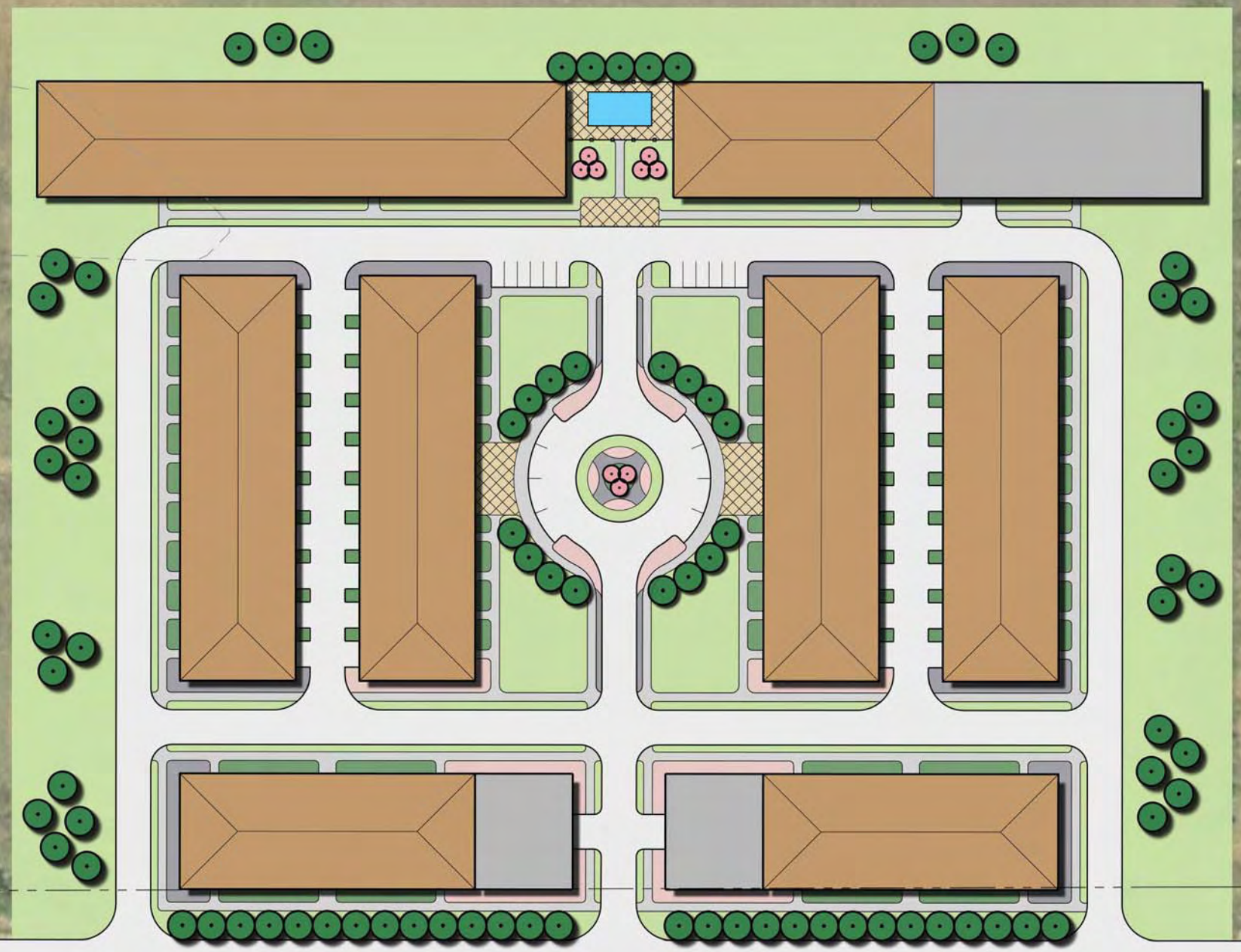
COMMERCIAL NODE

MIXED-USE CENTER

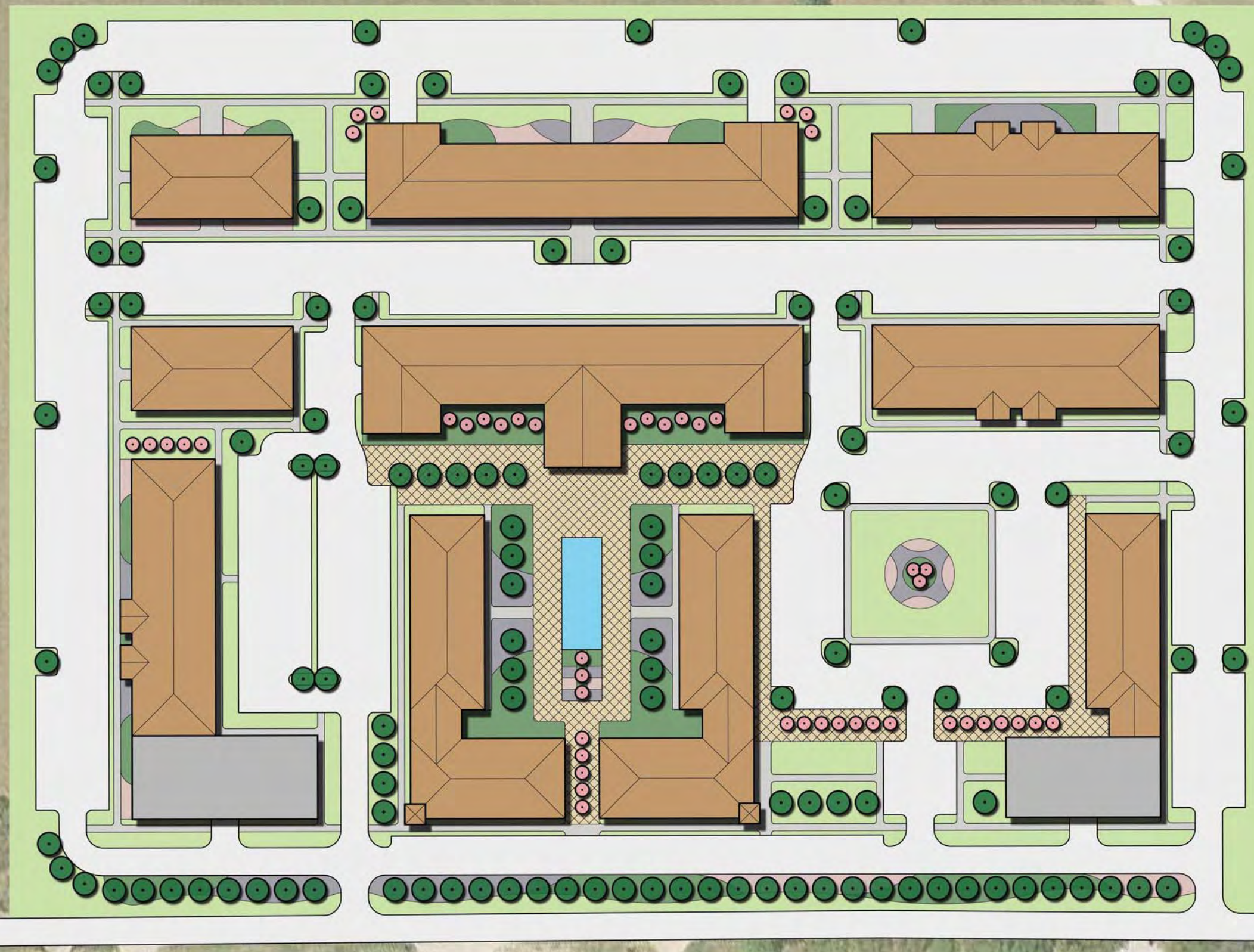


NEW INDUSTRIAL

URBAN RESIDENTIAL AND BUSINESS



URBAN RESIDENTIAL



3-D Renderings

To provide additional insight and detail to how future development might look, FNI created renderings of various land uses. The renderings show potential site utilization, the use of open space, and other related elements. The renderings were approved by the City and are in-line with the Comprehensive Plan for Burleson. The renderings can be seen following pages for the land use types listed below:

- Business Park Illustration
- Commercial Node Illustration
- Mixed-Use Center Illustration
- New Industrial Illustration
- Urban Residential and Business Illustration
- Urban Residential Illustration

BUSINESS PARK ILLUSTRATION



COMMERCIAL NODE ILLUSTRATION



MIXED-USE CENTER ILLUSTRATION



NEW INDUSTRIAL ILLUSTRATION



URBAN RESIDENTIAL AND BUSINESS ILLUSTRATION



URBAN RESIDENTIAL ILLUSTRATION



APPENDIX B
OVERALL POPULATION AND SERVICE POPULATION MAPPING

DRAFT FIGURE B-1

CITY OF BURLESON

WATER SERVICE AREA

LEGEND

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

Burleson TEXAS

FREESE AND NICHOLS

Crowley

Fort Worth

Rendon CDP

Briaroaks

Cross Timber

Joshua

Cleburne

Keene

Alvarado

0 2,000 4,000

SCALE IN FEET

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Job No.: BURL6101
Location: W:\All_WW_PLANNING\Final_Report\Appendix\Appendix_B\Figure_B-1) Water_Service_Area.mxd
Updated: Tuesday, December 15, 2020

FIGURE B-2

CITY OF BURLESON

SEWER SERVICE AREA

LEGEND

- Highway
- Road
- Railroad
- Stream
- Parcel
- Proposed Sewer Service Area
- Burleson City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

Crowley

Fort Worth

Rendon CDP

Briaroaks

Cross Timber

Joshua

Cleburne

Keene

Alvarado

JOHNSON COUNTY

TARRANT COUNTY

0 2,000 4,000

SCALE IN FEET

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Updated: Tuesday, April 12, 2016

FIGURE B-3

CITY OF BURLESON

POPULATION BY TRAFFIC SURVEY ZONE

TSZ ID

2015 Population = 41,118

2020 Population = 47,667

2025 Population = 55,795

2035 Population = 82,590

Buildout Population = 207,454

LEGEND

- Traffic Survey Zone
- Highway
- Road
- Railroad
- Stream
- Burleson City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

Crowley

Fort Worth

Rendon CDP

Briaroaks

Cross Timber

Joshua

Cleburne

Keene

Alvarado

JOHNSON COUNTY

TARRANT COUNTY

0 2,000 4,000

SCALE IN FEET

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Updated: Tuesday, April 12, 2016

FIGURE B-4

CITY OF BURLESON

WATER SERVED POPULATION BY TRAFFIC SURVEY ZONE

TSZ ID

2015 Served Population = 34,618

2020 Served Population = 38,492

2025 Served Population = 41,804

Buildout Served Population = 53,110

LEGEND

- Traffic Survey Zone
- Highway
- Road
- Railroad
- Stream
- Burleson City Limit
- Burleson ETJ
- Water Service Area
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

Crowley

Fort Worth

Rendon CDP

Joshua

Cleburne

Keene

Cross Timber

Briaroaks

Alvarado

TARRANT COUNTY

JOHNSON COUNTY

0 2,000 4,000

SCALE IN FEET

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Date: Tuesday, April 12, 2016
Location: R:\GIS_WW_PLANNING\Final_Report\Appendix\Appendix_B\Figure_B-4\Water_Served_TSZ.mxd
Updated: Tuesday, April 12, 2016

FIGURE B-5

CITY OF BURLESON

SEWER SERVED POPULATION BY TRAFFIC SURVEY ZONE

TSZ ID

2015 Served Population = 39,788

2020 Served Population = 45,940

2025 Served Population = 53,508

2035 Served Population = 79,766

LEGEND

- Traffic Survey Zone
- Highway
- Road
- Railroad
- Stream
- Burleson City Limit
- Burleson ETJ
- Proposed Sewer Service Area
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

Crowley

Fort Worth

Rendon CDP

Briaroaks

Cross Timber

Joshua

Cleburne

Keene

Alvarado

0 2,000 4,000

SCALE IN FEET

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Job No.: BURL4101
Location: W:\All_WW_PLANNING\Final_Report\Appendix\Appendix_B\[Figure_B-5]-Sewer_Served_TSZ.mxd
Updated: Tuesday, April 12, 2016

FIGURE B-6

CITY OF BURLESON

NON-RESIDENTIAL WATER SERVED ACREAGE BY TRAFFIC SURVEY ZONE

TSZ ID

2015 Served Non-Residential Acreage = 1,385

2020 Served Non-Residential Acreage = 1,616

2025 Served Non-Residential Acreage = 1,797

Buildout Served Non-Residential Acreage = 2,151

LEGEND

- Traffic Survey Zone
- Highway
- Road
- Railroad
- Stream
- Burleson City Limit
- Burleson ETJ
- Water Service Area
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE NICHOLS

Crowley

Fort Worth

Rendon CDP

Briaroaks

Cross Timber

Joshua

Cleburne

Keene

Alvarado

0 2,000 4,000

SCALE IN FEET

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Updated: Tuesday, April 12, 2016

FIGURE B-7

CITY OF BURLESON

NON-RESIDENTIAL SEWER SERVED ACREAGE BY TRAFFIC SURVEY ZONE

TSZ ID

2015 Served Non-Residential Acres = 1,812

2020 Served Non-Residential Acres = 2,375

2025 Served Non-Residential Acres = 2,993

2035 Served Non-Residential Acres = 4,785

LEGEND

- Traffic Survey Zone
- Highway
- Road
- Railroad
- Stream
- Burleson City Limit
- Burleson ETJ
- Proposed Sewer Service Area
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE NICHOLS

Crowley

Fort Worth

Rendon CDP

TARRANT COUNTY

JOHNSON COUNTY

Joshua

Cross Timber

Briaroaks

0 2,000 4,000

SCALE IN FEET

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Updated: Tuesday, April 12, 2016

APPENDIX C
PRESSURE RECORDER DATA SUMMARY

FIGURE C-1

CITY OF BURLESON

EXISTING WATER SYSTEM WITH PRESSURE TESTING LOCATIONS

LEGEND

- Pressure Recorder
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station
- 8" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

PR#1
WFH875
325 Snapdragon Ct.

PR#2
WFH12
517 Ann Lois Ln.

PR#3
WFH288
417 Gregory St.

PR#4
WFH456
616 Parkridge Blvd.

PR#5
WFH276
944 Vaughn Dr.

PR#6
WFH883
204 Flagstone Dr.

PR#7
WFH1153
1352 Gayle St.

PR#8
WFH380
1800 SW Hulen St.

PR#9
WFH718
109 Country Vista Cir.

PR#10
WFH686
2715 Park Pl.

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

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

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

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

2.0 MG Shaffstall
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Shaffstall
Pump Station
(3) 2,000 GPM Pumps

1.5 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

UPP to LPP Transfer Valve

UPP to LPP Transfer Valve

Crowley

Fort Worth

Rendon CDP

Joshua

Briar Oaks

Cross Timber

TARRANT CO.
JOHNSON CO.

TARRANT CO.
JOHNSON CO.

Village Creek

Village Creek

Village Creek

Village Creek

Village Creek

Village Creek

Quil Miller Creek

Quil Miller Creek

Quil Miller Creek

Shoal Creek

0 1,500 3,000

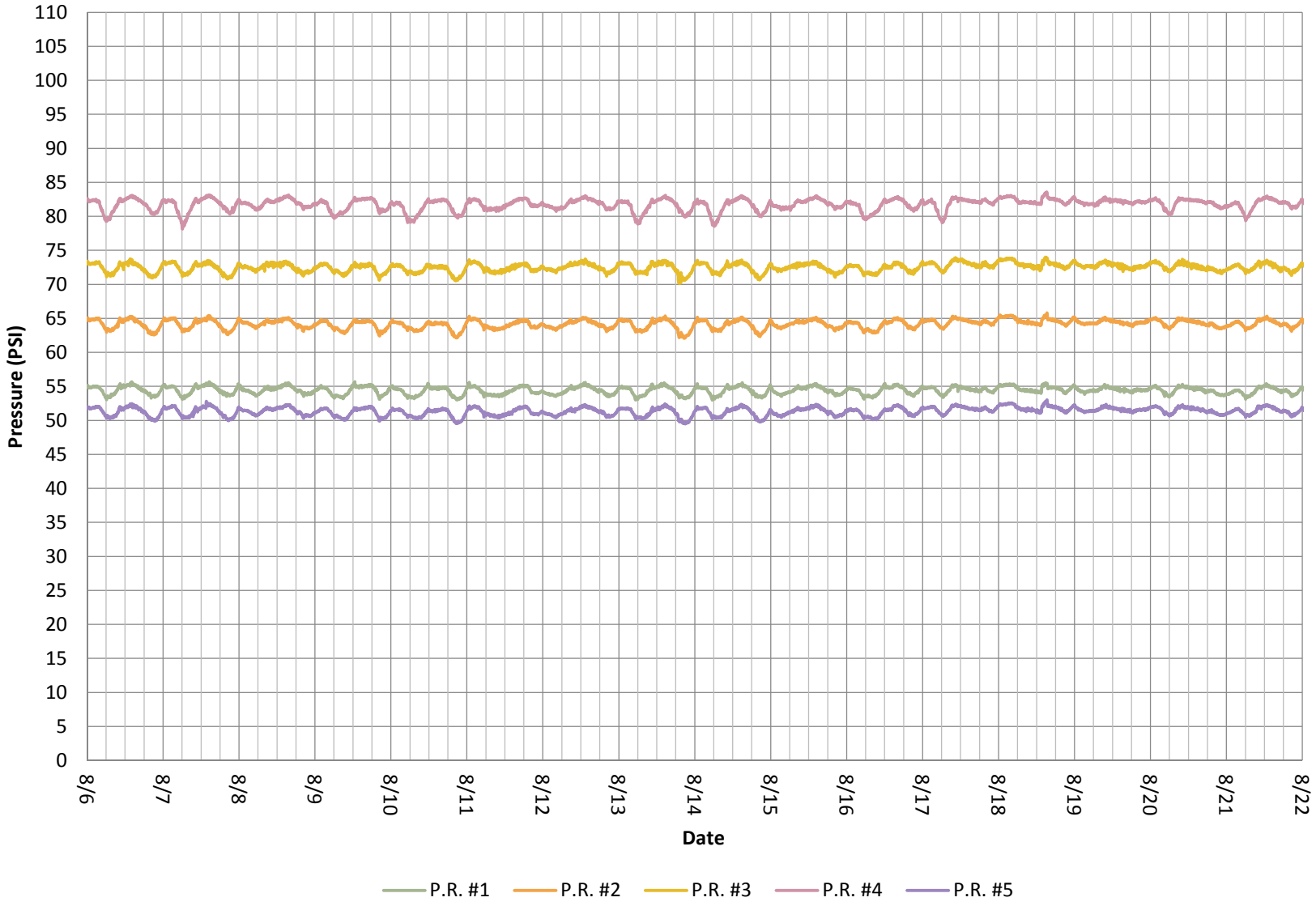
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City of Burleson

Lower Pressure Plane Graph

August 6 – 22, 2014

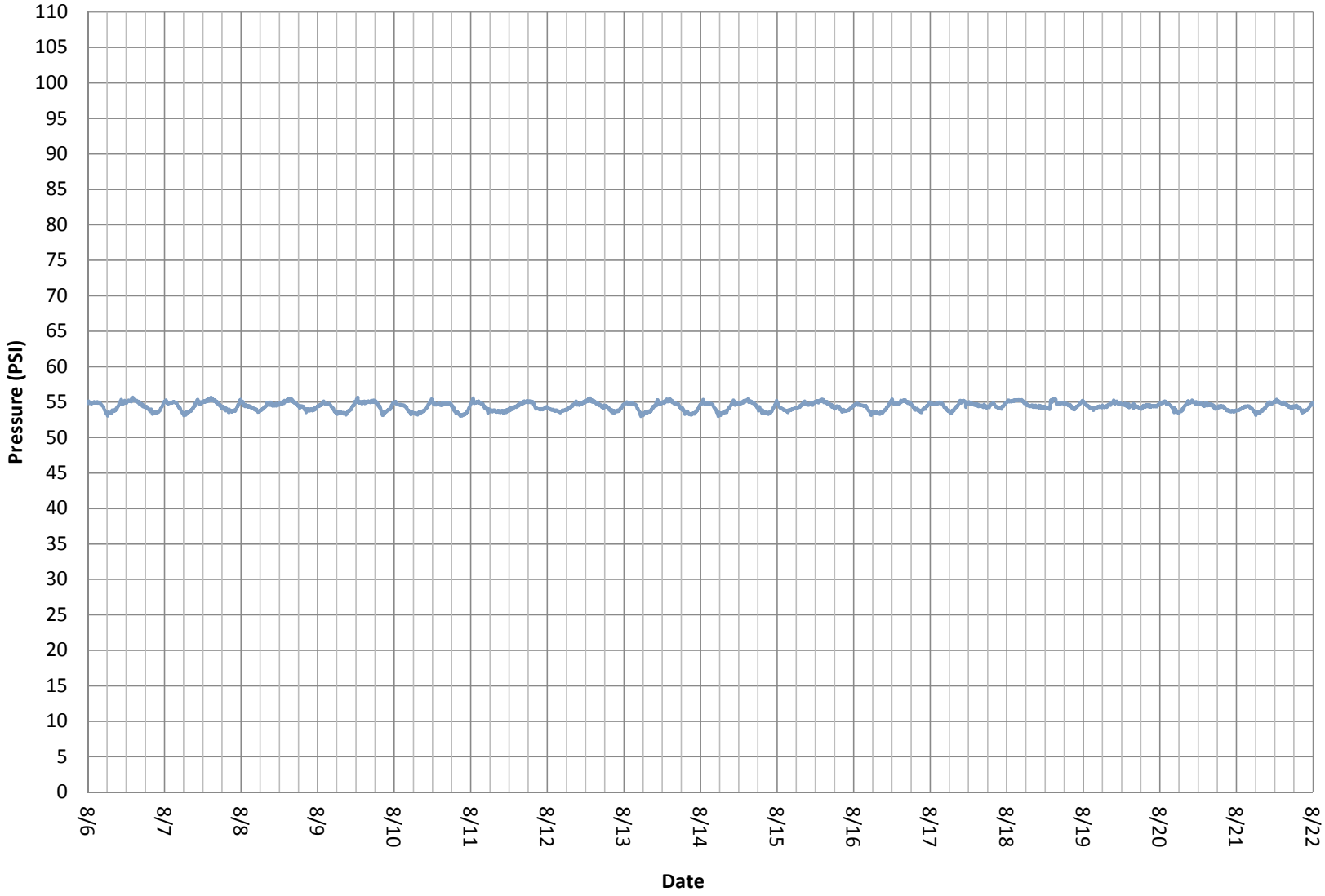


City of Burleson

Pressure Recorder #1 - WFH875

325 Snapdragon Ct.

August 6 – 22, 2014

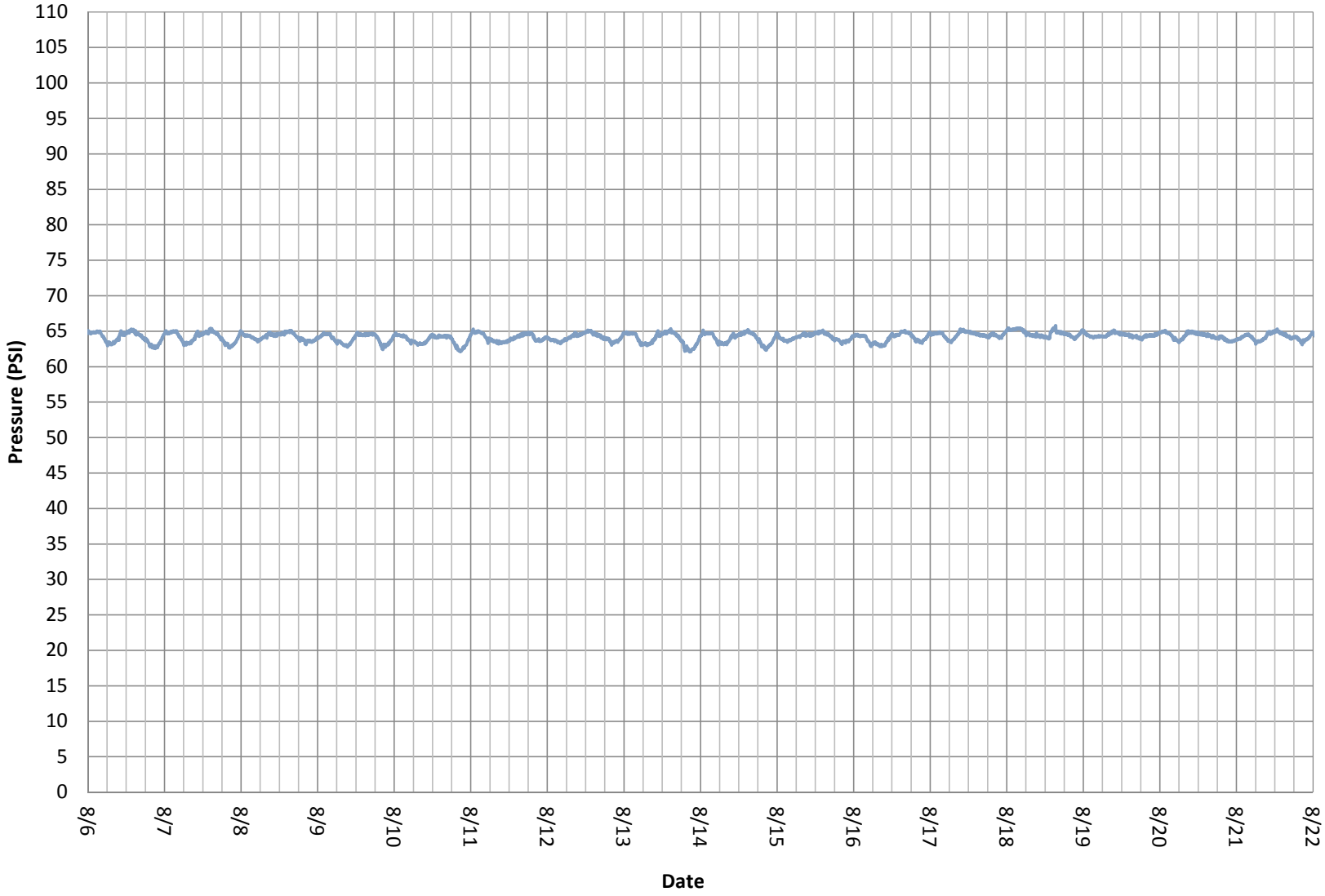


City of Burleson

Pressure Recorder #2 - WFH12

517 Ann Lois Ln.

August 6 – 22, 2014

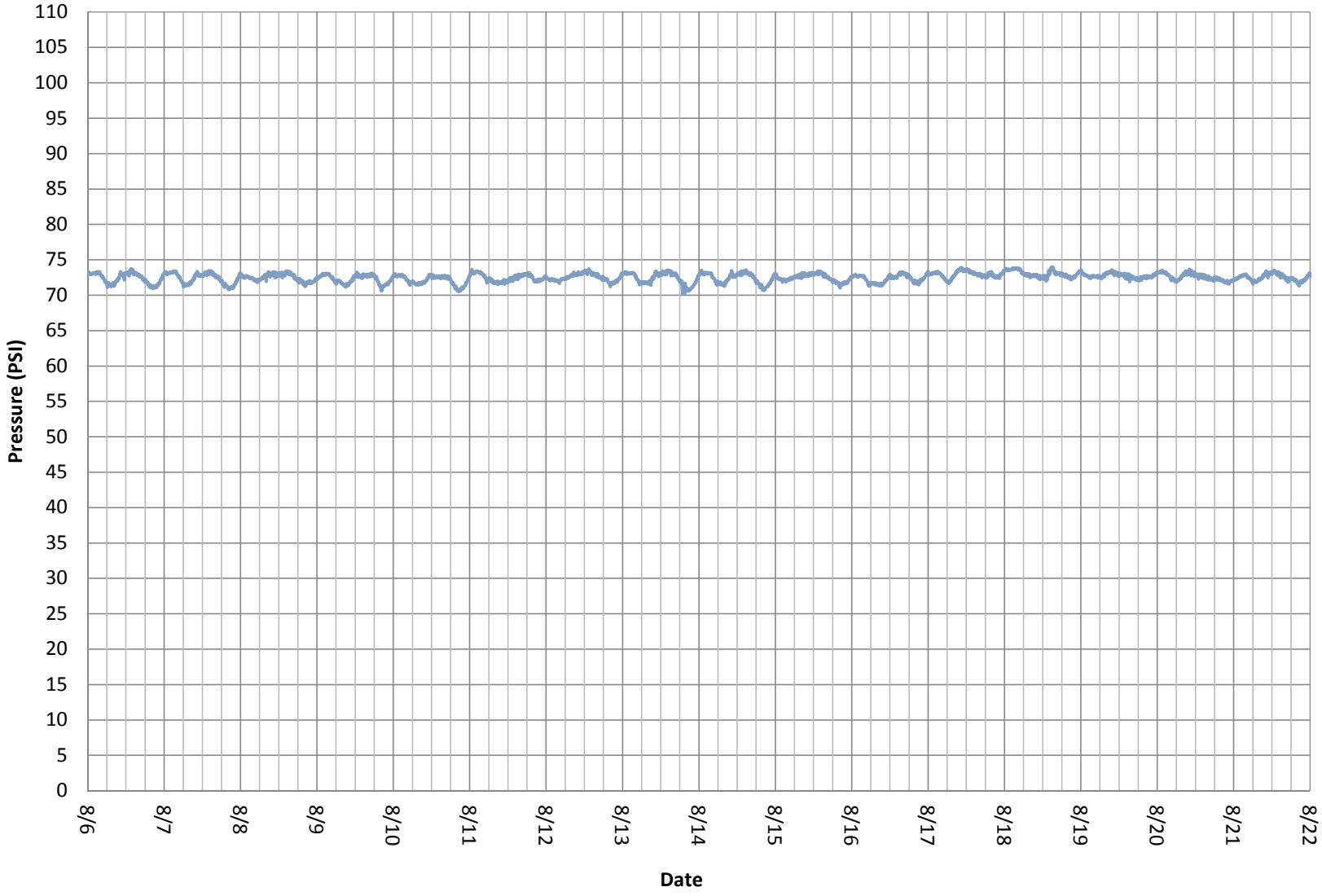


City of Burleson

Pressure Recorder #3 - WFH288

417 Gregory Dr.

August 6 – 22, 2014

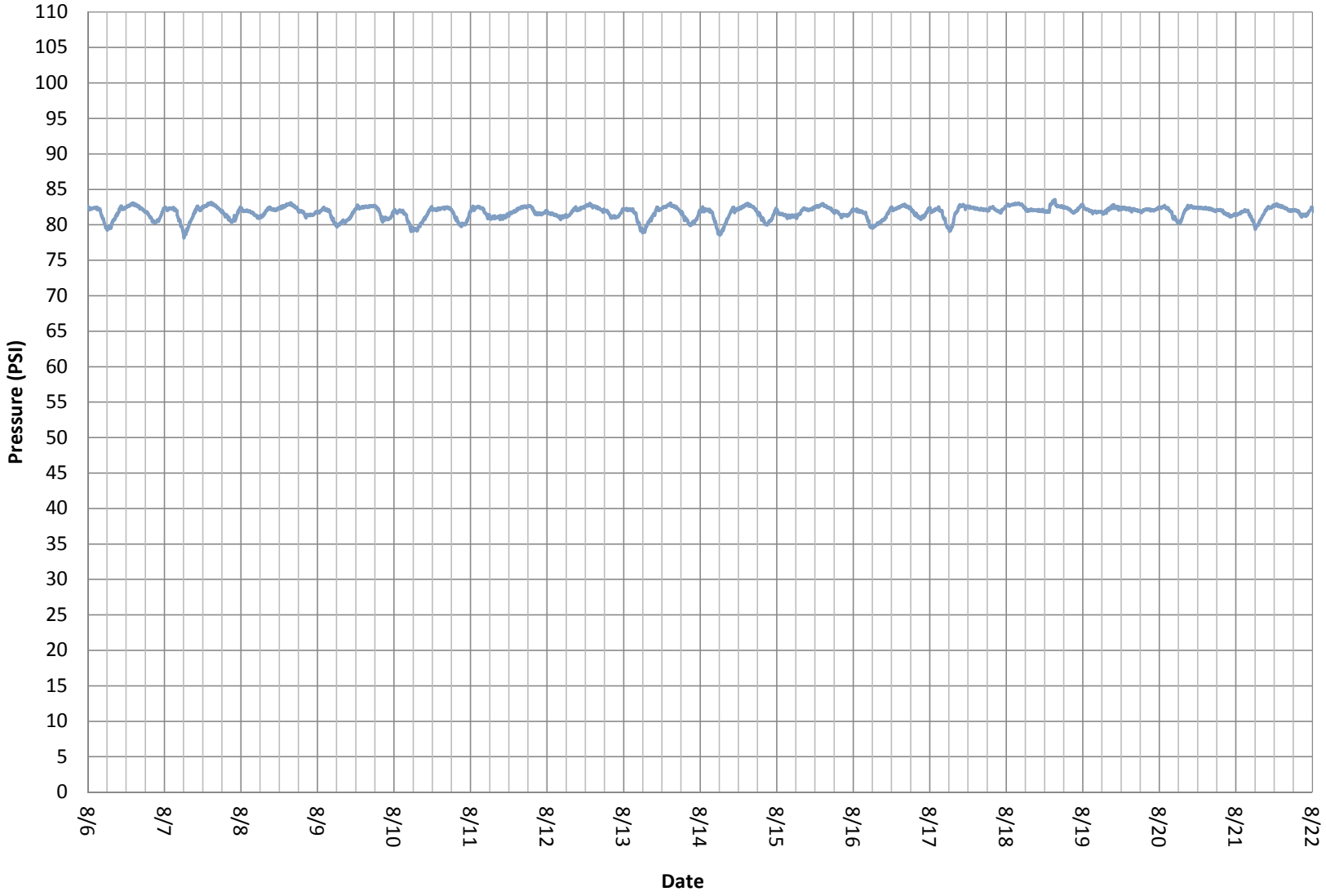


City of Burleson

Pressure Recorder #4 - WFH456

616 Parkridge Blvd.

August 6 – 22, 2014

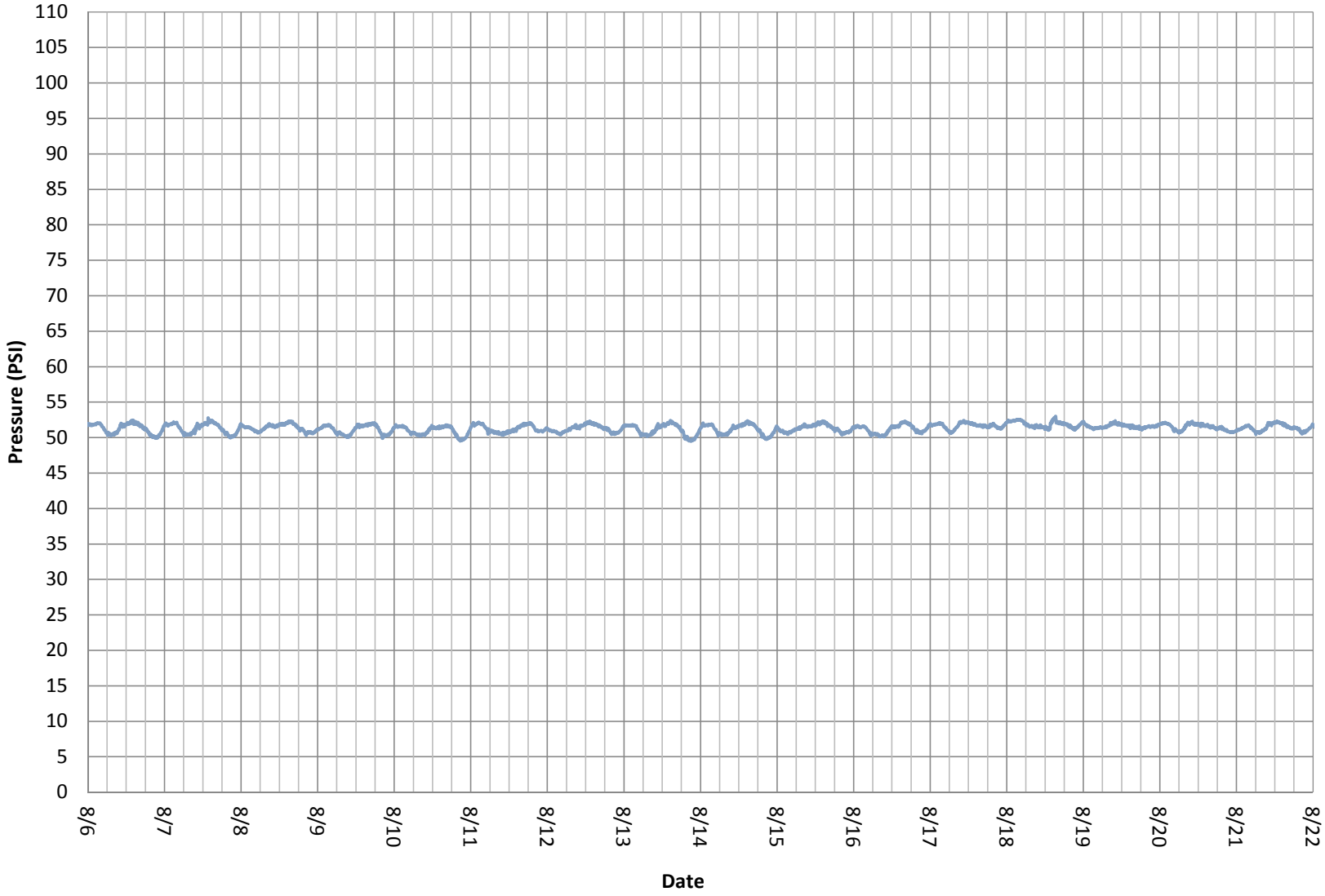


City of Burleson

Pressure Recorder #5 - WFH276

944 Vaughn Dr.

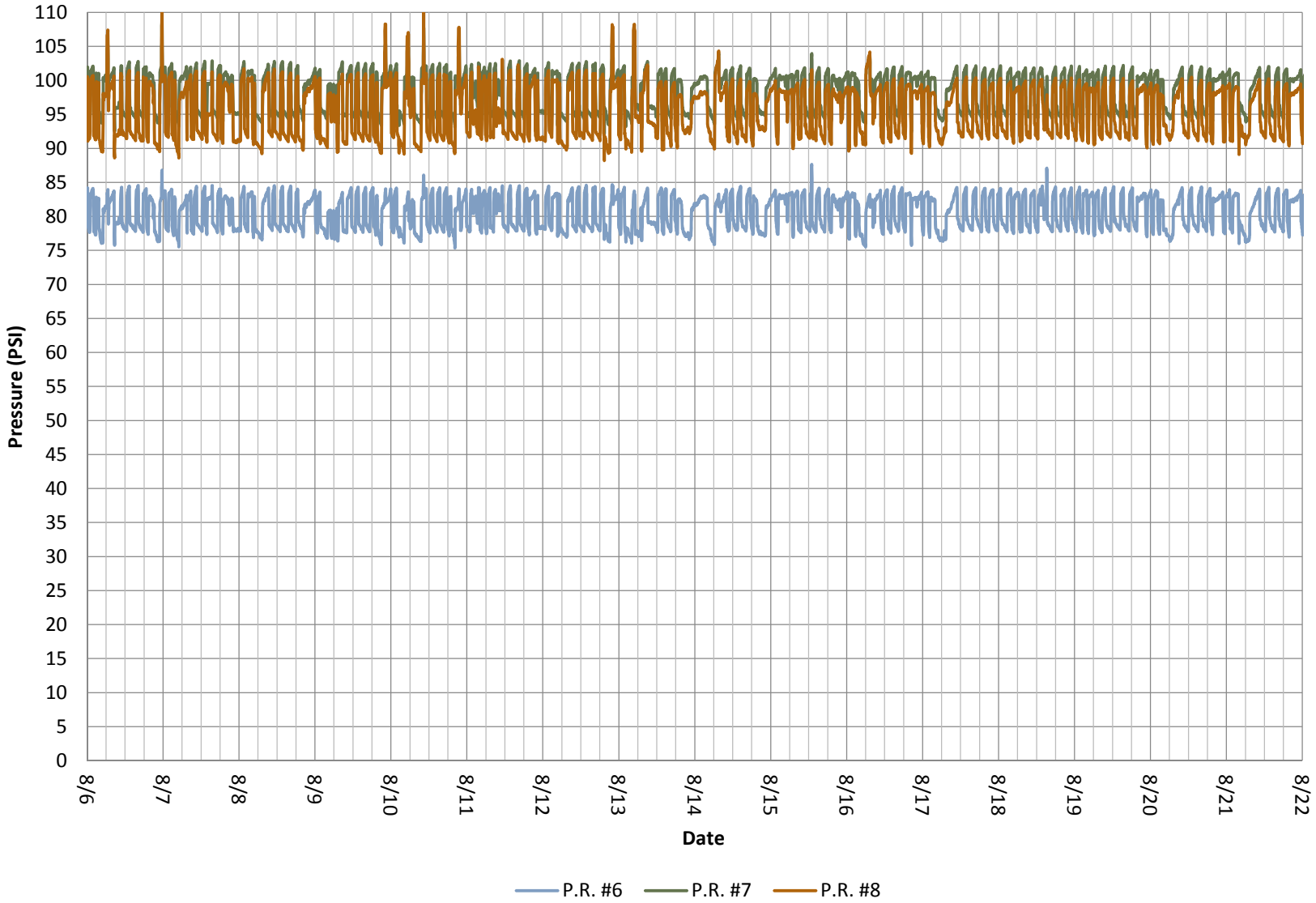
August 6 – 22, 2014



City of Burleson

Upper Pressure Plane Graph

August 6 – 22, 2014

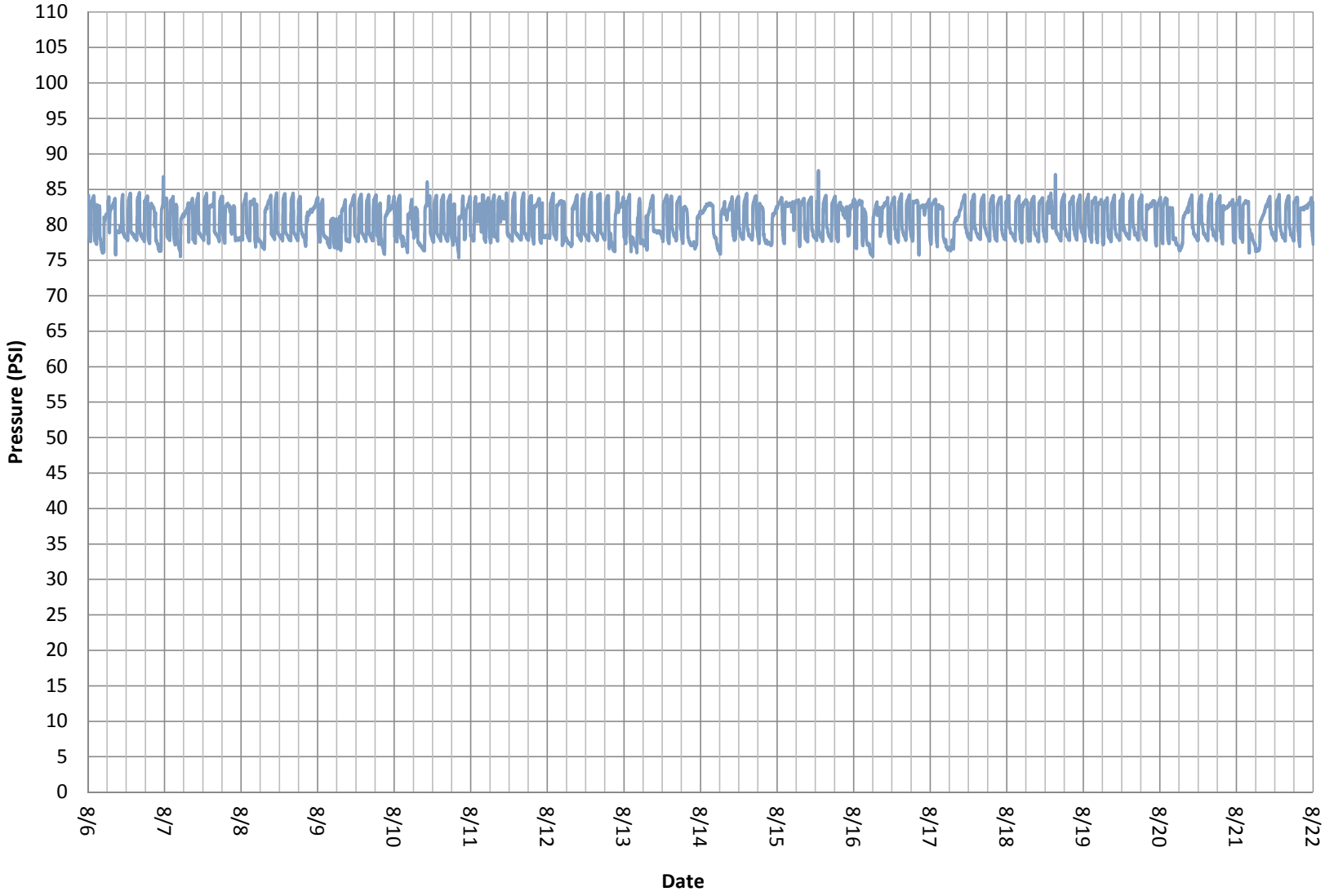


City of Burleson

Pressure Recorder #6 - WFH883

204 Flagstone Dr.

August 6 – 22, 2014

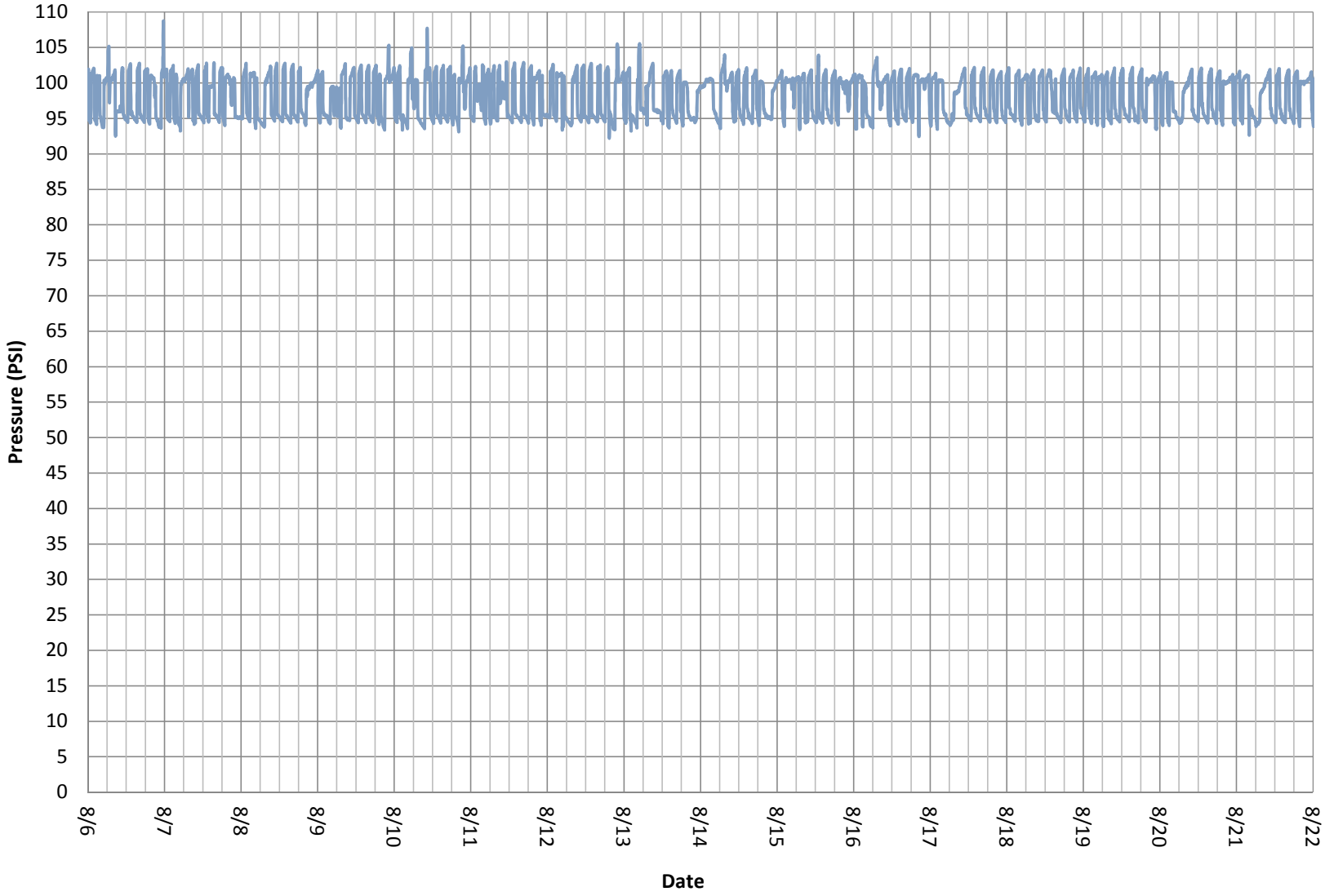


City of Burleson

Pressure Recorder #7 - WFH1153

1352 Gayle St.

August 6 – 22, 2014

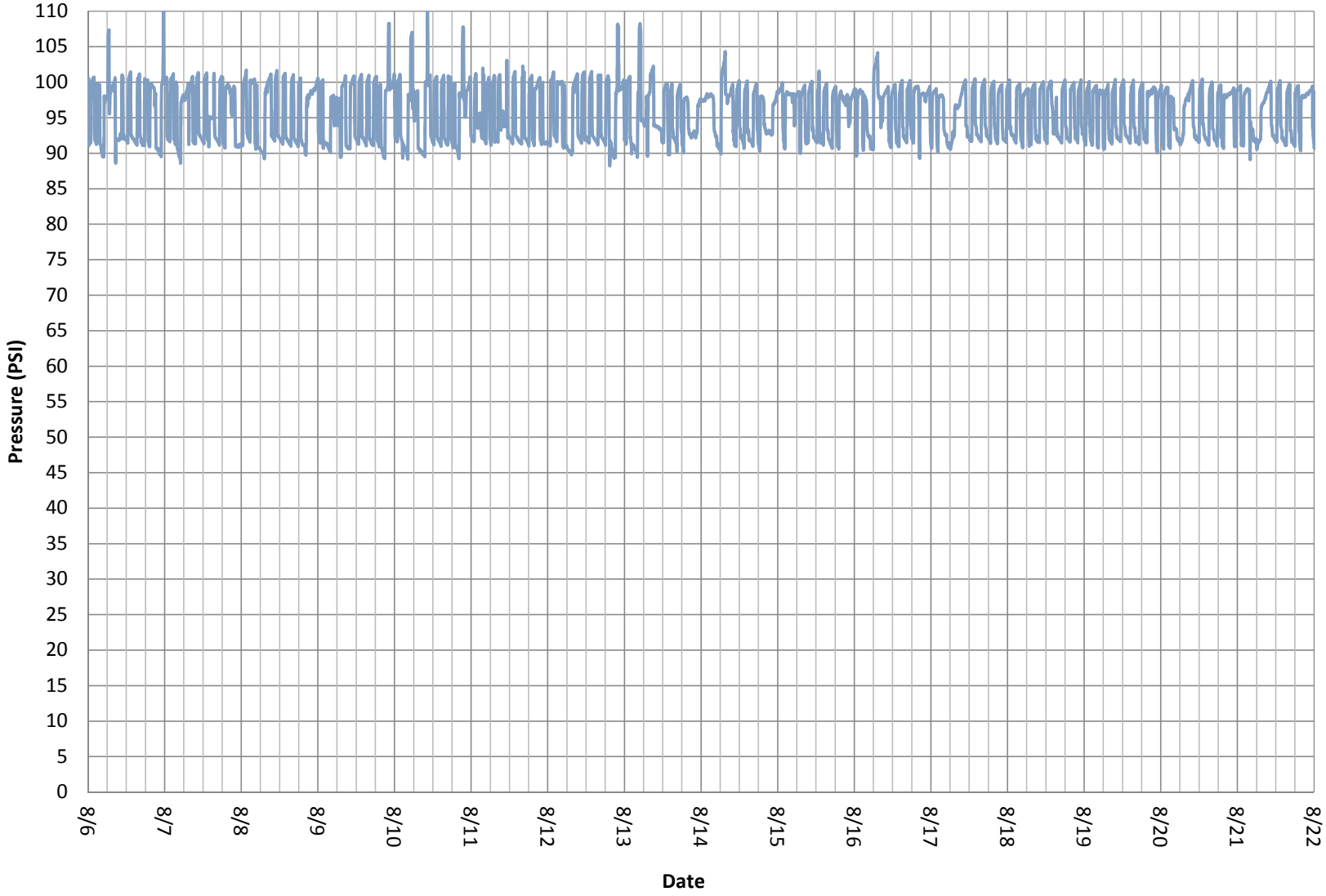


City of Burleson

Pressure Recorder #8 - WFH380

1820 SW Hulen St.

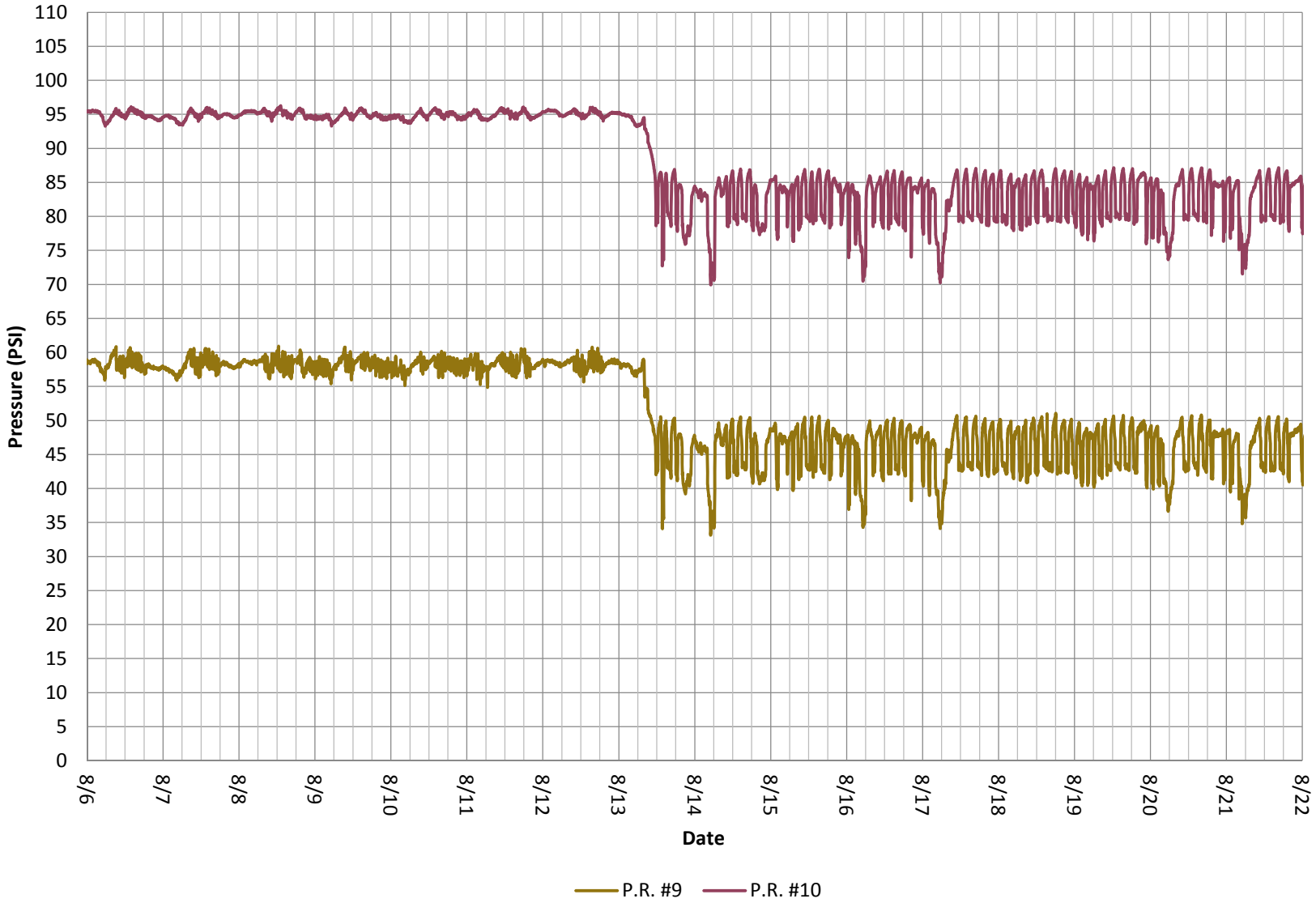
August 6 – 22, 2014



City of Burleson

Mountain Valley Pressure Plane Graph

August 6 – 22, 2014

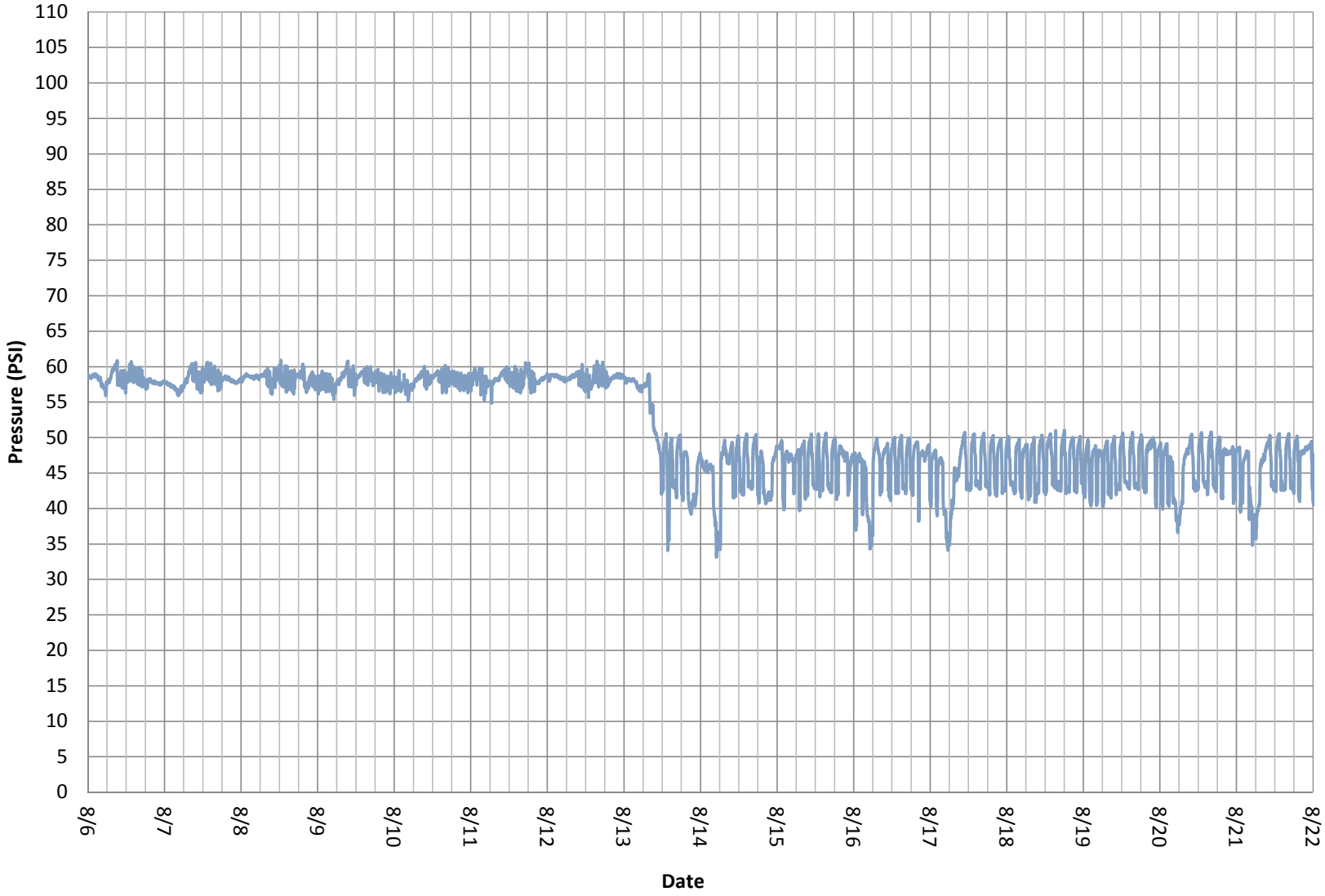


City of Burleson

Pressure Recorder #9 - WFH681

125 Country Vista Cir.

August 6 – 22, 2014

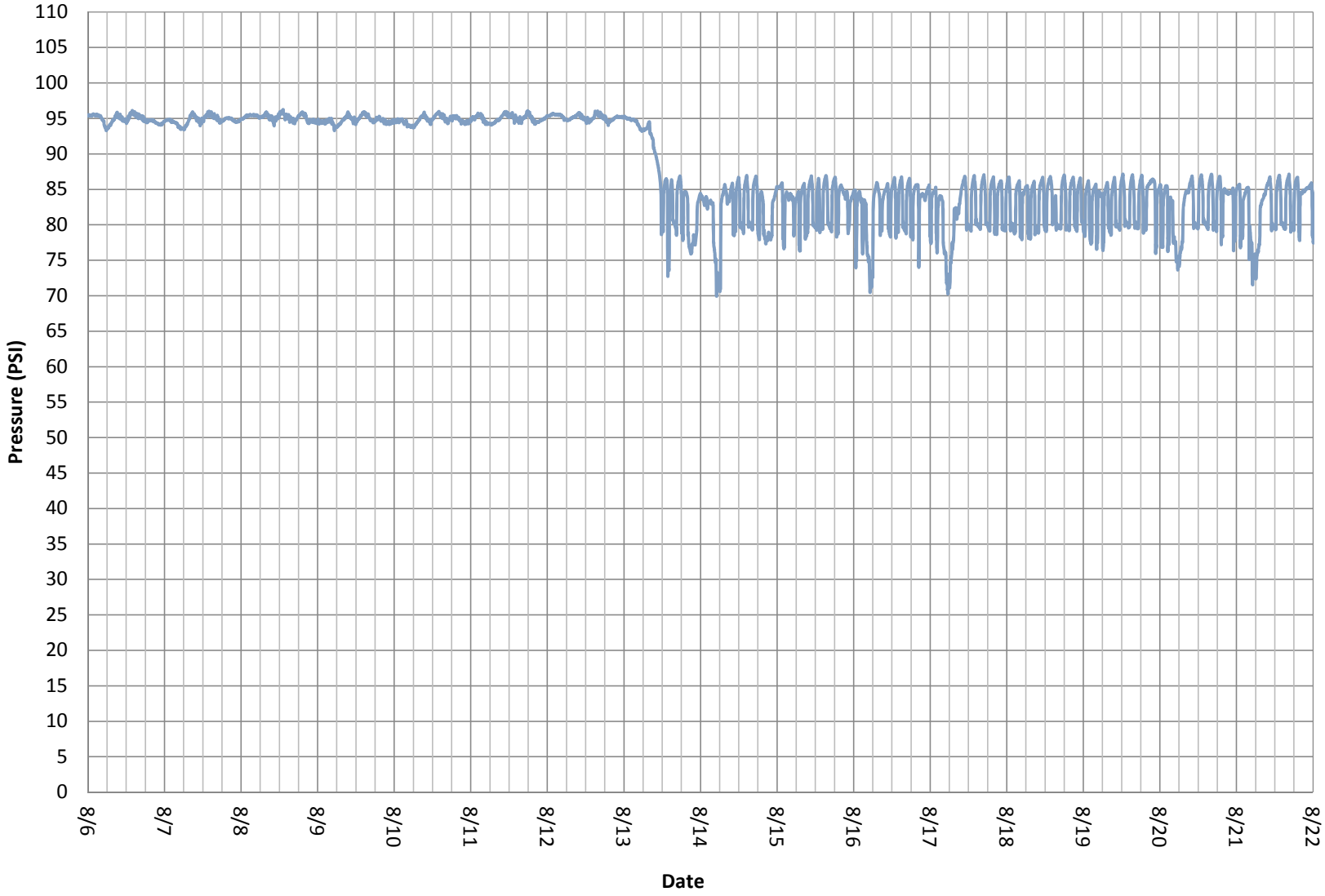


City of Burleson

Pressure Recorder #10 - WFH686

2715 Park Pl.

August 6 – 22, 2014

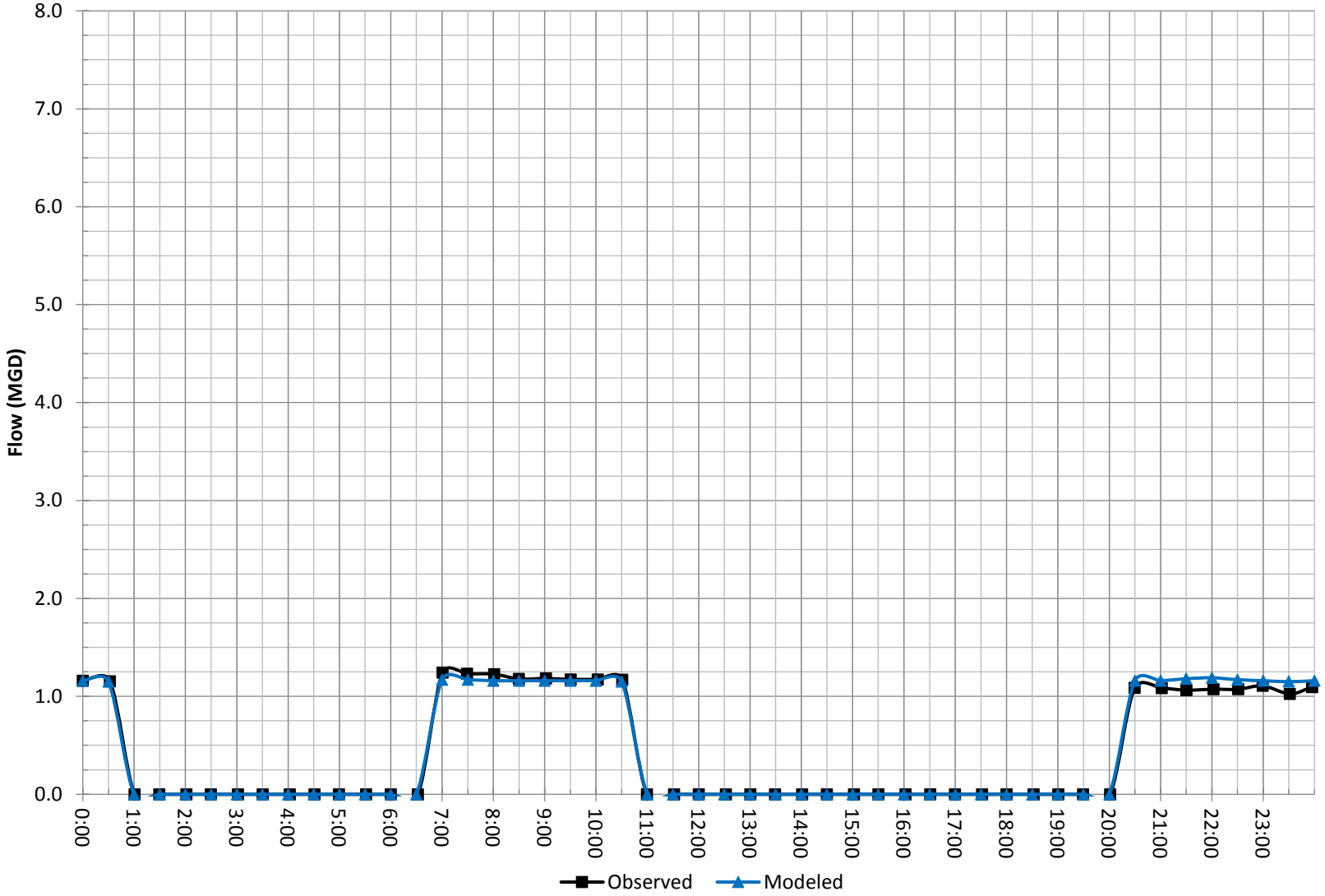


APPENDIX D
WATER MODEL CALIBRATION CHARTS

City of Burleson

Alsbury P.S. #1 Discharge Flow

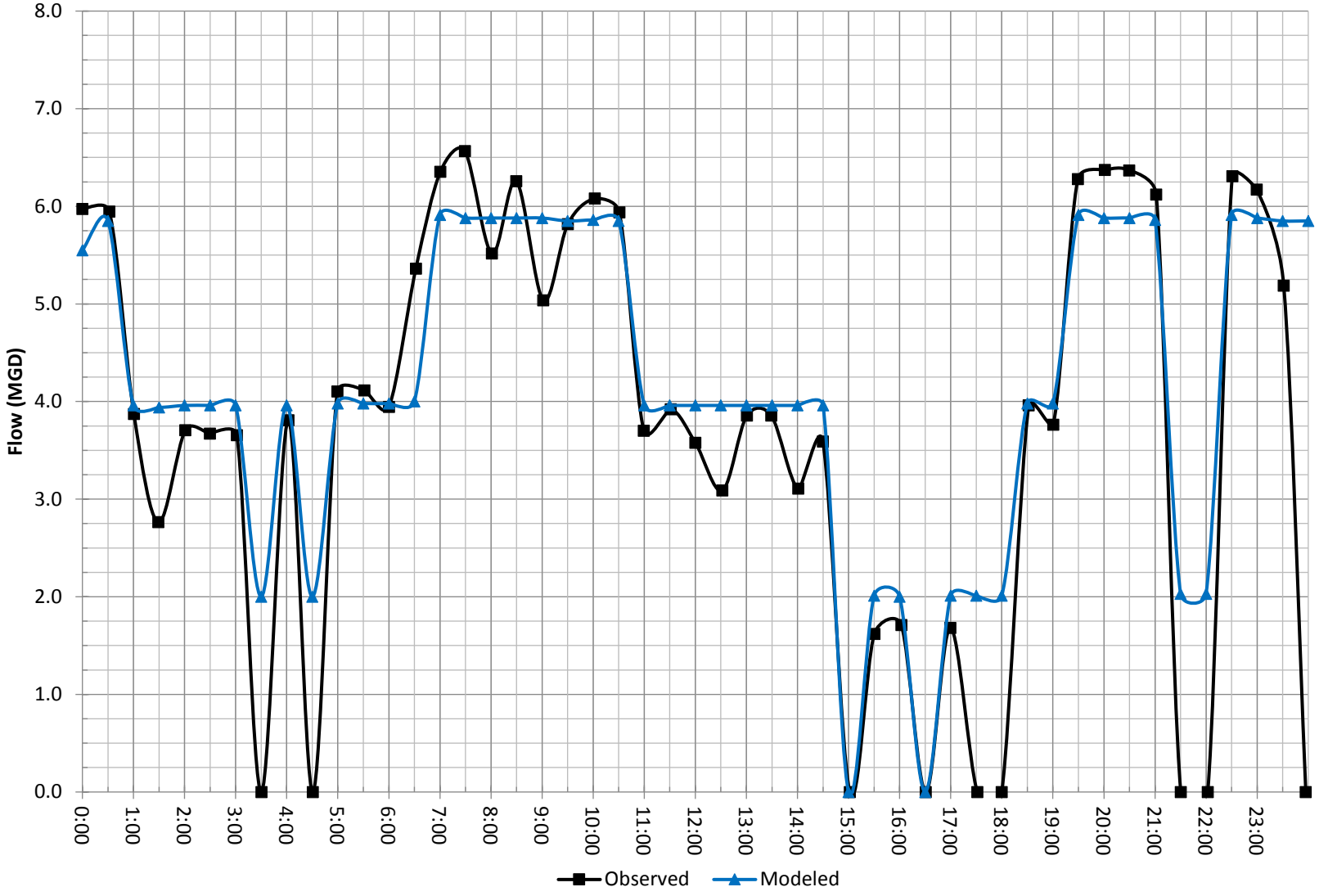
August 7, 2014



City of Burleson

Alsbury P.S. #2 Discharge Flow

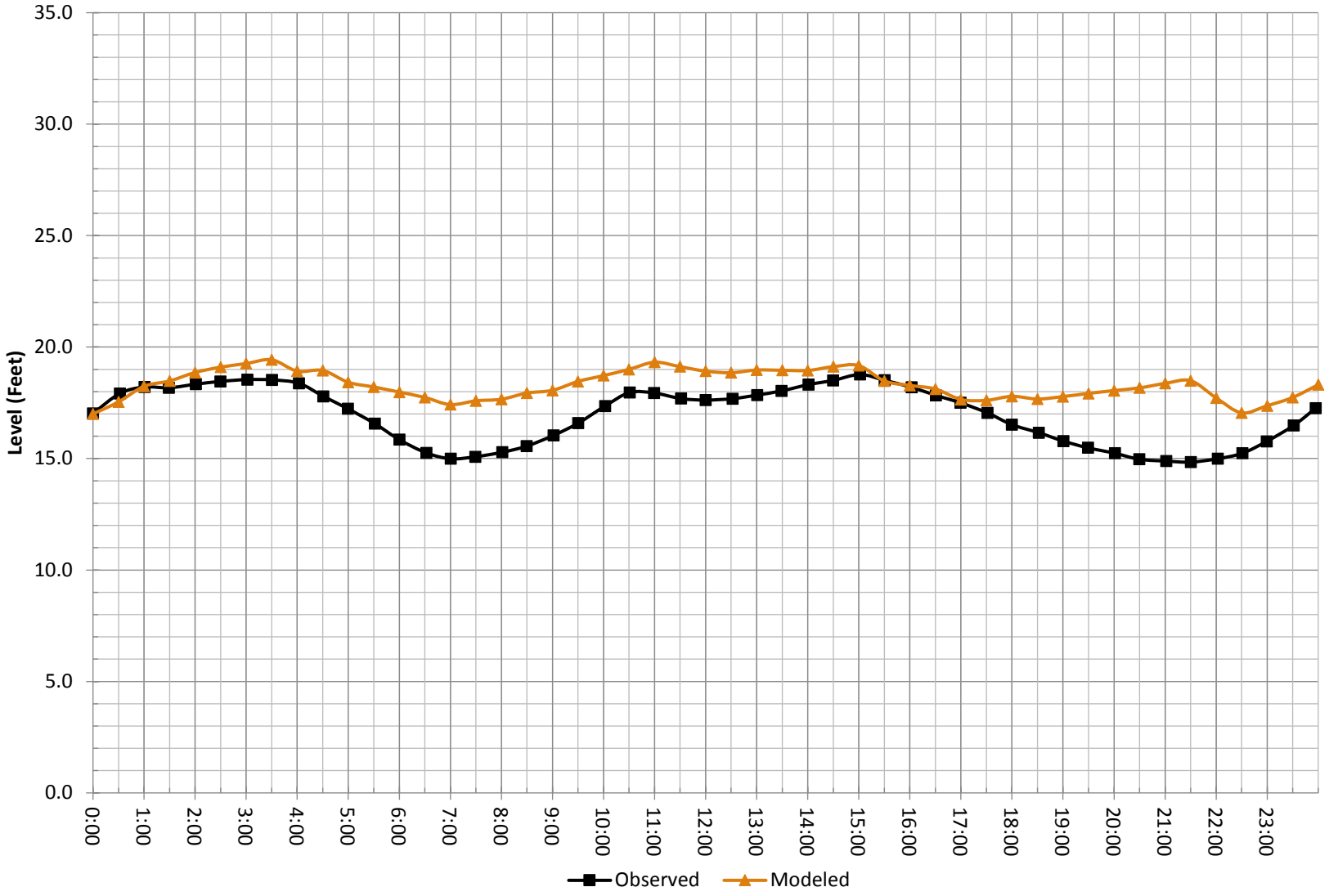
August 7, 2014



City of Burleson

Brushy Mound G.S.T. #1 & #2 Level

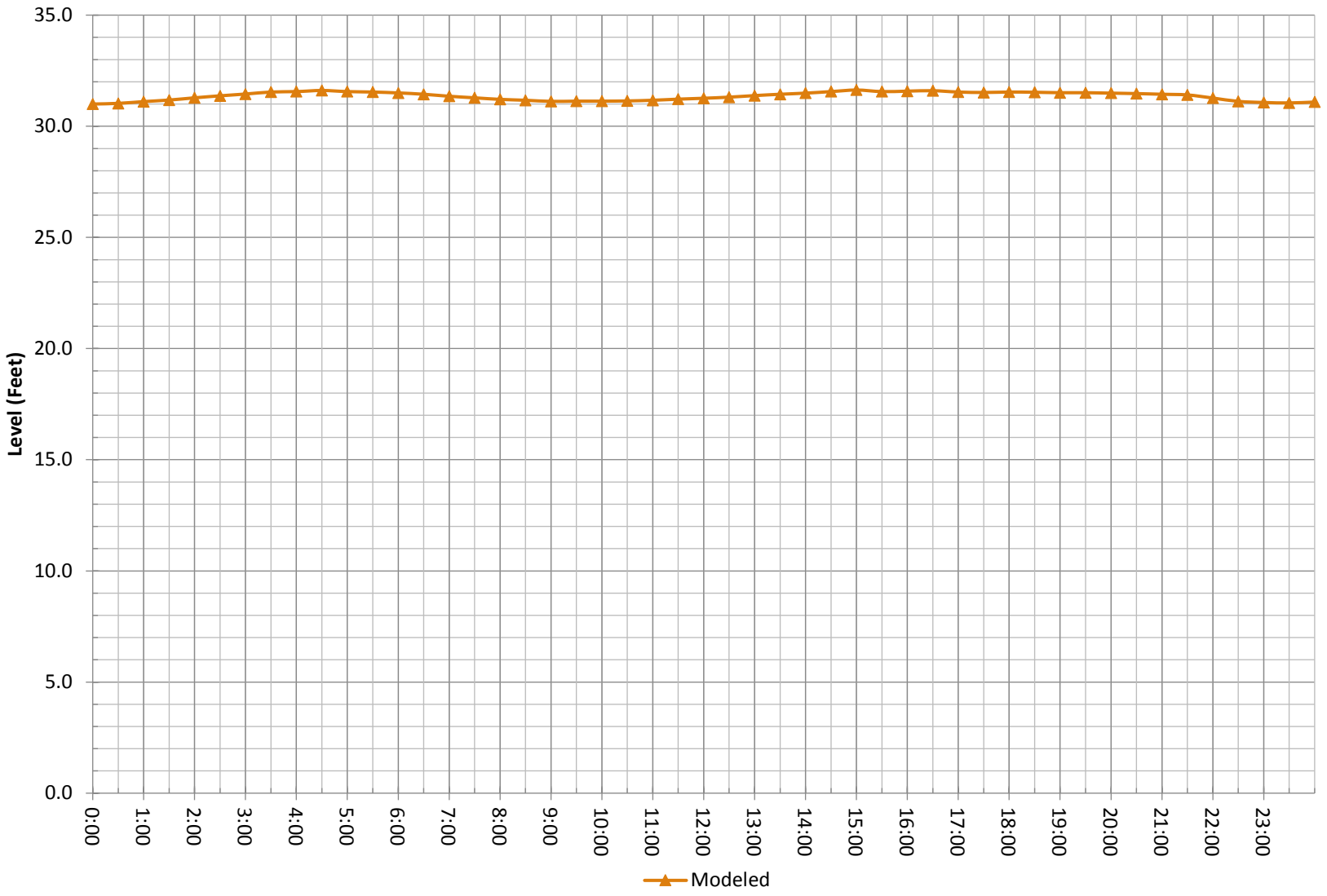
August 7, 2014



City of Burleson

Hidden Creek E.S.T. Level

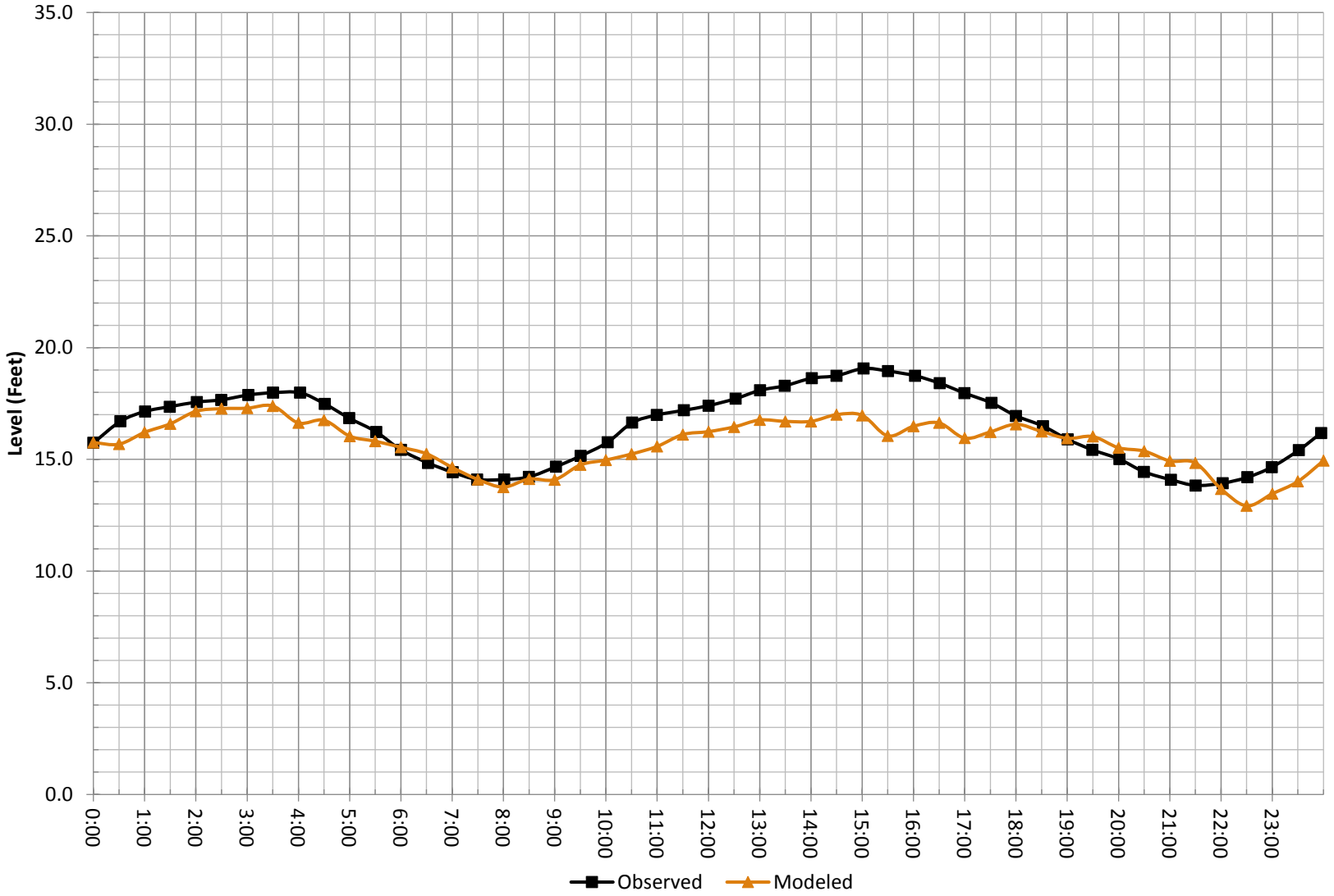
August 7, 2014



City of Burleson

Turkey Peak G.S.T. Level

August 7, 2014

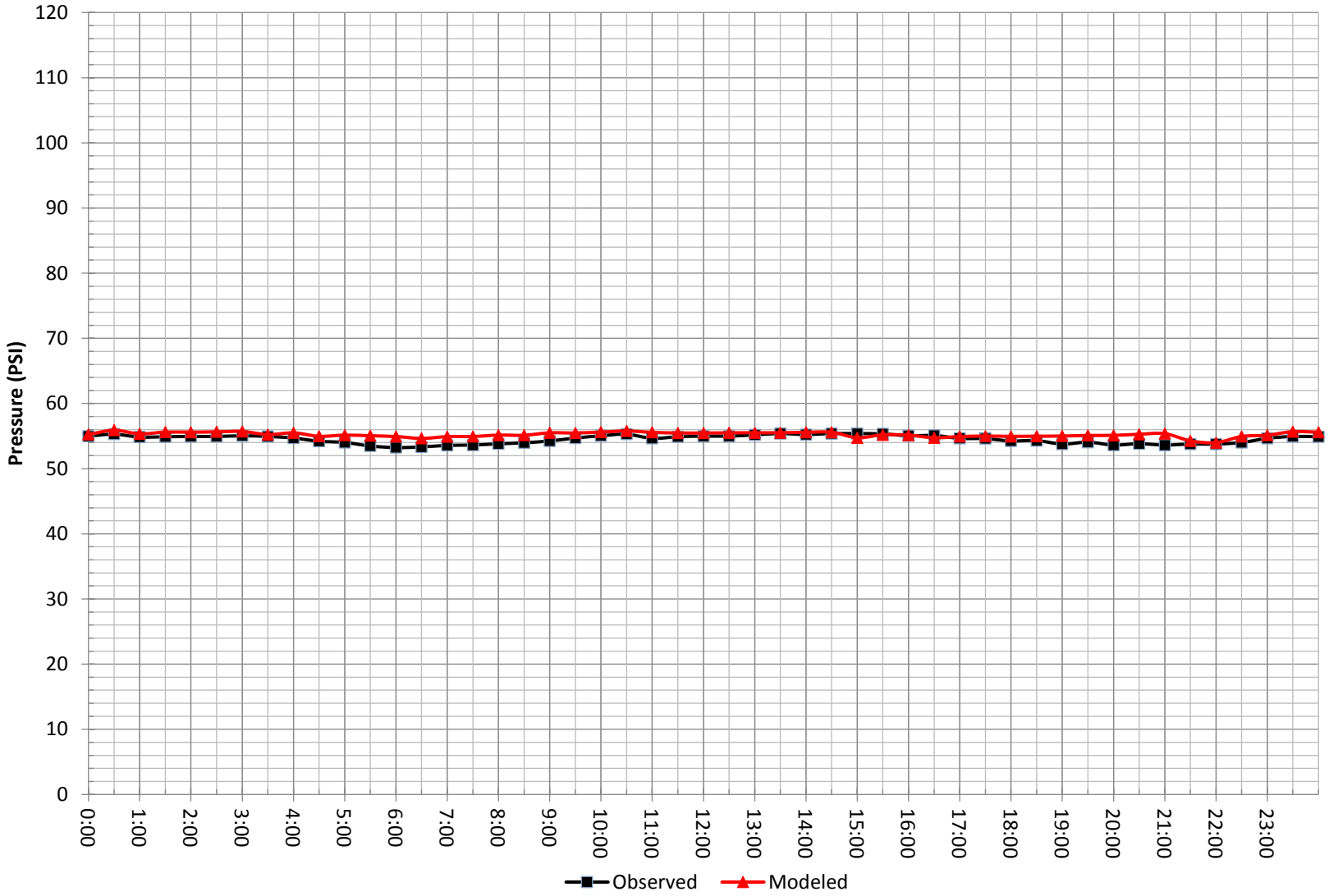


City of Burleson

LPP Pressure Recorder #1 - WFH875

325 Snapdragon Ct.

August 7, 2014

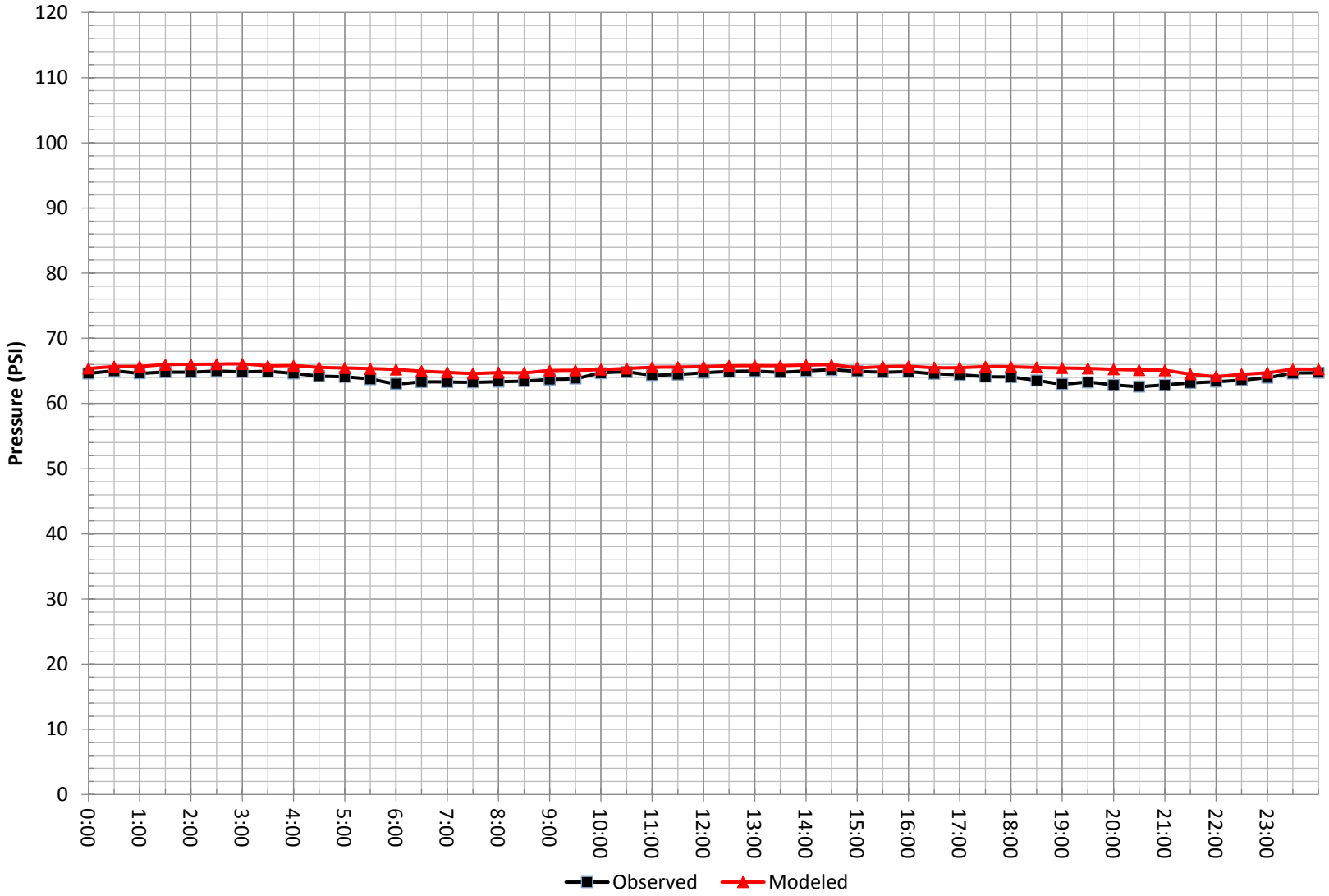


City of Burleson

LPP Pressure Recorder #2 - WFH12

517 Ann Lois Ln.

August 7, 2014

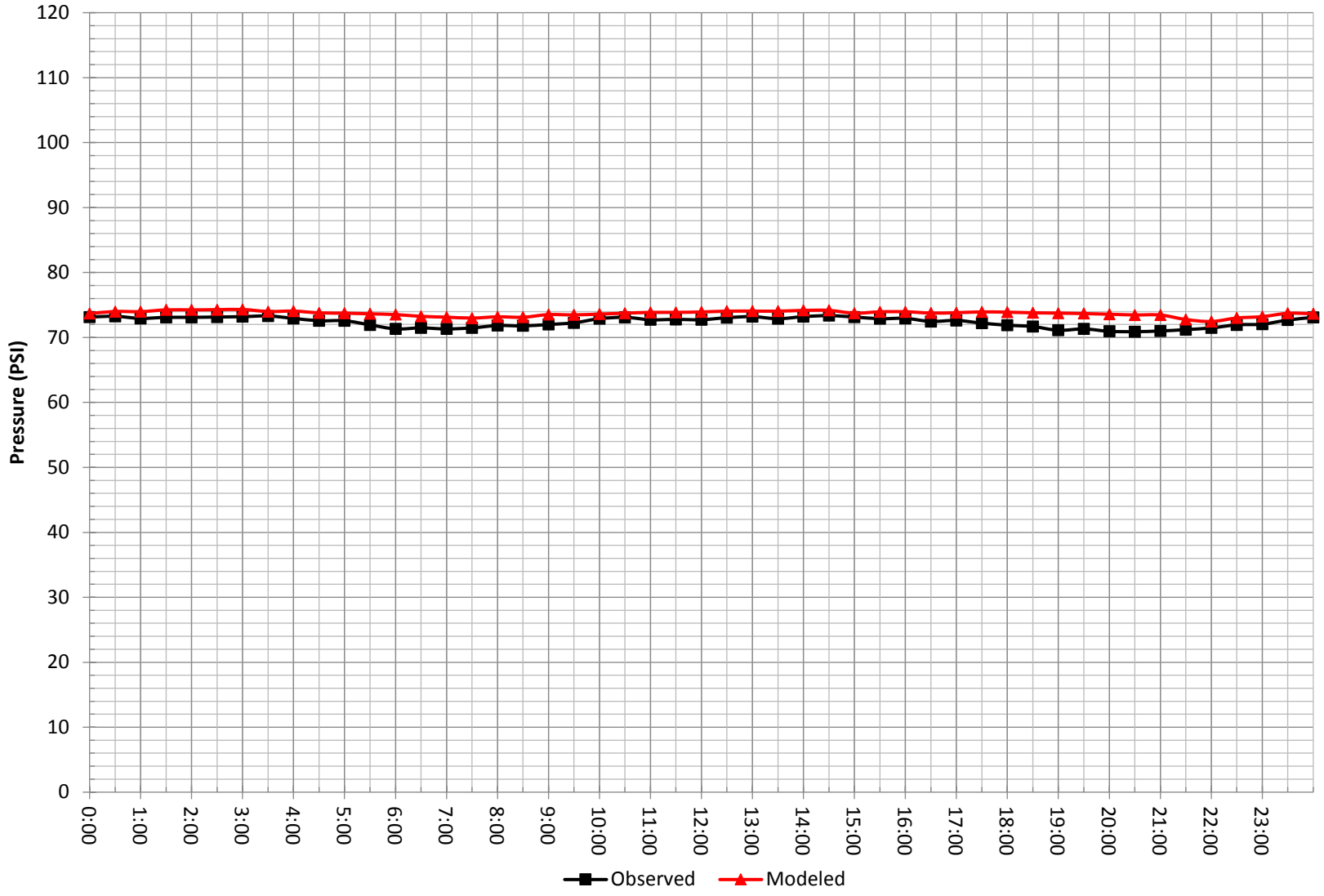


City of Burleson

LPP Pressure Recorder #3 - WFH288

417 Gregory Dr.

August 7, 2014

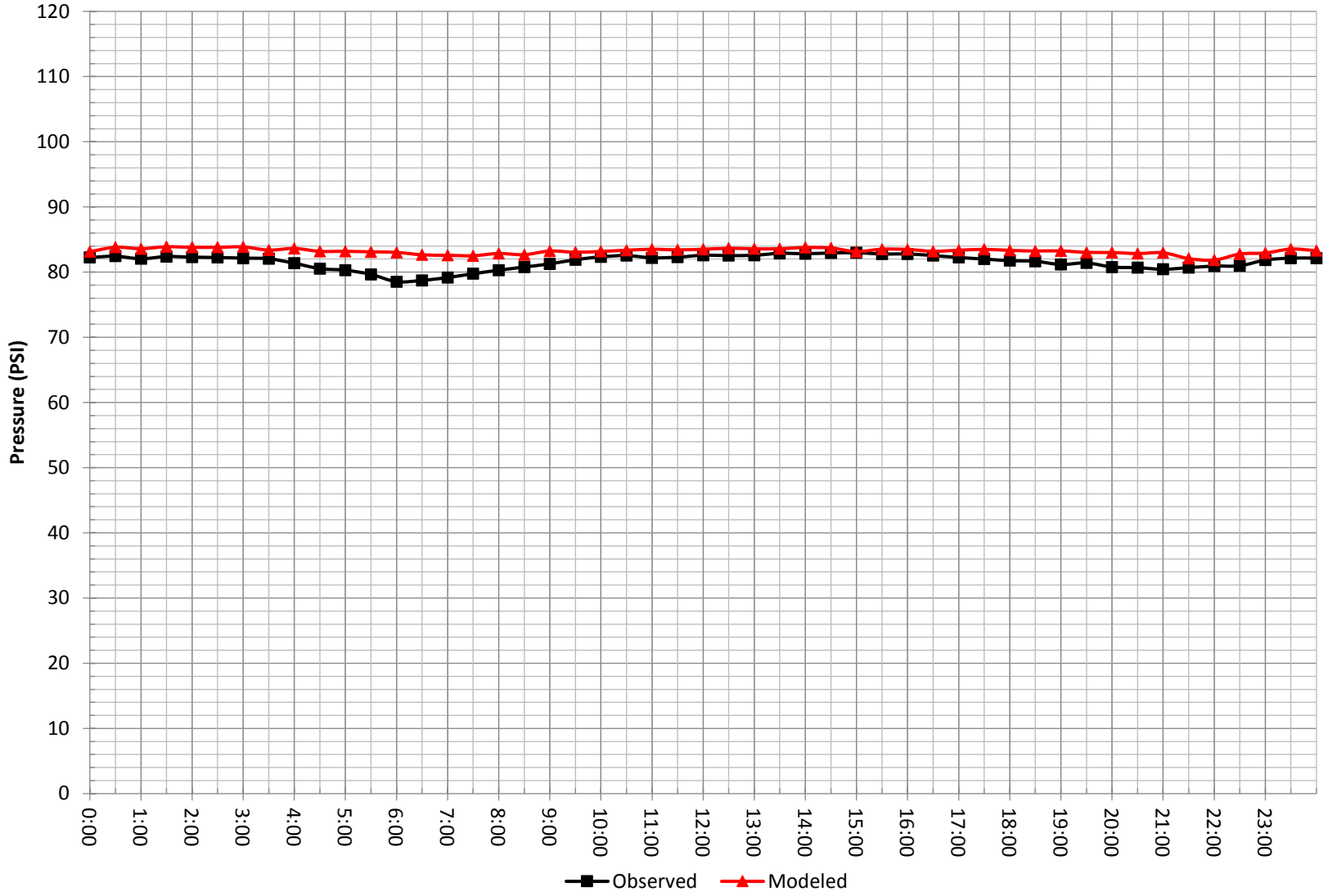


City of Burleson

LPP Pressure Recorder #4 - WFH456

616 Parkridge Blvd.

August 7, 2014

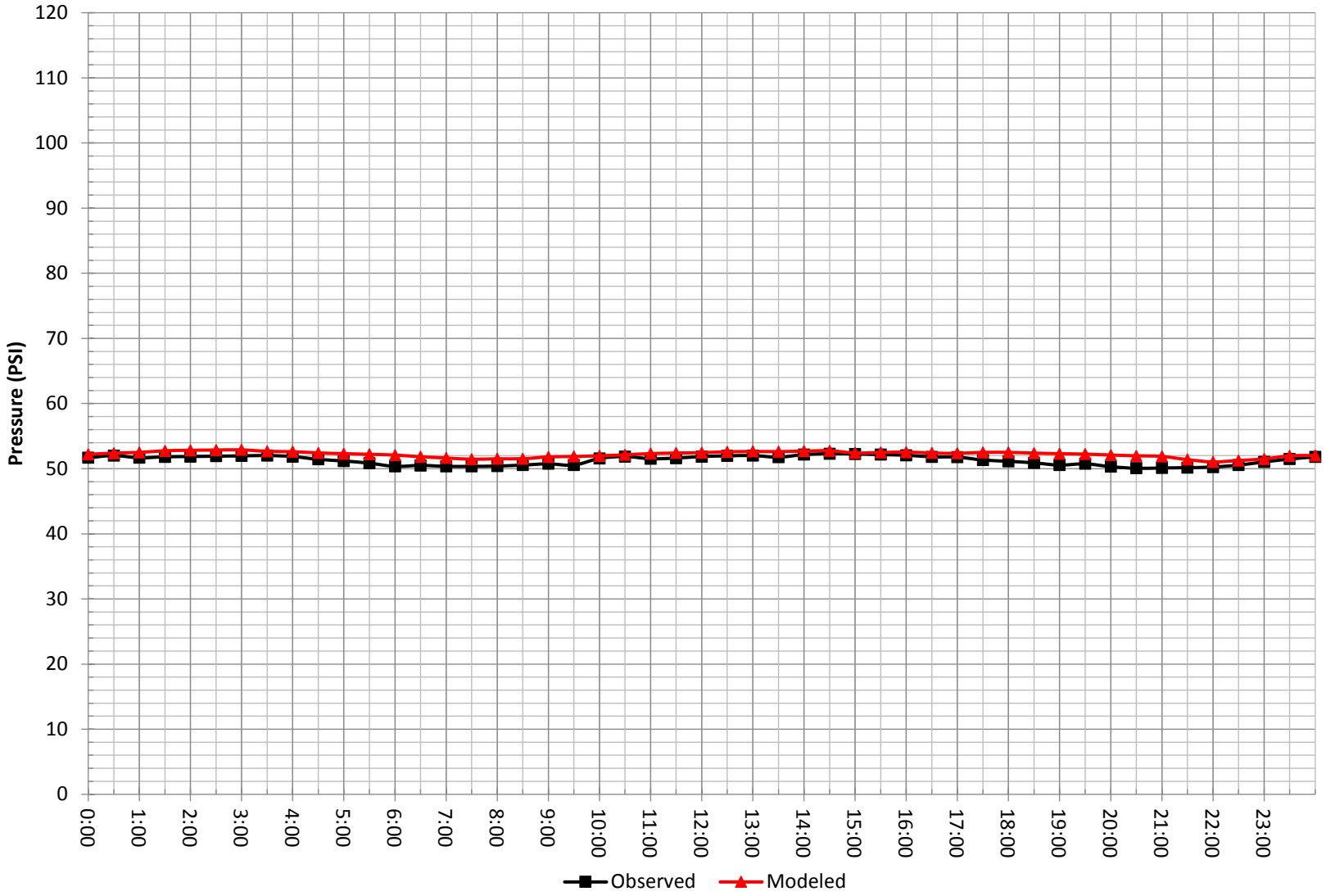


City of Burleson

LPP Pressure Recorder #5 - WFH276

944 Vaughn Dr.

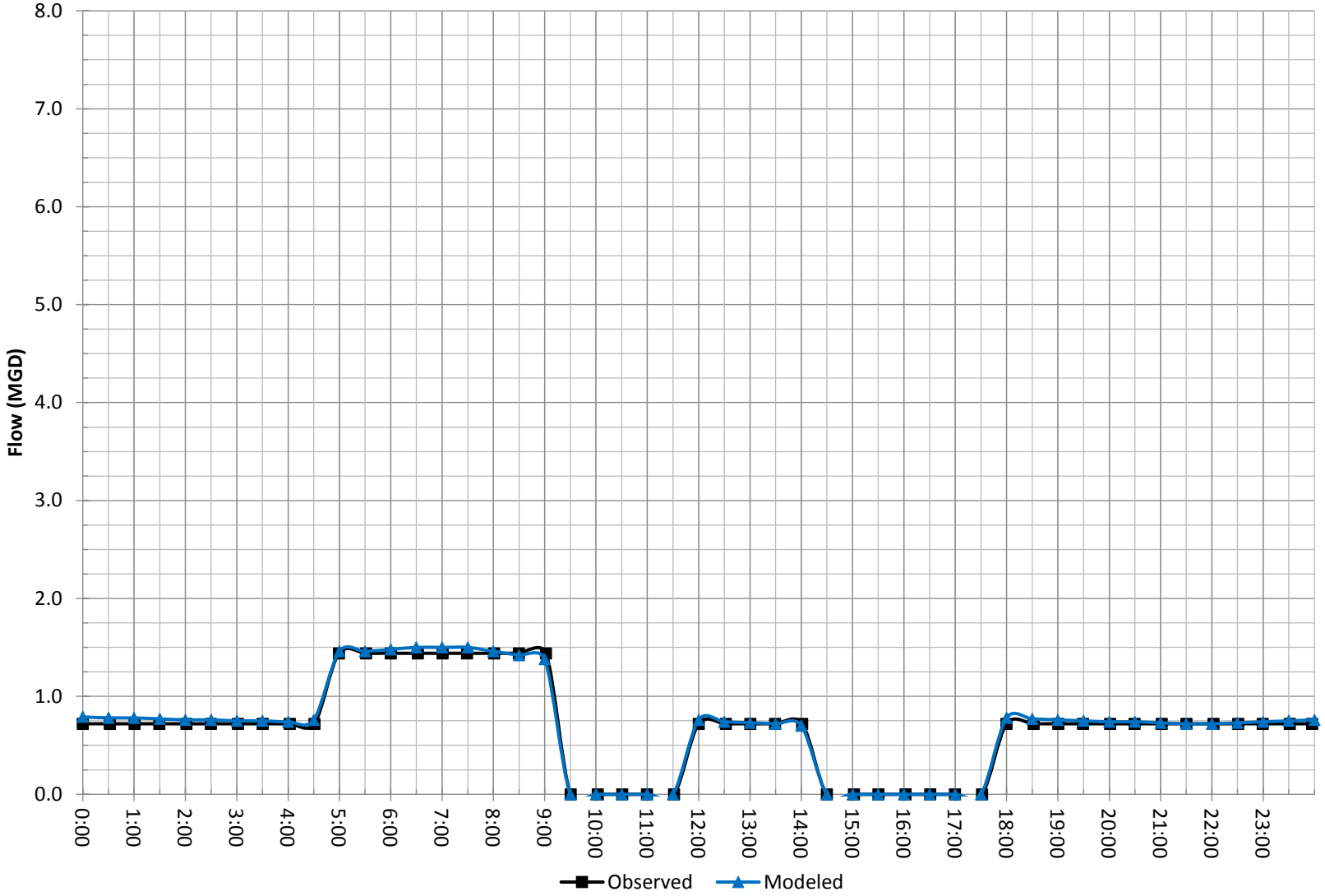
August 7, 2014



City of Burleson

Mtn. Valley P.S. Discharge Flow

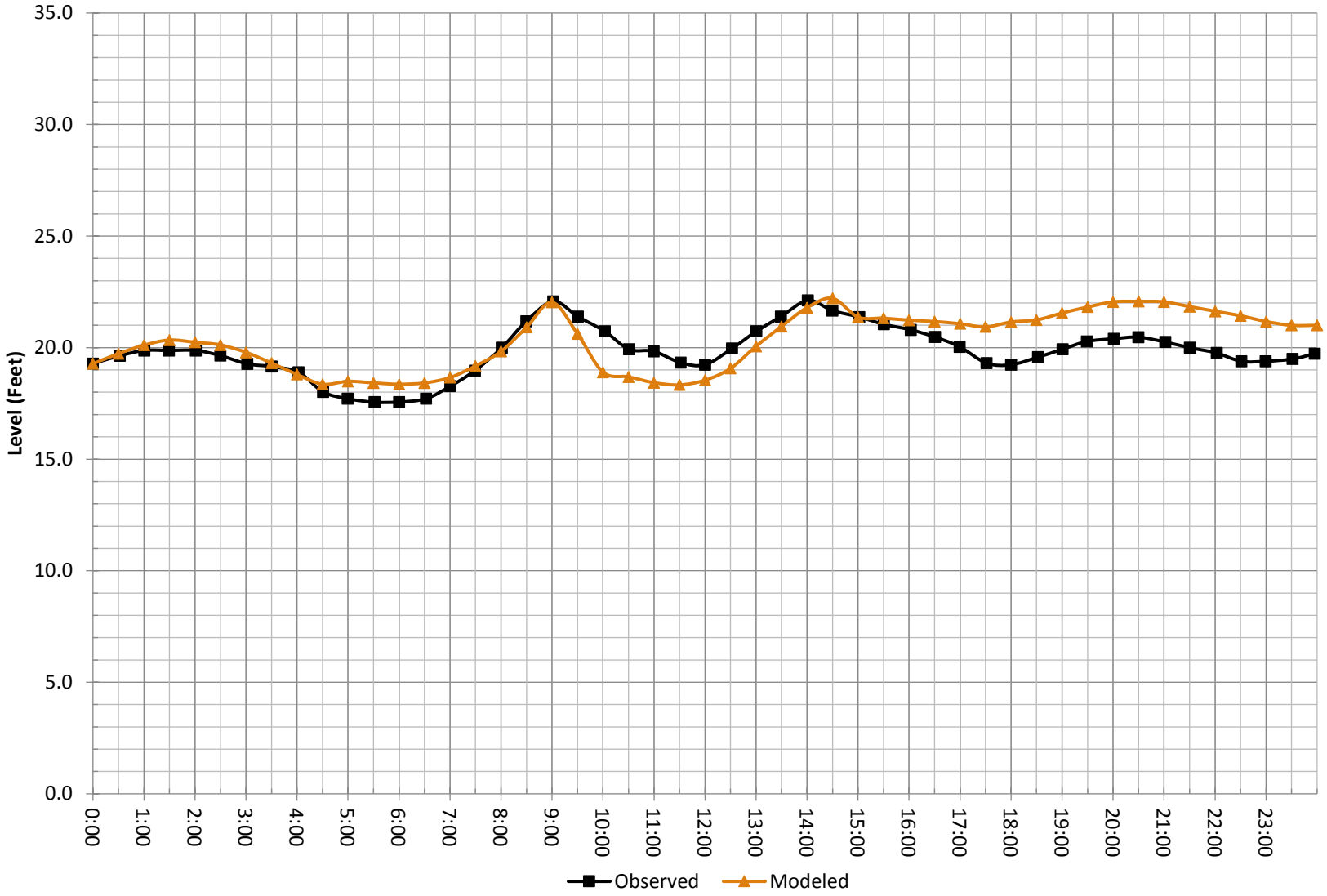
August 7, 2014



City of Burleson

Mtn. Valley E.S.T. Level

August 7, 2014

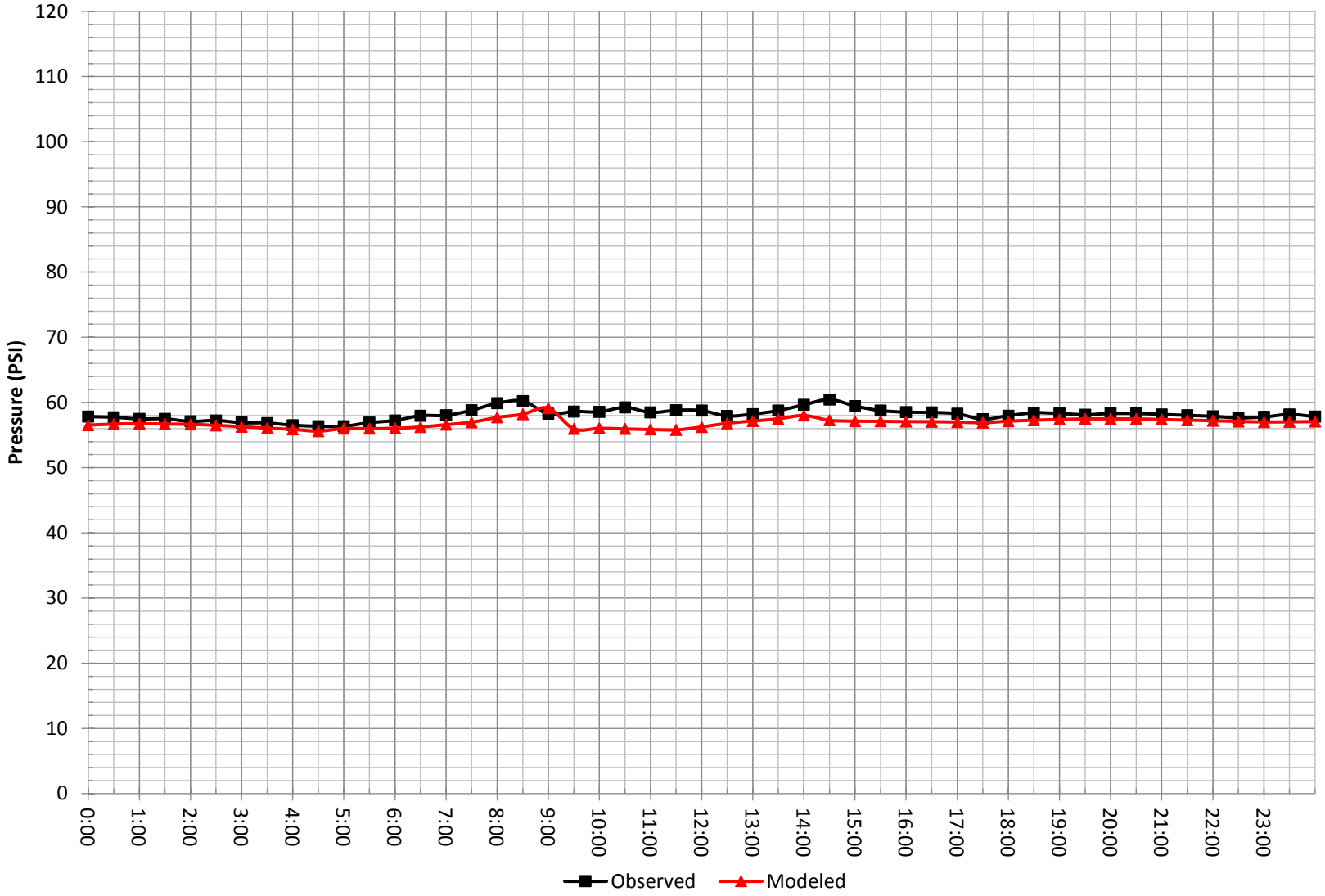


City of Burleson

MTNPP Pressure Recorder #9 - WFH681

125 Country Vista Cir.

August 7, 2014

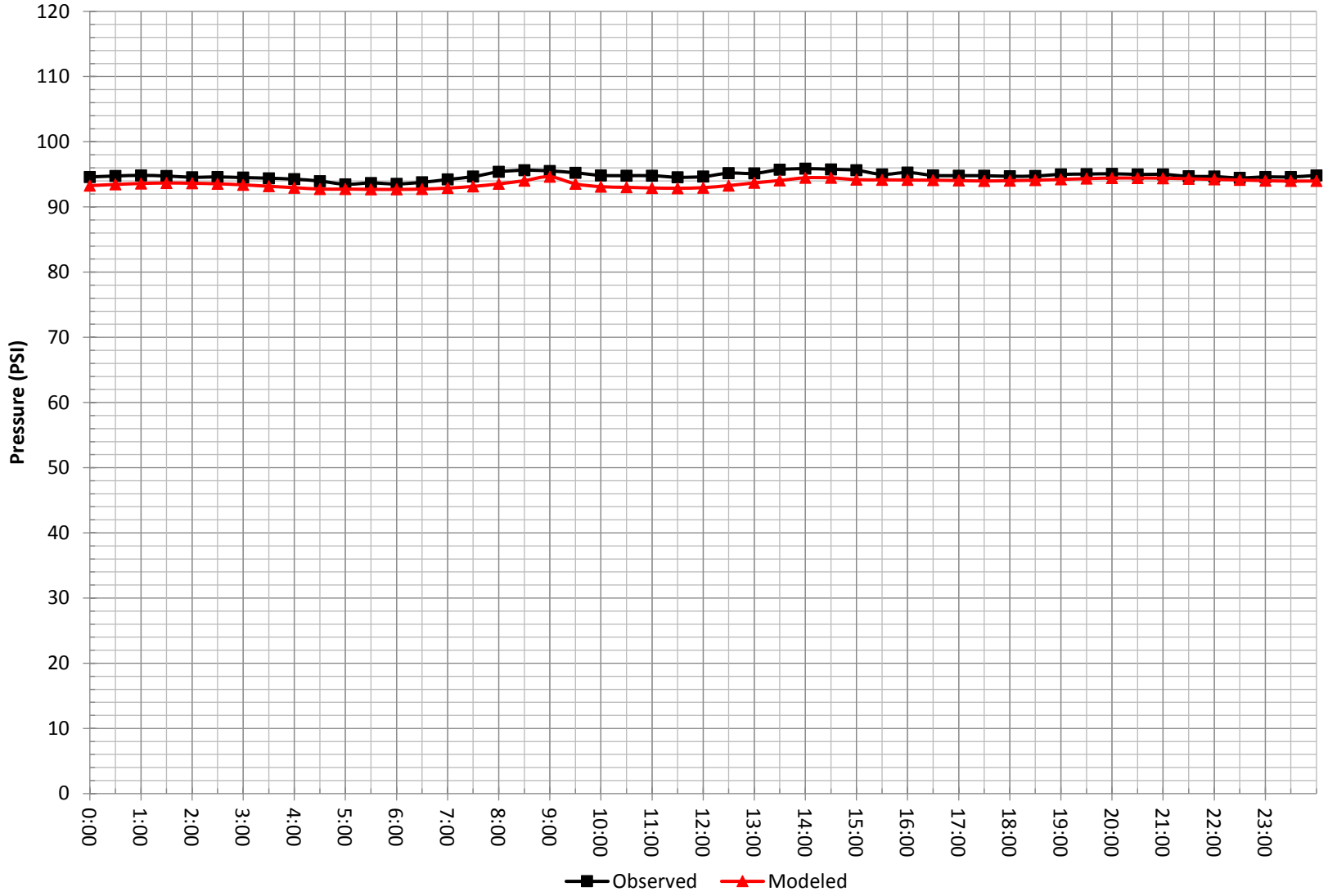


City of Burleson

MTNPP Pressure Recorder #10 - WFH686

2715 Park Pl.

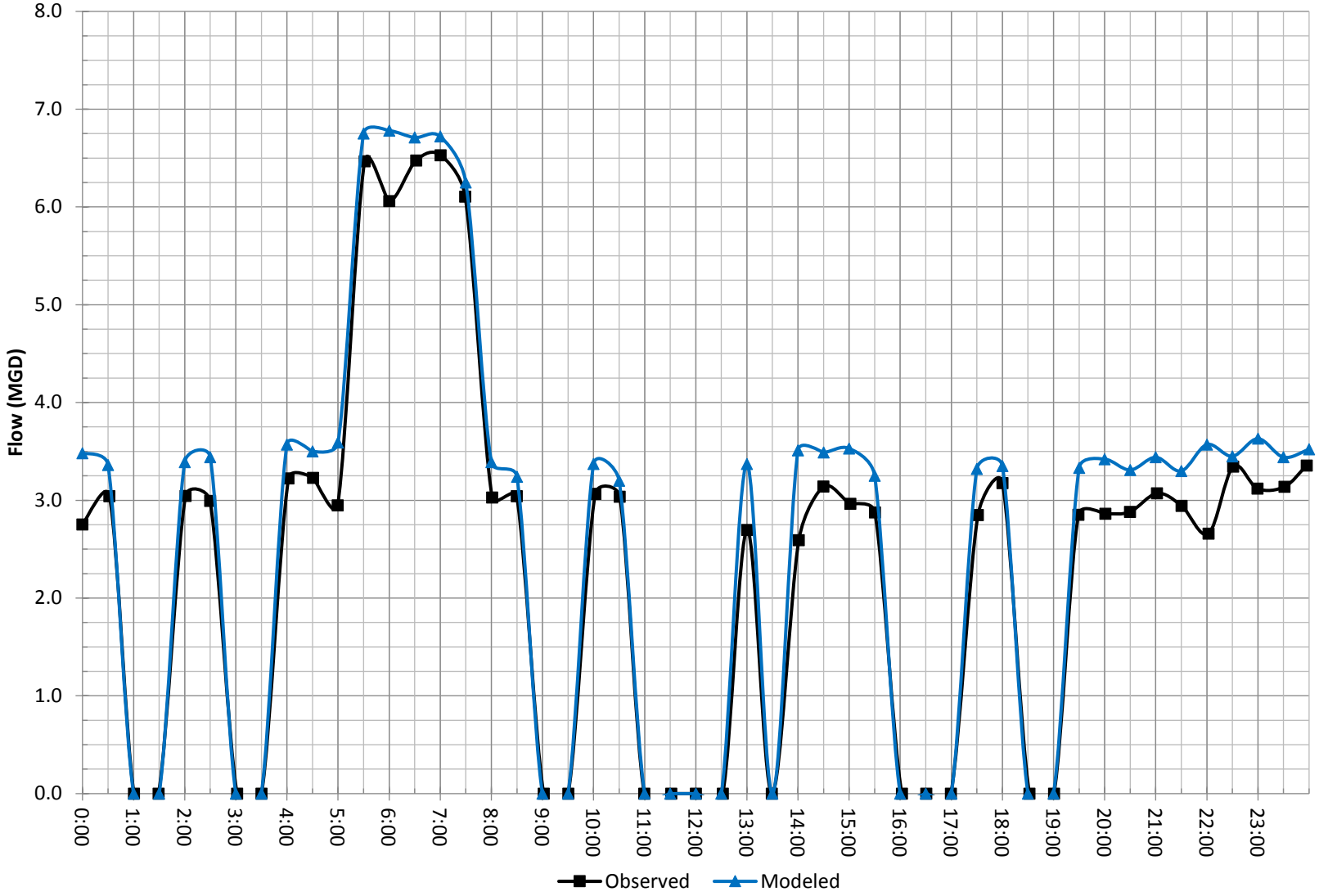
August 7, 2014



City of Burleson

Shaftstall P.S. Discharge Flow

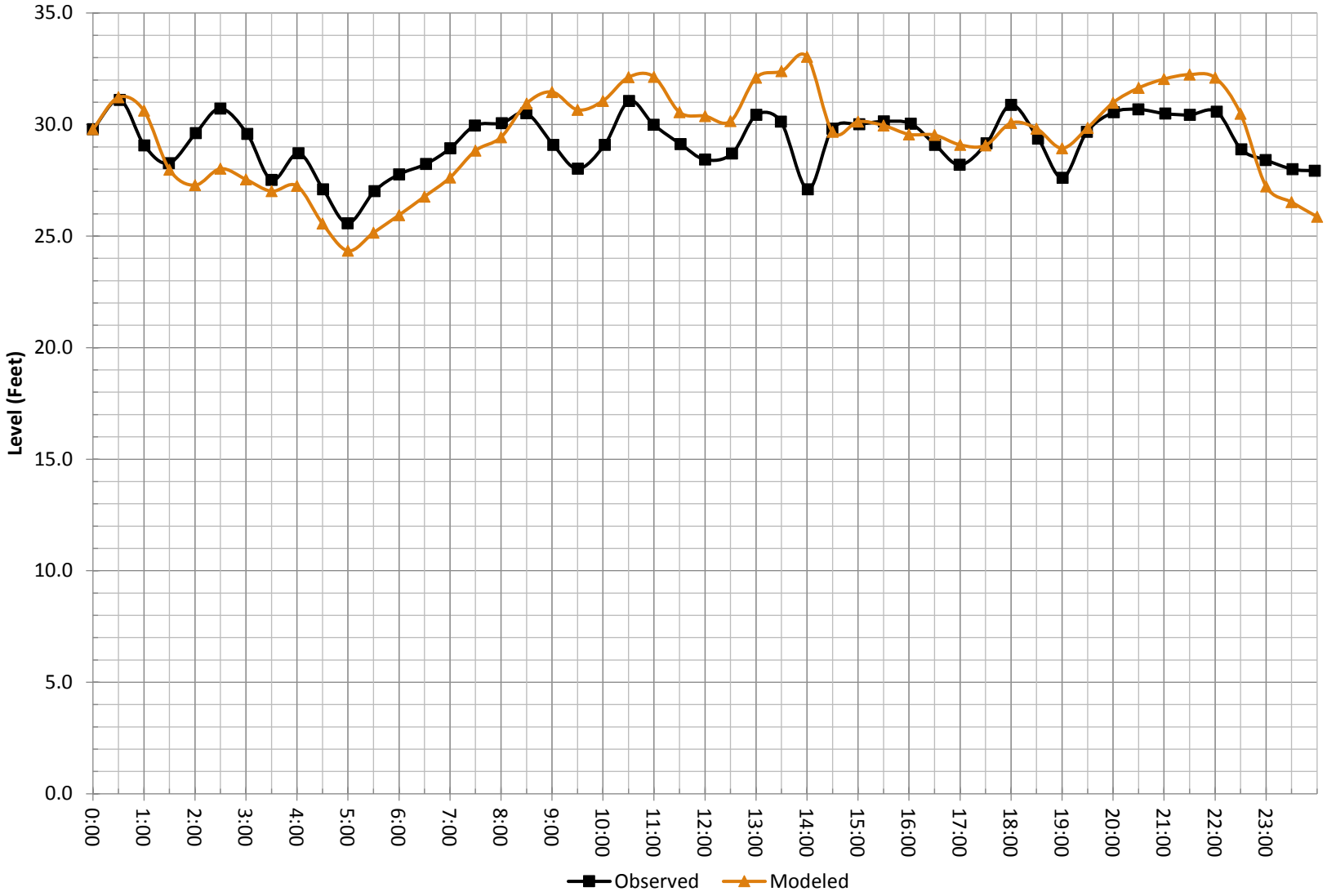
August 7, 2014



City of Burleson

Turkey Peak E.S.T. Level

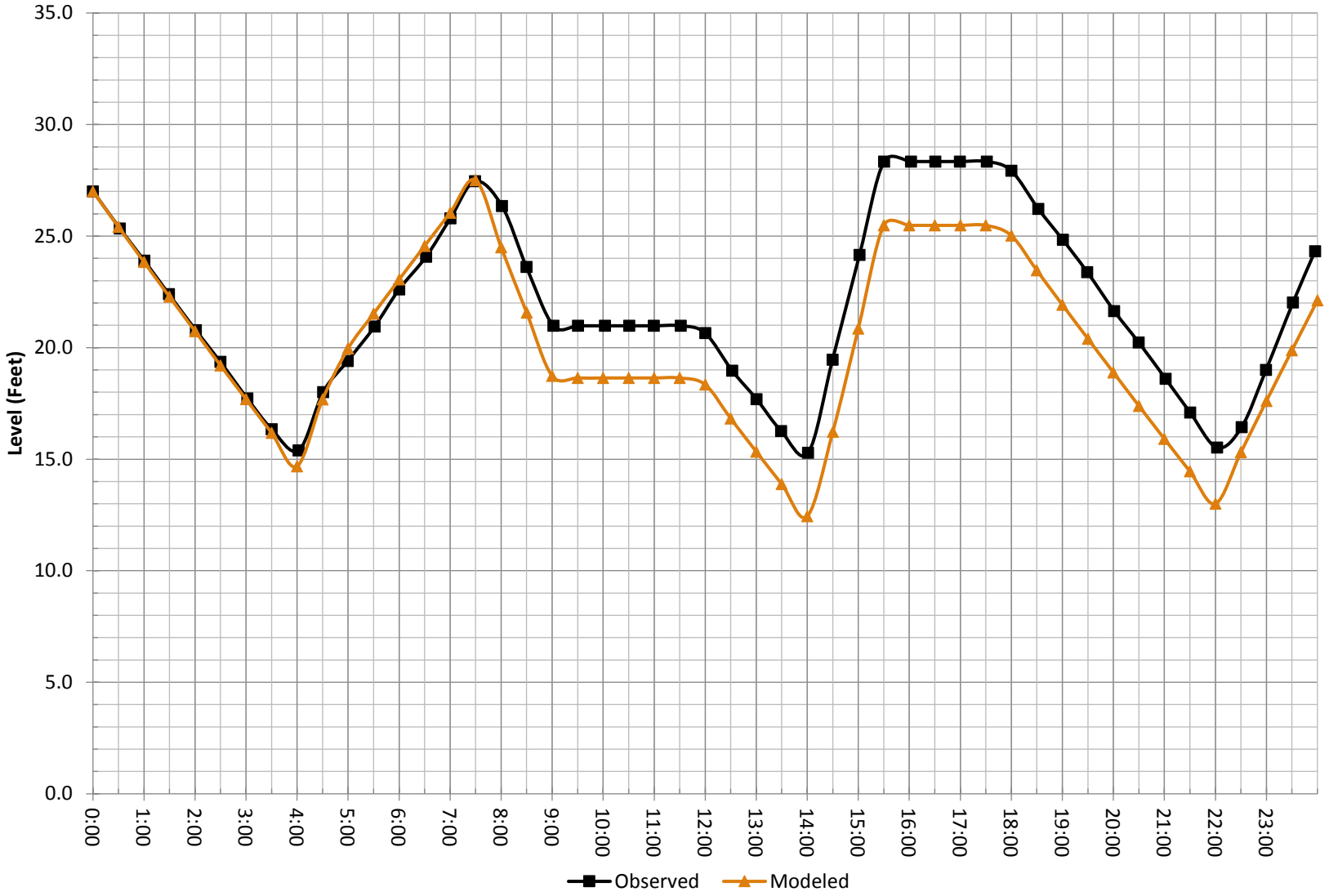
August 7, 2014



City of Burleson

Mt. Valley G.S.T. Level

August 7, 2014

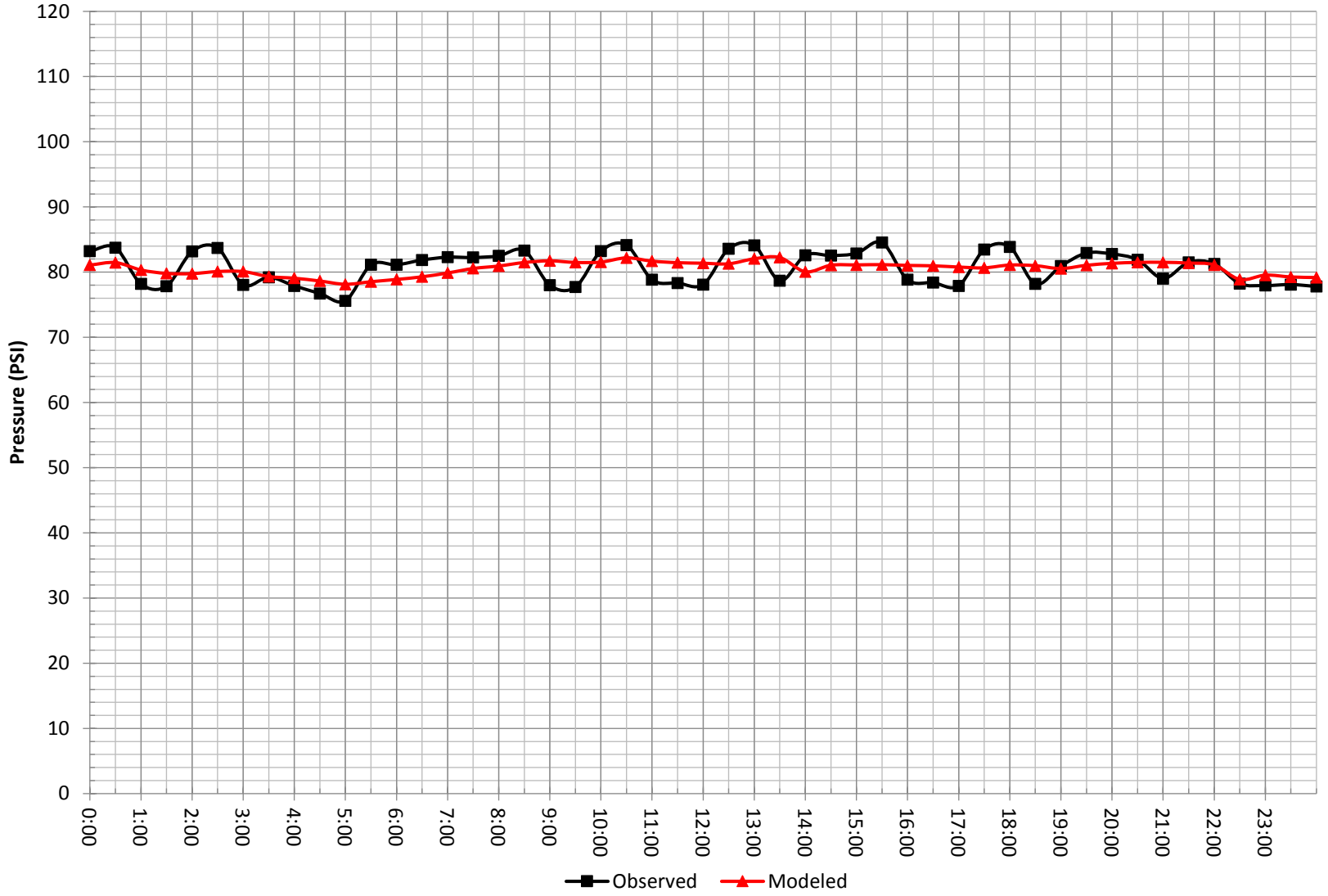


City of Burleson

UPP Pressure Recorder #6 - WFH883

204 Flagstone Dr.

August 7, 2014

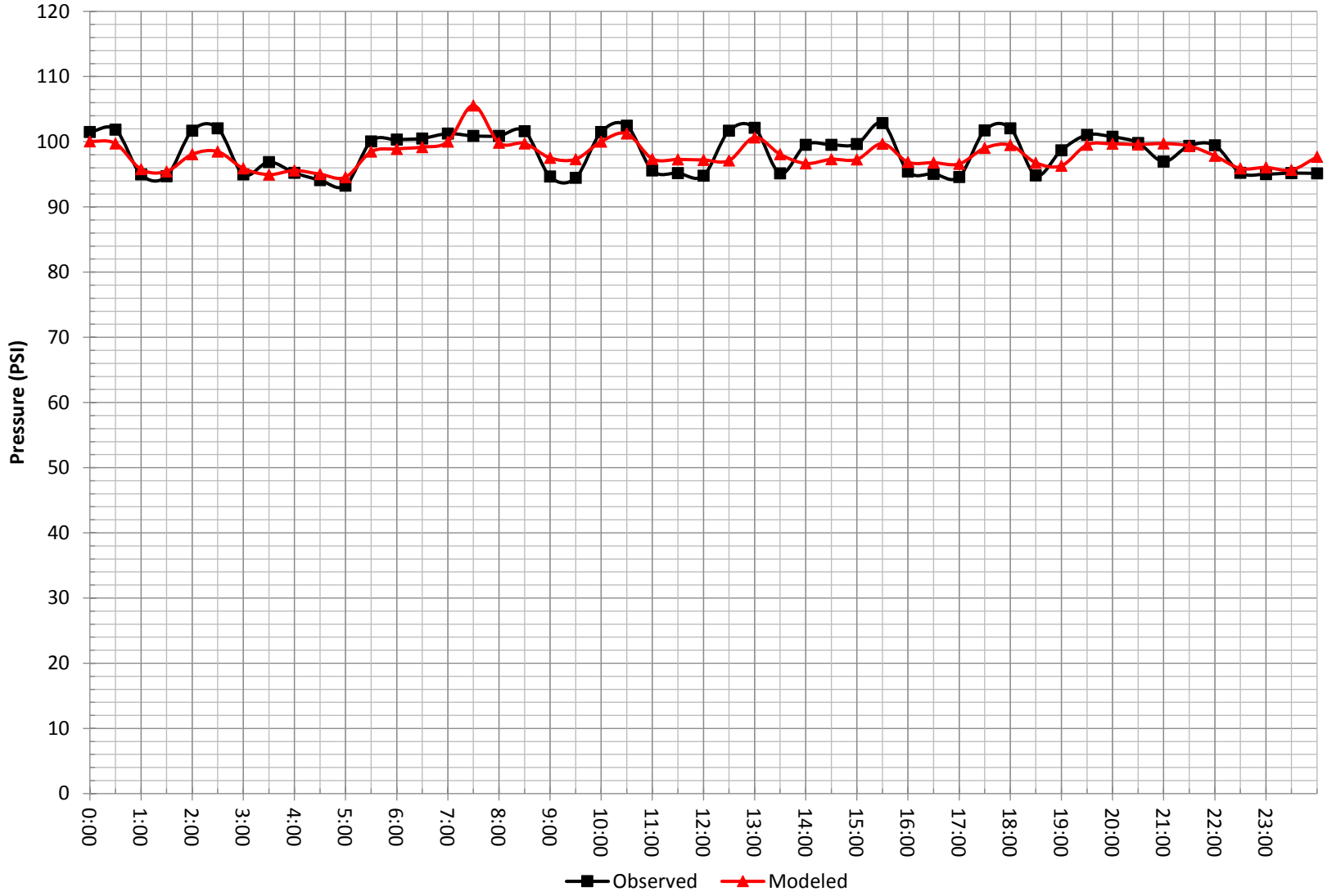


City of Burleson

UPP Pressure Recorder #7 - WFH1153

1352 Gayle St.

August 7, 2014

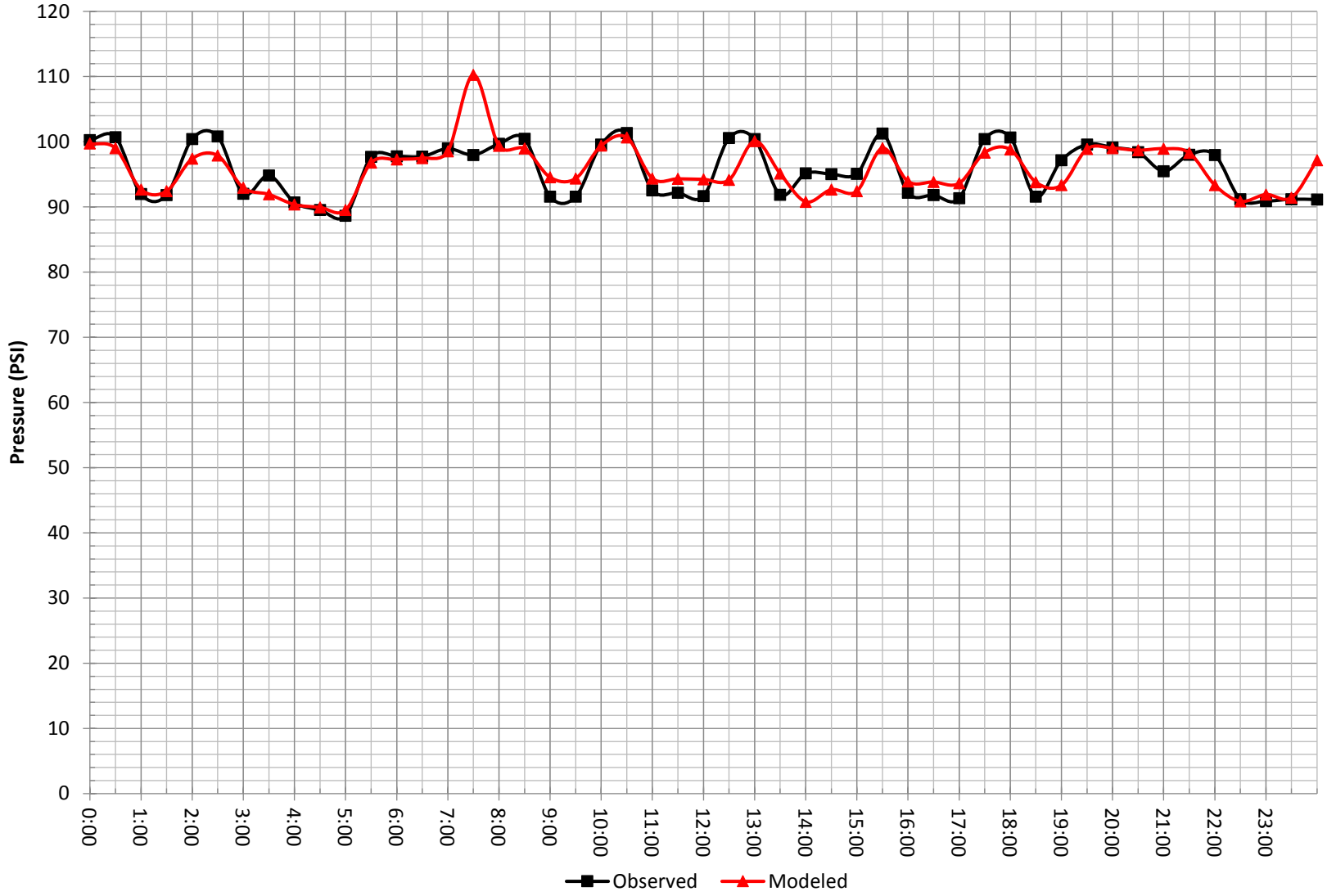


City of Burleson

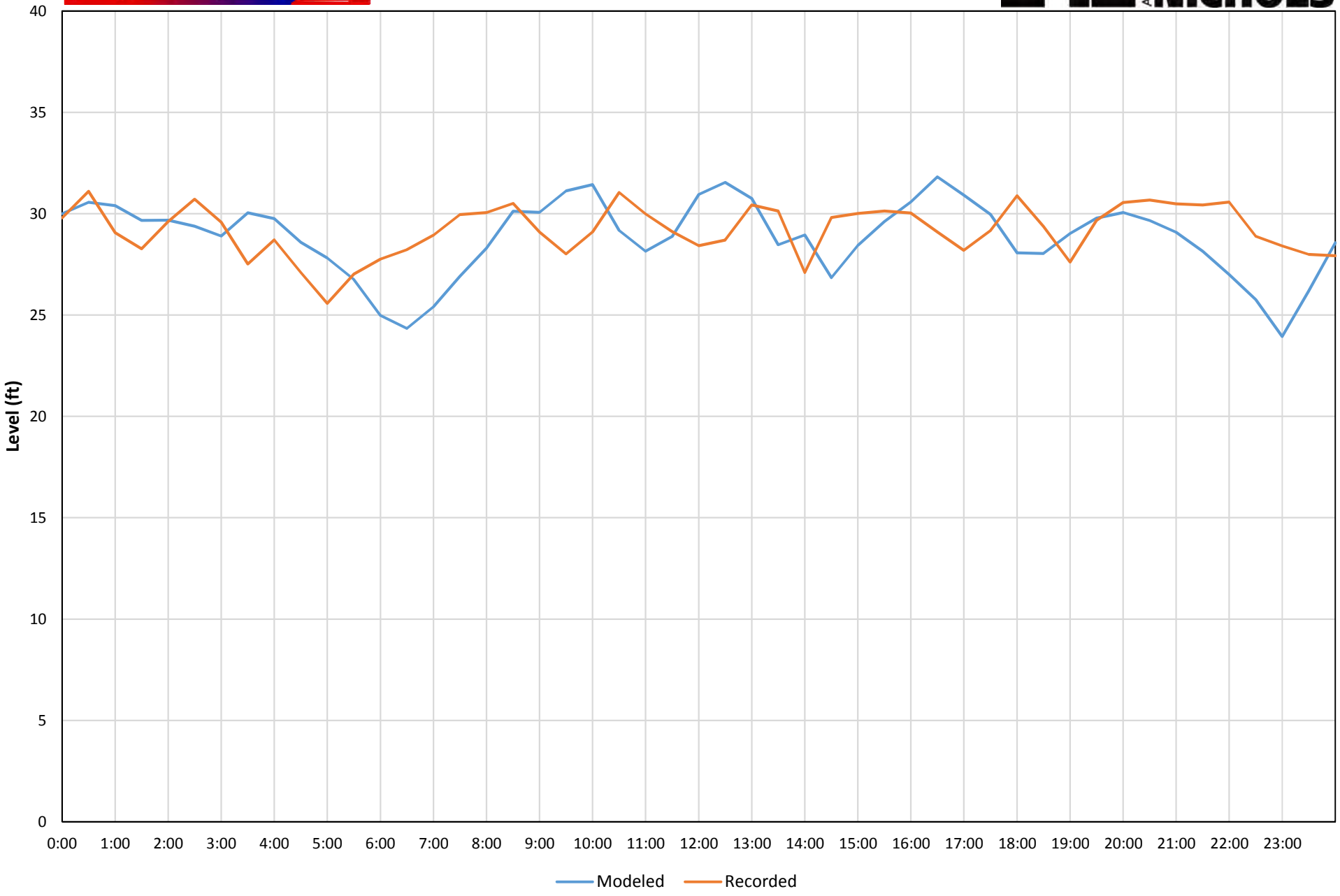
UPP Pressure Recorder #8 - WFH380

1820 SW Hulen St.

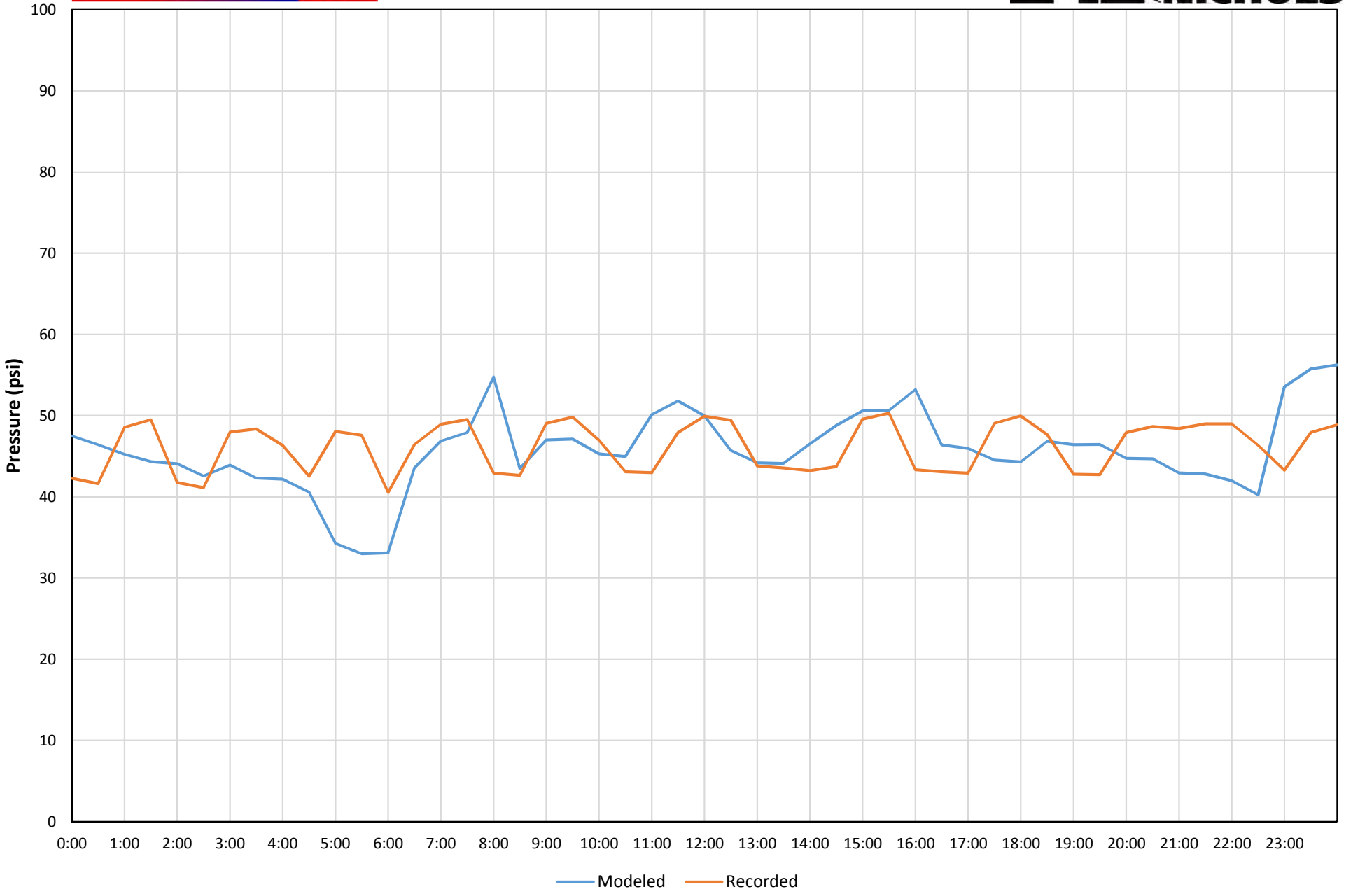
August 7, 2014



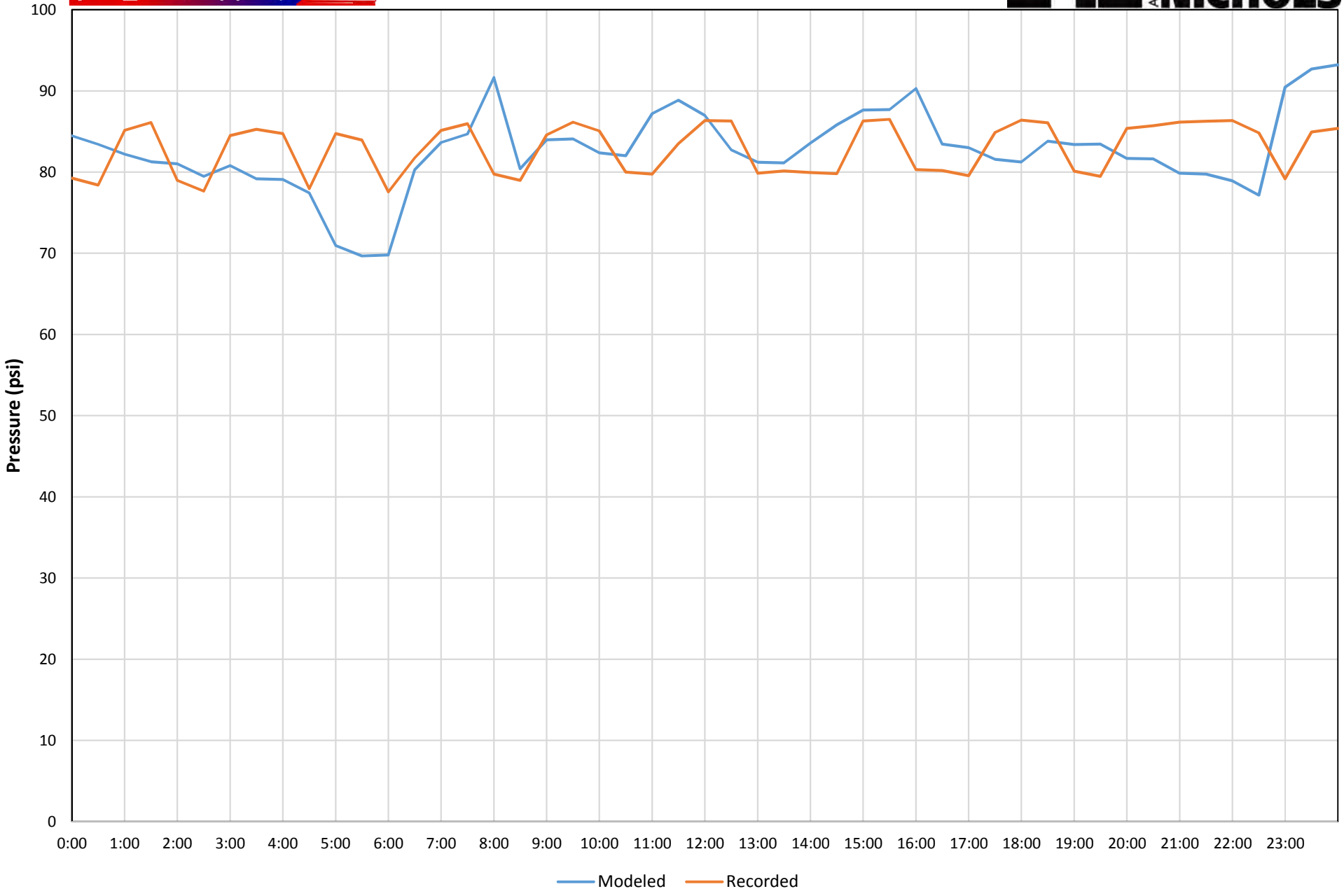
Turkey Peak EST
Two Pressure Plane Operation
Calibration Demand



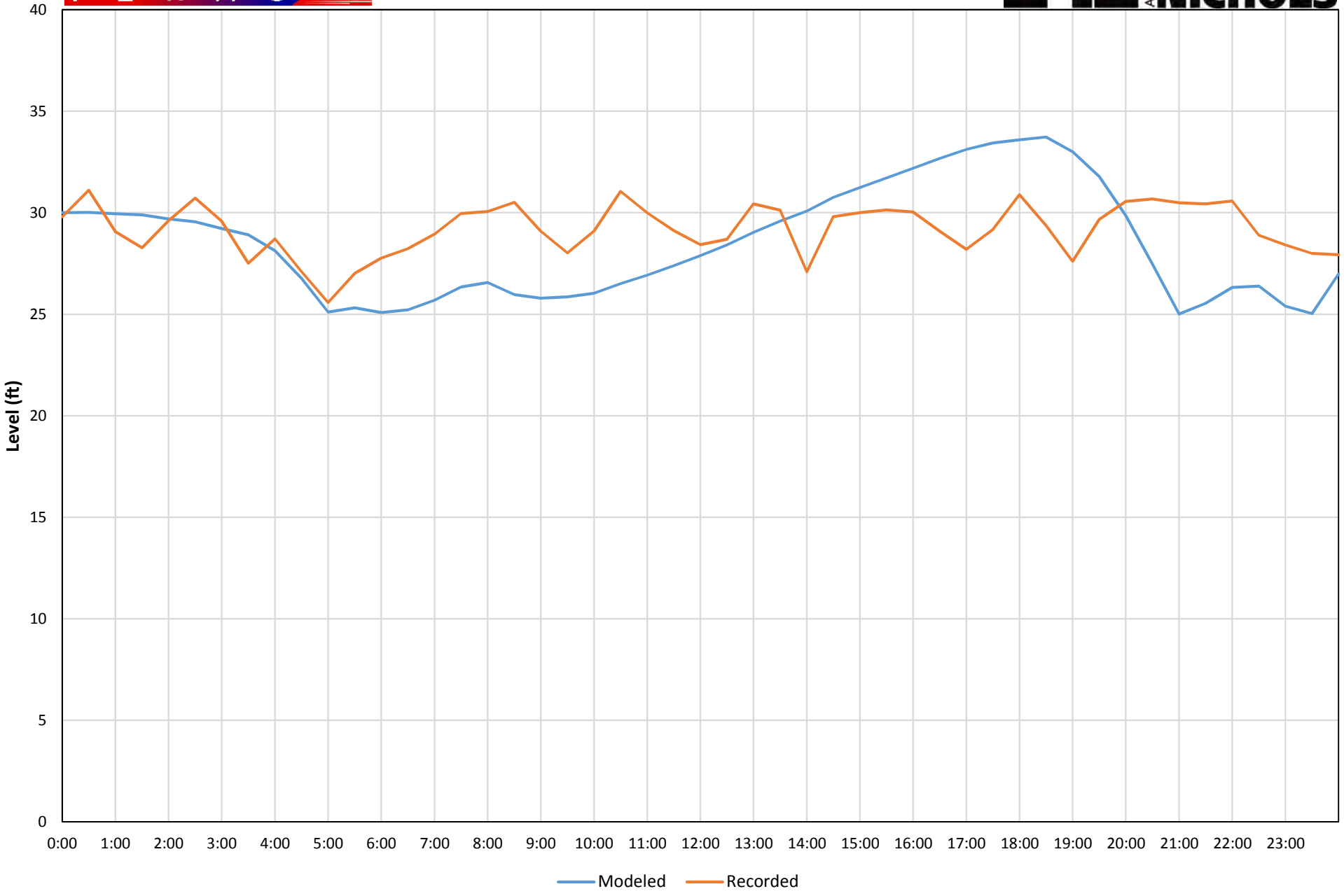
Pressure Recorder #9
Two Pressure Plane Operation
Calibration Demand



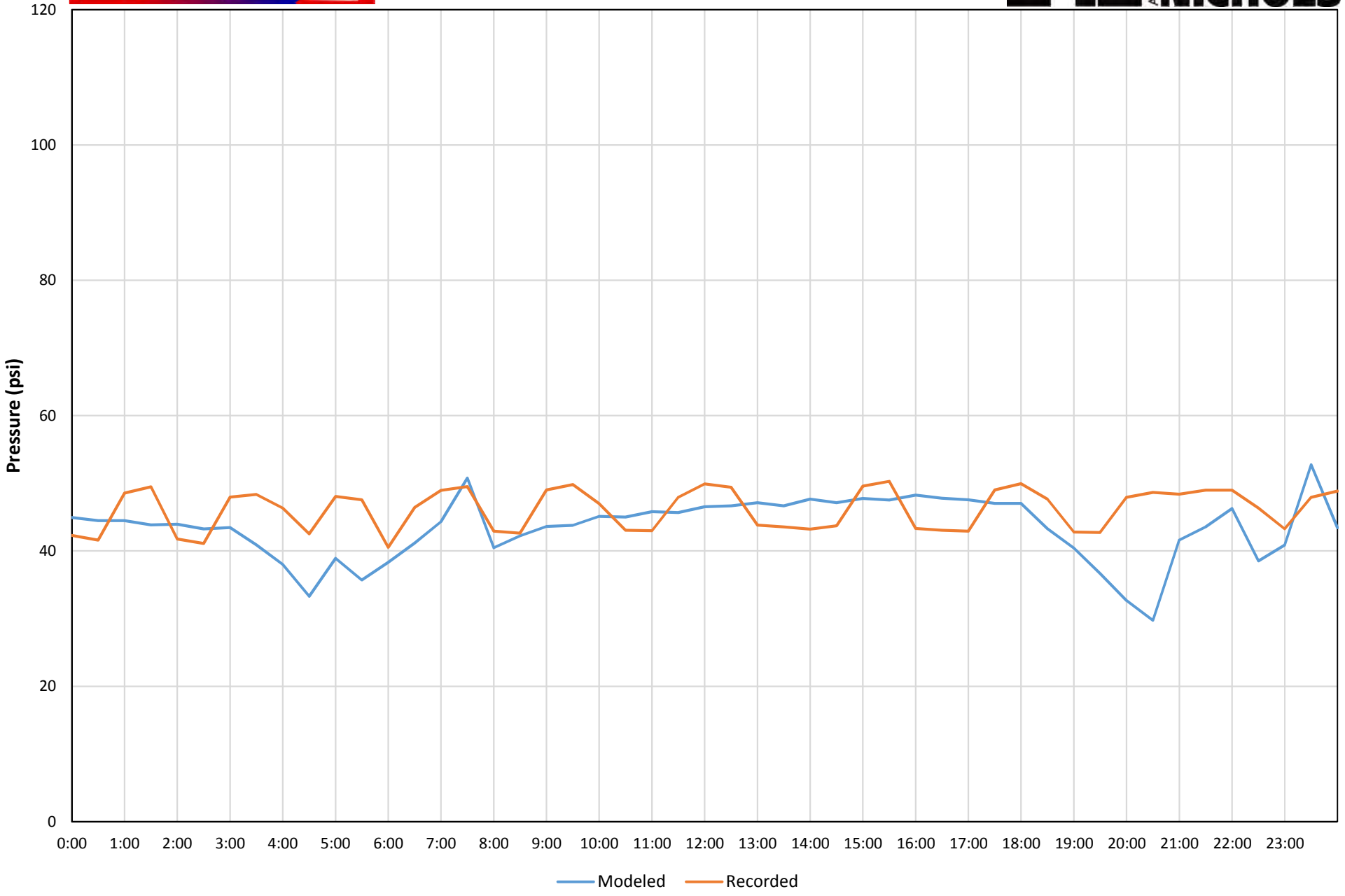
Pressure Recorder #10
Two Pressure Plane Operation
Calibration Demand



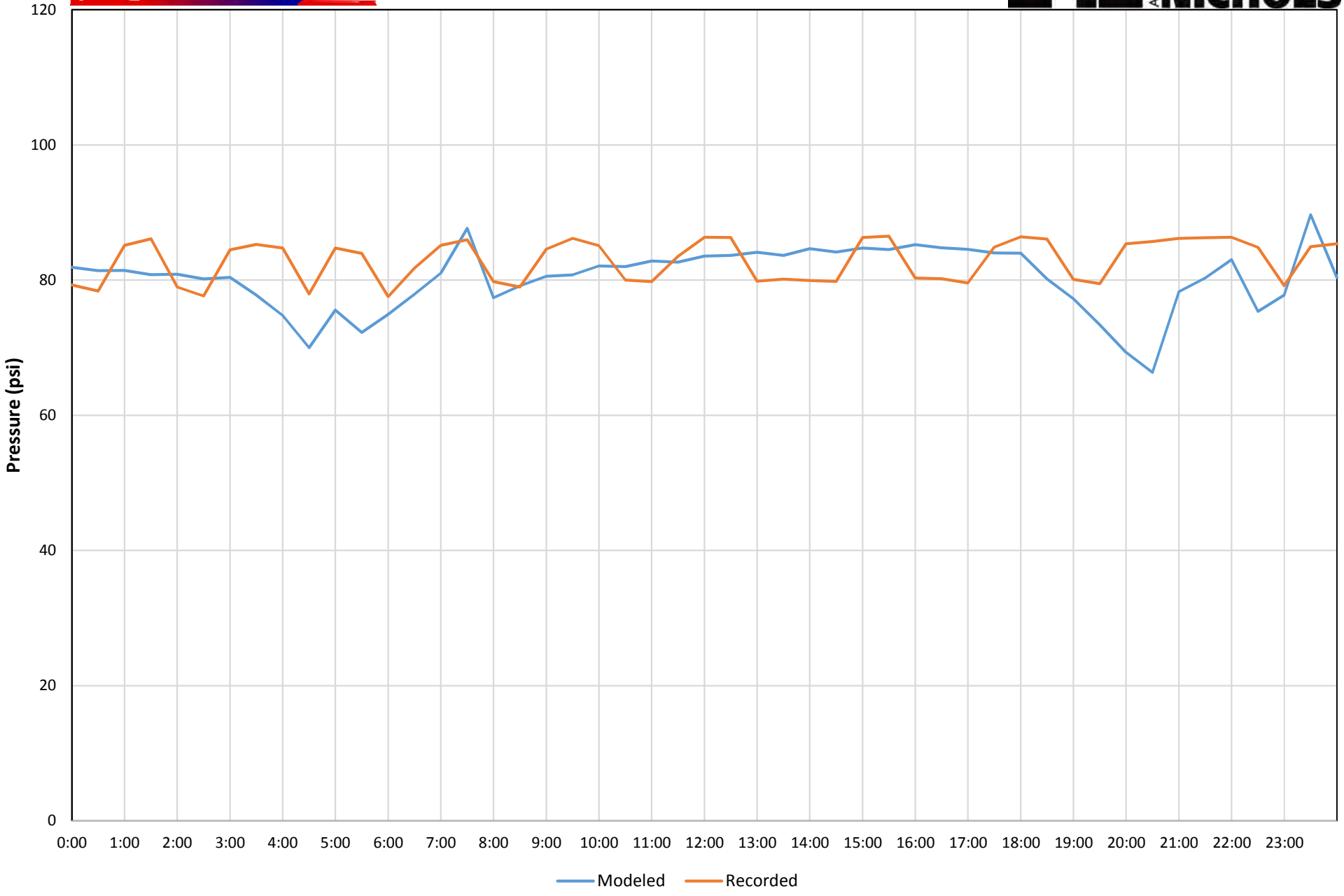
Turkey Peak EST
Two Pressure Plane Operation
Maximum Demand



Pressure Recorder #9
Two Pressure Plane Operation
Maximum Demand



Pressure Recorder #10
Two Pressure Plane Operation
Maximum Demand



APPENDIX E
WATER SYSTEM ANALYSIS MAPPING

FIGURE E-1

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY MINIMUM PRESSURES

LEGEND

Minimum Pressure

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

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

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

UPP to LPP Transfer Valve

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

Created by Freese and Nichols, Inc.
Job No. 10144-01
Location: H:\fF_WW_PLAN\NGIS\Final_Report\Appendix\Appendix_E\[Figure_E-1]-Existing_Max_Day_Min_Pressure.mxd
Updated: Tuesday, April 12, 2016 2:18:06 PM

FIGURE E-2

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY MAXIMUM PRESSURES

LEGEND

Maximum Pressures

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

UPP to LPP Transfer Valve

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

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

TARRANT CO.
JOHNSON CO.

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber

0 1,500 3,000
SCALE IN FEET

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Updated: Tuesday, April 12, 2016 2:09:48 PM

FIGURE E-3

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY 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
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

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

PRESSURE PLANES
- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

UPP to LPP Transfer Valve

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

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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FIGURE E-4

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY 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
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

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

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES
- Lower Pressure Plane
- Mountain Valley Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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Updated: Tuesday, April 12, 2016 2:28:00 PM

FIGURE E-5

CITY OF BURLESON

EXISTING WATER SYSTEM
AVAILABLE FIRE FLOW
UNDER MAXIMUM DAY DEMAND

LEGEND

Available Fire Flow

- Less than 1,000 gpm
- 1,000 - 1,500 gpm
- 1,500 - 3,000 gpm
- Greater than 3,000 gpm
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 800 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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FIGURE E-6

CITY OF BURLESON

EXISTING WATER SYSTEM
CALIBRATION DAY MINIMUM PRESSURES
TWO PRESSURE PLANE OPERATION

LEGEND

Minimum Pressure

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 900 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Briar Oaks
Cross Timber
Joshua

0 1,500 3,000
SCALE IN FEET

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Project: 2019 Water Model
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FIGURE E-7

CITY OF BURLESON

EXISTING WATER SYSTEM
CALIBRATION DAY MAXIMUM PRESSURES
TWO PRESSURE PLANE OPERATION

LEGEND

Maximum Pressures

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 900 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Briar Oaks
Cross Timber
Joshua
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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FIGURE E-8

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY MINIMUM PRESSURES
TWO PRESSURE PLANE OPERATION

LEGEND

Minimum Pressure

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 900 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

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

UPP to LPP Transfer Valve

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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Job No.: BURL1332
File Name: P:\BURL1332_PLANNING\GIS\Final_Report\Appendix\Appendix_E\[Figure_E-8]-Existing_Max_Day_Min_Pressure_Two_PP.mxd
Updated: Tuesday, April 12, 2016 2:38:18 PM

FIGURE E-9

CITY OF BURLESON

EXISTING WATER SYSTEM
MAXIMUM DAY MAXIMUM PRESSURES
TWO PRESSURE PLANE OPERATION

LEGEND

Maximum Pressures

- Less than 35 psi
- 35 - 45 psi
- 45 - 60 psi
- 60 - 80 psi
- Greater than 80 psi
- Transfer Valve
- Elevated Storage Tank
- Ground Storage Tank
- Pump Station

- 10" and Smaller Water Line
- 12" and Larger Water Line
- Road
- Railroad
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

PRESSURE PLANES

- Lower Pressure Plane
- Upper Pressure Plane

3.5 MGD Alsbury #1
Pump Station
(2) 1,740 GPM Pumps
(1) 900 GPM Pumps

4.0 MGD Alsbury #2
Pump Station
(3) 1,400 GPM Pumps

(2) 2.0 MG Alsbury
Ground Storage Tanks
Overflow Elev. = 739'

3.0 MGD Brushy Mound
Pump Station

(2) 0.42 MG Brushy Mound
Ground Storage Tanks
Overflow Elev. = 894'

UPP to LPP Transfer Valve

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

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

2.0 MG Hulen PS
Ground Storage Tank
Overflow Elev. = 876'

5.0 MGD Hulen High
Pump Station
(3) 1,780 GPM Pumps

5.0 MGD Hulen Low
Pump Station
(3) 1,780 GPM Pumps

UPP to LPP Transfer Valve

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

0.72 MGD Mtn. Valley
Pump Station

0.3 MG Mtn. Valley
Ground Storage Tank
Overflow Elev. = 876'

0.3 MG Mt. Valley
Elevated Storage Tank
Overflow Elev. = 1,034'

TARRANT CO.
JOHNSON CO.

Crowley
Fort Worth
Rendon CDP
Briar Oaks
Cross Timber
Joshua

0 1,500 3,000
SCALE IN FEET

Created by Freese and Nichols, Inc.
Job No.: BURL1332
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Updated: Tuesday, April 12, 2016 2:41:14 PM

APPENDIX F
WASTEWATER SYSTEM ANALYSIS MAPPING

FIGURE F-1

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM WITH PROPOSED FLOW MONITORS

LEGEND

- Proposed Flow Monitor Location
- Sewer Manhole
- Lift Station
- 8" and Smaller Gravity Main
- 10" and Larger Gravity Main
- 8" and Smaller Force Main
- 10" and Larger Force Main
- Road
- Railroad
- Stream
- City Limit
- Burleson ETJ
- Other City
- County Boundary

FREESE AND NICHOLS

Burleson TEXAS

MAJOR BASINS

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

Proposed Flow Monitor #1
Facility ID: SMH1076

Proposed Flow Monitor #2
Facility ID: SMH1307

Proposed Flow Monitor #3
Facility ID: SMH256

Proposed Flow Monitor #4
Facility ID: SMH10249

Village Creek WWTP

Crowley

Fort Worth

Rendon CDP

Joshua

Cross Timber

Briar Oaks

N

0 1,500 3,000

SCALE IN FEET

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Updated: Monday, October 18, 2010

FIGURE F-2

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM MODEL CALIBRATION RESULTS

LEGEND

- Flow Monitor Location
- Lift Station
- Manhole
- 8" and Smaller Gravity Main
- 10" and Larger Gravity Main
- 8" and Smaller Force Main
- 10" and Larger Force Main
- Road
- Railroad
- 10-Foot Contour
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

MAJOR BASINS

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

Village Creek WWTP
Recorded Flow: 9.77 MGD
Modeled Flow: 9.77 MGD

FM #4 (36-Inch Line)
Facility ID: SMH10249
Recorded Flow: 0.17 MGD
Modeled Flow: 0.17 MGD

FM #3 (18-Inch Line)
Facility ID: SMH256
Recorded Flow: 4.32 MGD
Modeled Flow: 4.32 MGD

FM #2 (12-Inch Line)
Facility ID: SMH1309
Recorded Flow: 0.63 MGD
Modeled Flow: 0.63 MGD

FM #1 (15-Inch Line)
Facility ID: SMH1076
Recorded Flow: 0.00 MGD
(Meter Offline)
Modeled Flow: 0.69 MGD

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

Created by Freese and Nichols, Inc
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Updated: Tuesday, April 12, 2016 2:44:25 PM

FIGURE F-3

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM MODEL CALIBRATION

q/Q ANALYSIS WITH OVERFLOWS

LEGEND

q/Q Value

- Less than 0.5
- 0.5 - 1.0
- Greater than 1.0
- 8" and Smaller Gravity Main
- 10" and Larger Gravity Main
- 8" and Smaller Force Main
- 10" and Larger Force Main
- Road
- Railroad

- Manhole (No Surcharge)
- Manhole (Surcharged)
- Lift Station
- 10-Foot Contour
- Stream
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

MAJOR BASINS

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

Village Creek WWTP

Crowley

Fort Worth

Rendon CDP

Joshua

Briar Oaks

Cross Timber

TARRANT CO.
JOHNSON CO.

0 1,500 3,000
SCALE IN FEET

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Job No. BURL4101
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Updated: Tuesday, April 12, 2016 2:46:56 PM

FIGURE F-4

CITY OF BURLESON

EXISTING WASTEWATER SYSTEM
PEAK WET WEATHER
q/Q ANALYSIS WITH OVERFLOWS

LEGEND

q/Q Value

- Less than 0.5
- 0.5 - 1.0
- Greater than 1
- 8" and Smaller Gravity Main
- 10" and Larger Gravity Main
- 8" and Smaller Force Main
- 10" and Larger Force Main
- Road
- Railroad
- 10-Foot Contour
- Stream

- Manhole (Overflow)
- Manhole (Surcharge Level <3 ft. from MH Rim)
- Manhole (Surcharged)
- Manhole (No Surcharge)
- Lift Station
- Parcel
- City Limit
- Burleson ETJ
- Other City Limit
- County Boundary

Burleson TEXAS

FREESE AND NICHOLS

MAJOR BASINS

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

Village Creek WWTP

TARRANT CO.
JOHNSON CO.

Crowley
Fort Worth
Rendon CDP
Joshua
Briar Oaks
Cross Timber
Quil Miller Creek

0 1,500 3,000
SCALE IN FEET

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APPENDIX G
DETAILED WATER CIP COST SHEETS

City of Burleson
Existing-2020 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 1

Project Description

2.0 MG Turkey Peak Ground Storage Tank Replacement, Abandoning the Brushy Mound GSTs, Moving the Brushy Mound Pump Station to the Turkey Peak facility site

Detailed Description

Replace the 0.42 MG Turkey Peak Ground Storage Tank with a 2.0 MG Ground Storage Tank. Abandon the 0.42 MG GSTs at Brushy Mound. Relocate the 3.0 MGD Brushy Mound PS to the Turkey Peak site.

Purpose

This project is intended to increase the available elevated storage capacity for the LPP to meet future needs by replacing the existing Turkey Peak GST with a larger tank. This project will replace the Brushy Mound GSTs and will be constructed with a similar head range as the Hidden Creek EST to allow both to cycle more closely together. The project also calls for abandoning the Brushy Mound site by removing the existing ground storage tanks, and moving the pump station to the Turkey Peak site which will serve as emergency supply into the UPP from the LPP.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	2.0 MG Ground Storage Tank	1	LS	$1,875,000	$1,875,000
2	Pump Station Relocation	1	LS	$50,000	$50,000
3	Decommission Ground Storage Tank	2	EA	$25,000	$50,000
		SUBTOTAL:			$1,975,000
		CONTINGENCY		20%	$395,000
		SUBTOTAL:			$2,370,000
		ENG/SURVEY		12%	$284,400
		SUBTOTAL:			$2,654,400
				PROJECT TOTAL	**$2,654,400**

Construction Project Number 2

Project Description

16-inch Lines along McNair Rd. to the Turkey Peak EST

Detailed Description

16-inch line east of the Turkey Peak Elevated Storage Tank from Jayellen Avenue to Wilshire Boulevard along McNair Road.

Purpose

This project is intended to supply water from the Turkey Peak GST to the Lower Pressure Plane.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" Pipe	5,600	LF	$160	$896,000
2	Pavement Repair	5,300	LF	$50	$265,000
3	34" Boring and Casing	150	LF	$595	$89,250
		SUBTOTAL:			$1,250,250
		CONTINGENCY		20%	$250,050
		SUBTOTAL:			$1,500,300
		ENG/SURVEY		12%	$180,040
		SUBTOTAL:			$1,680,340
				PROJECT TOTAL	**$1,680,340**

City of Burleson
Existing-2020 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 3

Project Description

8-inch and 12-inch lines from Hidden Vistas Blvd to Dobson Road

Detailed Description

8-inch and 12-inch lines connecting the existing 12-inch line along Hidden Vistas Blvd to the existing 8-inch line along Dobson Road.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe	3,000	LF	$80	$240,000
2	12" Pipe	2,200	LF	$120	$264,000
3	Pavement Repair	1,000	LF	$50	$50,000
4	16" Boring and Casing	50	LF	$350	$17,500
		SUBTOTAL:			$571,500
		CONTINGENCY		20%	$114,300
		SUBTOTAL:			$685,800
		ENG/SURVEY		12%	$82,300
		SUBTOTAL:			$768,100
				PROJECT TOTAL	**$768,100**

Construction Project Number 4

Project Description

16-inch Lines from Wilshire Blvd. to FM 731

Detailed Description

16-inch line connecting the proposed 16-inch line along Wilshire Boulevard to the existing 12-inch line along FM 731.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" Pipe	3,000	LF	$160	$480,000
2	Pavement Repair	3,000	LF	$50	$150,000
		SUBTOTAL:			$630,000
		CONTINGENCY		20%	$126,000
		SUBTOTAL:			$756,000
		ENG/SURVEY		12%	$90,720
		SUBTOTAL:			$846,720
				PROJECT TOTAL	**$846,720**

City of Burleson
Existing-2020 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	5

Project Description

10-inch Lines south of Crowley Plover Rd. and along Renfro St.

Detailed Description

10-inch line south of Crowley Plover Road from Renfro Street to Queen Annes Drive. Also a 10-inch bypass along Renfro Street between Downwood Drive and McAlister Road.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	2,600	LF	$100	$260,000
2	Pavement Repair	1,300	LF	$50	$65,000
		SUBTOTAL:			$325,000
		CONTINGENCY		20%	$65,000
		SUBTOTAL:			$390,000
		ENG/SURVEY		12%	$46,800
		SUBTOTAL:			$436,800
				PROJECT TOTAL	**$436,800**

Construction Project Number	6

Project Description

Mountain Valley EST 0.75 MG Replacement

Detailed Description

Replace the 0.3 MG Mountain Valley Elevated Storage Tank with a 0.75 MG Elevated Storage Tank.

Purpose

This project is intended to increase the available elevated storage capacity for the Upper Pressure Plane to meet future needs.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	0.75 MG Elevated Storage Tank	1	EA	$1,367,000	$1,367,000
		SUBTOTAL:			$1,367,000
		CONTINGENCY		20%	$273,400
		SUBTOTAL:			$1,640,400
		ENG/SURVEY		12%	$196,850
		SUBTOTAL:			$1,837,250
				PROJECT TOTAL	**$1,837,250**

2015-2020 TOTAL WATER CIP COST	$8,223,610

City of Burleson
2020-2025 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 7

Project Description

Offsite Water Supply from Fort Worth

Detailed Description

Cost Participate in an offsite water supply line from the City of Fort Worth. Proposed 20-inch water line is from Risinger Road to the wholesale meter at Alsbury Boulevard.

Purpose

This project is intended increase the City's water supply capacity to meet future needs. It is assumed for this study that Burleson would cost participate in 60% of bringing a 20-inch water line from Risinger Road to the City's wholesale meter. This assumes that Burleson would purchase 6.0 MGD of the full flow capacity of 10.0 MGD of the water line.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	20" Pipe	18,500	LF	$200	$3,700,000
2	24" Boring and Casing	400	LF	$420	$168,000
3	Pavement Repair	4,500	LF	$50	$225,000
		SUBTOTAL:			$4,093,000
		CONTINGENCY		20%	$818,600
		SUBTOTAL:			$4,911,600
		ENG/SURVEY		12%	$589,400
		SUBTOTAL:			$5,501,000
				PROJECT TOTAL	**$5,501,000**

Construction Project Number 8

Project Description

6.0 MGD Alsbury #2 Pump Station Expansion

Detailed Description

Expand the pumping capacity of the Alsbury #2 Pump Station by 6.0 MGD.

Purpose

The Alsbury #1 Pump Station will be abandoned and additional pumping capacity installed at the Alsbury #2 Site. The 6.0 MGD expansion will bring the Alsbury #2 Pump Station Firm Capacity to a total of 10.0 MGD.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	6.0 MGD Pumps	1	LS	$550,000	$550,000
2	Pump Station Site Work & Yard Piping	1	LS	$250,000	$250,000
3	Pump Station Building (Electrical, HVAC)	1	LS	$450,000	$450,000
4	Electrical (Installation, SCADA, MCC)	1	LS	$120,000	$120,000
5	Generator	1	EA	$50,000	$50,000
		SUBTOTAL:			$1,420,000
		CONTINGENCY		20%	$284,000
		SUBTOTAL:			$1,704,000
		ENG/SURVEY		12%	$204,480
		SUBTOTAL:			$1,908,480
				PROJECT TOTAL	**$1,908,480**

City of Burleson
2020-2025 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 9

Project Description

16-inch Line along Wilshire Blvd.

Detailed Description

16-inch line along Wilshire Blvd from the transfer valve to the Mountain Valley Pump Station.

Purpose

This project extends a 16-inch UPP water line from the Hulen High Pump Station along Wilshire Blvd parallel to the existing 12-inch water line. This project is necessary for extending the UPP boundary to include the MVPP when the Mountain Valley Pump Station is taken out of service. The proposed 16-inch line will supply the existing 12-inch line along Wilshire Blvd. on the downstream end of the Mountain Valley Pump Station. The LPP service area will be extended by converting the existing 12-inch water line along Wilshire Blvd to the LPP.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" Pipe	4,000	LF	$160	$640,000
2	Pavement Repair	4,000	LF	$50	$200,000
		SUBTOTAL:			$840,000
		CONTINGENCY		20%	$168,000
		SUBTOTAL:			$1,008,000
		ENG/SURVEY		12%	$120,960
		SUBTOTAL:			$1,128,960
				PROJECT TOTAL	$1,128,960

Construction Project Number 10

Project Description

16-inch Lines southeast of Wilshire Blvd.

Detailed Description

16-inch lines along St. Andrews Drive connecting the Mountain Valley Pump Station to the Mountain Valley Elevated Storage Tank.

Purpose

This project is intended to allow for a more flow from the Mountain Valley Pump Station to the Mountain Valley Elevated Storage Tank.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" Pipe	9,600	LF	$160	$1,536,000
2	Pavement Repair	200	LF	$50	$10,000
3	34" Boring and Casing	50	LF	$595	$29,750
		SUBTOTAL:			$1,575,750
		CONTINGENCY		20%	$315,150
		SUBTOTAL:			$1,890,900
		ENG/SURVEY		12%	$226,910
		SUBTOTAL:			$2,117,810
				PROJECT TOTAL	$2,117,810

City of Burleson
2020-2025 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 11

Project Description

12-inch Lines from Hulen St. to Wilshire Blvd

Detailed Description

12-inch line connecting the future 16-inch line along Wilshire Boulevard to the existing 16-inch line along Hulen

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	4,200	LF	$120	$504,000
2	Pavement Repair	150	LF	$50	$7,500
		SUBTOTAL:			$511,500
		CONTINGENCY		20%	$102,300
		SUBTOTAL:			$613,800
		ENG/SURVEY		12%	$73,660
		SUBTOTAL:			$687,460
				PROJECT TOTAL	$687,460

Construction Project Number 12

Project Description

2.5 MGD Hulen High Pump Station Expansion

Detailed Description

Expand the pumping capacity of the Hulen High Pump Station by 2.5 MGD

Purpose

This expansion will bring the Hulen High Pump Station Firm Capacity to a total of 7.5 MGD.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	2.5 MGD Pumps	1	LS	$300,000	$300,000
2	Pump Station Piping & Appurtenances	1	LS	$100,000	$100,000
3	Electrical (Installation, SCADA, MCC)	1	LS	$120,000	$120,000
		SUBTOTAL:			$520,000
		CONTINGENCY		20%	$104,000
		SUBTOTAL:			$624,000
		ENG/SURVEY		12%	$74,880
		SUBTOTAL:			$698,880
				PROJECT TOTAL	$698,880

City of Burleson
2020-2025 Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	13

Project Description

12-inch Lines along I-35 and Hurst Rd

Detailed Description

12-inch line along the east side of I-35. Starting at Hidden Creek Parkway looping over to Hurst Road and back up to Hidden Creek Parkway.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	8,600	LF	$120	$1,032,000
2	Pavement Repair	1,000	LF	$50	$50,000
		SUBTOTAL:			$1,082,000
		CONTINGENCY		20%	$216,400
		SUBTOTAL:			$1,298,400
		ENG/SURVEY		12%	$155,810
		SUBTOTAL:			$1,454,210
				PROJECT TOTAL	$1,454,210

2020-2025 TOTAL WATER CIP COST	$13,496,800

City of Burleson
2025-Buildout Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 14

Project Description

12-inch Lines east of Mtn Valley GST

Detailed Description

12-inch line from existing 12-inch lines at FM 731 connecting to proposed 12-inch lines.

Purpose

These lines are identified to provide looping and increase fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	6,800	LF	$120	$816,000
2	Pavement Repair	200	LF	$50	$10,000
		SUBTOTAL:			$826,000
		CONTINGENCY		20%	$165,200
		SUBTOTAL:			$991,200
		ENG/SURVEY		12%	$118,950
		SUBTOTAL:			$1,110,150
				PROJECT TOTAL	**$1,110,150**

Construction Project Number 15

Project Description

12-inch Lines from St. Andrews Dr. to Fairway View Dr. and Morningside Dr

Detailed Description

12-inch line connecting the existing 12-inch line along Fairway View Drive to the proposed 16-inch along St. Andrews Drive. Also a 12-inch line connecting the existing 12-inch along Morningside Drive to the proposed 16-inch along St. Andrews Drive.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	3,100	LF	$120	$372,000
2	Pavement Repair	200	LF	$50	$10,000
		SUBTOTAL:			$382,000
		CONTINGENCY		20%	$76,400
		SUBTOTAL:			$458,400
		ENG/SURVEY		12%	$55,010
		SUBTOTAL:			$513,410
				PROJECT TOTAL	**$513,410**

City of Burleson
2025-Buildout Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 16

Project Description

12-inch Line along Country Rd. 714

Detailed Description

12-inch line along Country Road 714 between Vintage Avenue and Hidden Vistas Boulevard.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,500	LF	$120	$660,000
2	Pavement Repair	1,400	LF	$50	$70,000
		SUBTOTAL:			$730,000
		CONTINGENCY		20%	$146,000
		SUBTOTAL:			$876,000
		ENG/SURVEY		12%	$105,120
		SUBTOTAL:			$981,120
				PROJECT TOTAL	**$981,120**

Construction Project Number 17

Project Description

4.0 MGD Alsbury #2 Pump Station Expansion

Detailed Description

Expand the pumping capacity of the Alsbury #2 Pump Station by 4.0 MGD.

Purpose

This expansion will bring the Alsbury #2 Pump Station Firm Capacity to a totoal of 13.0 MGD.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4.0 MGD Pumps	1	LS	$400,000	$400,000
2	Electrical (Installation, SCADA, MCC)	1	LS	$120,000	$120,000
		SUBTOTAL:			$520,000
		CONTINGENCY		20%	$104,000
		SUBTOTAL:			$624,000
		ENG/SURVEY		12%	$74,880
		SUBTOTAL:			$698,880
				PROJECT TOTAL	**$698,880**

City of Burleson
2025-Buildout Water CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	18

Project Description

12-inch Lines along County Road 802

Detailed Description

12-inch line connecting the existing 12-inch along Shoreline Drive to the existing 12-inch along Glenn Ranch Drive.

Purpose

This project is intended to provide water service to new development and provide looping and increased fire flow protection.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	7,400	LF	$120	$888,000
2	Pavement Repair	500	LF	$50	$25,000
		SUBTOTAL:			$913,000
		CONTINGENCY		20%	$182,600
		SUBTOTAL:			$1,095,600
		ENG/SURVEY		12%	$131,480
		SUBTOTAL:			$1,227,080
				PROJECT TOTAL	**$1,227,080**

2025-BUILDOUT TOTAL WATER CIP COST	$5,757,720

APPENDIX H
DETAILED WASTEWATER CIP COST SHEETS

City of Burleson

Existing-2020 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 1

Project Description

15-inch Sewer Extension in the southern portion of the Quil Miller sewer basin

Detailed Description

15-inch sewer extension which starts in an undeveloped region of the Quil Miller sewer basin, continues across County Road 711 and connects to the existing 15-inch interceptor in the southern part of the Quil Miller sewer basin.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe	3,600	LF	$105	$378,000
2	60" Diameter Manhole	8	EA	$6,000	$48,000
3	Pavement Repair	200	LF	$50	$10,000
		SUBTOTAL:			$436,000
		CONTINGENCY		20%	$87,200
		SUBTOTAL:			$523,200
		ENG/SURVEY		12%	$62,790
		SUBTOTAL:			$585,990
				PROJECT TOTAL	**$585,990**

Construction Project Number 2

Project Description

1.00 MGD Lift Station, a 10-inch Force Main, and a 10/12/15-inch Sewer Interceptor in west Burleson

Detailed Description

10-inch sewer interceptor conveying wastewater flow from the Burleson West basin into a 1.00 MGD Lift Station facility and a 10-inch force main which lifts flow to a 12/15-inch interceptor which gravity flows to the under design 12-inch interceptor in west Shannon Creek basin.

Purpose

The City is expected to see growth in the area in the near future and the proposed line will provide sewer service to new residents in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	6,000	LF	$70	$420,000
2	12" Pipe	8,500	LF	$84	$714,000
3	15" Pipe	2,000	LF	$105	$210,000
4	48" Diameter Manhole	29	EA	$5,000	$145,000
5	60" Diameter Manhole	5	EA	$6,000	$30,000
6	20" Boring and Casing	100	LF	$350	$35,000
7	1.0 MGD Lift Station	1	EA	$1,300,000	$1,300,000
8	10" Force Main	6,700	LF	$70	$469,000
		SUBTOTAL:			$3,323,000
		CONTINGENCY		20%	$664,600
		SUBTOTAL:			$3,987,600
		ENG/SURVEY		12%	$478,520
		SUBTOTAL:			$4,466,120
				PROJECT TOTAL	**$4,466,120**

City of Burleson

Existing-2020 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	3

Project Description

10-inch Sewer Extension from SE John Jones Dr. to Tantarra Dr.

Detailed Description

10-inch sewer extension from the 24-inch sewer line at SE John Jones Dr to Tantarra Dr. The proposed line will cross Wilshire and Hulen Street and continue further west towards the Tantarra development.

Purpose

To transport wastewater uphill requires a lift station and force main. The facility has been sized to accommodate all future planning period flows.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	7,300	LF	$70	$511,000
2	48" Diameter Manhole	16	EA	$5,000	$80,000
3	20" Boring and Casing	100	LF	$350	$35,000
4	Pavement Repair	300	LF	$50	$15,000
		SUBTOTAL:			$641,000
		CONTINGENCY		20%	$128,200
		SUBTOTAL:			$769,200
		ENG/SURVEY		12%	$92,310
		SUBTOTAL:			$861,510
				PROJECT TOTAL	**$861,510**

Construction Project Number	4

Project Description

10-inch Parallel Sewer Interceptor northwestern Town Creek basin

Detailed Description

10-inch parallel sewer interceptor along Parkview Drive from Flagstone Street to Rand Drive.

Purpose

Model results show the current line will become insufficient in the future periods to convey all the required flow. The parallel line will allow for proper conveyance of wastewater flow.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	2,400	LF	$70	$168,000
2	48" Diameter Manhole	5	EA	$5,000	$25,000
3	Pavement Repair	2,400	LF	$50	$120,000
		SUBTOTAL:			$313,000
		CONTINGENCY		20%	$62,600
		SUBTOTAL:			$375,600
		ENG/SURVEY		12%	$45,080
		SUBTOTAL:			$420,680
				PROJECT TOTAL	**$420,680**

City of Burleson
Existing-2020 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	5

Project Description

24-inch Sewer Interceptor from Oakbrook Dr. to 24-inch Interceptor north of Village Creek

Detailed Description

24-inch sewer interceptor parallel to the existing 15-inch line conveying wastewater flow from the Willow Creek basin. The line begins at the existing 24-inch line just north of Village Creek and travels to the intersection of two existing 12-inch lines as well as a proposed 15-inch line.

Purpose

Model results indicate that while the existing 15-inch line functions properly in the 2010 and 2015 wet weather conditions, by 2020 the line experiences surcharging and overflows. The parallel line alleviates the load on the existing line and provides capacity for the future as well.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe	12,200	LF	$168	$2,049,600
2	60" Diameter Manhole	17	EA	$6,000	$102,000
3	38" Boring and Casing	100	LF	$665	$66,500
4	Pavement Repair	900	LF	$50	$45,000
		SUBTOTAL:			$2,263,100
		CONTINGENCY		20%	$452,620
		SUBTOTAL:			$2,715,720
		ENG/SURVEY		12%	$325,890
		SUBTOTAL:			$3,041,610
				PROJECT TOTAL	**$3,041,610**

Construction Project Number	6

Project Description

10-inch Sewer Extensions in the central region of Willow Creek basin

Detailed Description

10-inch sewer extension beginning in an undeveloped region of the Willow Creek sewer basin, continues across County Road 1021 and connects to the under desigin 15-inch interceptor.

Purpose

The purpose of this line is to provide sanitary sewer service to an area which will be growing in the future planning periods.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	9,400	LF	$70	$658,000
2	48" Diameter Manhole	19	EA	$5,000	$95,000
3	Pavement Repair	100	LF	$50	$5,000
		SUBTOTAL:			$758,000
		CONTINGENCY		20%	$151,600
		SUBTOTAL:			$909,600
		ENG/SURVEY		12%	$109,160
		SUBTOTAL:			$1,018,760
				PROJECT TOTAL	**$1,018,760**

2015-2020 TOTAL WASTEWATER CIP COST	$10,394,670

City of Burleson
2020-2025 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 7

Project Description

2.50 MGD Lift Station, a 12-inch Force Main, and a 12-inch Sewer Interceptor in southwestern Burleson

Detailed Description

The construction of a 2.5 MGD Lift Station facility and a 12-inch force main which lifts flow from the Chisholm Trail Parkway corridor and gravity flows into a 12-inch interceptor.

Purpose

To transport wastewater uphill requires a lift station and force main. The facility has been sized to accommodate all future planning period flows.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Force Main	4,700	LF	$84	$394,800
2	12" Pipe	4,400	LF	$84	$369,600
3	48" Diameter Manhole	9	EA	$5,000	$45,000
4	Pavement Repair	150	LF	$50	$7,500
5	2.5 MGD Lift Station	1	EA	$1,500,000	$1,500,000
		SUBTOTAL:			$2,316,900
		CONTINGENCY		20%	$463,380
		SUBTOTAL:			$2,780,280
		ENG/SURVEY		12%	$333,640
		SUBTOTAL:			$3,113,920
				PROJECT TOTAL	**$3,113,920**

Construction Project Number 8

Project Description

12-inch Sewer Interceptor along Chisholm Trail Parkway Corridor

Detailed Description

12-inch sewer collector which runs parallel to the proposed Chisholm Trail Parkway to the proposed Chisholm Trail lift station.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	6,100	LF	$84	$512,400
2	48" Diameter Manhole	13	EA	$5,000	$65,000
3	20" Boring and Casing	100	LF	$350	$35,000
4	Pavement Repair	100	LF	$50	$5,000
		SUBTOTAL:			$617,400
		CONTINGENCY		20%	$123,480
		SUBTOTAL:			$740,880
		ENG/SURVEY		12%	$88,910
		SUBTOTAL:			$829,790
				PROJECT TOTAL	**$829,790**

City of Burleson

2020-2025 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 9

Project Description

12-inch Sanitary Sewer Interceptor along the east side of Interstate-35

Detailed Description

12-inch sanitary sewer line which crosses Interstate 35 at Bethesda Road and runs along the east side of Interstate 35 to County Road 518.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,700	LF	$84	$478,800
2	48" Diameter Manhole	12	EA	$5,000	$60,000
3	Pavement Repair	1,700	LF	$50	$85,000
4	20" Boring and Casing	400	LF	$350	$140,000
		SUBTOTAL:			$763,800
		CONTINGENCY		20%	$152,760
		SUBTOTAL:			$916,560
		ENG/SURVEY		12%	$109,990
		SUBTOTAL:			$1,026,550
				PROJECT TOTAL	$1,026,550

Construction Project Number 10

Project Description

8-inch Sanitary Sewer Interceptor along the east side of Interstate-35

Detailed Description

8-inch sanitary sewer line which runs along the east side of Interstate 35 from the exiting 8-inch interceptor at County Road 711 to Conveyor Drive.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe	3,000	LF	$56	$168,000
2	48" Diameter Manhole	6	EA	$5,000	$30,000
3	Pavement Repair	1,700	LF	$50	$85,000
4	20" Boring and Casing	400	LF	$350	$140,000
		SUBTOTAL:			$423,000
		CONTINGENCY		20%	$84,600
		SUBTOTAL:			$507,600
		ENG/SURVEY		12%	$60,920
		SUBTOTAL:			$568,520
				PROJECT TOTAL	$568,520

City of Burleson
2020-2025 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	11

Project Description

12-inch Sewer Interceptor in southwestern Shannon Creek sewer basin

Detailed Description

12-inch sewer interceptor which runs from an undeveloped portion of the Shannon Creek sewer basin and connects to the existing 12-inch line at Falls Creek Court.

Purpose

This line provides flow conveyance for the surrounding area which is projected to experience growth within the future planning periods.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,200	LF	$84	$436,800
2	48" Diameter Manhole	11	EA	$5,000	$55,000
3	Pavement Repair	100	LF	$50	$5,000
		SUBTOTAL:			$496,800
		CONTINGENCY		20%	$99,360
		SUBTOTAL:			$596,160
		ENG/SURVEY		12%	$71,540
		SUBTOTAL:			$667,700
				PROJECT TOTAL	$667,700

Construction Project Number	12

Project Description

12-inch Sewer Extension from 24-inch collector main in the northern Shannon Creek basin

Detailed Description

12-inch sewer extension of service from the existing 24-inch interceptor in the Shannon Creek basin.

Purpose

The City is expected to see growth in the area in the near future and the proposed line will provide sewer service to new residents in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,800	LF	$84	$487,200
2	48" Diameter Manhole	12	EA	$5,000	$60,000
3	20" Boring and Casing	100	LF	$350	$35,000
		SUBTOTAL:			$582,200
		CONTINGENCY		20%	$116,440
		SUBTOTAL:			$698,640
		ENG/SURVEY		12%	$83,840
		SUBTOTAL:			$782,480
				PROJECT TOTAL	$782,480

City of Burleson

2020-2025 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	13

Project Description

12-inch Sanitary Sewer Interceptor along the east side of Interstate-35

Detailed Description

12-inch sanitary sewer line which runs along the east side of Interstate 35 from the existing 21-inch interceptor to County Road 602.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	2,400	LF	$84	$201,600
2	48" Diameter Manhole	5	EA	$5,000	$25,000
3	Pavement Repair	1,600	LF	$50	$80,000
		SUBTOTAL:			$306,600
		CONTINGENCY		20%	$61,320
		SUBTOTAL:			$367,920
		ENG/SURVEY		12%	$44,160
		SUBTOTAL:			$412,080
				PROJECT TOTAL	$412,080

2020-2025 TOTAL WASTEWATER CIP COST	$7,401,040

City of Burleson

2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 14

Project Description

36-inch and 42-inch Sewer Interceptor in northeastern Town Creek basin

Detailed Description

36-inch and 42-inch sewer interceptor parallel to the existing Village Creek Wastewater Relief interceptor to the discharge meter station in the northeastern region of the Town Creek sewer basin.

Purpose

During future planning period simulations, the existing line was experiencing backwater conditions, surcharging, and overflows. The 36-inch and 42-inch parallel line provides capacity for the future planning periods and beyond.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	36" Pipe	4,900	LF	$252	$1,234,800
2	42" Pipe	2,200	LF	$294	$646,800
3	72" Diameter Manhole	8	EA	$6,000	$48,000
		SUBTOTAL:			$1,929,600
		CONTINGENCY		20%	$385,920
		SUBTOTAL:			$2,315,520
		ENG/SURVEY		12%	$277,870
		SUBTOTAL:			$2,593,390

PROJECT TOTAL $2,593,390

Construction Project Number 15

Project Description

30-inch Sewer Interceptor in central Town Creek basin

Detailed Description

30-inch sewer interceptor from Rigney Street to the junction of multiple sewer interceptors in the northeast Town Creek basin area.

Purpose

Model results show the current line will become insufficient in the future periods to convey all the required flow. The parallel line will allow for proper conveyance of wastewater flow through a critical area of the City's infrastructure.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	30" Pipe	3,700	LF	$210	$777,000
2	36" Pipe	1,200	LF	$252	$302,400
3	72" Diameter Manhole	7	EA	$6,000	$42,000
4	48" Boring and Casing	400	LF	$840	$336,000
		SUBTOTAL:			$1,457,400
		CONTINGENCY		20%	$291,480
		SUBTOTAL:			$1,748,880
		ENG/SURVEY		12%	$209,870
		SUBTOTAL:			$1,958,750

PROJECT TOTAL $1,958,750

City of Burleson
2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — **May 2016**

Construction Project Number 16

Project Description

12/15-inch Sewer Interceptor from the existing 15-inch line to south of FM 731

Detailed Description

12/15-inch sewer interceptor originating from the existing 15-inch interceptor at the far north end of the Willow Creek Sewer Basin to the south of FM 731 in the proposed sewer service area.

Purpose

The purpose of this project is to provide sanitary sewer service to customers previously on private septic systems and to accommodate new growth in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	4,100	LF	$84	$344,400
2	15" Pipe	4,900	LF	$105	$514,500
3	48" Diameter Manhole	9	EA	$5,000	$45,000
4	60" Diameter Manhole	10	EA	$6,000	$60,000
5	Pavement Repair	50	LF	$50	$2,500
6	24" Boring and Casing	50	LF	$420	$21,000
		SUBTOTAL:			$987,400
		CONTINGENCY		20%	$197,480
		SUBTOTAL:			$1,184,880
		ENG/SURVEY		12%	$142,190
		SUBTOTAL:			$1,327,070
				PROJECT TOTAL	**$1,327,070**

Construction Project Number 17

Project Description

10-inch Sanitary Sewer Extension in the southern area of Willow Creek basin

Detailed Description

10-inch sewer extension to the southern and eastern regions of the Willow Creek sewer basin. The line begins at FM 731 and connects to the proposed 12-inch interceptor directly to the north.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	5,800	LF	$70	$406,000
2	48" Diameter Manhole	12	EA	$5,000	$60,000
3	Pavement Repair	100	LF	$50	$5,000
		SUBTOTAL:			$471,000
		CONTINGENCY		20%	$94,200
		SUBTOTAL:			$565,200
		ENG/SURVEY		12%	$67,830
		SUBTOTAL:			$633,030
				PROJECT TOTAL	**$633,030**

City of Burleson
2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 18

Project Description

10-inch Sewer Extension from the 36-inch Village Creek Wastewater Relief Line to Mockingbird Meadows

Detailed Description

10-inch sewer extension from the existing 36-inch Village Creek Wastewater Relief interceptor to Fox Lane then continuing along Mockingbird Meadows.

Purpose

This project will serve new growth in the northwest portion of the Quil Miller basin. Additionally the line will provide an option to users of privately operated septic systems.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	5,400	LF	$70	$378,000
2	48" Diameter Manhole	11	EA	$5,000	$55,000
3	Pavement Repair	1,000	LF	$50	$50,000
		SUBTOTAL:			$483,000
		CONTINGENCY		20%	$96,600
		SUBTOTAL:			$579,600
		ENG/SURVEY		12%	$69,560
		SUBTOTAL:			$649,160
				PROJECT TOTAL	**$649,160**

Construction Project Number 19

Project Description

8-inch Sewer Interceptor in southeastern Willow Creek sewer basin

Detailed Description

8-inch sewer interceptor in southeastern Willow Creek basin along a Village Creek tributary.

Purpose

The purpose of this project is to connect existing homes in the City's sanitary sewer system and to accommodate any new growth in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe	3,500	LF	$56	$196,000
2	48" Diameter Manhole	7	EA	$5,000	$35,000
		SUBTOTAL:			$231,000
		CONTINGENCY		20%	$46,200
		SUBTOTAL:			$277,200
		ENG/SURVEY		12%	$33,270
		SUBTOTAL:			$310,470
				PROJECT TOTAL	**$310,470**

City of Burleson

2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 20

Project Description

10-inch Sewer Extension in the southern area of Willow Creek basin

Detailed Description

10-inch sewer extension beginning just north of County Road 802 and connects to a 15-inch sewer interceptor in the southern region of the Willow Creek basin.

Purpose

The purpose of this line is to extend the City's sewer service to new growth and existing customers converting from private septic systems.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	9,100	LF	$70	$637,000
2	48" Diameter Manhole	19	EA	$5,000	$95,000
3	Pavement Repair	50	LF	$50	$2,500
		SUBTOTAL:			$734,500
		CONTINGENCY		20%	$146,900
		SUBTOTAL:			$881,400
		ENG/SURVEY		12%	$105,770
		SUBTOTAL:			$987,170
				PROJECT TOTAL	$987,170

Construction Project Number 21

Project Description

10-inch Sewer Extension in the southern portion of the Quil Miller sewer basin

Detailed Description

10-inch sewer extension which starts in an undeveloped region of the Quil Miller sewer basin, continues across Briaroaks Road, and connects to the existing 15-inch interceptor.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	4,100	LF	$70	$287,000
2	48" Diameter Manhole	10	EA	$5,000	$50,000
		SUBTOTAL:			$337,000
		CONTINGENCY		20%	$67,400
		SUBTOTAL:			$404,400
		ENG/SURVEY		12%	$48,530
		SUBTOTAL:			$452,930
				PROJECT TOTAL	$452,930

City of Burleson
2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 22

Project Description

10-inch Sewer Interceptor in western Shannon Creek sewer basin

Detailed Description

10-inch sewer extension which runs from an undeveloped region along Shannon Creek to the under design 15-inch interceptor.

Purpose

This line extends out approximately to County Road 1016 and will provide sanitary sewer service to existing development and for any new growth which might occur in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	2,800	LF	$70	$196,000
2	48" Diameter Manhole	6	EA	$5,000	$30,000
		SUBTOTAL:			$226,000
		CONTINGENCY		20%	$45,200
		SUBTOTAL:			$271,200
		ENG/SURVEY		12%	$32,550
		SUBTOTAL:			$303,750
				PROJECT TOTAL	**$303,750**

Construction Project Number 23

Project Description

10-inch Sewer Extension in the southwestern area of Willow Creek basin

Detailed Description

This project is a 10-inch sewer extension from the south of Caddo Peak Trail to the proposed 15-inch line near County Road 1021.

Purpose

This line provides flow conveyance for the surrounding area which is projected to experience growth within the future planning periods.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	5,400	LF	$70	$378,000
2	48" Diameter Manhole	11	EA	$5,000	$55,000
3	Pavement Repair	3,700	LF	$50	$185,000
		SUBTOTAL:			$618,000
		CONTINGENCY		20%	$123,600
		SUBTOTAL:			$741,600
		ENG/SURVEY		12%	$89,000
		SUBTOTAL:			$830,600
				PROJECT TOTAL	**$830,600**

City of Burleson
2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — **May 2016**

Construction Project Number 24

Project Description

10-inch Sewer Interceptor along Chisholm Trail Parkway Corridor

Detailed Description

This line is a 10-inch sewer collector which runs parallel to the proposed Chisholm Trail Parkway and connects to the proposed 12-inch interceptor.

Purpose

The purpose of this line is to convey flow from new customers along the proposed highway corridor to the proposed Chisholm Trail lift station.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	6,800	LF	$70	$476,000
2	48" Diameter Manhole	14	EA	$5,000	$70,000
3	20" Boring and Casing	100	LF	$350	$35,000
4	Pavement Repair	150	LF	$50	$7,500
		SUBTOTAL:			$588,500
		CONTINGENCY		20%	$117,700
		SUBTOTAL:			$706,200
		ENG/SURVEY		12%	$84,750
		SUBTOTAL:			$790,950
				PROJECT TOTAL	**$790,950**

Construction Project Number 25

Project Description

10-inch Parallel Line in the northeastern area of Village Creek sewer basin

Detailed Description

10-inch parallel sewer interceptor along Dobson St. under Village Creek and connects to the existing 18-inch Village Creek Sanitary Sewer Outfall line.

Purpose

In future model simulations, the downstream line runs full and this creates surcharging and overflows in the existing line. The parallel line creates more storage capacity for extreme situations and eliminates any flow issues.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	2,700	LF	$70	$189,000
2	48" Diameter Manhole	6	EA	$5,000	$30,000
		SUBTOTAL:			$219,000
		CONTINGENCY		20%	$43,800
		SUBTOTAL:			$262,800
		ENG/SURVEY		12%	$31,540
		SUBTOTAL:			$294,340
				PROJECT TOTAL	**$294,340**

City of Burleson

2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 26

Project Description

10-inch Sewer Extension in the southern portion of the Quil Miller sewer basin

Detailed Description

10-inch sewer extension which starts east of County Road 711 and connects to the proposed 15-inch interceptor.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Pipe	4,900	LF	$70	$343,000
2	48" Diameter Manhole	10	EA	$5,000	$50,000
3	Pavement Repair	50	LF	$50	$2,500
		SUBTOTAL:			$395,500
		CONTINGENCY		20%	$79,100
		SUBTOTAL:			$474,600
		ENG/SURVEY		12%	$56,960
		SUBTOTAL:			$531,560
				PROJECT TOTAL	$531,560

Construction Project Number 27

Project Description

12-inch/15-inch Sanitary Sewer Extension in the southern portion of the Quil Miller sewer basin

Detailed Description

12-inch/15-inch sewer interceptor starting near Conveyor Drive and connects to the existing 15-inch line in the southern part of the Quil Miller sewer basin.

Purpose

The purpose of this line is to extend the City's sewer service to new growth and existing customers converting from private septic systems.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	4,700	LF	$84	$394,800
2	15" Pipe	4,900	LF	$105	$514,500
3	48" Diameter Manhole	10	EA	$5,000	$50,000
4	60" Diameter Manhole	10	EA	$6,000	$60,000
5	Pavement Repair	1,000	LF	$50	$50,000
		SUBTOTAL:			$1,069,300
		CONTINGENCY		20%	$213,860
		SUBTOTAL:			$1,283,160
		ENG/SURVEY		12%	$153,980
		SUBTOTAL:			$1,437,140
				PROJECT TOTAL	$1,437,140

City of Burleson
2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number 28

Project Description

8-inch Sewer Interceptor in eastern Willow Creek sewer basin

Detailed Description

8-inch sewer interceptor which starts along Jayme Court, crosses Diamond Lane and Lace Lane before connecting to the 15-inch sewer interceptor.

Purpose

The purpose of this project is to connect existing homes in the City's sanitary sewer system and to accommodate any new growth in the area.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe	5,200	LF	$56	$291,200
2	48" Diameter Manhole	11	EA	$5,000	$55,000
3	Pavement Repair	1,500	LF	$50	$75,000
		SUBTOTAL:			$421,200
		CONTINGENCY		20%	$84,240
		SUBTOTAL:			$505,440
		ENG/SURVEY		12%	$60,660
		SUBTOTAL:			$566,100
				PROJECT TOTAL	$566,100

Construction Project Number 29

Project Description

12-inch Sewer Extension in the southern portion of the Quil Miller sewer basin

Detailed Description

12-inch sewer extension which starts at Conveyor Drive and connects to the proposed 15-inch interceptor.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	7,100	LF	$84	$596,400
2	48" Diameter Manhole	15	EA	$5,000	$75,000
3	Pavement Repair	50	LF	$50	$2,500
		SUBTOTAL:			$673,900
		CONTINGENCY		20%	$134,780
		SUBTOTAL:			$808,680
		ENG/SURVEY		12%	$97,050
		SUBTOTAL:			$905,730
				PROJECT TOTAL	$905,730

City of Burleson

2025-2035 Wastewater CIP

OPINION OF PROBABLE COST — May 2016

Construction Project Number	30

Project Description

8-inch Sewer Interceptor along the east side of Interstate-35

Detailed Description

8-inch sewer interceptor which runs along the east side of Interstate 35 from Asher Road and connects to the existing 8-inch sewer interceptor.

Purpose

Future projections call for growth of sewer customers in this area, and the proposed line will serve this region.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe	10,000	LF	$56	$560,000
2	48" Diameter Manhole	20	EA	$5,000	$100,000
3	Pavement Repair	1,400	LF	$50	$70,000
		SUBTOTAL:			$730,000
		CONTINGENCY		20%	$146,000
		SUBTOTAL:			$876,000
		ENG/SURVEY		12%	$105,120
		SUBTOTAL:			$981,120
				PROJECT TOTAL	**$981,120**

2025-2035 TOTAL WASTEWATER CIP COST	$15,553,260