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Innovative approaches
Practical results
Outstanding service

Wastewater Master Plan

Prepared for:

The City of Kerrville

Prepared by:

FREESE AND NICHOLS, INC.
4040 Broadway, Suite 600
San Antonio, Texas 78209
210-298-3800

FNI Project
KER11495

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Prepared for:

City of Kerrville

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

Freese and Nichols, Inc. (FNI) was retained in 2011 by the City of Kerrville to update the 2007 Wastewater Master Plan. The goals of the Wastewater Master Plan were to investigate and analyze the existing wastewater treatment plant (WWTP) and collection system and to recommend an integrated Capital Improvement Plan (CIP) through the year 2032. The recommended improvements will serve as a basis for the design, construction, and financing of facilities required to meet Kerrville's wastewater service needs as a result of the projected population growth and commercial development. This report has been prepared to provide the City of Kerrville a planning tool that will serve as a guide for short-term and long-term improvements to the infrastructure within the wastewater system.

2.0 POPULATION

The City of Kerrville has experienced a historical annual average population growth of 1.4% per year. The population projections were developed based on information provided by the City planning and utility staff. As presented to Council and approved in January 2012, it was determined that the city is expected to grow to 25,035 residents by 2032. The projected populations and associated growth rates are summarized in **Table ES.1**.

Table ES.1 City of Kerrville Projected Population

Year	Average Annual Growth Rate	Population
2012		**22,347**
2017	0.30%	22,683
2022	0.58%	23,355
2027	0.69%	24,195
2032	**0.67%**	**25,035**

The City wanted to plan for a scenario in which all of the growth could occur in any of the five major sanitary sewer service areas: Jefferson, G-Street, Birkdale, Legion and Quinlan Service Areas. The growth within each service area was focused at the location of the proposed developments within that service area.

3.0 WASTEWATER FLOWS

FNI analyzed monthly flow data provided by the City from January 2009 through September 2011 to determine the historical trends in system-wide average daily flow and per-capita flow. The citywide per-capita flow rate ranged from a low of 90 gpcd in 2011 to 105 gpcd in 2010. **Table ES.2** provides a summary of the historical wastewater flows.

Table ES.2 Historical Wastewater Flows

Year	Population	Average Daily Flow (MGD)	Average Per-capita Flow (gpcd)	Annual Rainfall (inches)
2009	22,252*	2.18	98	32.72
2010	22,347	2.36	105	30.13
2011	22,347**	2.01	90	13.10
Average		**2.18**	**98**	

* Population assumed to be equal to 2010 census minus population equivalent of 44 permits.
** Population assumed to be equal to 2010 census.

Annual average day wastewater flows for the 2012 and 2032 planning periods were developed by analyzing historical average daily flow rates. Flow projections for future development were added to the 2012 existing flows to determine the future average daily flow.

To project future average wastewater flows, FNI applied a 110 gpcd to future population growth in the City of Kerrville WWTP service area for the 2012 and 2032 planning periods. **Table ES.3** provides a breakdown of the population and wastewater flow by basin for each planning period.

Table ES.3 Wastewater Flow Projections by Basin

Major Basin	2012 Average Day Flow (MGD)	2012 Peak Wet Weather Flow (MGD)	2032 Average Day Flow (MGD)	2032 Peak Wet Weather Flow (MGD)
Jefferson	0.898	4.885	0.966	7.142
G-Street	0.169	0.758	0.471	3.868
Comanche Trace	0.098	0.440	0.382	1.912
Birkdale	0.279	1.504	0.297	2.169
Broadway	0.056	0.253	0.056	0.281
Airport	0.002	0.011	0.002	0.012
Legion	0.522	2.351	0.522	2.612
Quinlan	0.311	1.554	0.586	2.930
Total	**2.335**	**11.756**		

4.0 WASTEWATER COLLECTION SYSTEM ANALYSIS

The wastewater collection system was evaluated to assess the ability of the system to adequately convey wastewater to the WWTP without excessively surcharging or overflowing. This analysis was performed to determine if there are any existing system deficiencies and also to provide a baseline for the current level of service.

Overall, the collection system interceptors convey the peak flow without overflows under existing system conditions. The following areas demonstrate overflows under future conditions:

- When the Jefferson Lift Station is expanded (Project 1), the peak flows from the Jefferson Lift Station will cause the interceptors in the Legion basin, downstream of the Jefferson Lift Station, to surcharge (Project 5).
- As the City of Ingram wholesale flow increases, Knapp Lift Station will need to be expanded and a new force main will be constructed which will divert the Knapp Lift Station flows to the Lois Street interceptor (Project 3). As a result of the increased Ingram wholesale flows, the peak flows from Knapp Lift Station will cause the interceptors downstream of the lift station to surcharge (Project 6).
- Due to the growth focused in the Whiskey Springs & Gateway developments, the Quinlan Basin interceptors will surcharge unless upsized (Project 9). Due to the continued growth in the Comanche Trace development, the Comanche Trace Basin interceptors will surcharge unless upsized (Project 10). Due to the projected growth in the City of Ingram, the Jefferson Basin interceptors upstream of Knapp Lift Station will surcharge unless upsized (Project 11).

5.0 WASTEWATER COLLECTION SYSTEM CIP

A capital improvements plan (CIP) was developed for the City of Kerrville to ensure high quality wastewater service that promotes residential and commercial development. The recommended improvements will provide the required capacity and reliability to meet projected wastewater flows through 2032. FNI utilized the hydraulic model to analyze the wastewater collection system. **Table ES.4** summarizes the 20-year wastewater collection system capital improvement plan for the City of Kerrville. It is recommended that the City fund their Water Reclamation Division at a level which allows for sustainable operations, maintenance, and completion of in house projects. Cities can typically defer certain capital expenditures by sufficiently funding annual maintenance efforts.

It is recommended that these projects be constructed generally in the order listed; however, development patterns may make it necessary to construct some projects sooner or later than anticipated. The collection system improvements are integrated with the WWTP improvements and phased into planning periods as described in **Section 9**.

Table ES.4 Wastewater Collection System CIP

Proj. No.	Scope	Project Cost
1	New 5,000 gpm Jefferson Lift Station and 12" & 16" Force Mains	**$4,539,300**
2	Reduce Broadway Lift Station Capacity to 500 gpm	**$486,800**
3	New Knapp Wet Well & 12" Force Main	**$1,258,000**
4	G-Street Lift Station Decommission	**$78,000**
5	21" Interceptor Downstream of Jefferson Lift Station	**$1,412,200**
6	15"/18"/21" Interceptors Downstream of Knapp LS	**$1,849,000**
7	New 5900 gpm Legion Lift Station	**$4,290,000**
8	New 1,600 gpm Comanche Trace Lift Station & 12” Force Main	**$1,547,000**
9	Quinlan Basin 10"/12"/15" Interceptors	**$2,639,900**
10	Comanche Trace 12"/15" Interceptors	**$1,336,400**
11	15" Interceptor Upstream of Knapp Lift Station	**$605,300**
	Collection System CIP Total:	***$20,199,900***

6.0 WWTP CONDITION ASSESSMENT

For the treatment plant evaluation, FNI was tasked with performing a risk and capacity assessment for the plant, evaluating alternatives for providing wastewater treatment for the 20 year planning period. The risk assessment consisted of an evaluation of the condition and criticality of the current Kerrville Wastewater Treatment Plant (WWTP) components.

On January 13, 2012, a team from Freese and Nichols visited the Kerrville WWTP to assess the condition of the equipment with the assistance of plant management. Each major process and piece of equipment at the WWTP was evaluated and its condition scored by performance, age, and maintenance history.

Risk can be defined as the “Probability of failure (Condition) multiplied by the consequence of failure (Criticality).” In order to obtain an overall risk score for each treatment component, the condition and criticality scores were combined and grouped into categories of either low risk, medium risk or high risk.

Overall, five systems or pieces of equipment are considered in High Risk status and should be considered potential targets for near-term improvements. **Table ES.5** lists the projects in the High Risk category.

Table ES.5 Risk Assessment Scores

Facility	Condition Rating	Criticality Rating	Risk
Electrical - main	Poor	Very High Impact	High Risk
Clarifier 3	Poor	Very High Impact	High Risk
Chemical Feed System	Fair	Very High Impact	High Risk
Oxidation Ditch	Fair	Very High Impact	High Risk
RAS Pump Stations	Fair	Very High Impact	High Risk

7.0 WWTP CAPACITY ASSESSMENT

The WWTP capacity assessment consisted of a hydraulic analysis, treatment process and regulatory analysis, and flow equalization capacity analysis.

An updated hydraulic profile was developed and a single 12" pipeline between the Junction Box and the clarifiers was identified as an area of concern. This design flaw has not been an operational issue. The capacities of the individual processes at the plant were evaluated based on the current regulations set forth by the "TCEQ Chapter 217 Design Criteria for Wastewater Systems". The media filters are currently the only process that does not meet the TCEQ 217 requirements for the permitted level of flow. The results from each analysis were combined and evaluated to determine the project prioritization and anticipated project costs for the identified plant deficiencies.

8.0 WASTEWATER SYSTEM ALTERNATIVES FOR FUTURE TREATMENT

In conjunction with the assessments presented in the previous section, FNI selected three future alternatives for the City of Kerrville to provide wastewater treatment in the future. The three alternatives were:

- Alternative 1: Extend the life of the existing WWTP by completing the projects prioritized based on risk and capacity assessments.
- Alternative 2: Add a new parallel 1.5 MGD BNR train at the current WWTP site.
- Alternative 3: Construct a new BNR WWTP at another location.

Table ES.6 lists the total project costs associated with each Alternative. Due to the fact that Alternative 1 remains the lowest cost alternative and the treatment plant staff is familiar with the operation of the current equipment, FNI recommended that the City pursue Alternative 1 for the future needs of the Kerrville WWTP. In May 2012, the City Council gave direction to proceed forward with Alternative 1. **Table ES.7** lists the projects and the associated costs for the recommended Alternative 1.

Table ES.6 Alternative Costs

Alternative	Description	Project Cost
1	Rehabilitate existing WWTP	**$11,305,023**
2	Add parallel 1.5 MGD BNR train to the existing WWTP	**$17,091,649**
3	Construct new BNR WWTP off-site	**$37,960,000**

Table ES.7 Plant Rehabilitation Projects and Estimated Cost

Proj. No.	Scope	Project Cost
1	Add Additional Clarifier	**$2,268,014**
2	Upgrade Electrical System	**$1,444,500**
3	Oxidation Ditch Rehab	**$1,283,344**
4	Parallel 12” Pipe	**$41,580**
5	Rehabilitate Clarifier No. 3 and repair Clarifier No. 1 WAS valve	**$502,909**
6	Increase Filter Capacity	**$3,532,454**
7	Flow Equalization Basin and Lift Station	**$2,085,244**
8	Rehabilitate Chemical Feed System	**$101,250**
9	Rehabilitate RAS Pump Station	**$45,728**
	WWTP CIP Total:	***$11,305,023***

9.0 WASTEWATER CAPITAL IMPROVEMENTS PLAN

An integrated wastewater capital improvements plan (CIP) was developed for the City of Kerrville to combine and prioritize the wastewater collection system and treatment plant CIP projects. A 3% annual inflation factor was applied to each of the projects beyond 2013 as shown in **Table ES.8** for each planning period. For the planning period 2014 to 2019, the annual inflation factor was applied through the year 2019 and for the planning period 2020 to 2032, the annual inflation factor was applied through the year 2032.

It is recommended that the City fund their Water Reclamation Division at a level which allows for sustainable operations, maintenance, and completion of in house projects. Cities can typically defer certain capital expenditures by sufficiently funding annual maintenance efforts. It is recommended that these improvements be constructed generally in the order shown; however, it is understood that development in certain parts of the City may make it necessary to construct certain future improvements sooner than anticipated.

Table ES.8 Wastewater System Integrated 20-Year CIP

	Proj. No.	Project Description	Project Cost	Project Cost with 3% Annual Inflation
FY 2013	1	Jefferson Lift Station Expansion & 12"/16" Force Mains	$ 4,539,300	$ 4,539,300
	2	Add New Clarifier at WWTP	$ 2,268,014	$ 2,268,014
	3	Upgrade WWTP Electrical System	$ 1,444,500	$ 1,444,500
	4	Reduce Broadway Lift Station Capacity to 500 gpm	$ 486,800	$ 486,800
	5	Project Contingency	$ 1,500,000	$ 1,500,000
		Total 2013	**$ 10,238,614**	**$ 10,238,614**
2014-2019	1	WWTP Oxidation Ditch Rehab	$ 1,283,344	$ 1,578,384
	2	New Knapp Wet Well & 10" Force Main	$ 1,211,000	$ 1,489,409
	3	G-Street Lift Station Decommission	$ 78,000	$ 95,932
	4	21-inch Interceptor Downstream of Jefferson Lift Station	$ 1,412,200	$ 1,736,865
	5	Project Contingency	$ 215,456	-
		Total 2014 - 2019	**$ 4,200,000**	**$ 4,900,590**
2020 & Beyond	Collection System	15"/18"/21" Interceptors Downstream of Knapp Lift Station	$ 1,849,000	$ 3,339,479
		New 5900 gpm Legion Lift Station	$ 4,290,000	$ 7,748,169
		New 1600 gpm Comanche Trace Lift Station	$ 1,547,000	$ 2,794,037
		Quinlan Basin 10"/12"/15" Interceptor	$ 2,844,900	$ 5,138,174
		Comanche Trace 12"/15" Interceptors	$ 1,336,400	$ 2,413,672
		15" Interceptor Upstream of Knapp Lift Station	$ 605,300	$ 1,093,232
	WWTP	Parallel Clarifier Effluent Pipe	$ 41,580	$ 75,098
		Clarifier Rehab & Repair	$ 502,909	$ 908,303
		Increase Filter Capacity	$ 3,532,454	$ 6,379,159
		FEB & Lift Station Capacity Increase	$ 2,085,244	$ 3,766,159
		Rehab Chemical Feed System	$ 101,250	$ 182,868
		Rehab RAS Pump Station	$ 45,728	$ 82,589
		Total 2020 & Beyond	**$ 18,781,765**	**$ 33,920,939**
		Grand Total	**$ 33,220,379**	**$ 49,060,143**

1.0 INTRODUCTION

Freese and Nichols, Inc. (FNI) was retained in 2011 by the City of Kerrville to update the 2007 Wastewater Master Plan. The goals of the Wastewater Master Plan were to investigate and analyze the existing wastewater treatment plant (WWTP) and collection system and to recommend an integrated Capital Improvement Plan (CIP) through the year 2032. The recommended improvements will serve as a basis for the design, construction, and financing of facilities required to meet Kerrville's wastewater service needs as a result of the projected population growth and commercial development. This report has been prepared to provide the City of Kerrville a planning tool that will serve as a guide for short-term and long-term improvements to the infrastructure within the wastewater system.

1.1 SCOPE OF WORK

The major elements of the scope of this project include:

- Land Use Assumptions for 20-year Planning Period
- Population and Wastewater Flow Projections for 20-year Planning Period
- Wastewater Model Update and Calibration
- Inventory of WWTP Facility Assets & Site Visits
- Development of Treatment Facility Prioritization Scoring System
- Prioritize WWTP Rehabilitation Projects
- Evaluation of Existing WWTP Capacity and Regulatory Compliance
- WWTP Alternative Analysis
- Wastewater System Improvement Alternatives for 20-year Planning Period
- Wastewater System Capital Improvement Plan and Master Plan Report

1.2 LIST OF ABBREVIATIONS

Table 1.1 List of Abbreviations

Abbreviation	Actual
ADF	Average Day Flow
AO	Anoxic-oxic
BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
CIP	Capital Improvements Plan
ETJ	Extraterritorial Jurisdiction
FEB	Flow Equalization Basin
FM	Force Main
FNI	Freese and Nichols, Inc.
GIS	Geographic Information System
gpad	Gallons per Commercial Acre per Day
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
H_2S	Hydrogen Sulfide
I/I	Infiltration and Inflow
LS	Lift Station
MCC	Motor Control Center
MG	Million Gallons
mg/l	Milligrams per Liter
MGD	Million Gallons per Day
ML	Mixed Liquor
NH_3-N	Ammonia Nitrogen
OPCC	Opinion of Probable Construction Cost
P	Phosphorus
RAS	Return Activated Sludge
SCADA	Supervisory Control and Data Acquisition
SRT	Solids Retention Time
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
WAS	Waste Activated Sludge
WSE	Water Surface Elevation
WWTP	Wastewater Treatment Plant

2.0 POPULATION

Population projections are an important element in the analysis of wastewater systems. Wastewater flows depend on the residential population and commercial development served by the systems. A thorough analysis of historical and projected populations provides the basis for future wastewater flows.

2.1 HISTORICAL POPULATION

The City of Kerrville has experienced an average annual historical population growth of 1.4% per year. The historical census populations are shown in **Table 2.1**.

Table 2.1 City of Kerrville Historical Census Population

Year	Average Annual Growth Rate	Population
1980	2.1%	15,276
1990	1.4%	17,384
2000	1.7%	20,425
2010	0.9%	22,347

2.2 PROJECTED POPULATION

The population projections were developed based on information provided by the City planning and utility staff as seen in **Appendix A**. As presented to Council and approved in 2012, the city is expected to grow 2,688 residents by 2032.

The projected populations and associated growth rates are summarized in **Table 2.2**. The year 2012 was assumed to have the same population as the 2010 census. The population growth over the next 20 years was based on the following growth scenario:

- Years 2012 – 2016: 25 building permits/year
- Years 2017 – 2021: 60 building permits/year
- Years 2022 – 2031: 80 building permits/year

Beyond 2032, the annual growth is expected to be 1.0%. The 2032 population is estimated to be 25,035. The City Council approved this projected population in 2012.

Table 2.2 City of Kerrville Projected Population

Year	Annual Growth Rate	Population
2012		**22,347**
2013	0.24%	22,400
2014	0.23%	22,452
2015	0.24%	22,505
2016	0.23%	22,557
2017	0.56%	22,683
2018	0.55%	22,809
2019	0.55%	22,935
2020	0.55%	23,061
2021	0.54%	23,187
2022	0.72%	23,355
2023	0.71%	23,523
2024	0.71%	23,691
2025	0.70%	23,859
2026	0.70%	24,027
2027	0.69%	24,195
2028	0.69%	24,363
2029	0.68%	24,531
2030	0.68%	24,699
2031	0.68%	24,867
2032	**0.68%**	**25,035**

2.3 POPULATION DISTRIBUTION

For wastewater master planning, the distribution of population is as important as the total number. The magnitude and distribution of the growth in population will dictate where future water and wastewater infrastructure is required. It is important to note that projecting future population is challenging, especially for relatively small geographic areas such as individual cities because it can be difficult to predict how fast or slow development will occur when there are a variety of circumstances that can impact it.

The City of Kerrville is divided into five major service areas comprised of their nine major sewer basins. The five major service areas are:

- Jefferson Service Area
    - Consists of Jefferson Basin and City of Ingram Wholesale Flow
- G-Street Service Area
    - Consists of G-Street Basin
- Birkdale Service Area
    - Consists of Birkdale Basin
- Legion Service Area
    - Consists of Legion, Comanche Trace, Broadway, Airport/Al Mooney Basins
- Quinlan Service Area
    - Consists of Quinlan Basin

The City wanted to plan for a scenario in which all of the growth (2,752 people) could occur in any one of these major sanitary sewer service areas. For the distribution of future growth, the City provided the names and locations of known planned developments. The proposed developments are shown on **Figure 2.1**.

The growth within each service area was focused at the location of the proposed developments within that service area. For example, the growth within the Jefferson service area was focused on the location of the Town Creek and Kirk Ranch developments as well as commercial infill on Highway 27.

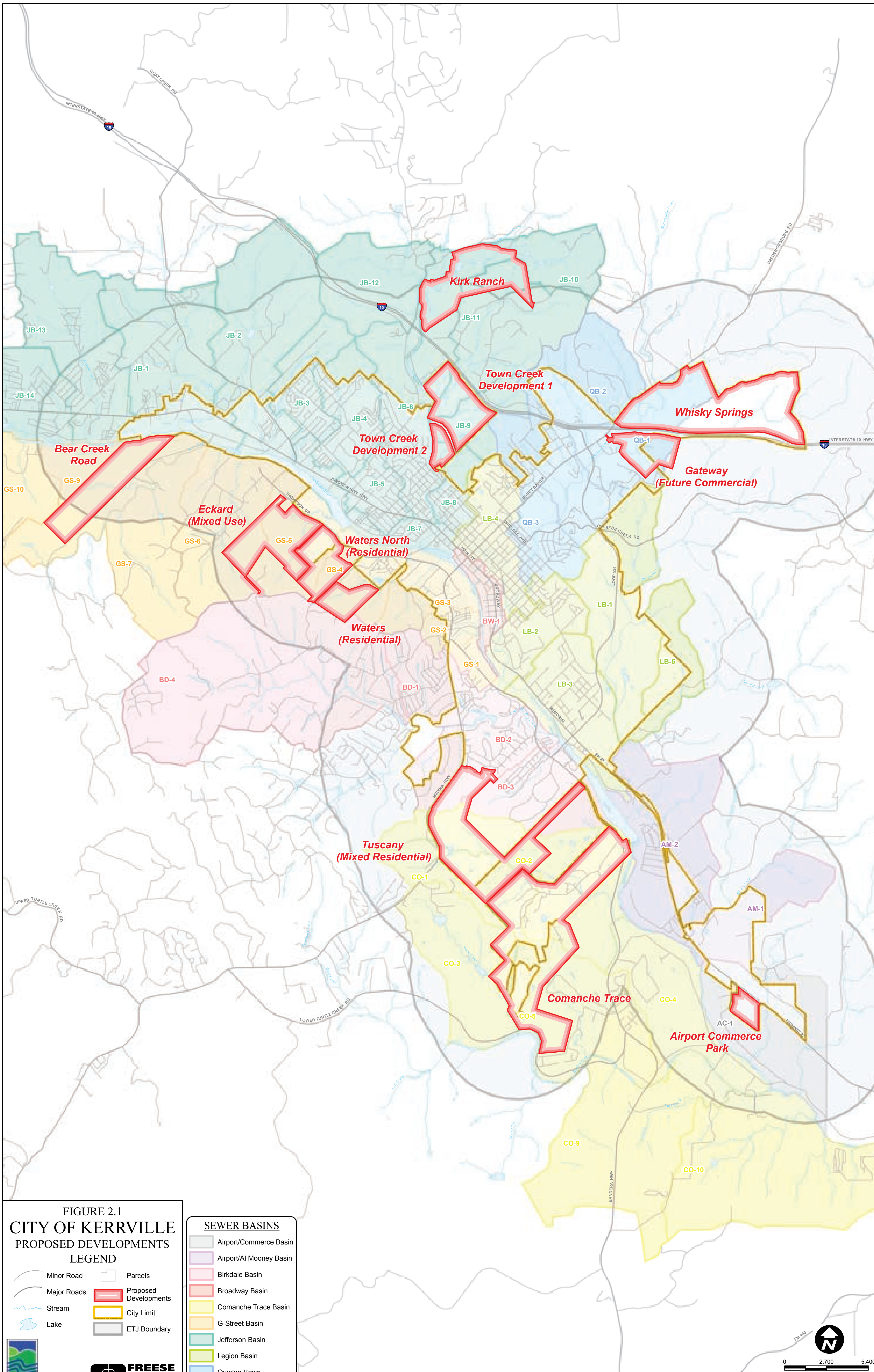


FIGURE 2.1
CITY OF KERRVILLE
PROPOSED DEVELOPMENTS

3.0 WASTEWATER FLOWS

3.1 GENERAL

Wastewater flows in a municipal collection system vary by time of day, wastewater discharge source and weather conditions. Average daily flow is defined as the total wastewater flow over a one year period divided by the number of days in that year. Wastewater treatment plants are typically sized in terms of average daily flow. The collection system is sized to convey peak wastewater flows. Peak wastewater flow is comprised of three components: the peak dry weather flow, infiltration, and inflow. Infiltration is the seepage of groundwater into the sewer pipe and appurtenances. All infiltration is estimated as the difference between the minimum nighttime flow during dry weather-low groundwater periods and the minimum nighttime flow during high groundwater periods, which occur immediately after a storm event. Inflow is the rainwater that enters the collection system, directly and indirectly, during and immediately following a storm event. The inflow represents storm water runoff from paved and non-paved areas from both public and private sector sources. The collection system must be able to convey the peak flow that results from design level storm events. The WWTP is currently permitted to treat 4.5 MGD of wastewater.

3.2 HISTORICAL WASTEWATER FLOWS

FNI analyzed monthly flow data provided by the City from January 2009 through September 2011 to determine the historical trends in system-wide average daily flow and per-capita flow. The citywide per-capita flow rate ranged from a low of 90 gpcd in 2011 to 105 gpcd in 2010. **Table 3.1** provides a summary of the historical wastewater flow.

Table 3.1 Historical Wastewater Flows

Year	Population	Average Daily Flow (MGD)	Average Per-capita (gpcd)	Annual Rainfall (inches)
2009	22,252*	2.18	98	32.72
2010	22,347	2.36	105	30.13
2011	22,347**	2.01	90	13.10
Average		**2.18**	**98**	

* Population assumed to be equal to 2010 census minus population equivalent of 44 permits.
** Population assumed to be equal to 2010 census.

3.3 PROJECTED WASTEWATER FLOWS

Average day wastewater flows for the 2012 and 2032 planning periods were developed by analyzing historical average daily flow rates. Flow projections for future development were added to the 2012 existing flows to determine the future average daily flow.

To project future average wastewater flows, FNI utilized 110 gpcd for wastewater flow in the City of Kerrville WWTP service area. Future average daily wastewater loads were calculated by applying the 110 gpcd to the growth in population for the 2012 and 2032 planning periods.

The projected population was used along with average day dry weather per capita and wet weather peaking factors to project future peak wet weather flows for 2032. The calculated 2012 average day per capita flows varied by sub-basin. These residential per capita flows were determined by comparing the meter billing data by usage type (provided by the City) and the existing population.

To determine the peak wet weather to average day peaking factor, the data from the flow monitoring that was performed as part of the City's 2007 Wastewater Master Plan was analyzed. For the 2012 wastewater flows, FNI utilized the peaking factors developed in the previous master plan for a 3.8-inch, 5-year, 6-hour design storm. Based on the 2007 flow monitoring data results, the wet weather peaking factor for 2012 was developed per meter basin with values ranging from 4.5 to 6.0. These peaking factors were applied to flows associated with the existing population and remained constant for the future year projections.

Table 3.2 provides the observed peaking factors for each sub-basin from the flow monitoring performed as part of the 2007 Wastewater Master Plan. Based on this flow monitoring, the highest amounts of I/I occur in parts of the Jefferson and Birkdale Basins which have peaking factors of 6.0. TCEQ recommends a goal peaking factor of 4.0. Based on the fact that this 6.0 is a high peaking factor, FNI recommends an I/I study be performed for the City of Kerrville in order to reduce this peaking factor in these problematic basins. Since this flow monitoring was performed, the City has conducted significant I/I improvements. The potential improvements in I/I were not considered as part of this study but it is assumed that once these I/I improvements are complete, a system-wide peaking factor of 5.0 will be valid for future flow projections. For 2032, the flows in all basins were peaked at 5.0.

Table 3.3 and **Table 3.4** provide a breakdown of the population and wastewater flow by basin for each planning period.

Table 3.2 2007 Peaking Factors by Sub-Basin

Sewer Basin	Sewer Sub-Basin	2012 Peaking Factor
Jefferson	JB-1	4.5
	JB-2	4.5
	JB-3	6.0
	JB-4	4.5
	JB-5	4.5
	JB-6	4.5
	JB-7	6.0
	JB-8	4.5
Birkdale	BD-1	4.5
	BD-2	6.0
	BD-3	6.0
Comanche Trace	CO-1	4.5
	CO-2	4.5
	CO-3	4.5
	CO-5	4.5
Broadway	BW-1	4.5
Quinlan	QB-1	5.0
	QB-2	5.0
	QB-3	5.0
Legion	LB-1	4.5
	LB-2	4.5
	LB-3	4.5
	LB-4	4.5
	LB-5	4.5
	LB-6	4.5
G-Street	GS-1	4.5
	GS-2	4.5
	GS-3	4.5
	GS-4	4.5
Airport	AM-2	4.5
	AC-1	4.5
	AC-2	4.5

Table 3.3 2012 Wastewater Flows by Basin

Major Basin	Served Population	Per Capita (gpcd)	Average Day Flow (MGD)	Wet Weather Peaking Factor	Peak Wet Weather Flow (MGD)
Jefferson	9,496	87	0.898	5.4	4.885
G-Street	430	*	0.169	4.5	0.758
Comanche Trace	723	154	0.098	4.5	0.440
Birkdale	2,663	84	0.279	5.4	1.504
Broadway	703	80	0.056	4.5	0.253
Airport	46	46	0.002	4.5	0.011
Legion	5,465	156	0.522	4.5	2.351
Quinlan	2,821	147	0.311	5.0	1.554
Total	**22,347**	**105**	**2.335**	**-**	**11.756**

*The G-Street basin currently consists of predominately non-residential wastewater loads.

Table 3.4 2032 Wastewater Flow Projections by Basin

Major Basin	Served Population	Per Capita (gpcd)	Average Day Flow (MGD)	Wet Weather Peaking Factor	Peak Wet Weather Flow (MGD)
Jefferson	12,248	110	0.966	5.0	7.142
G-Street	3,182	110	0.471	5.0	3.868
Comanche Trace	3,310	110	0.382	5.0	1.912
Birkdale	2,828	110	0.297	5.0	2.169
Broadway	703	110	0.056	5.0	0.281
Airport	46	110	0.002	5.0	0.012
Legion	5,465	110	0.522	5.0	2.612
Quinlan	5,573	110	0.586	5.0	2.930

3.4 WHOLESALE WASTEWATER FLOWS

The City of Kerrville currently provides wholesale wastewater service to the City of Ingram. The existing wholesale contract with the City of Ingram is for a not to exceed daily wastewater flow of 0.425 MGD. The City of Ingram provided the City of Kerrville with an anticipated wastewater flow projection for the next 40 years that shows the City of Ingram will exceed their current contract by 2022. This contract can be renegotiated if and when necessary. The City of Ingram's current wholesale contract and wastewater flow projections can be seen in **Appendix B**.

It is assumed that 100% of the contractual amount will enter Kerrville's collection system. A summary of the projected wholesale wastewater flows is shown in **Table 3.5**.

Table 3.5 City of Ingram Wholesale Wastewater Flows

Year	No. of Connections[1]	Gallons per Connection[2]	Average Day Flow (gpd)	Peaking Factor[3]	Peak Flow (MGD)
2012	292	210	61,320	4	0.245
2017	1,000	210	210,000	4	0.840
2022	1,250	210	262,500	4	1.050
2032	1,720	210	361,200	4	1.445

(1) Per City of Ingram Projections
(2) Per City of Kerrville standards
(3) Per TCEQ Chapter 217 Guidelines

The flows from **Table 3.5** were used in the development of the CIP. Each project has reserve capacity that could be used by the City of Ingram to convey wholesale wastewater flows. *Section 9.2* summarizes the living unit equivalents (LUEs) contributing to each project.

4.0 WASTEWATER COLLECTION SYSTEM ANALYSIS

4.1 EXISTING WASTEWATER COLLECTION SYSTEM

The City of Kerrville's wastewater collection system consists of a network of gravity lines, 14 major lift stations (8 minor lift stations) and associated force mains, and one wastewater treatment plant.

4.1.1 Major Basins

Wastewater basin boundaries are identified by determining the flow paths in the wastewater collection system and grouping areas that have the same outfall location. Kerrville's collection system is separated into eight major wastewater basins: Jefferson, G-Street, Comanche Trace, Birkdale, Broadway, Airport, Legion and Quinlan.

4.1.2 Wastewater Lines

The City of Kerrville's existing wastewater system consists of 209 miles of wastewater collector mains and interceptors. Pipeline diameters range in size from 2-inch to 24-inches. **Figure 4.1** illustrates the percentage of pipe length by diameter. The majority of the pipes are 6-inch and 8-inch. **Figure 4.2** shows a summary of the pipe material based on the City's GIS data. The majority of the pipes are PVC or clay. Typically, clay pipes in a wastewater system are linked to occurrences of high levels of I/I.

Figure 4.1 Pipeline Diameter by Length

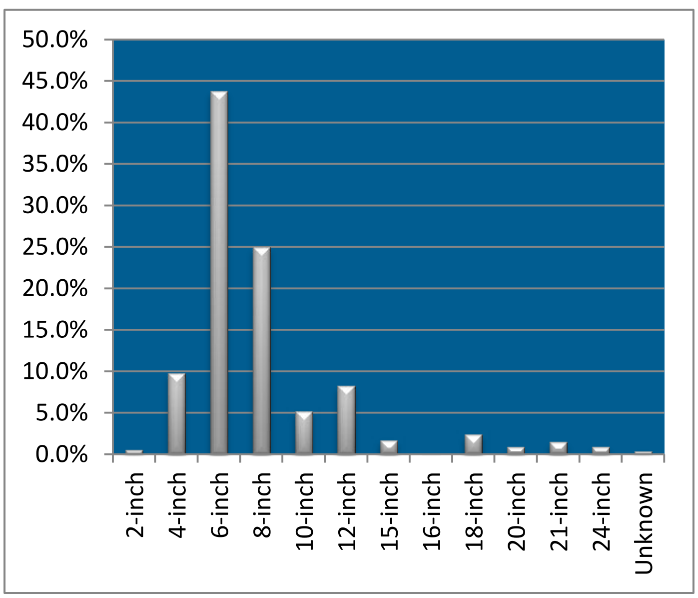
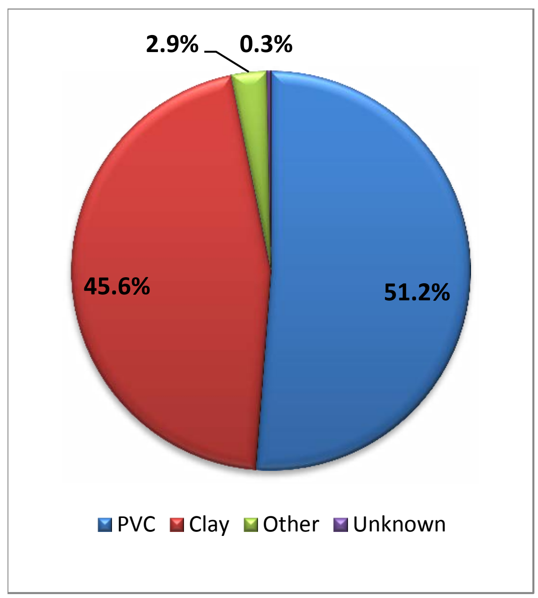


Figure 4.2 Pipeline Material by Length



4.1.3 Wastewater Treatment Plants

The wastewater collection system is served by one wastewater treatment plant. The WWTP is located along Loop 534 on the east side of the city. Kerrville and Ingram convey flow to this plant, which has a total permitted treatment capacity of 4.5 MGD. The WWTP is discussed in detail in Sections 5 and 6.

4.1.4 Lift Stations

Lift stations are necessary when wastewater needs to be pumped to a higher elevation where the flow can resume flowing by gravity to the outfall of the system. Due to the varying topography, Kerrville operates 14 major lift stations throughout the service area. The lift stations vary in size from small development lift stations near the city limits to the four large lift stations in the center of the City.

The WWTP currently receives flow from two force mains. One force main carries flow from the Legion lift station and the other force main carries flow from both New Quinlan and Loop 534 lift stations. A new 20” force main from the Birkdale lift station is under construction and is scheduled to be in service by 2013. The Loop 534 lift station is designed to handle future flows along Loop 534 north of the WWTP and currently does not contribute significant flow. Therefore the majority of the flow in the force main comes from the New Quinlan lift station.

The Legion lift station serves the Legion Basin and also currently receives flow from the Airport, Comanche Trace, Broadway, Birkdale and Jefferson lift stations. A new Birkdale lift station is under construction and will receive flow from the Comanche Trace, Birkdale, Jefferson and G-Street basins after completion. Upon completion of the Birkdale Lift Station, the G-Street Lift Station will be decommissioned and the G-Street basin will be served by the G-Street interceptor that is currently under design. The New Quinlan lift station receives flow from the Quinlan Basin and the flow from Jefferson lift station. The Jefferson lift station currently has 4 pumps and three force mains. Three pumps and two 10” force mains pump to Legion and one pump and one 18” force main are designed to flow to New Quinlan. A new Jefferson lift station is under design and will pump to Legion and Birkdale. It will remain possible for the City to valve the force mains so that flow from any pump can be directed to New Quinlan when needed.

Table 4.1 provides a list of the lift stations in the City of Kerrville along with the corresponding existing firm pumping capacity. **Appendix C** provides a lift station inventory.

Table 4.1 Existing Lift Station Capacity

Lift Station	Firm Capacity (gpm)
Airport/Al Mooney	180
Airport/Commerce Park(1)	150
Birkdale(2)	6,800
Broadway	2,000
Comanche Trace	600
G-Street(3)	250
Jefferson	3,300
Kerrville South	100
Knapp	560
Legion	3,800
Loop 534	1,700
Meridian	170
Quinlan	2,400
Schreiner	150
Turtle Creek	450

(1) Pumps to Airport/Al Mooney Lift Station
(2) Under Construction
(3) Will be decommissioned in 2014

4.2 WASTEWATER MODEL DEVELOPMENT

FNI utilized GIS mapping of the wastewater system and record drawings of major wastewater projects completed since the last wastewater master plan to update the wastewater system model for 8-inch and larger wastewater lines and other critical wastewater lines. The City's 2007 $H_2$0Map Sewer model was updated to include all existing 8" and larger wastewater gravity lines, key 6" wastewater gravity lines and force mains for all major lift stations. FNI updated lift station facility and operational data in the model to represent the 2012 wastewater system conditions.

4.3 WASTEWATER FLOW DISTRIBUTION

The existing wastewater flow was distributed in the model by geocoding, which is a GIS routine that assigns a water usage to the nearest manhole in the model. The water usage came from the City's water billing data and the wastewater flow was determined by calculating the return flow percentage (75%) from average day water demands.

4.4 WASTEWATER SYSTEM DESIGN CRITERIA

Freese and Nichols has established design criteria for future water and wastewater facilities. Criteria were developed for sizing sewer trunk lines, force mains and lift station wet wells and pumping capacities for the wastewater system.

4.4.1 Sewer Trunk Lines and Force Mains

When determining the size of proposed wastewater lines, TCEQ design criteria dictate that gravity sewer lines shall be sized to maintain a minimum velocity of 2 feet/second and a maximum velocity of 8 feet/second. Maintaining these velocities discourages settling of solids and erosion of gravity mains. TCEQ design criteria also state that force mains shall be sized to convey the lift station pumping capacity at a minimum velocity of 2 feet/second with one pump operating, a maximum velocity of 8 feet /second at firm capacity, and a maximum working pressure of 100 psi. When sizing lines for future wastewater loading, it is specifically stated in TCEQ Chapter 217 §217.53 (4) (j) that "Systems shall be designed to preclude surcharge at the expected peak flow." Therefore, all proposed lines are sized to prevent surcharging. TCEQ slope requirements, as shown in **Table 4.2**, were utilized for new lines in undeveloped areas. If proposed lines are constructed at a greater slope and the minimum slopes listed in **Table 4.2**, then the proposed line size should be evaluated based on the updated capacity.

Table 4.2 TCEQ Slope Requirements

Pipe Size (in)	Minimum Slope (ft/ft)	Maximum Slope (ft/ft)
6	0.00500	12.35
8	0.00330	8.40
10	0.00250	6.23
12	0.00200	4.88
15	0.00150	3.62
18	0.00110	2.83
21	0.00090	2.30
24	0.00080	1.93
27	0.00060	1.65
30	0.00055	1.43

4.4.2 Lift Station Pumping Capacity

Lift station capacity was also analyzed under peak wet weather flow conditions. FNI recommends new lift station sizing or lift station expansion sizing to meet TCEQ requirements. TCEQ Chapter 217 §217.62 (c) states that “the firm pumping capacity of all lift stations shall be such that the expected peak flow can be pumped to its desired destination.” Firm pumping capacity is defined as total station, maximum pumping capacity with the largest pumping unit out of service.

4.4.3 WWTP Treatment Capacity

The wastewater treatment plant capacity is based on the average day flow rate, as opposed to lift station capacity, which is based on peak flow rate. TCEQ Chapter 317 references the *Design of Municipal Treatment Plants* for treatment plant design. The *Design of Municipal Treatment Plants* handbook states that treatment capacity is to be based on the “average day flow rate”. Based on this design standard, we have stated the WWTP flow as average day flow.

4.5 WASTEWATER COLLECTION SYSTEM ANALYSIS

The wastewater collection system was evaluated to assess the ability of the system to adequately convey wastewater to the WWTP without excessively surcharging or overflowing. This analysis was performed to determine if there are any existing system deficiencies and also to provide a baseline for the current level of service.

4.5.1 Lift Stations

Table 4.3 provides a list of the modeled lift stations in the City of Kerrville along with the corresponding existing firm pumping capacity and 2012 peak flows. FNI developed the projected 2032 peak flows for each lift station and determined whether a lift station expansion would be required to serve those peak flows. **Table 4.3** indicates that the Jefferson, Knapp, Legion and Comanche Trace lift stations will need to be expanded in the next 20-year planning period. Jefferson Lift Station currently has a firm capacity less than the 2012 peak flow and is a critical project. A second critical project is reducing the firm capacity of the Broadway Lift Station from 2,000 gpm to 500 gpm in order to reduce the peak flows in the Legion interceptors. The Legion Lift Station currently has a firm capacity less than the 2012 peak flow but with the re-direction of a portion of the Jefferson flow. In addition, the G-Street Lift Station will be abandoned upon completion of the 24”/27” G-Street Interceptor currently under design and will need to be decommissioned.

Table 4.3 Lift Station Peak Flows

Lift Station	2012 Firm Capacity (gpm)	2012 Peak Flow (gpm)	2032 Firm Capacity (gpm)	2032 Peak Flow (gpm)
Airport/Al Mooney	180	180	180	180
Birkdale(1)	6,800	1,900	6,800	5,600
Broadway	2,000	175	500	195
Comanche Trace	600	300	1,800	1,300
G-Street(2)	250	**500**	-	-
Jefferson	3,300	**3,400**	5,000	4,900
Knapp	560	**1,200**	1,600	1,600
Legion	3,800	**7,100**	5,900	5,900
Quinlan	2,400	1,100	2,400	2,000

(1) Under Construction
(2) Will be decommissioned in 2014

4.5.2 Interceptors

Overall, the collection system interceptors convey the peak flow without overflows under existing system conditions. CIP projects were developed to alleviate capacity restrictions and reduce the potential for sanitary sewer overflows (SSOs). The following areas demonstrate overflows under future conditions:

- **Interceptors downstream of the Jefferson Lift Station**
  When the Jefferson Lift Station is expanded, the peak flows from the lift station will cause the interceptors downstream of the lift station to surcharge. The excess peak flows from Jefferson Lift Station should be pumped to the Quinlan Lift Station until the Legion interceptors can be replaced.
- **Interceptors downstream of the Knapp Lift Station**
  As the City of Ingram wholesale flow increases, Knapp Lift Station will need to be expanded and a new force main will be constructed which will divert the Knapp Lift Station flows to the Lois Street interceptor. As a result of the increased Ingram wholesale flows, the peak flows from the lift station will cause the interceptors downstream of the lift station to surcharge.
- **Quinlan Basin Interceptors**
  Due to the growth focused in the Whiskey Springs & Gateway developments, the Quinlan Basin interceptors will surcharge unless upsized.

- **Comanche Trace Basin Interceptors**
  Due to the pumped flow from Turtle Creek Lift Station in the Comanche Trace development, the Comanche Trace Basin interceptors will surcharge unless upsized.
- **Interceptors upstream of the Knapp Lift Station**
  Due to the growth focused in the City of Ingram, the Jefferson Basin interceptors upstream of Knapp Lift Station will surcharge unless upsized.

4.6 LIVING UNIT EQUIVALENTS BY SERVICE AREA

Table 4.4 summarizes the growth in living unit equivalents (LUEs) in each of the five major lift station service areas.

The Birkdale service area will grow from 1,268 LUEs to 6,600 LUEs in 2032 as a result of the growth focused in the Tuscany and Comanche Trace developments. After the completion of the Birkdale and Jefferson Lift Station expansions and the G-Street interceptor, the Birkdale service area will receive flow from the Birkdale, Comanche Trace, G-Street and Jefferson basins.

The G-street service area will be served by the G-Street interceptor upon completion of the Birkdale Lift Station and decommissioning of the G-Street Lift Station. The G-Street service area will grow from 205 LUEs to 3,705 LUEs as a result of the growth focused in the Eckard, Water and Bear Creek developments and the 173 Commercial Corridor. Upon completion of the Jefferson Lift Station expansion, the G-Street service area will received 1,600 gpm of flow from the Jefferson service area.

The Jefferson service area serves the City of Ingram wholesale flow through Knapp Lift Station. The Jefferson service area will grow from 4,814 LUEs to 7,552 LUEs as a result of the growth focused in the Town Creek and Kirk Ranch developments and commercial infill along Highway 27. The Jefferson Lift Station flow is pumped to two basins as seen in **Table 4.4**.

The Legion service area receives flow from the Legion Basin and Broadway, Jefferson and Al Mooney Lift Stations. The construction of the Birkdale Lift Station delays the expansion of the Legion Lift Station to beyond 2020.

The Quinlan service temporarily receives flow from the Jefferson Lift Station. The Jefferson Lift Station expansion will direct all Jefferson flow to the Legion and Birkdale service areas. As a result of the growth focused in the Whiskey Springs and Gateway developments, the Quinlan basin flow will increase but the total contributing LUEs will decrease as a result of removing the current Jefferson Lift Station flow.

Table 4.4 Living Unit Equivalents by Lift Station Service Area

Contributing Source	2012 2 Hour Peak Flow (MGD)	2012 2 Hour Peak Flow (gpm)	2032 2 Hour Peak Flow (MGD)	2032 2 Hour Peak Flow (gpm)
Birkdale Lift Station Service Area				
	2012 = 1,268 LUE		**2032 = 6,600 LUE**	
Birkdale Basin	1.5	1,042	2.17	1,507
G-Street Basin (2032 Includes Jefferson LS Flow)			4.62	3,208
Comanche Trace LS Flow			2.3	1,600
Total Birkdale Flows	**1.5**	**1,042**	**9.09**	**6,315**
G-Street Service Area				
	2012 = 205 LUE		**2032 = 3,705 LUE**	
G-St Basin	0.76	528	2.32	1,611
Jefferson LS Flow			2.3	1,600
Total G-Street Flows	**0.76**	**528**	**4.62**	**3,211**
Jefferson Lift Station Service Area				
	2012 = 4,814 LUE * 33% to Legion *67% to Quinlan		**2032 = 7,552 LUE** * 68% to Legion *32% to Birkdale	
Jefferson Basin	4.13	2,868	5.66	3,931
Ingram Wholesale	0.76	528	1.45	1,000
Total Jefferson Flows	**4.89**	**3,396**	**7.11**	**4,931**
Legion Lift Station Service Area				
	2012 = 7,530 LUE		**2032 = 7,941 LUE**	
Legion Basin	2.35	1,632	2.61	1,812
Broadway LS (2012 includes G-Street)	2.88	2,000	0.72	500
Al Mooney LS	0.26	181	0.26	181
Jefferson LS	1.58	1,100	4.9	3,400
Total Legion Flows	**7.07**	**4,913**	**8.49**	**5,893**
Quinlan Lift Station Service Area				
	2012 = 4,352 LUE		**2032 = 2,651 LUE**	
Quinlan Basin	1.55	1,076	2.89	2,007
Jefferson LS Flow	3.17	2,200		
Total Quinlan Flows	**4.72**	**3,276**	**2.89**	**2,007**

5.0 WASTEWATER COLLECTION SYSTEM CIP

A capital improvements plan (CIP) was developed for the City of Kerrville. The recommended improvements will provide the required capacity and reliability to meet projected wastewater flows through 2032. The recommended projects for the wastewater collection system are presented on **Figure 5.1**. The project numbers shown on **Figure 5.1** are for the wastewater collection system prioritization. These projects are renumbered for the purposes of the integrated wastewater system capital improvement plan which are shown in **Section 9**. Projects D1 through D4 are fully dependent upon future development and would not serve any current City wastewater flow. The wastewater flow impacts of these developments are accounted for the downstream wastewater system analysis but the projects themselves are not included in the City capital improvement plan.

Locations shown for new mains and other recommended improvements were generalized for hydraulic analyses. Specific alignments and sites will be determined as part of the design process. It is recommended that the City fund their Water Reclamation Division at a level which allows for sustainable operations, maintenance, and completion of in house projects. Cities can typically defer certain capital expenditures by sufficiently funding annual maintenance efforts. It is recommended that these projects be constructed generally in the order listed. However, development patterns may make it necessary to construct some projects sooner than anticipated.

Capital costs were calculated for the major wastewater facilities and do not include individual service connections or subdivision lines. The costs are in 2012 dollars and include an allowance for engineering, surveying, and contingencies. **Table 5.1** provides the unit costs used to develop the cost estimates for each project. Detailed descriptions of the projects and associated costs are included in **Appendix D**.

Table 5.1 Wastewater Projects Unit Costs

Item	Unit Cost
Gravity Line	$7/diameter-inch/linear foot
Force Main	$7/diameter-inch/linear foot
48” Manhole	$3,500 each
60” Manhole	$5,000 each
Boring & Casing	$17.50/diameter-inch/linear foot
Pavement Repair	$30/linear foot

The following section lists the individual projects and provides a description and purpose. The collection system improvements will be integrated with the WWTP improvements and phased into planning periods as described in **Section 9**.

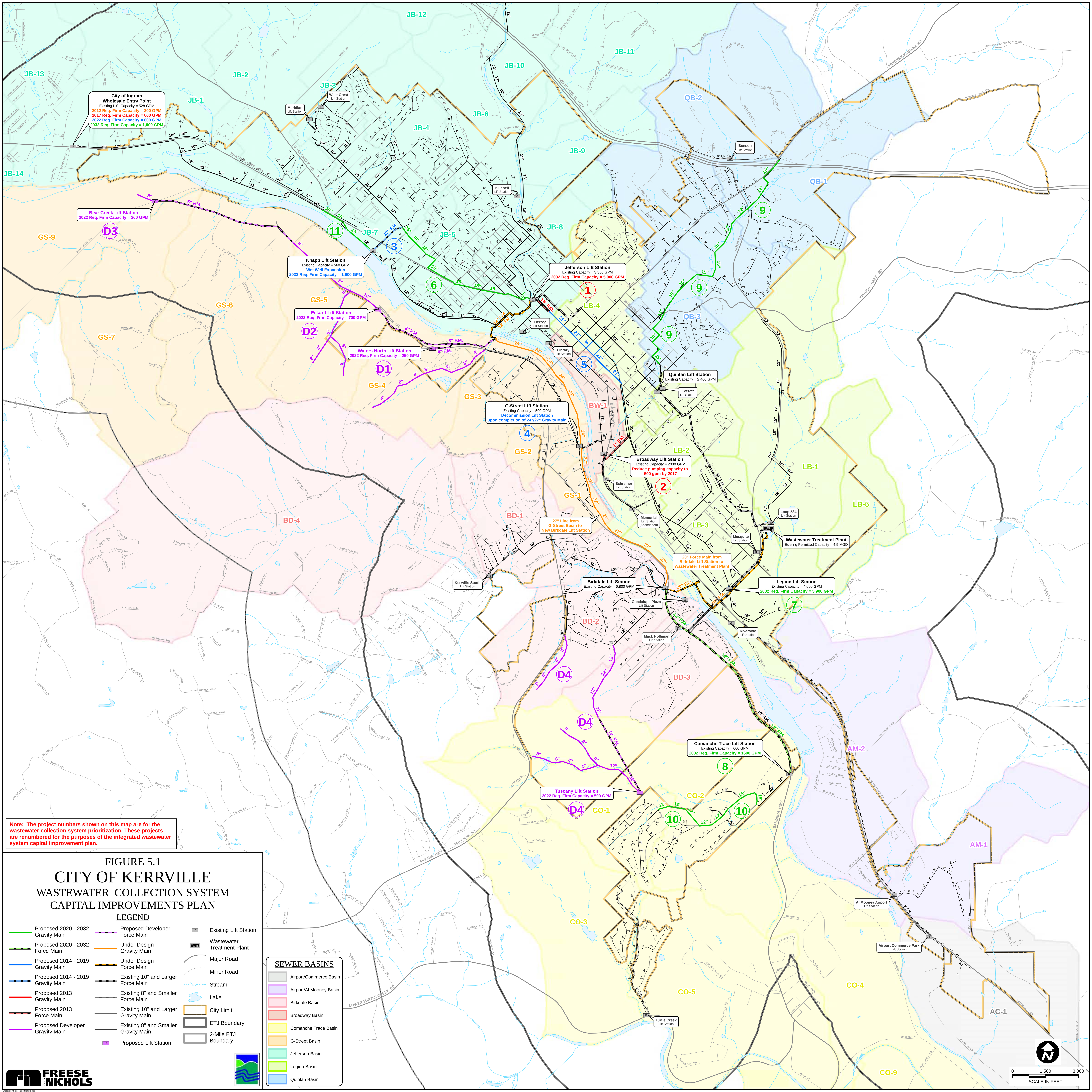

City of Ingram
Wholesale Entry Point
Existing L.S. Capacity = 528 GPM
2012 Req. Firm Capacity = 200 GPM
2017 Req. Firm Capacity = 600 GPM
2022 Req. Firm Capacity = 800 GPM
2032 Req. Firm Capacity = 1,000 GPM
Bear Creek Lift Station
2022 Req. Firm Capacity = 200 GPM
Knapp Lift Station
Existing Capacity = 560 GPM
Wet Well Expansion
2032 Req. Firm Capacity = 1,600 GPM
Eckard Lift Station
2022 Req. Firm Capacity = 700 GPM
Waters North Lift Station
2022 Req. Firm Capacity = 250 GPM
Jefferson Lift Station
Existing Capacity = 3,300 GPM
2032 Req. Firm Capacity = 5,000 GPM
Quinlan Lift Station
Existing Capacity = 2,400 GPM
G-Street Lift Station
Existing Capacity = 500 GPM
Decommission Lift Station
upon completion of 24"/27" Gravity Main
Broadway Lift Station
Existing Capacity = 2000 GPM
Reduce pumping capacity to
500 gpm by 2017
27" Line from
G-Street Basin to
New Birkdale Lift Station
20" Force Main from
Birkdale Lift Station to
Wastewater Treatment Plant
Wastewater Treatment Plant
Existing Permitted Capacity = 4.5 MGD
Birkdale Lift Station
Existing Capacity = 6,800 GPM
Legion Lift Station
Existing Capacity = 4,000 GPM
2032 Req. Firm Capacity = 5,900 GPM
Comanche Trace Lift Station
Existing Capacity = 600 GPM
2032 Req. Firm Capacity = 1600 GPM
Tuscany Lift Station
2022 Req. Firm Capacity = 500 GPM
Meridian Lift Station
West Crest Lift Station
Bluebell Lift Station
Benson Lift Station
Herzog Lift Station
Library Lift Station
Everett Lift Station
Schreiner Lift Station
Memorial Lift Station (Abandoned)
Mesquite Lift Station
Loop 534 Lift Station
Kerrville South Lift Station
Guadalupe Plaza Lift Station
Mack Holliman Lift Station
Riverside Lift Station
Al Mooney Airport Lift Station
Airport Commerce Park Lift Station
Turtle Creek Lift Station
JB-1
JB-2
JB-3
JB-4
JB-5
JB-6
JB-7
JB-8
JB-9
JB-10
JB-11
JB-12
JB-13
JB-14
QB-1
QB-2
QB-3
LB-1
LB-2
LB-3
LB-4
LB-5
GS-1
GS-2
GS-3
GS-4
GS-5
GS-6
GS-7
GS-9
BW-1
BD-1
BD-2
BD-3
BD-4
CO-1
CO-2
CO-3
CO-4
CO-5
CO-9
AM-1
AM-2
AC-1
1
2
3
4
5
6
7
8
9
10
11
D1
D2
D3
D4
Note: The project numbers shown on this map are for the wastewater collection system prioritization. These projects are renumbered for the purposes of the integrated wastewater system capital improvement plan.
FIGURE 5.1
CITY OF KERRVILLE
WASTEWATER COLLECTION SYSTEM
CAPITAL IMPROVEMENTS PLAN
LEGEND
Proposed 2020 - 2032 Gravity Main
Proposed 2020 - 2032 Force Main
Proposed 2014 - 2019 Gravity Main
Proposed 2014 - 2019 Force Main
Proposed 2013 Gravity Main
Proposed 2013 Force Main
Proposed Developer Gravity Main
Proposed Developer Force Main
Under Design Gravity Main
Under Design Force Main
Existing 10" and Larger Force Main
Existing 8" and Smaller Force Main
Existing 10" and Larger Gravity Main
Existing 8" and Smaller Gravity Main
Proposed Lift Station
Existing Lift Station
Wastewater Treatment Plant
Major Road
Minor Road
Stream
Lake
City Limit
ETJ Boundary
2-Mile ETJ Boundary
SEWER BASINS
Airport/Commerce Basin
Airport/Al Mooney Basin
Birkdale Basin
Broadway Basin
Comanche Trace Basin
G-Street Basin
Jefferson Basin
Legion Basin
Quinlan Basin
0
1,500
3,000
SCALE IN FEET
FREESE AND NICHOLS

Table 5.2 summarizes the 20-year wastewater collection system capital improvement plan for the City of Kerrville. A 3% annual inflation factor was applied to each of the projects beyond 2013. For the planning period 2014 to 2019, the annual inflation factor was applied through the year 2019 and for the planning period 2020 to 2032, the annual inflation factor was applied through the year 2032.

Table 5.2 Wastewater Collection System CIP

Proj. No.	Scope	Project Cost	Project Cost with Annual 3% Inflation
1	New 5,000 gpm Jefferson Lift Station and 12" & 16" Force Mains	**$4,539,300**	**$4,539,300**
2	Reduce Broadway Lift Station Capacity to 500 gpm	**$486,800**	**$486,800**
3	New Knapp Wet Well & 12" Force Main	**$1,258,000**	**$1,547,214**
4	G-Street Lift Station Decommission	**$78,000**	**$95,932**
5	21" Interceptor Downstream of Jefferson Lift Station	**$1,412,200**	**$1,736,865**
6	15"/18"/21" Interceptors Downstream of Knapp LS	**$1,849,000**	**$3,339,479**
7	New 5900 gpm Legion Lift Station	**$4,290,000**	**$7,748,169**
8	New 1,600 gpm Comanche Trace Lift Station & 12" Force Main	**$1,547,000**	**$2,794,037**
9	Quinlan Basin 10"/12"/15" Interceptors	**$2,639,900**	**$4,767,923**
10	Comanche Trace 12"/15" Interceptors	**$1,336,400**	**$2,413,672**
11	15" Interceptor Upstream of Knapp Lift Station	**$605,300**	**$1,093,232**
	Collection System CIP Total:	***$20,041,900***	***$30,562,623***

* Costs include Mobilization, Engineering, O & P and Contingency

5.1 20-YEAR WASTEWATER COLLECTION SYSTEM CIP

The CIP projects included in the 20-year time period resolve existing deficiencies or accommodate anticipated growth. A detailed description of each project is provided below.

Project 1: New Jefferson Lift Station

Project 1 is the construction of a new Jefferson Lift Station, which is currently operating beyond its firm capacity. Jefferson Lift Station will be expanded from its current firm pumping capacity of 4.75 MGD to 7.2 MGD (5000 gpm). This project will be sized to serve the existing and future peak flows from the Jefferson Basin and Ingram wholesale. One new wet well, new pumps and two new force mains will be installed at the New Jefferson Lift Station. One 12” force main will direct approximately 2.3 MGD (1600 gpm) of flow across the river along Lemos to the future 24”/27” gravity main in the G-Street Basin which will convey flow from Lemos to the new Birkdale Lift Station. Another 16” force main will direct approximately 4.6 MGD (3400 gpm) of flow from the Jefferson Lift Station to the Legion Basin. Until Projects 5 and 7 (see project descriptions below) are completed, the force main which currently directs flow to Quinlan Lift Station will remain in service due to capacity constraints in the Legion Lift Station. In the future, an emergency valve will continue to allow flow to be pumped to the Quinlan Lift Station in emergency situations.

Project 2: Reduce Broadway Lift Station Capacity to 500 gpm

Project 2 is the reduction of capacity of the Broadway Lift Station by replacing the current 2,000 gpm pumps with 500 gpm pumps and replacing the existing force main with a new 8" force main. The Broadway Lift Station currently receives flow from the G-Street Lift Station; however, in the future, the G-Street basin will be served by the new Birkdale Lift Station. The ultimate peak flow for the Broadway basin, after removing the G-Street Lift Station is only 195 gpm. This project will allow the City to avoid pumping 2,000 gpm from the Broadway Lift Station and therefore reduce or eliminate the need to unnecessarily account for this flow in downstream infrastructure projects.

Project 3: New Knapp Wet Well & 12" Force Main

Project 3 is the construction of a new wet well and 12" force main at Knapp Lift Station. The pumps have recently been replaced and sized to meet 20-year peak flows but the wet well and force main have not been upgraded yet. Four pumps are currently in place at the Knapp Lift Station, with a firm pumping capacity of 560 gpm to meet the peak flows from the northwestern Jefferson Basin and the City of Ingram Wholesale. A new wet well and new 12" force main will be installed at the New Knapp Lift Station to convey flow to the Lois Street interceptor. With these improvements, the firm pumping capacity will increase to 1,600 gpm.

Project 4: Decommission G-Street Lift Station

Project 4 consists of the decommissioning of the G-Street Lift Station upon completion of the new 24"/27" G-Street Interceptor and the new Birkdale Lift Station.

Project 5: 21" Interceptor Downstream of Jefferson Lift Station

Project 5 consists of a new 21" interceptor to increase the hydraulic capacity to serve the flow from the expanded Jefferson Lift Station (see Project 1).

Project 6: 15”/18”/21” Interceptor Downstream of Knapp Lift Station

Project 6 consists of new interceptors downstream of the new Knapp Lift Station force main in the Jefferson Basin. A 15" gravity line will be constructed between Bob White and Harper along Lois St. An 18” line will be constructed between Harper Rd. and Water St. along Lois St. and Junction Hwy. A 21” line will be constructed from Water St. to the Jefferson Lift Station.

Project 7: New 5900 gpm Legion Lift Station

Project 7 is the expansion of the Legion Lift Station, which is currently operating close to its firm capacity. The City is currently in the process of implementing projects that will reduce the current load on the Legion Lift Station; however, as Jefferson Basin flows continue to increase, it will be necessary to upgrade the Legion Lift Station. The Legion Lift Station will be expanded from its current firm pumping capacity of 5.76 MGD (4,000 gpm) to 8.5 MGD (5,900 gpm). The existing 12” and 14” force mains have sufficient capacity to handle this expansion and therefore no force main upsizing will be required.

Project 8: New 1600 gpm Comanche Trace Lift Station

The existing Comanche Trace basin facilities are not designed to handle the peak flows from the Comanche Trace development. **Project 8** is the expansion of the Comanche Trace Lift Station from its current firm pumping capacity of 0.86 MGD to 2.3 MGD (1600 gpm) to serve the future peak flows from the Comanche Trace development. The 10” State Highway 173 force main which runs from the Comanche Trace Lift Station to the New Birkdale Lift Station will need to be increased to 12” when the pumps at the Comanche Trace Lift Station are upgraded.

Project 9: Quinlan Basin 10”/12”/15” Interceptor

Project 9 is the construction of a new 10”/12”/15” gravity line from Sydney Baker and I-10 to the existing 18” line near 3rd & Ross. This line will serve the growth in the upstream section of the Quinlan Basin and the Whiskey Springs development located along I-10 east of Sydney Baker and will alleviate capacity problems in the existing Quinlan Basin interceptors.

Project 10: Comanche Trace 12"/15" Interceptors

Project 10 is the construction of a new 12"/15" line in the Comanche Trace Basin. The new 12" line will replace an existing 8" line from Trail Head Court downstream along Comanche Trace Drive to Mulligan Way. The new 15" line will replace an existing 12" from Mulligan Way to Rock Barn Drive. This project is necessary to provide sufficient hydraulic capacity in the Comanche Trace development.

Project 11: 15" Interceptor Upstream of Knapp Lift Station

Project 11 is the construction of a new 15" line from Goat Creek Rd. to Knapp Rd. in the Jefferson Basin. This project will provide the needed capacity as the City of Ingram's wholesale flow continues to increase.

6.0 WWTP CONDITION ASSESSMENT

For the treatment plant portion of this study, FNI was tasked with performing a risk and capacity assessment for the plant, evaluating alternatives for providing wastewater treatment for the 20 year planning period. The risk assessment consisted of an evaluation of the condition and criticality of the current Kerrville Wastewater Treatment Plant (WWTP) components. FNI presented the results of the complete WWTP assessment to the Kerrville City Council on May 31, 2012. This document, in conjunction with the presentation given to the City Council, expresses the results and recommendations from FNI's analyses of the Kerrville WWTP.

6.1 DESCRIPTION OF EXISTING WWTP

The Kerrville WWTP has undergone several additions and expansions since the construction of the initial trickling filter plant in the 1950's. **Table 6.1** provides a brief overview of construction at the plant since the 1950's to reflect the current condition and site layout shown on **Figure 6.1**.

Table 6.1 WWTP Construction History

Year	Treatment Process Improvement
1950's	Built trickling filter plant
1974	Constructed 2MGD oxidation ditch along with Clarifier No. 1
1984	Added Clarifier No. 3
1987	Plant upgraded to current capacity of 4.5 MGD. Added Anoxic Basin, Equalization Basin, Filters, Chlorine Contact Basin, etc.
2003	New 8 MGD capacity Headworks was added along with the rehabilitation of Clarifier No. 1
2011	New Belt Filter Press Facility added

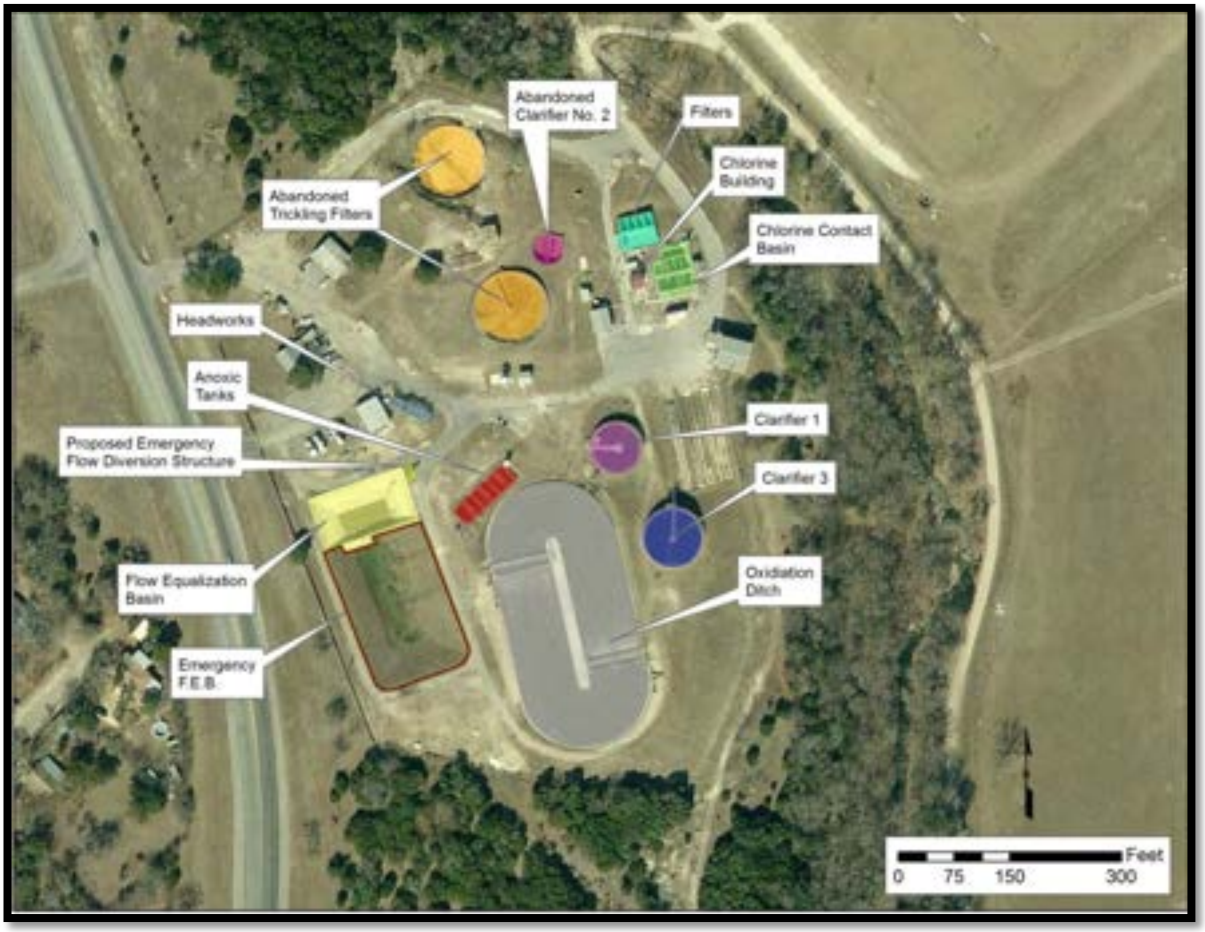
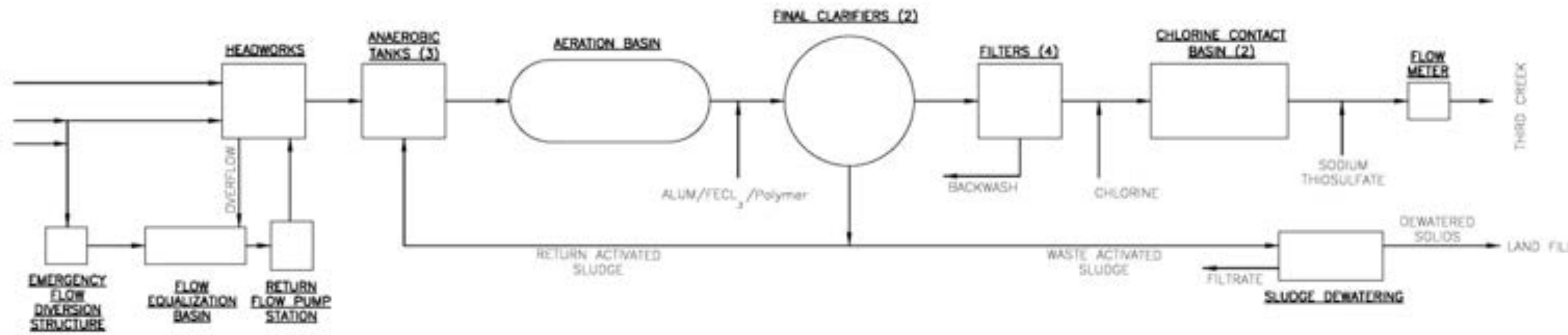


Figure 6.1 WWTP Site Overview

6.1.1 WWTP Processes

The plant schematic, shown on **Figure 6.2**, provides an overview of the current plant processes. The plant has a permitted average daily flow (ADF) of 4.5 million gallons per day (MGD) and a 2-hr peak capacity of 7 MGD or 4,861 gallons per minute (gpm). The plant is designed to remove organic wastes (BOD), suspended solids (SS), ammonia nitrogen (NH_3-N), and phosphorus (P). The following is a description of the unit processes and their role in meeting treatment objectives.

Figure 6.2 WWTP Process Schematic



Once arriving at the headworks, the raw sewage is metered and undergoes initial fine screening and grit removal. Screening removes large objects, rags, and other debris that cannot be treated and may clog downstream processes. Grit removal removes sand and other inert, readily settleable materials. Effluent from the headworks is sent to the anoxic tanks or diverted to the flow equalization basin (FEB) during periods of high flow. Upon completion of the Birkdale Lift Station Project, two force mains will deliver raw influent to the headworks. One force main will come directly from the Quinlan Lift Station and the other will contain the combined flows from the Legion and Birkdale Lift Stations by way of the proposed Emergency Flow Diversion Structure. The current headworks is rated for a peak flow capacity of 8 MGD. The addition of the Emergency Flow Diversion Structure will provide an additional means to divert flow directly to the FEB without overflowing the headworks during peak flow events. **Figure 6.3** shows the current headworks and FEB.

Figure 6.3 Headworks (top) and FEB (bottom)

After screening and grit removal, the plant influent is sent to the Anoxic Tanks. The Anoxic Tanks serve as the first step in the biological treatment process for the plant. The wastewater is combined with microorganisms that are recycled from the clarifiers known as return activated sludge (RAS) to form mixed liquor (ML). The conditions of the anoxic tank aid in selecting bacteria to remove phosphorus (P). Upon exiting the anoxic tanks, the ML flows into the oxidation ditch; the second and final step of the biological treatment process. Two partially submerged horizontal rotors on opposite ends of the tank provide mixing and transfer the oxygen necessary to promote aerobic biological treatment. Floating rotors can be added to augment the transfer of oxygen to the sludge as needed or replace a rotor that is out of service. The combined anoxic tank/oxidation ditch treatment removes organic material, NH_3-N, and P in order to achieve compliance with the permit discharge limitations summarized in Section 5.1.B. **Figure 6.4** displays the first and third Anoxic Tank, as well as the Oxidation Ditch influent and its rotors.

Figure 6.4 Anoxic Tank (top) and Oxidation Ditch (bottom)

The ML from the oxidation ditch flows to a splitter box, where it is distributed to the two clarifiers (1 and 3). The clarifiers remove suspended solids (SS) by allowing them to settle to the bottom of the tanks where the settled solids can then be removed. Alum and occasionally ferric chloride are added to the ML upon exiting the oxidation ditch to enhance the removal of P in the clarifiers. Settled solids are sent to the central pump house to be either pumped back to the anoxic tank or sent to the belt filter presses to be dewatered. The clarifiers are pictured on **Figure 6.5**.

Figure 6.5 Clarifier No. 1 (right) and Clarifier No. 3 (left)

Secondary effluent from the clarifiers combines in a junction box and flows to the effluent filters. The purpose of the filters is to remove SS that are too light to settle in the clarifiers. The effluent filters consist of four individual sand media filters. The filter media consists of approximately 4 feet of sand and 18 inches of gravel for structural support. The gravel then sits on top of the filter underdrain.

The filter effluent is conveyed to the chlorine contact basin where it is chlorinated to kill pathogens in the water. The chlorine gas is fed from three one-ton cylinders located on a covered concrete slab outside of the chlorine feed building. The chlorine contact basin consists of two parallel tanks of identical size each containing four baffle walls to ensure proper contact time and mixing. One of the filters and the chlorine contact basin is shown on **Figure 6.6.**

Figure 6.6 Effluent Filters (left) and Chlorine Contact Basin (right)

Water for reuse customers is pumped directly from the chlorine contact basin, while the final plant effluent is dechlorinated using sodium thiosulfate to prevent harm to aquatic life and then discharged to Third Creek. Third Creek then eventually empties into the Guadalupe River.

6.1.2 Permit Limits and Compliance

Table 6.2 details the effluent discharge limits for the Kerrville WWTP as well as the plant's rated capacities for average and 2-hr peak flow. The effluent limits for NH_3-N and P vary depending on the flow rate in the Guadalupe River as described in the note below **Table 6.2**. The full TCEQ TPDES permit is shown in **Appendix E**. This permit expires on February 1, 2015.

The flow in the Guadalupe River shall be measured once per day by the City of Kerrville at the TCEQ Stream Monitoring network Station No. 1806.0242 located at the City of Kerrville Dam. When this flow is measured to be 50 cubic feet per second (cfs) or less for five consecutive days the, the more stringent effluent parameters for Ammonia Nitrogen and Total Phosphorus shall be required. These more stringent parameters shall remain in effect until the flow exceeds 50 cfs for five (5) consecutive days, at which time the less stringent parameters for Ammonia Nitrogen and Total Phosphorus shall be in effect. The parameters of 5 mg/l for Carbonaceous Biochemical Oxygen Demand and 5 mg/l for Total Suspended Solids shall be in effect for all flow conditions.

Table 6.2 Discharge Permit Summary for Kerrville WWTP

Effluent Characteristics		Discharge Limitations			
		Daily Avg (mg/l (lbs/day))	7-day Avg (mg/l)	Daily Max (mg/l)	Single Grab (mg/l)
Flow, MGD		Report	N/A	Report	mg/l
Carbonaceous Biochemical Oxygen Demand (5-day)		5 (188)	8	13	18
Total Suspended Solids		5 (188)	10	15	20
Ammonia Nitrogen	Flow > 50 cfs*	2 (75)	4	7	10
	Flow < 50 cfs*	1 (38)	2	4	5
Total Phosphorus	Flow > 50 cfs*	1 (38)	2	4	5
	Flow < 50 cfs*	0.5 (19)	1	2	3
E. coli, colonies per 100 ml		126	N/A	394	N/A
Flow Limitations					
Annual Average Flow		4.5	MGD		
2-hour Peak Flow		4,861	gpm		
		7	MGD		

* The flow in the Guadalupe River shall be measured once per day by the City of Kerrville at the TCEQ Stream Monitoring network Station No. 1806.0242 located at the City of Kerrville Dam. When this flow is measured to be 50 cfs or less for five consecutive days, the more stringent effluent parameters for Ammonia Nitrogen and Total Phosphorus shall be required. These more stringent parameters shall remain in effect until the flow exceeds 50 cfs for five (5) consecutive days, at which time the less stringent parameters for Ammonia Nitrogen and Total Phosphorus shall be in effect. The parameters of 5 mg/l for Carbonaceous Biochemical Oxygen Demand and 5 mg/l for Total Suspended Solids shall be in effect for all flow conditions.

Table 6.3 lists the annual average effluent characteristics for the plant for years 2009 to 2011.

Table 6.3 Monthly Discharge Characteristics at Kerrville WWTP from 2009-2011

Parameter Effluent Characteristics										
	pH	TSS (mg/l)	BOD (mg/l)	NH_3-N (mg/l)	P (mg/l)	Pre De-Chlor. Cl_2 (mg/l)	D.O. (mg/l)	Temp. (°C)	Average Flow (MGD)	2-Hr Peak Flow (gpm)
Average	7.71	0.96	2.68	0.07	0.14	1.51	8.23	*21.50*	1.56	3158.34
Maximum	7.80	1.53	5.43	0.15	0.39	3.31	10.01	27.80	2.15	4768.00
Daily Average* TCEQ Parameters	6-9	5.00	5.00	2.00	1.00	1.00	4.00	-	4.50	4,861.00

* Daily discharge limits are dependent on the Guadalupe River flow.

Figure 6.7 and **Figure 6.8** track the monthly average BOD, NH_3-N, and P concentrations present in the effluent. Historically, the Kerrville WWTP is successful at meeting the limits of the Texas Pollutant Discharge Elimination System (TPDES) permit issued by the Texas Commission on Environmental Quality (TCEQ). However, the average flow rates tend to be much lower than the design flow rates, so the plant is operating well below its rated capacity.

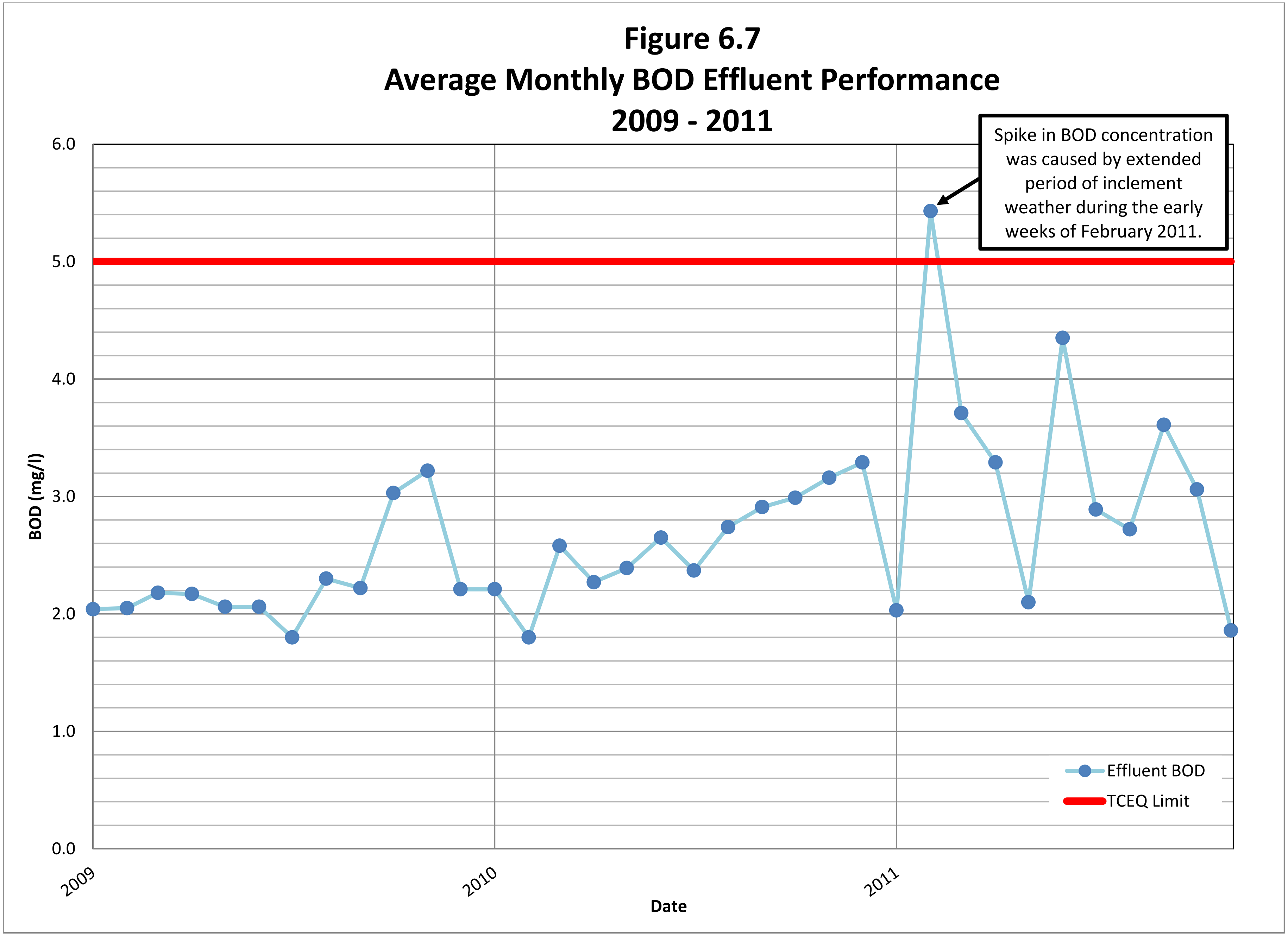


Figure 6.7
Average Monthly BOD Effluent Performance
2009 - 2011
Spike in BOD concentration was caused by extended period of inclement weather during the early weeks of February 2011.
BOD (mg/l)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2009
2010
2011
Date
Effluent BOD
TCEQ Limit

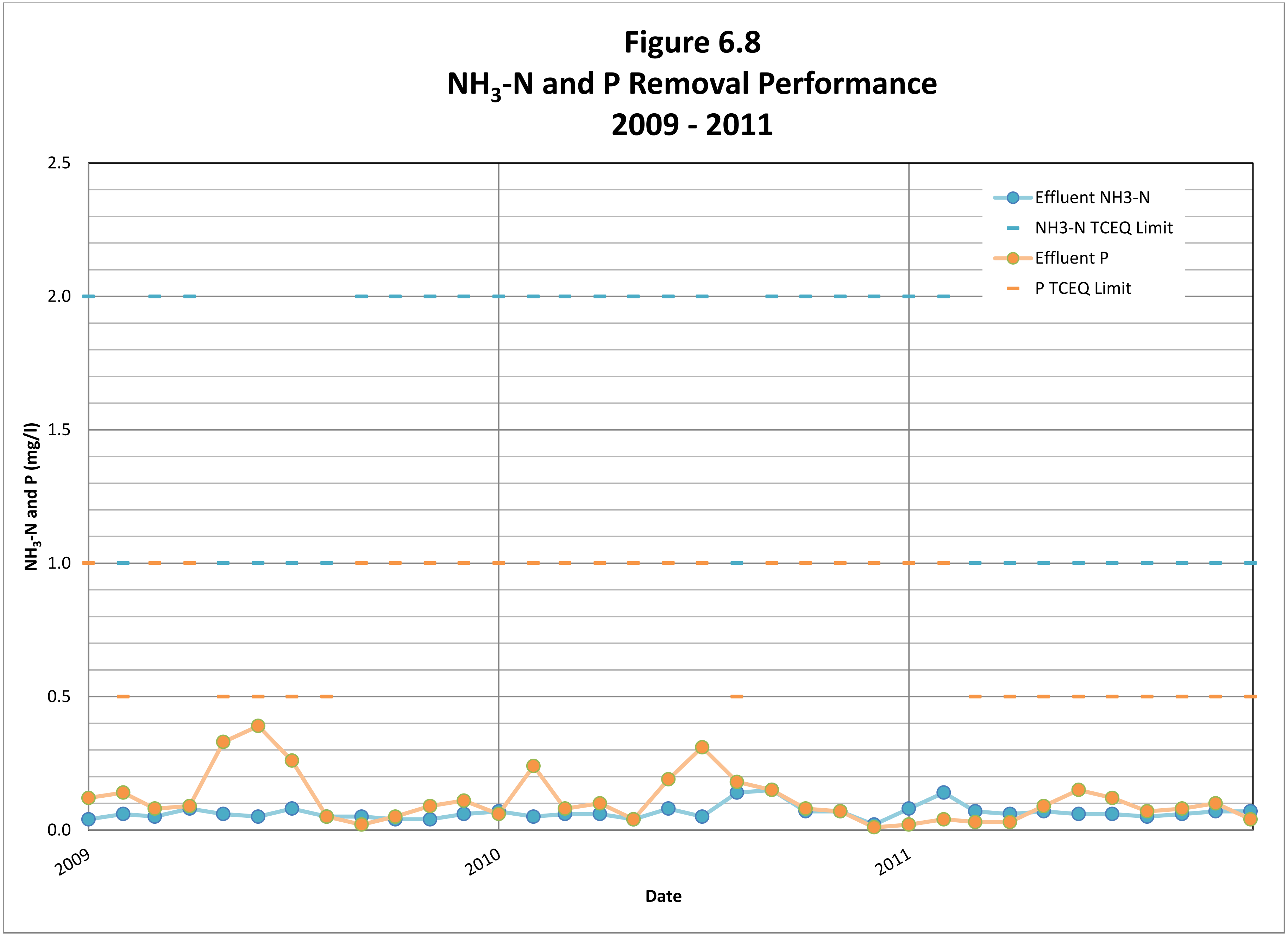


Figure 6.8
NH_3-N and P Removal Performance
2009 - 2011
2.5
2.0
1.5
1.0
0.5
0.0
NH_3-N and P (mg/l)
2009
2010
2011
Date
Effluent NH3-N
NH3-N TCEQ Limit
Effluent P
P TCEQ Limit

6.2 WWTP CONDITION ASSESSMENT

On January 13, 2012, a team from Freese and Nichols visited the Kerrville WWTP to assess the condition of the equipment with the assistance of plant management. Every significant component of the plant was evaluated in terms of its current condition and its criticality to meeting treatment objectives.

6.2.1 Condition Scoring System

Each major process and piece of equipment at the WWTP was evaluated and its condition scored by performance, age, and maintenance history. Condition scores range from 0 – 100, with a condition score of zero being the best and one hundred being the worst. Condition scoring followed the guidelines in **Table 6.4**.

Table 6.4 Condition Scoring System

CONDITION ASSESSMENT SCORING LEGEND	
Score	**Condition Assessment Scoring Definition**
0 - 20	New: Perfect condition
21 - 40	Good Condition: No improvements recommended to maintain function
41 - 60	Fair Condition: Improvements recommended to improve performance or efficiency
61 - 80	Poor Condition: Improvements recommended to maintain reliability
81-100	Eminent Failure: Rehabilitation or replacement required

Each process piece of equipment has very different components so a distinct set of criteria was developed for each to aid the evaluation. Six of the plant components had at least one piece of equipment with a condition score of 100. These plant components can be replaced by plant staff through operations and maintenance budgets rather than being included in the CIP. Full results from the condition scoring process are included in **Appendix F**.

6.2.2 Criticality Scoring System

In addition to considering its physical condition, the criticality of each process or piece of plant equipment was considered with respect to its role in the overall performance of the plant. Scores were determined according to the description in **Table 6.5**.

Table 6.5 Criticality Scoring

CRITICALITY ASSESSMENT SCORING LEGEND	
Score	**Criticality Assessment Scoring Definition**
Low Impact	**Total Score < 30**
Medium Impact	**30 ≤ Total Score < 50**
High Impact	**50 ≤ Total Score ≤ 70**
Very High Impact	**Total Score > 70**

To assist in establishing a specific score, criticality was evaluated based on the amount of treatment capacity affected if all or a portion of the component was to fail, the impact on treatment effectiveness, and the probable length of an outage to perform a significant repair. The criteria used for scoring the criticality of WWTP equipment is shown in **Table 6.6**.

Table 6.6 Criticality Criteria

CRITICALITY PARAMETERS & WEIGHTING SYSTEM
Capacity Affected (30%)
Based on Percent of Total Plant Capacity Lost
(≤ 13%) Capacity Lost = 10
(14 - 25%) Capacity Lost = 30
(26 - 50%) Capacity Lost = 50
(51 - 85%) Capacity Lost = 70
(≥ 86%) Capacity Lost = 100
Process Impact (50%)
Based on Treatment Process Effectiveness w/o Component
Mild = 20
Moderate = 55
Severe = 100
Outage Duration (20%)
Based on Estimated Response Time, Parts Availability and Length of Repair
≤ 2 Days = 10
3 - 15 Days = 40
16 - 29 Days = 70
≥ 30 Days = 100

The Site Visit Evaluation Summary is located in **Appendix D**.

6.2.3 Risk Assessment Summary

Risk can be defined as the "Probability of failure (Condition) multiplied by the consequence of failure (Criticality)." In order to obtain an overall risk score for each treatment component, the condition and criticality scores were combined in a matrix as shown on **Figure 6.9**.

		Condition				
		Very Good	Good	Fair	Poor	Very Poor
Criticality	Low Impact	Belt Press - New	Belt Press – Old Effluent Meter & Composite Sampling Water System			
	Medium Impact		Headworks Splitter Box @ Headworks	Chlorine Contact Basin Effluent Filters Filter Backwash Handling		
	High Impact		Anoxic Tank Clarifier 1 Flow Equalization Basin			
	Very High Impact		Chlorination Building Dechlorination System	Chemical Feed System Oxidation Ditch RAS Pumps	Electrical Clarifier 3	

Figure 6.9 Risk Assessment Matrix

Table 6.7 summarizes the overall condition, criticality, and risk scores for each treatment component.

Table 6.7 Risk Assessment Scores

Facility	Condition	Criticality	Condition Rating	Criticality Rating	Risk
Electrical - main	62.50	100.00	Poor	Very High Impact	High Risk
Clarifier 3	78.00	72.00	Poor	Very High Impact	High Risk
Chemical Feed System	51.38	82.00	Fair	Very High Impact	High Risk
Oxidation Ditch	47.75	88.00	Fair	Very High Impact	High Risk
RAS Pump Stations	46.75	82.00	Fair	Very High Impact	High Risk
Anoxic Tank	39.50	63.00	Good	High Impact	Medium Risk
Chlorination Building	30.75	82.00	Good	Very High Impact	Medium Risk
Chlorine Contact Basin	60.00	47.00	Fair	Medium Impact	Medium Risk
Clarifier 1	37.50	62.50	Good	High Impact	Medium Risk
Dechlorination System	37.50	82.00	Good	Very High Impact	Medium Risk
Effluent Filters	40.88	40.00	Fair	Medium Impact	Medium Risk
Filter Backwash Handling	49.25	38.50	Fair	Medium Impact	Medium Risk
Flow Equalization Basin	35.50	58.00	Good	High Impact	Medium Risk
Belt Press - Old	31.75	8.00	Good	Low Impact	Low Risk
Belt Press - New	0.00	8.00	Very Good	Low Impact	Low Risk
Effluent Meter and Composite Sampling	27.50	21.00	Good	Low Impact	Low Risk
Headworks	30.00	48.00	Good	Medium Impact	Low Risk
Splitter Box @ Headworks	25.00	34.50	Good	Medium Impact	Low Risk
Water System - Plantwide	30.50	30.00	Good	Low Impact	Low Risk

Overall, five systems or pieces of equipment are considered in High Risk status (**Table 6.7**) and should be considered potential targets for near-term improvements as described in the following list:

1. Main Electrical System
    a. The age of the main electrical system is showing in several locations at the plant with decaying metal and fraying wires. The motor control centers (MCCs) have water collecting in them causing a hazard as well as a possible failure.
    b. Without the main electrical system, the plant would suffer a catastrophic failure and almost every process would be unable to perform its designed function.
2. Clarifier 3
    a. The centerwell is in poor condition and the rake and the scum skimmer are unable to scrape the entire circumference of the clarifier possibly due to either improper construction or the clarifier structure having moved (e.g. slid down-grade) at the plant site.
    b. As the larger clarifier, Clarifier 3 would have a critical impact on overall plant performance if it went down.
3. Chemical Feed System
    a. Emergency showers are missing, the chemical feed building structure is deficient, the bulk alum storage system is aging, the control panel is corroded, and piping and valves were leaking.
    b. The lack of a SCADA system creates some issues in terms of dependency, automation, etc.
4. Oxidation ditch
    a. Overall, the oxidation ditch had a "fair" condition rating.
    b. The plant's permit compliance depends heavily on this process continuing to perform well.
    c. The stem on the mud valve is broken and there is a large amount of solids accumulated at the bottom of the tank.
5. RAS Pump Stations
    a. Several components of the RAS pumping system are in bad condition: the electrical control panel is deteriorating, the pump station roof appears in bad shape, and piping and valves are leaking.
    b. If either suction or discharge piping were damaged, the plant would not be able to operate.

7.0 WWTP CAPACITY ASSESSMENT

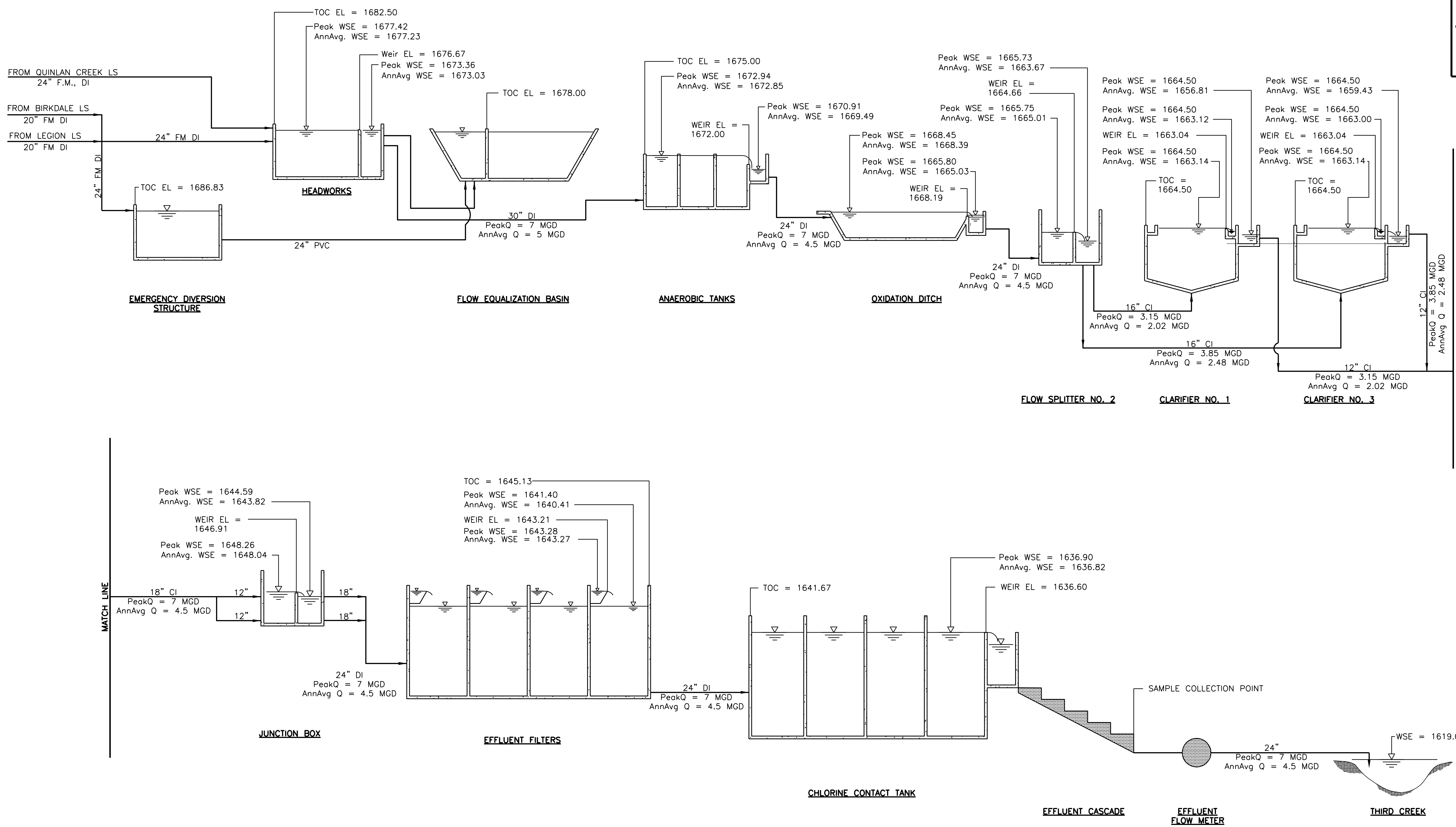
The WWTP capacity assessment consisted of a hydraulic analysis, treatment process and regulatory analysis, and flow equalization capacity analysis.

7.1 HYDRAULIC CAPACITY

To evaluate the plant's hydraulic capacity, an updated hydraulic profile was developed. The hydraulic analysis began with the chlorine contact basin effluent weir and calculated backwards through the plant to the future Emergency Diversion Structure (to be bid and constructed in 2013/2014).

The updated hydraulic profile shows the water surface elevations (WSE) in each component of the treatment plant for the average day and peak 2-hour conditions as shown on **Figure 7.1**.

An area of concern was identified for the 2-hour peak flow. A single 12" pipeline between the Junction Box and the clarifiers receives the combined flow from two 12" clarifier effluent lines which causes high velocities and high headlosses in the single pipe. Assuming a C-factor of 100 due to the age of the pipe, during peak flow of 7 MGD this pipeline experiences velocities of around 13.79 ft/sec and a headloss of over 25 feet. This amount of headloss would lead to overflows at both clarifiers and the weir of the Splitter Box being submerged. WWTP staff described a rain event in 2002 that had over-topped several structures and short-circuited both clarifiers. During this rain event, the City had 22.46 inches over a 9-day period and 5.13 inches in a 12-hour time period.



Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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KERRVILLE WWTP
FLOW SCHEMATIC AND HYDRAULIC PROFILE
FIGURE 7.1

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FILE NAME	GN-ALL-EL-HYDP.dwg

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Date: Oct 30, 2012 - 8:15am User: 02029 File: N:\util\Exhibit\GN-ALL-EL-HYDP.dwg

7.2 TREATMENT PROCESS AND REGULATORY ANALYSIS

The capacities of the individual processes at the plant were evaluated based on the current regulations set forth by the "TCEQ Chapter 217 Design Criteria for Wastewater Systems". The most recent version of the regulations was issued on August 28, 2008 and all updates to the Kerrville WWTP occurred prior to the implementation of the latest version so the process may have been designed using different criteria. However, since any improvements will need to meet the latest regulations, each treatment process was evaluated for regulatory compliance and treatment capacity based on the most current regulations. The design and peak organic loadings were calculated in accordance with TCEQ 217.34(2)(A) specifying the use of historical organic loading data. The design and peak organic loads were based on the 3-year monthly average data provided by plant staff. In accordance with the regulations the sum of the mean and a single standard deviation was used to determine the plant loading from historical data. **Table 7.1** summarizes the loading data used for capacity assessment calculations.

Table 7.1 Influent Loading Data

Organic Loading and Flow Data					
		TSS	BOD	NH3	P
		Concentration (mg/l)			
		224.3	222.6	31.8	10.7
Plant Flow (MGD)		***Daily Loading (lbs/day)***			
2-hr Peak	7	13,108.9	13,014.3	1,860.6	626.2
Design	4.5	8,427.2	8,366.3	1,196.1	402.5
Historical Avg	1.6	2,996.3	2,974.7	425.3	143.1

Table 7.2 summarizes the critical design parameters of each treatment process. Non-compliance with process capacity regulations are identified by red lettering. The media filters are currently the only process that does not meet the TCEQ 217 requirements for the permitted level of flow. The results and regulations specific to each process are described in further detail in the next section.

Table 7.2 Summary of Critical Treatment Process Capacities

Process	Critical Parameter	Surface Area (sf)	Volume (cf)	Process Capacity: Loading	Process Capacity: Capacity	Process Capacity: HRT (Θ)	Flow Rate Used
Activated Sludge				(lbd/1000 cf)	(MGD)	(hrs)	Annual Average Flow
	Organic Loading			Requirements			
				< 35	-------	-------	
	*Anoxic Tank	-------	21,725.0	770.2	-------	0.9	
	Oxidation Ditch	-------	268,391.4	31.2	-------	10.7	
217.154(b)(2)	**Total**	-------	290,116.4	**30.0**	-------	**11.6**	
Effluent Clarifiers				(gpd/sf)	(MGD)	(hrs)	2-hr Peak Flow
	Overflow Rate			Requirements			
				<1200	*>7*	*>1.8*	
	Clarifier 1	3,848.5	40,177.8	1818.9	4.6	1.0	
	Clarifier 3	5,026.5	52,477.2	1392.6	6.0	1.6	
217.154(c)(1-2)	**Total**	8,875.0	92,655.0	**788.7**	**10.6**	**4.5**	
Chlorine Disinfection				(lbd/1000 cf)	(MGD)	(min)	2-hr Peak Flow
	Contact Time			Requirements			
				-------	*>7*	*> 20*	
	Basin 1	-------	8,487.2	-------	4.6	13.1	
	Basin 2	-------	8,487.2	-------			
217.821(b)(1-2)	**Total**	-------	16,974.4	-------	**9.1**	**26.1**	
Media Filters				(gpm/sf)	(MGD)	(min)	2-hr Peak Flow
	Application Rate			Requirements			
				<3	*>7*	-------	
	1 Filter In-Service	200	-------	24.3	0.9	-------	
	2 Filters In-Service	400	-------	12.2	1.7	-------	
217.191 (a)(1)(A)	**3 Filters In-Service (TCEQ)**	600	-------	**8.1**	**2.6**	-------	
217.190(b)(2)	4 Filters In-Service (All)	800	-------	6.1	3.5	-------	

* Anoxic tank loading assumes half of volume acts as AS

7.2.1 Headworks

The headworks was installed in 2003 and consists of two fine screens and a grit removal system. The headworks is the newest piece of the treatment train. The headworks was designed by FNI for a capacity of 8 MGD, which is above the 7 MGD 2-hr peak flow designated by the TCEQ discharge permit.

The dual fine screens allow for redundancy in the system and the center coarse screen allows for by-pass of the fine screens to the vortex grit removal chamber. The screens may also be bypassed directly to the FEB during peak flow events.

7.2.2 Activated Sludge

The critical capacity of the Activated Sludge system at the Kerrville WWTP is based on 217.154(b)(2) Table F.1 “Design Organic Loading Rates for Sizing Clarifiers and Aeration Basins Based on Traditional Design Methods”. The oxidation ditch was probably originally designed as an extended aeration process. However, the hydraulic retention time at the design flow (10.7 hours) is much smaller than in a typical extended aeration tank. Therefore, the oxidation ditch and Anoxic tank were assumed to operate as conventional activated sludge processes with nitrification and reactor temperatures greater than 15° C to select the maximum organic loading rate.

1. **Anoxic Tank**

The anoxic tank serves as the first step in the BOD and nutrient treatment process. The anoxic tank was originally designed to facilitate biological nutrient removal (BNR) when operated as an anoxic/anoxic-oxic (AO) process. More specifically, the anoxic tank aids in selecting bacteria for phosphorus removal. Due to the small volume of the anoxic tank relative to the oxidation basin, the tank only satisfies a small portion of the BOD loading capacity for the plant as specified in 217.154(b)(2). No explicit criteria are listed in the TCEQ 217 design manual for the organic loading rate of anoxic/anoxic tanks and therefore a conservative calculation was made to estimate the effectiveness of BOD removal in the anoxic tank. This calculation used only half of the anoxic tank volume in calculating the organic BOD loading rate. Calculations presented in **Table 7.2** therefore show the anoxic tank to be negligible in terms of BOD organic loading capacity.

As mentioned above the intended function of the anoxic tank is to aid in BNR, not remove BOD and there are few regulations specifying requirements for BNR processes.

2. **Oxidation Ditch**

The oxidation ditch provides the majority of organics and ammonia removal for the facility. As shown in **Table 7.2**, the design organic loading capacity for the plant can be handled solely by the oxidation ditch without the anoxic tank. The oxygen requirements of the oxidation ditch are supplied by the two sets of two rotors and can be varied depending on the depth of the rotors in the basin. Additionally, floating rotors are available if additional oxygen input is required. TCEQ defines the oxygen requirements for mechanical aeration systems in 217.155. Based on this section, the required aerating the oxidation ditch was calculated and is shown in **Table 7.3** below for the Daily Average Flow.

Table 7.3 Motor Requirements for Rotors

Motor Requirements for O_2 Transfer		
Oxygen Requirement O_2R =	1.81	lb O_2/lb BOD
Clean Water OTE =	1.8	lb O_2/hp-hr
β Correction Factor =	0.95	
Wastewater OTE =	1.7	lb O_2/hp-hr
Required hp for O_2 Transfer	**370**	

The Kerrville WWTP has 4 fixed rotors that produce 75 hp each, 2 floating rotors that produce 20 hp each, and 2 floating rotors that produce 15 hp each. As shown in **Table 7.4**, the plant does not meet the oxygen transfer requirements at the design flow if the largest rotor or any of the rotors are out of service. Therefore, the plant fails the redundancy requirements specified in 217.155(c)(3)(A)(ii).

Table 7.4 WWTP Motor Horsepower Capacity

Motor Horsepower Capacity	
	Available hp
4 Fixed Rotors @ 75 hp each =	300
2 Floating Rotors @ 15 hp each =	30
2 Floating Rotors @ 20 hp each =	40
Total Available hp =	370
With Largest Rotor Out (hp) =	295

Redundancy of the aeration basins is required by 217.153(c)(1) unless the aeration equipment is removable without taking the basin out of service. Most rotor maintenance can be completed without removing the rotors but the bottom of the basin cannot be cleaned without taking the basin out of service. Solids have settled and accumulated on the bottom of the ditch over time and greatly reduced the organic loading capacity of the oxidation ditch. Though no official testing has been completed at the plant, previous soundings have shown solids deposits as high as a foot at certain locations. Solids on the bottom of the tank are estimated to have eliminated about a half foot of depth from the bottom of the tank on average. The most recent soundings were completed roughly eight years ago; therefore, the levels are probably higher today. **Table 7.5** details the reduction in organic loading capacity of the oxidation ditch as solids accumulate on the bottom of the oxidation ditch. If solids have accumulated to a foot of depth, the oxidation ditch will no longer meet the 35 lbd/1,000 cf requirement expressed in 217. 154(b)(2). The oxidation ditch should be sounded to get an accurate depth estimate.

Table 7.5 Treatment Capacity Reduction from Solids

Effect of Solids Accumulation of Treatment Ability				
	Full Tank	*0.5' of Solids*	*1' of Solids*	*1.5' of Solids*
Treatment Volume =	268,391.4	247,580.8	226,771.3	205,963.1
Hydraulic Retention Time (Θ) =	10.7	9.9	9.0	8.2
Maximum Organic Loading Rate =	35.0	35.0	35.0	35.0
Average Daily Organic Loading Rate =	31.2	33.8	36.9	40.6

7.2.3 Clarifiers

The capacity of the activated sludge clarifiers is based on the overflow rate of each clarifier as well as the hydraulic retention time at the peak 2-hr flow rate of the plant. With both clarifiers in service, the treatment operation meets all overflow and hydraulic retention time criteria regardless of the process type assumed.

The clarifiers also satisfy the weir loading requirements established in 217.152(c)(5) which states “For a facility with a design flow equal to or greater than 1.0 MGD, the weir loading must not exceed 30,000 gallons per day (gpd) at the peak flow per linear foot of weir length.” The maximum peak flow capacities of the clarifiers are shown in **Table 7.6**. As can be noted, Clarifier 3 can meet the Weir Loading Capacity alone while Clarifier 1 cannot.

Table 7.6 Weir Loading Capacities

Weir Loading Capacity			
	Clarifier 1	**Clarifier 3**	**Total**
Weir Length (ft)	219.9	251.3	471.2
Max Flow (MGD)	6.6	7.5	14.1

The clarifier process does not meet the redundancy requirements in 217.153(c)(2) because as displayed in **Table 7.2** and **Table 7.6**, none of the criteria can be met at peak flow if Clarifier 3 is out of service.

As mentioned in the condition assessment, the waste activated sludge (WAS) valve on Clarifier 1 is currently broken meaning all sludge from Clarifier 1 must be recycled and all waste sludge comes from Clarifier 3. This broken valve takes Clarifier 1 out of compliance with 217.159(a)(1) requiring the operator to have the ability to control the Solids Retention Time (SRT) in aeration tanks by wasting a surplus volume of activated sludge.

7.2.4 Effluent Filters

The capacity of the media Filters is based on the peak flow application rates for "Deep Bed, Intermittently Backwashed, Granular Media Filters" TCEQ 217.191. More specifically, the maximum design filtration rate for singular media Filters provided in 217.191(a)(1)(A) is 3.0 gallons per minute per square foot. This filtration rate is based on the peak 2-hr flow rate and must be met with the largest filter out of service due to redundancy requirements. As shown in **Table 7.2**, this requirement is not met regardless of redundancy and effluent filtration is the only process not obtaining the capacity of the current TPDES permit. According to regulations, the filters should only be rated for a peak flow of 1,800 gallons per minute or 2.6 MGD.

One additional requirement not met by the media filters is that headloss indicators must be present on all effluent filters according to 217.191(f)(4). Any upgrades to the filters will need to address this requirement.

7.2.5 Disinfection

The capacity of the chlorine disinfection process is controlled by the amount of chlorine available as well as the minimum contact time in the Chlorine contact basin. The maximum withdrawal rates for each chlorine cylinder is specified by 217.273(a)(1) Equation K.2. The three on-site 1-ton chlorine gas cylinders provide more than twice the daily chlorine requirements needed at the peak flow rate of the plant as shown in **Table 7.7**.

Table 7.7 Chlorine Availability at Kerrville WWTP

Chlorine Availability Requirement		
Minimum Design Cl_2 Concentration =	6.0	mg/l
Pounds Per Day Required for Treatment =	**350.3**	lbs/day
Maximum Gas Withdrawal Rate Per Cylinder (Wg) =	280	lbs/day
Number of Tanks at Site =	3	
Chlorine Availability =	**840**	lbs/day

Disinfection capacity is therefore determined by the minimum chlorine contact time of 20 minutes prescribed in 217.821(b)(1-2). As shown in **Table 7.2**, at the peak flow rate, the detention time in the chlorine contact chamber is 26.1 minutes and therefore satisfies the requirements of TCEQ.

7.2.6 Flow Equalization Basin Capacity

The previous Wastewater Master Plan completed in 2008, discussed the need for additional FEB storage capacity due to a significant increase in future flows. However, the projected population growth has decreased since the last master plan. In order to determine the future total FEB storage capacity needed at the plant, FNI analyzed a diurnal storm event using a peaking factor of 5.0 (**Table 7.8**) and the anticipated average daily flows (ADFs) for the years 2012, 2017, and 2022.

Table 7.8 Diurnal Pattern

Hour	Peaking Factor
0-5	1.0
5-6	3.0
6-7	5.0
7-8	4.0
8-9	2.5
9-10	2.0
10-11	1.5
11-24	1.0

Since all flow coming into the treatment plant is pumped from the Quinlan, Legion, or the future Birkdale Lift Station, the maximum flows coming to the plant depends on the pump controls at each lift station. As stated earlier, the peak capacity of the headworks is 8.0 MGD. If all three influent lift stations are running with every pump turned on, 19 MGD will be sent to the plant. If the incoming flow to the plant will overflow the headworks, the proposed Emergency Flow Diversion Structure will divert the additional flow directly to the FEB. Once the peak flow event subsides, the return FEB lift station will begin to drain the FEB by pumping the raw wastewater back through the headworks to be treated at the plant. For the FEB analysis, the return lift station was assumed to have a capacity of 2.0 MGD. The existing return pumps do not have this capacity and should be upgraded to a firm capacity of 2.0 MGD.

Table 7.9 displays the results of the FEB storage capacity analysis. The maximum flow storage needs for the plant are well below 1.0 MG for 2012-2022. The current 2.0 MG storage capacity of the existing FEB is therefore adequate for flows through 2022.

Table 7.9 FEB Storage Requirements

<table>
<tr><th colspan="2"></th><th colspan="3">Year</th></tr>
<tr><td colspan="2"></td><td>2012</td><td>2017</td><td>2022</td></tr>
<tr><td rowspan="4">ADF (gpm)</td><td>Legion</td><td>820.00</td><td>820.00</td><td>820.00</td></tr>
<tr><td>Birkdale</td><td>995.97</td><td>1047.36</td><td>1150.13</td></tr>
<tr><td>Quinlan</td><td>204.17</td><td>224.31</td><td>224.31</td></tr>
<tr><td>Total</td><td>2020.14</td><td>2091.67</td><td>2194.44</td></tr>
<tr><td colspan="2">FEB Storage Needed (MG)</td><td>0.55</td><td>0.59</td><td>0.64</td></tr>
</table>

7.3 ODOR CONTROL

As noted during the site visit and in discussions with the treatment plant staff the Kerrville WWTP has been having problems with odors. FNI provided a brief investigation into potential odor sources at the plant but recommends a full odor study to completely identify and address the sources and components of the problem.

The odor problems at the plant typically emerge from the headworks and FEB, the two main components where raw sewage is exposed to the open air. Hydrogen sulfide (H_2S), the odor causing compound, is formed in the collection system and released upon entering the plant. The existing odor control device (**Figure 7.2**) at the headworks of the plant is not currently in use because the operators have had trouble maintaining the plant pH when it is running.

Figure 7.2 Existing Odor Control Device

Odor is also released in the box near the FEB where the current septic haulers discharge shown on **Figure 7.3**. Raw sewage is constantly standing in the box due to inefficiencies with the hydraulics. This problem should be eliminated with the addition of the new Emergency Diversion Structure because the existing box and bar screen will be demolished and the haulers will dump directly into the new structure.

Figure 7.3 Existing Septic Screening Structure

A. Odor Reduction Recommendations

1. Complete a comprehensive odor control study. Upon completion of the study a more definite odor control plan can be designed.
2. The addition of iron salts, nitrates or aeration at the lift stations could be implemented to eliminate the quantity of H_2S coming in to the plant.
3. Aerate the FEB. Aeration and mixing are required in the FEB by TCEQ Chapter 217 any time that flow equalization is necessary to minimize random or cyclic peaking of hydraulic loadings.
4. Construct a dump station for septic haulers.

7.4 REHABILITATION PROJECTS PRIORITIZATION

Table 7.10 summarizes the overall results of the risk and capacity analyses performed by FNI on the City of Kerrville WWTP. The results from each analysis were combined and evaluated to determine the project prioritization and anticipated project costs for the identified plant deficiencies.

Table 7.10 Plant Rehabilitation Projects and Estimated Cost

	Project	Justification	Cost
1.	Add Additional Clarifier	Will provide overflow capacity for the plant during wet weather events and redundancy for rehabilitating the other clarifiers.	$2,268,014
2.	Upgrade Electrical System	Determined to be High Risk. Poor condition due to age, failure would result in a total plant outage. Concerns about sewer gas deteriorating system.	$1,444,500
3.	Oxidation Ditch	Determined to be High Risk. Majority of permit compliance depends on this process.	
	Add aeration	Additional rotors needed for dissolved oxygen input and TCEQ redundancy requirements	$1,133,344
	Repair mud valve stem and remove solids	The stem of the mud valve is broken and solids have accumulated on the bottom of the tank. Solids need to be removed to restore the full basin capacity.	$150,000
4.	Parallel 12" Pipe	Prevent overflows during peak events	$41,580
5.	Rehabilitate Clarifier No. 3 and repair Clarifier No. 1 WAS valve	Determined to be High Risk. As the largest clarifier, it is very critical to the treatment process. The center well is badly corroded. The rake and scum skimmer are in poor condition. Repairing the WAS valve will allow for solids wasting in Clarifier No. 1 to improve redundancy.	$502,909
6.	Increase Filter Capacity	Additional capacity needed to meet TCEQ loading requirements and prevent overflows	$3,532,454
7.	Flow Equalization Basin and Lift Station	Concrete existing Emergency FEB, add aeration, and *increase transfer pumping capacity * Dependent on Emergency Diversion Structure Project	$2,085,244
8.	Rehabilitate Chemical Feed System	Determined to be High Risk. Poor condition, affects permit compliance	$101,250
9.	Rehabilitate RAS Pump Station	Determined to be High Risk. Piping in poor condition, failure would result in a total plant outage	$45,728

8.0 WASTEWATER SYSTEM ALTERNATIVES FOR FUTURE TREATMENT

In conjunction with the assessments presented in the previous section, FNI selected three future alternatives for the City of Kerrville for the City based on the prioritized needs of the plant as determined through the risk and capacity assessment tasks. The alternatives were examined based on cost and non-monetary criteria and a recommendation was provided for a 20 year planning period. The updated wastewater master plan flows were analyzed to determine what if any future planning requirements would need to be fulfilled by the City of Kerrville. TCEQ requires expansion planning through the 75/90 Rule.

- 75% Rule: Whenever flow measurements at any sewage treatment plant reaches 75% of the permitted average daily or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and upgrade of the facility and collection system.
- 90% Rule: Whenever the daily average flow or annual average flow reaches 90% of the permitted average daily or annual flow for three consecutive months, the permittee shall obtain necessary authorization from the TCEQ to commence construction of additional treatment and collection facilities.

Table 8.1 shows the projected ADFs for the wastewater flows in years 2012 and 2032. The magnitudes of the flows do not require planning for the next 20 years as the future ADFs are not predicted to encroach on the 75% mark of the 4.5 MGD permitted plant capacity.

Table 8.1 Projected Average Daily Flows

	Year	
	2012	2032
ADF (MGD)	**2.335**	**2.936**
% of Permit	52%	65%

However, the alternatives analysis is still beneficial to compare the upgrades needed for the plant to attain the permitted capacity with the desire to increase the reliability of treatment processes, modernize the treatment facilities, and increase the plant gravity flows. Therefore, three alternatives were determined by FNI for the plant:

- Alternative 1: Rehabilitate current plant to address high risk components, eliminate hydraulic bottlenecks, and solidify the 4.5 MGD permitted capacity at the existing plant.
- Alternative 2: Down rate existing plant to 3 MGD, add a new parallel 1.5 MGD train to existing site to provide redundancy and additional firm treatment capacity.
- Alternative 3: Construct new plant off-site

8.1 ALTERNATIVE 1

The focus of Alternative 1 is to solidify the permit capacity and extend the life of the existing plant by completing the project prioritization established through the risk and capacity assessments. **Table 8.2** lists the projects needing to be completed at the plant and the associated scopes and costs. A 3% annual inflation factor was applied to each of the projects beyond 2013. For the planning period 2014 to 2019, the annual inflation factor was applied through the year 2019 and for the planning period 2020 to 2032, the annual inflation factor was applied through the year 2032.

Table 8.2 WWTP Alternative 1 Costs

Project	Scope	Project Cost	Project Cost with 3% Inflation
1. Add New Clarifier	Construct New 80' Diameter Clarifier	$2,268,014	$2,268,014
2. Upgrade Electrical System	Upgrade MCC/Switchgear, Panelboard, SCADA	$1,444,500	$1,444,500
3. Oxidation Ditch Rehab	Remove Solids and Add Aeration Capacity	$1,283,344	$1,578,384
4. Parallel Clarifier Effluent Pipe	Install Parallel Pipe to Relieve Bottleneck	$41,580	$75,098
5. Clarifier Rehab and Repair	Rehab CL-3 and Replace CL-1 WAS valve	$502,909	$908,303
6. Increase Filter Capacity	Add 4.4 MGD of Filter Capacity	$3,532,454	$6,379,965
7. FEB and Lift Station Capacity Increase	Concrete Emergency FEB, Add Aeration, and Pumping Capacity	$2,085,244	$3,766,159
8. Rehab Chemical Feed System	New Alum Storage Tank and Chemical Feed Bldg	$101,250	$182,868
9. Rehab RAS Pump Station	Replace Exposed Piping, Valves, and Fittings	$45,728	$82,589
	Alternative 1 Project Total:	*$11,305,023*	*$16,685,880*

* Costs include Mobilization, Engineering, O & P and Contingency

8.2 ALTERNATIVE 2

Alternative 2 consists of adding a parallel 1.5 MGD biological nutrient removal (BNR) train at the current plant site. **Figure 8.1** shows a conceptual layout of this parallel train consisting of a new headworks facility, anoxic tank, anoxic tank, aeration basin, clarifier, filters, and a new blower building with blowers. In addition to the new 1.5 MGD train, many of the projects from Alternative 1 will still need to be completed to correct deficiencies in the existing plant. **Table 8.3** itemizes the cost of the 1.5 MGD expansion as well as the Alternative 1 projects that also must be completed. The projected total cost for Alternative 2 is approximately $17,000,000.

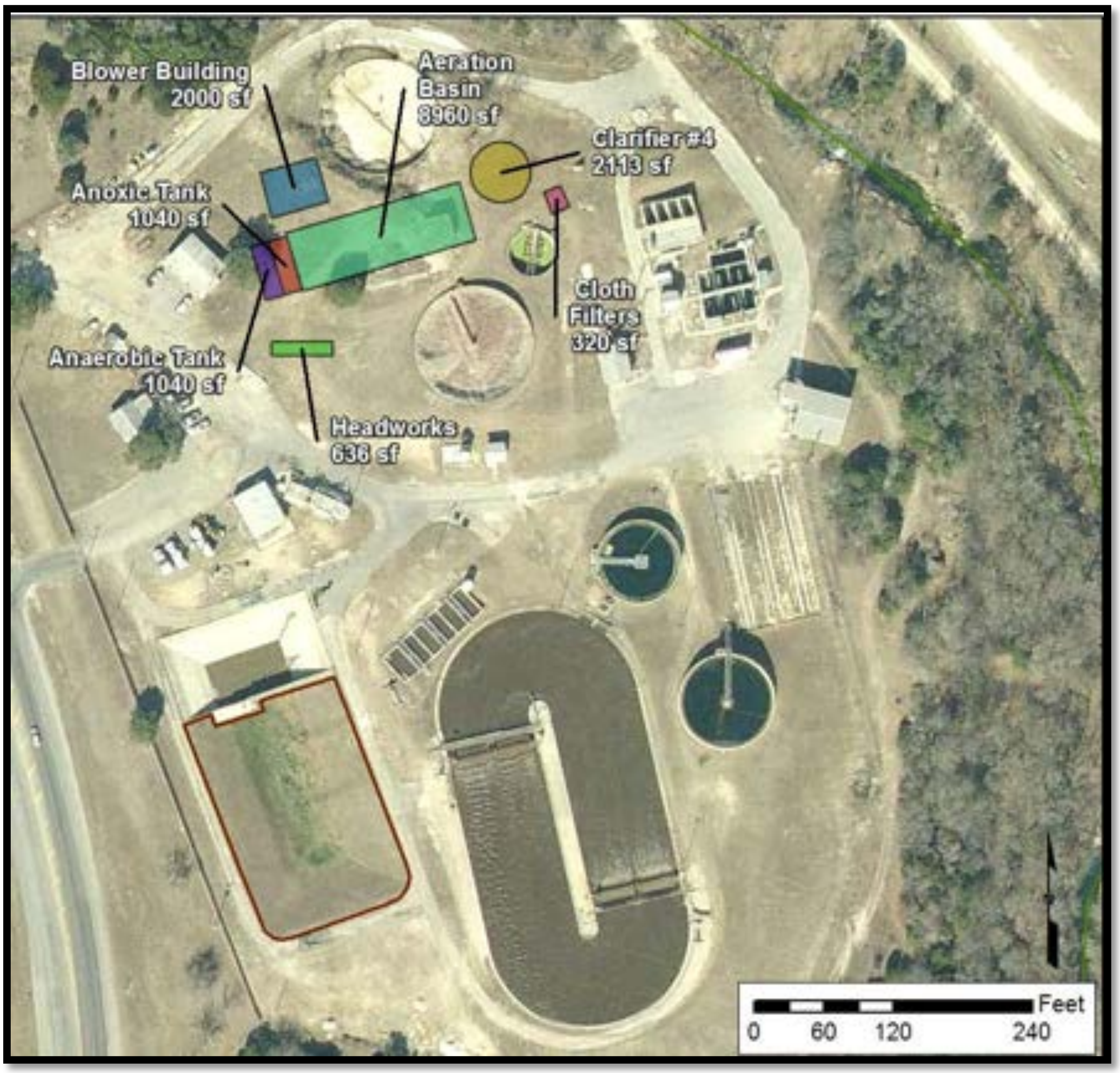


Figure 8.1 1.5 MGD Parallel Train Conceptual Layout

Table 8.3 WWTP Alternative 2 Costs

ITEM	DESCRIPTION		TOTAL
1	Sitework		$322,500
2	Headworks		$582,700
3	Anoxic Tanks		$700,100
4	Anoxic Tanks		$700,100
5	Aerobic Tanks		$1,204,040
6	Blower Building		$1,012,000
7	Final Clarifiers		$300,600
8	Chemical Feed		$30,000
9	Cloth Media Filters		$458,400
10	Electrical and Instrumentation		$1,062,088
11	Yard Piping		$955,879
	Subtotal		$7,328,407
	Mobilization	5%	$366,420
	Subtotal		$7,694,800
	OH&P	15%	$1,154,220
	Subtotal		$8,849,000
	Contingency	25%	$2,212,250
	Subtotal		$11,061,250
	Engineering	15%	$1,659,188
	1.5 MGD Total:		***$12,720,438***
Alternative 1: Existing Plant Rehabilitation			
1	Parallel Clarifier Effluent Pipe		$41,580
2	CL-3 Rehab and CL-1 WAS Valve		$502,909
3	Electrical System Upgrade		$1,444,500
4	Remove OD Ditch Solids		$150,000
6	FEB and Lift Station		$2,085,244
8	RAS Pump Station Rehab.		$45,728
9	Chemical Feed System Rehab.		$101,250
	Alternative 1 Total:		***$4,371,211***
	Alternative 2 Project Total:		***$17,091,649***

8.3 ALTERNATIVE 3

The final alternative investigated the cost of constructing a new BNR WWTP at some other location in the City of Kerrville to potentially have gravity flow to the plant site. FNI anticipated a need for roughly 15 acres of land to construct a new plant that allowed for some future expansion as well as the 150' buffer zone required by TCEQ. A conceptual layout of this new site is shown on **Figure 8.2**. **Table 8.4** lists the components of the new plants and the associated costs. The total cost of Alternative 3 is approximately $38,000,000.

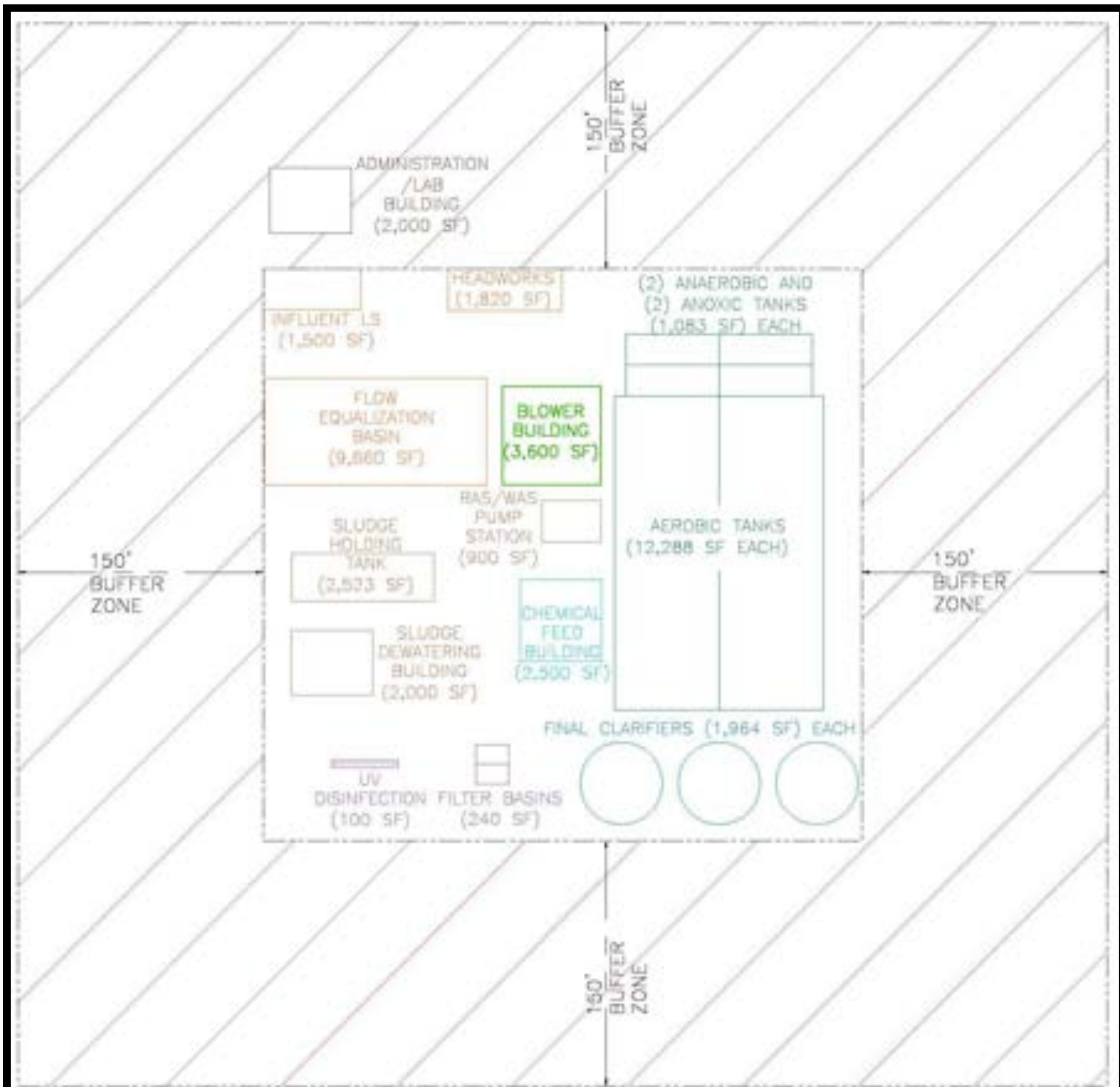


Figure 8.2 New Off-site WWTP Conceptual Layout

Table 8.4 WWTP Alternative 3 Costs

ITEM	DESCRIPTION		TOTAL
1	Sitework		$922,730
2	Influent Lift Station		$1,418,678
3	Headworks		$660,800
4	Equalization Basin		$1,289,400
5	Anoxic Tanks		$963,900
6	Anoxic Tanks		$963,900
7	Aerobic Tanks		$1,936,740
8	Blower Building		$1,938,000
9	Final Clarifiers		$833,300
10	Chemical Feed		$392,000
11	RAS/WAS Pump Station		$290,000
12	Cloth Media Filters		$458,400
13	UltraViolet Disinfection System		$1,724,700
14	Sludge Holding Tank Modifications		$514,327
15	Sludge Dewatering Building		$1,150,000
16	Administration/Lab Building		$290,000
17	Grease and Septage Handling		$100,000
18	Electrical and Instrumentation		$3,169,380
19	Yard Piping		$2,852,445
	Subtotal		$21,868,800
	Mobilization	5%	$1,093,440
	Subtotal		$22,962,300
	OH&P	15%	$3,444,345
	Subtotal		$26,406,700
	Contingency	25%	$6,601,675
	Subtotal		$33,008,400
	Engineering	15%	$4,951,260
	Alternative 3 Project Total:		***$37,960,000***

* *Land, Environmental, and Off-Site Piping Costs were not included*

8.4 RECOMMENDED ALTERNATIVE

Table 8.5 below compares the different alternatives based on five important criteria. **Appendix G** provides the detailed OPCCs for each Alternative.

Table 8.5 WWTP Alternatives Matrix

Treatment Alternative	Land Acquisition	Discharge Permit	Capital Cost	Reliability	Future Considerations
Alternative 1	None required	No Change	≈ *11,305,023*	Experience with current plant. Old equipment prone to failure.	Aging Infrastructure
Alternative 2	None required	Possible Permit Amendment	≈ \$17,091,649	Increased reliability and redundancy from new train	Would provide redundancy for rehabilitating existing plant
Alternative 3	Purchase 15 acres	Must apply for a new permit	≈ \$37,960,000 (Does not include land, environmental, or off-site piping)	Modernized facilities, automation	Could be designed for future expansion and increased population growth

Based upon the WWTP Alternatives Matrix, FNI recommends that the City pursue Alternative 1. Alternative 3 would provide the most reliability, allow for future expansion, and modernize the current facilities with the likelihood of lowering maintenance and electricity costs. However, the future growth projections don't warrant the need for increasing the plant capacity beyond 4.5 MGD in the near future and this alternative could likely cost four times that of Alternative 1.

Alternative 2 would also allow for more redundancy and capacity in the system which could be especially helpful during future rehabilitations. However, the plant discharge permit may require amendment if this option were selected. Additionally, this alternative costs nearly $6 million more than Alternative 1.

Alternative 1 addresses the current treatment process concerns by correcting the problems found during the risk and capacity assessments. Upon completion of all Alternative 1 projects, the plant should be able to maintain its current 4.5 MGD ADF permit. The current plant has not had problems meeting the effluent limits of the current NPDES permit and with the reduction in future population growth projections, the 4.5 MGD rating should provide adequate capacity for the next 20 years.

Due to the fact that Alternative 1 remains the lowest cost alternative and the treatment plant staff is familiar with the operation of the current equipment, FNI recommended that Alternative 1 be selected for the future needs of the Kerrville WWTP. In May 2012, the City Council gave direction to proceed forward with Alternative 1 moving forward with the Integrated Capital Improvements Plan.

9.0 INTEGRATED WASTEWATER CAPITAL IMPROVEMENTS PLAN

An integrated wastewater capital improvements plan (CIP) was developed for the City of Kerrville to combine and prioritize the wastewater collection system and treatment plant CIP projects. The projects are grouped into phases based on the City's financial constraints defined as the following:

- **Fiscal Year 2013** - $10,000,000
- **Fiscal Year 2014 to 2019** - $4,200,000 (Based on $700,000 per year)
- **Fiscal Year 2020 to 2032** – All projects not included in the first two phases

A 3% annual inflation factor was applied to each of the projects beyond 2013 as shown in **Table 9.1**. For the planning period 2014 to 2019, the annual inflation factor was applied through the year 2019 and for the planning period 2020 to 2032, the annual inflation factor was applied through the year 2032. It is recommended that the City fund their Water Reclamation Division at a level which allows for sustainable operations, maintenance, and completion of in house projects. Cities can typically defer certain capital expenditures by sufficiently funding annual maintenance efforts.

It is recommended that these improvements be constructed generally in the order shown; however, it is understood that development in certain parts of the City may make it necessary to construct certain future improvements sooner than anticipated.

9.1 IMPACT OF CITY OF INGRAM WHOLESALE FLOWS ON PROJECTS

The impact of increased City of Ingram wholesale flows was evaluated for each CIP project. **Table 9.2** summarizes the living unit equivalents (LUEs) contributing to each project.

Table 9.1 Wastewater System Integrated 20-Year CIP

	Proj. No.	Project Description	Project Cost	Project Cost with 3% Annual Inflation
FY 2013	1	Jefferson Lift Station Expansion & 12"/16" Force Mains	$ 4,539,300	$ 4,539,300
	2	Add New Clarifier at WWTP	$ 2,268,014	$ 2,268,014
	3	Upgrade WWTP Electrical System	$ 1,444,500	$ 1,444,500
	4	Reduce Broadway Lift Station Capacity to 500 gpm	$ 486,800	$ 486,800
	5	Project Contingency	$ 1,500,000	$ 1,500,000
Total 2013			**$ 10,238,614**	**$ 10,238,614**
2014-2019	1	WWTP Oxidation Ditch Rehab	$ 1,283,344	$ 1,578,384
	2	New Knapp Wet Well & 10" Force Main	$ 1,211,000	$ 1,489,409
	3	G-Street Lift Station Decommission	$ 78,000	$ 95,932
	4	21-inch Interceptor Downstream of Jefferson Lift Station	$ 1,412,200	$ 1,736,865
	5	Project Contingency	$ 215,456	-
Total 2014 - 2019			**$ 4,200,000**	**$ 4,900,590**
2020 & Beyond	Collection System	15"/18"/21" Interceptors Downstream of Knapp Lift Station	$ 1,849,000	$ 3,339,479
		New 5900 gpm Legion Lift Station	$ 4,290,000	$ 7,748,169
		New 1600 gpm Comanche Trace Lift Station	$ 1,547,000	$ 2,794,037
		Quinlan Basin 10"/12"/15" Interceptor	$ 2,844,900	$ 5,138,174
		Comanche Trace 12"/15" Interceptors	$ 1,336,400	$ 2,413,672
		15" Interceptor Upstream of Knapp Lift Station	$ 605,300	$ 1,093,232
	WWTP	Parallel Clarifier Effluent Pipe	$ 41,580	$ 75,098
		Clarifier Rehab & Repair	$ 502,909	$ 908,303
		Increase Filter Capacity	$ 3,532,454	$ 6,379,159
		FEB & Lift Station Capacity Increase	$ 2,085,244	$ 3,766,159
		Rehab Chemical Feed System	$ 101,250	$ 182,868
		Rehab RAS Pump Station	$ 45,728	$ 82,589
Total 2020 & Beyond			**$ 18,781,765**	**$ 33,920,939**
		Grand Total	**$ 33,220,379**	**$ 49,060,143**

Table 9.2 Ingram's Proportional Impact on Kerrville's Wastewater System Improvements

		Project Description	Project Cost	Project Cost with 3% Annual Inflation	2032 Number of LUEs Contributed to Project	2032 Ingram % Contribution at 1590 LUEs	2032 Ingram Impact on CIP Projects with 3% Inflation
FY 2012		Birkdale	$5,945,000	$5,945,000	8533	19%	$354,484
		G-St Interceptor (To Birkdale)	$2,360,000	$2,360,000	2417	66%	$496,801
Total 2012			**$8,305,000**	**$8,305,000**			**$851,285**
FY 2013		Jefferson Lift Station Expansion & 12"/16" Force Mains	$4,539,300	$4,539,300	7552	21%	$955,705
		Add New Clarifier at WWTP	$2,268,014	$2,268,014	11952	13%	$301,721
		Upgrade WWTP Electrical System	$1,444,500	$1,444,500	11952	13%	$192,166
		Project Contingency	$1,500,000	$1,500,000	11952	13%	$199,550
Total 2013			**$9,751,814**	**$9,751,814**			**$1,649,143**
2019-2014		WWTP Oxidation Ditch Rehab	$1,283,344	$1,578,384	11952	13%	$209,977
		New Knapp Wet Well & 10" Force Main	$1,211,000	$1,490,000	2195	72%	$1,079,317
		21-inch Interceptor Downstream of Jefferson Lift Station	$1,412,200	$1,737,000	6365	25%	$295,063
		Project Contingency	$215,456	$0	11952	13%	$0
Total 2014 - 2019			**$4,122,000**	**$4,805,384**			**$1,584,358**
2020 & Beyond	Collection System	15"/18"/21" Interceptors Downstream of Knapp Lift Station	$1,849,000	$3,339,479	4715	34%	$1,126,088
		New 5900 gpm Legion Lift Station	$4,290,000	$7,748,300	8422	19%	$994,712
		15" Interceptor Upstream of Knapp Lift Station	$605,300	$1,093,400	2195	72%	$792,030
	WWTP	Parallel Clarifier Effluent Pipe	$41,580	$75,098	11952	13%	$9,991
		Clarifier Rehab & Repair	$502,909	$908,303	11952	13%	$120,834
		Increase Filter Capacity	$3,532,454	$6,379,159	11952	13%	$848,640
		FEB & Lift Station Capacity Increase	$2,085,244	$3,766,159	11952	13%	$501,024
		Rehab Chemical Feed System	$101,250	$182,868	11952	13%	$24,328
		Rehab RAS Pump Station	$45,728	$82,589	11952	13%	$10,987
Total 2020 & Beyond			**$13,053,465**	**$23,575,355**			**$4,428,633**
		Grand Total	**$35,232,279**	**$46,437,553**			**$7,662,133**

APPENDIX A

City of Kerrville Land Planning Assumptions

January 6, 2012

Census Population Data

Population Counts

	Kerrville		Kerr County		Less Kerrville
1970	12,672		19,454		
1980	15,276	1.9%	28,780	4%	7.1%
1990	17,384	1.3%	36,304	2.3%	3.4%
2000	20,425	1.6%	43,653	1.9%	2.1%
2010	22,347	.9%	49,625	1.2%	.4%

% Breakdown by Age Categories

	Kerrville		Kerr County	
	2000	**2010**	**2000**	**2010**
Under 19	23.4%	22.8%	24.9%	22.9%
20-54	37.4%	38.8%	38.9%	37.8%
55-64	9.9%	12.3%	11.3%	14.4%
Over 65	29.3%	26.3%	24.9%	24.7%
Median Age	44.7	45.7	43.8	47.3

Water Accounts

Date	Residential Accounts	Units Served	Commercial Accounts	Units Served	Irrigation
9/30/2001	6,983	9,531	976	1,156	430
9/30/2002	6,942	9,537	963	1,201	411
9/30/2003	7,204		977		419
9/30/2004	7,261	9,470	1,025	1,180	430
9/30/2005	7,380	9,795	1,036	1,193	457
9/30/2006	7,489	9,908	1,092	1,249	469
9/30/2007	7,602	10,261	1,077	1,234	494
9/30/2008	7,675	10,277	1,085	1,236	510
9/30/2009	7,727	10,114	1,106	1,296	504
9/30/2010	7,741	10,348	1,107	1,457	502
9/30/2011	7,942	10,730	1,084	1,401	529

Sewer Accounts

Date	Residential Accounts	Units Served	Commercial Accounts	Units Served
9/30/2001	6,651		897	
9/30/2002	6,818		920	
9/30/2003				
9/30/2004	7,087		917	
9/30/2005	7,185		1,001	
9/30/2006	7,305		1,029	
9/30/2007	7,468		1,032	
9/30/2008	7,491		1,041	
9/30/2009	7,590		1,066	
9/30/2010	7,615	10,101	1,083	1,230
9/30/2011	7,694	10,261	1,099	1,239

did not track # units before 9/30/10

283 Inactive water accounts - roughly equals 353 inactive units

Building permits – New Construction

	Residential	Commercial
2005	100	9
2006	139	1
2007	102	1
2008	70	4
2009	44	5
2010	55	4
2011	35	2
7 year average	78	3.7
5 year average	61	3.2
3 year average	44.5	3.6

MLS Information

MLS new listings	2007	1,099
	2011	1,241
MLS average days on market	2007	141 days
	2011	192 days
Median price of home sold	2007	$165,000
	2011	$150,000
Average price of home sold	2007	$202,000
	2011	$185,000
Total $ volume of homes sold	2007	$130,205,000
	2011	$72,485,000

NON – RESIDENTIAL

Development	Platted Lots/Acres	Lots Not Platted/Acres
Airport Commerce Park	2 (5.61 acres)	20 (60 acres)
Town Creek	0	79 acres
Gateway	0	65 acres
Whiskey Springs	0	83 acres
TOTAL:	2 (5.61 acres)	20 (287 acres)

Other Properties: City property along 534, I-10 and Harper Road, Spur 98

SINGLE FAMILY RESIDENTIAL

Development	Platted Lots Available	Remaining Lots Not Platted
Comanche Trace	**365**	**485**
Keystone	**55**	**195**
Heights of Kerrville	**57**	**0**
Town Creek	**0**	**593**
Whiskey Springs	**0**	**368**
Pinto Trail (HCHOB)	**11**	**0**
Maud Jennings (HFH-Kerr County)	**15**	**19**
TOTAL:	**503**	**1660**

Other Developments with Available Lots:

Sendero Ridge, Meridian, Summit

Other Developments:

Tuscany, Kirk Ranch, Hamrick Tract

Wastewater Master Plan Update, 1-6-12, Land Planning Assumptions

Planning Scenario

Percentage	Year	Population
	2012	22,347
0.24%	2013	22,400
0.23%	2014	22,452
0.24%	2015	22,505
0.23%	2016	22,557

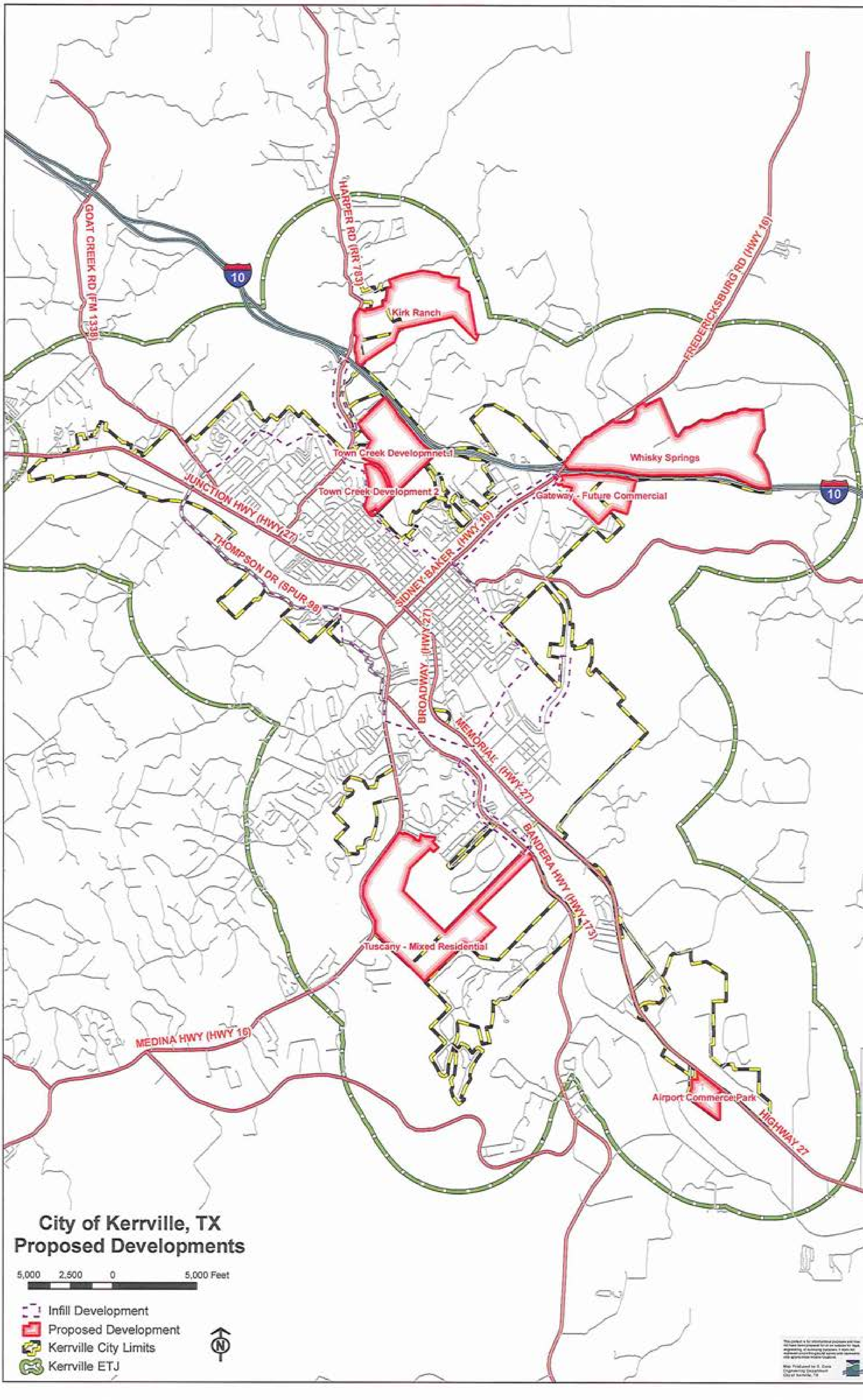
2012-2016
263 Population Growth
125 Permits in five years
25 Permits/ Yr

0.56%	2017	22,683
0.55%	2018	22,809
0.55%	2019	22,935
0.55%	2020	23,061
0.54%	2021	23,187

2017-2021
630 Population Growth
300 Permits in five years
60 Permits / Yr

0.72%	2022	23,355
0.71%	2023	23,523
0.71%	2024	23,691
0.70%	2025	23,859
0.70%	2026	24,027
0.69%	2027	24,195
0.69%	2028	24,363
0.68%	2029	24,531
0.68%	2030	24,699
0.68%	2031	24,867

2022-2031
1680 Population Growth
800 Permits in ten years
80 Permits/ Yr



GOAT CREEK RD (FM 1338)
HARPER RD (RR 783)
10
Kirk Ranch
FREDERICKSBURG RD (HWY 16)
Whisky Springs
Town Creek Developmnet 1
Town Creek Development 2
Gateway - Future Commercial
JUNCTION HWY (HWY 27)
THOMPSON DR (SPUR 98)
SIDNEY BAKER (HWY 16)
BROADWAY (HWY 27)
MEMORIAL (HWY-27)
BANDERA HWY (HWY 173)
Tuscany - Mixed Residential
MEDINA HWY (HWY 16)
Airport Commerce Park
HIGHWAY 27
City of Kerrville, TX
Proposed Developments
5,000 2,500 0 5,000 Feet
Infill Development
Proposed Development
Kerrville City Limits
Kerrville ETJ
N

APPENDIX B

City of Ingram Wholesale Contract & Wastewater Flow Projections

City of Ingram Wastewater Flow Projection

DATE	NO OF CONNECTIONS	DEMAND PER CONN. (GPD)	AVERAGE DAY DEMAND (GPD)	PEAKING FACTOR	PROJECTED PEAK (GPD)	PERCENT OF CONTRACT
Jun-12	292	54	15,868	1.2	18,812	4%
Jun-13	320	60	19,200	1.2	23,040	5%
Jun-14	620	80	49,600	1.3	64,480	14%
Jun-15	700	90	63,000	1.4	88,200	20%
Jun-16	900	100	90,000	1.5	135,000	30%
Jun-17	1,000	110	110,000	1.6	176,000	39%
Jun-18	1,050	120	126,000	1.7	214,200	48%
Jun-19	1,100	130	143,000	1.8	257,400	57%
Jun-20	1,150	140	161,000	1.9	305,900	68%
Jun-21	1,200	150	180,000	2.0	360,000	80%
Jun-22	1,250	160	200,000	2.5	500,000	111%
Jun-23	1,300	170	221,000	2.7	596,700	133%
Jun-24	1,350	180	243,000	2.9	704,700	157%
Jun-25	1,400	190	266,000	3.1	824,600	183%
Jun-26	1,450	200	290,000	3.3	957,000	213%
Jun-27	1,500	210	315,000	3.5	1,102,500	245%
Jun-28	1,550	210	325,500	3.6	1,171,800	260%
Jun-29	1,600	210	336,000	3.7	1,243,200	276%
Jun-30	1,650	210	346,500	3.8	1,316,700	293%
Jun-31	1,700	210	357,000	3.9	1,392,300	309%
Jun-32	1,720	210	361,200	4.0	1,444,800	321%
Jun-37	1,820	210	382,200	4.0	1,528,800	340%
Jun-42	1,920	210	403,200	4.0	1,612,800	358%
Jun-47	2,020	210	424,200	4.0	1,696,800	377%
Jun-52	2,120	210	445,200	4.0	1,780,800	396%

INTERLOCAL AGREEMENT FOR WHOLESALE WASTEWATER SERVICE

This Interlocal Agreement for Wholesale Wastewater Service (the "Agreement") is entered into by and between the CITY OF KERRVILLE, Texas ("Kerrville"), a home-rule city and municipal corporation of the State of Texas situated in Kerr County, Texas; and organized and operating under the provisions of its home rule charter and the Constitution and laws of the State of Texas; and the CITY OF INGRAM, Texas ("Ingram"), a general-law city and municipal corporation of the State of Texas situated in Kerr County, Texas, and organized and operated under state law. Kerrville and Ingram are referred to herein collectively as the "Parties," and separately as the "Party."

WHEREAS, Kerrville has long been a provider of wastewater services in and around its corporate limits; and

WHEREAS, Kerrville and Ingram recognize that it is in the best interests of the citizens of both the city of Kerrville and the city of Ingram to work together toward the reduction of on-site sewage treatment facilities, including individual septic systems ("OSSFs"), in Kerr County; and

WHEREAS, Kerrville and Ingram recognize that the development of new and/or the expansion of existing centralized wastewater collection and treatment facilities, owned and operated by responsible governmental entities, will aid in the protection of surface and groundwater quality within Kerrville, Ingram and Kerr County, improve the environment, and help maintain the general quality of life in Kerr County; and

WHEREAS, Kerrville and Ingram recognize the mutual benefits to be achieved through the development of centralized wastewater collection and treatment facilities on a regional basis; and

WHEREAS, Kerrville and Ingram further recognize the public interests to be served, and the economic savings to be recognized by avoiding the duplication of services and facilities; and

WHEREAS, Kerrville is willing to receive, treat and dispose of the wastewater collected by Ingram pursuant to this Agreement; and

WHEREAS, Kerrville and Ingram are authorized to enter into this Agreement under the laws of the State of Texas including, *inter alia*, the Interlocal Cooperation Act codified as Chapter 791, TEX. GOV'T CODE; and

NOW, THEREFORE, in consideration of the covenants, conditions, and promises contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Kerrville and Ingram agree as follows:

Approved by City Council
Date: October 05 2005
Volume 35 Page 426
Resolution No. 110-2005
Contract No. 2005-45

Article I
Intent of Parties and Term

1.01 General. For so long as this Agreement remains in effect, Kerrville shall provide wholesale wastewater transportation, treatment, and disposal services ("Wastewater Services") to Ingram in accordance with the terms and conditions contained herein. Both Parties acknowledge and agree that such services shall be provided and utilized in compliance with all applicable local, state, and federal laws.

1.02 Term of Agreement; Renewal and Extension. This Agreement shall be effective on and after the date of execution by both Parties. The term of this Agreement shall be for a period of forty (40) years (the "Initial Term"), unless Ingram or Kerrville elects to terminate sooner in accordance with the terms of this Agreement. Upon the expiration of the Initial Term, this Agreement may be renewed or extended by mutual agreement of the Parties for an additional forty (40) years under such terms and conditions as may be agreed upon by the Parties.

Article II
Definitions

Unless the context indicates otherwise, the following words and phrases as used in this Agreement shall have the following meanings:

2.01 Biochemical Oxygen Demand or B.O.D. - the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures for five (5) days at twenty degrees (20°) centigrade, usually expressed as a concentration (*e.g.*, mg/l).

2.02 Customer Service Agreements – an agreement executed by all Ingram retail wastewater customers prior to any connection being made to the Ingram Wastewater System. Such Customer Service Agreements shall be substantially in the form of the agreement attached hereto as **Exhibit A** and incorporated herein by reference for all purposes.

2.03 Capital Recovery Fee - a charge or assessment lawfully imposed, pursuant to Chapter 395, TEX. LOCAL GOV'T CODE, against new development, as that term is defined by state law, in order to finance the costs of capital improvements or facility expansions to either the Kerrville System or the Ingram System necessitated by, and attributable to, the new connection. The term includes amortized charges, lump sum charges, capital recovery fees, contributions in aid of construction, and any other fee that functions as described by this definition.

2.04 Infiltration - the water entering a wastewater system and service connections from the ground, through such means as, but not limited to, defective pipes, pipe joints, connections, or manhole walls. Infiltration does not include, and is distinguished from, Inflow and Wastewater Flow.

2.05 Inflow - the water discharged into a wastewater system from such sources as, but not limited to, roof leaders, cell or yard and area drains, foundation drains, cooling water

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discharges, drains from springs and swampy areas, manhole covers, cross connections from storm waters, surface run-off, street wash waters, or drainage. Inflow does not include, and is distinguished from, Infiltration and Wastewater Flow.

2.06 Ingram Contributed Wastewater Service Volume - the total volume of Wastewater Flow, Infiltration and Inflow expressed in gallons that is to be generated within the Ingram Wastewater Service Area as measured by the Meter(s) on a monthly basis.

2.07 Ingram Customer Classes – classes of retail wastewater customers within the Ingram Wastewater Service Area having similar flows and wastewater characteristics contracting with Ingram for centralized wastewater service. Ingram Customer Classes shall be identified as:

(a) Residential (One and two unit family residences); and

(b) Commercial (All business types, including apartments).

2.08 Ingram Wastewater Service Area – the geographic region(s) or location(s) within Kerr County, Texas, specifically identified on the map attached hereto as **Exhibit B** and incorporated herein for all purposes by reference.

2.09 Ingram Wastewater Service Charge – total monthly charge for Wastewater Services provided by Kerrville to Ingram based upon the Ingram Wastewater Service Rate.

2.10 Ingram Wastewater Service Rate – the volumetric rate per thousand gallons of Ingram Contributed Wastewater Service Volume charged to Ingram by Kerrville, as established from time to time by Kerrville for Wastewater Services.

2.11 Ingram Wastewater System – all properties, facilities and easements to be constructed and leased, owned, or otherwise controlled, operated and maintained by Ingram within the Ingram Wastewater Service Area for the collection and transportation of wastewater, together with repairs, replacements, and additions thereto, which are utilized to collect and transport wastewater generated within said area for delivery to the Kerrville System.

2.12 Kerrville System – all properties, facilities and plants currently owned, operated and maintained by Kerrville for the collection and treatment of wastewater, together with all future extensions, improvements, purchases, repairs, replacements and additions thereto, paid for and owned by Kerrville whether situated within or outside the corporate limits of the City of Kerrville.

2.13 Kerrville Wastewater Service Area – the geographic region(s) or location(s) within Kerr County, Texas, specifically identified on the map attached hereto as **Exhibit C** and incorporated herein for all purposes by reference. Notwithstanding the foregoing, the Parties agree that this definition is being adopted for purposes of this Agreement only, and that this Agreement shall not be construed or interpreted so as to prevent Kerrville from providing retail wastewater service to any area it deems appropriate in the exercise of its sole discretion.

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2.14 Meter(s) – the meter(s) installed, operated, and owned by Kerrville where the Ingram Wastewater System connects to the Kerrville System, which includes all monitoring and controlling equipment.

2.15 Solids, Suspended or TSS – solids which float on the surface of or are in suspension in the sewage and that may be removed by laboratory filtering, usually expressed as a concentration (*e.g.*, mg/l).

2.16 Texas Commission on Environmental Quality or "TCEQ" – the Agency of the state of Texas (formerly known as the Texas Natural Resource Conservation Commission), or any successor agency, charged by the Texas Legislature with the regulation and supervision of the collection, treatment and disposal of wastewater within the State of Texas.

2.17 Wastewater Connection – the joining of an individual retail wastewater customer's private service lateral to the Ingram Wastewater System.

2.18 Wastewater Flow – the sewage water delivered into a wastewater system from wastewater connections to residential and commercial units. Wastewater Flow does not include, and is distinguished from, Infiltration and Inflow.

2.19 Wastewater Service Fee – the dollar amount charged by Ingram to individual retail wastewater customers within the Ingram Wastewater Service Area for the collection and transportation of wastewater in the Ingram Wastewater System for delivery to, treatment by and/or and disposal from the Kerrville System.

Article III
Consideration

3.01 General. Kerrville shall transport, process and treat, and lawfully dispose of wastewater generated within the Ingram Wastewater Service Area and delivered by the Ingram Wastewater System into the Kerrville System at the Meter(s). In consideration for such service, Ingram shall timely pay the Ingram Wastewater Service Charge to Kerrville for Wastewater Services furnished by Kerrville in accordance with the terms and conditions of this Agreement.

3.02 Customer Service Agreements Required. Ingram shall ensure that Customer Service Agreements are executed by Ingram retail wastewater customers prior to any connection being made to the Ingram Wastewater System.

Article IV
Cost of Service and Rate-Making Methodologies

4.01 General. Kerrville shall bill Ingram the Ingram Wastewater Service Charge on a monthly basis based on rates (*i.e.*, the Ingram Wastewater Service Rate) authorized and approved, from time to time by Kerrville, in accordance with this Agreement. The Ingram Wastewater Service Rate initially in effect upon execution of this Agreement shall be

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$2.67 per 1,000 gallons as measured at the Meter(s) ("Initial Rate"). The Initial Rate shall remain in effect for twelve (12) months from the date that the Ingram Wastewater System is connected to the Kerrville System at the Meter, unless a rate adjustment, effective to customers of both the Kerrville System and Ingram Wastewater System, is made necessary pursuant to Section 4.04 below.

4.02 Rate Adjustment. Kerrville may adjust the Ingram Wastewater Service Rate from time to time; provided, however, that (i) the same shall not be changed more frequently than once each Kerrville fiscal year (*i.e.*, October 1–September 30), except as otherwise provided for herein; (ii) Kerrville shall notify Ingram of any rate increase not later than July 1 of each year prior to the beginning of Kerrville's fiscal year (*i.e.*, October 1) in which a new rate is to become effective, except as otherwise provided for herein; (iii) such adjustments shall be made only in accordance with the methodologies provided in this Agreement; and (iv) any change in the Ingram Wastewater Service Rate shall become effective on the next October 1st, except as otherwise provided for herein, following the date the change is adopted by Kerrville.

4.03 Ratemaking Guidelines. The Ingram Wastewater Service Rate adopted by Kerrville shall be developed using generally accepted cost-of-service methodologies. The use of cost of service principles and rate-making methodologies shall be evidenced and documented by Kerrville in studies, reports or computerized modeling made for such purposes. Additionally, when setting the Ingram Wastewater Service Rate, Kerrville shall remove from the costs of service expenses for services directly attributable to retail meter reading, utility billing and related administrative costs, and other services to be performed by Ingram or that are not directly related to the provision of Wastewater Services. Kerrville, upon written request, shall provide Ingram with copies of its rate methodologies and studies in sufficient detail to demonstrate that Kerrville has adjusted its rate in accordance with this Agreement. Ingram acknowledges and agrees that this section shall not obligate Kerrville to furnish a computer model to Ingram that is capable of manipulation by Ingram. In addition, Ingram agrees to keep confidential any proprietary information furnished by Kerrville to the maximum extent authorized by the laws of the State of Texas.

4.04 Unforeseen Rate Adjustments. Kerrville reserves the right to adjust the Ingram Wastewater Service Rate at any time that it adjusts rates for the Kerrville System should the costs of transporting, treating and/or disposing of wastewater increase due to either:

(a) the imposition by any federal, state, or other regulatory agency of any finding, rule, regulation or law which requires Kerrville to change any process(s), procedure(s), method(s) or facility(s) in order to meet the new regulations; and/or

(b) damage or disability of the Kerrville System as a result of Force Majeure, as that term is defined herein.

The cost increase related to (a) and/or (b) above shall be applied uniformly to all customers on the Kerrville System. Further, Kerrville shall notify Ingram in writing of

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any action it takes which results in an adjustment of the Ingram Wastewater Service Rate; such notice to be provided within ten (10) days following such action. The notification shall, at a minimum, include a copy of the resolution, which effectuates an adjustment under this section. In recognition of Ingram's obligation to provide notice to its customers, Kerrville agrees that any such unforeseen Rate Adjustment shall not become effective until the month following the expiration of sixty (60) days after the date Ingram receives written notice from Kerrville.

4.05 Right to Terminate. Upon receiving notice of any rate adjustment in the Ingram Wastewater Service Rate effectuated under Section 4.02 above, Ingram shall have the option to terminate this Agreement by giving written notice to that effect to Kerrville within at least thirty (30) days following Kerrville's notice of an adjustment to the Ingram Wastewater Service Rate. The effective date of the termination pursuant to this Section 4.05 shall be the date specified in Ingram's notice to Kerrville, but in no case shall the termination date be prior to the end of the current fiscal year in which the notice is being provided to Kerrville.

4.06 Effect of Termination. In the event Ingram terminates this Agreement pursuant to Section 4.05 above, Kerrville shall not be obligated to provide Wastewater Services to Ingram after the termination date provided to Kerrville without the execution of a new contract for such service.

4.07 Termination of Services. Kerrville shall have the option to terminate this Agreement where Ingram remains delinquent for any payments due hereunder for a period of sixty (60) days after receiving notice thereof by Kerrville. Each Party may pursue all legal remedies against the other Party to enforce and protect their respective rights due hereunder. In recognition of the public and human health and safety issues that would arise in the event Kerrville exercises the option to terminate prescribed by this Section 4.07, Kerrville agrees that it shall first pursue all other available options, including those prescribed in Sections 11.04 and 11.05 below. Kerrville agrees that in the event Ingram disputes any charge or fee imposed by Kerrville, Ingram may pay the disputed bill(s) under protest pending a resolution to the dispute. In the event that Ingram prevails in any such challenge, then Kerrville shall immediately tender to Ingram all excess amounts paid by Ingram. Moreover, the prevailing party in any such proceeding shall be entitled to recover all costs and expenses from the non-prevailing party, including reasonable attorneys' fees.

4.08 Responsibility of Ingram and Indemnification. In the event Ingram terminates this Agreement pursuant to Section 4.05 above, Ingram acknowledges it will have no continuing rights with respect to either Wastewater Services or to any use of the Kerrville System. Ingram agrees that in that event, it will not assert or raise against Kerrville any claims for continuation of Wastewater Services or use of the Kerrville System following such termination. TO THE EXTENT AUTHORIZED BY THE LAWS OF THE STATE OF TEXAS, INGRAM WILL INDEMNIFY AND HOLD KERRVILLE AND ITS OFFICERS, AGENTS, EMPLOYEES, CONTRACTORS AND SUBCONTRACTORS HARMLESS FROM ANY CLAIMS, JUDGMENTS, LOSSES, LIABILITIES, EXPENSES (INCLUDING ATTORNEYS' FEES) AND DAMAGES THAT ARISE

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FROM, ARE ASSERTED BY, OR ARE ATTRIBUTABLE TO ANY CLAIM OR ACTION BY A INGRAM CUSTOMER AGAINST KERRVILLE, OR ITS OFFICERS, AGENTS, EMPLOYEES, CONTRACTORS OR SUBCONTRACTORS, SEEKING CONTINUATION OF WASTEWATER SERVICES FOLLOWING INGRAM'S TERMINATION OF THIS AGREEMENT PURSUANT TO SECTION 4.05 ABOVE OR RELATED TO OR ARISING, FOR WHATSOEVER REASON, FROM TERMINATION OF THIS AGREEMENT, FOR ANY REASON, BY INGRAM.

Article V
Metering of and Billing for Wastewater Service

5.01 Meter(s), Connection Fee and Ownership.

(a) The Ingram Contributed Wastewater Service Volume delivered into the Kerrville System shall be calculated by measuring the same by the Meter(s). Ingram shall give Kerrville not less than sixty (60) days written notice prior to the date that Ingram desires to initiate Wastewater Service.

(b) Ingram shall pay Kerrville a one time connection fee of $25,000.00.

(c) The Meter(s) shall be owned, operated, and maintained by Kerrville.

5.02 Meter Calibrations. Not less than once during its fiscal year on a date as near the end of such year as practical, Kerrville shall calibrate the Meter(s) in the presence of Ingram at Kerrville's expense. The Parties shall then jointly observe any adjustments that may be necessary. Kerrville shall give Ingram reasonable written notice of the date and time when any such calibration(s) or adjustment(s) are to be made and, if an Ingram representative is not present at the time set, Kerrville may proceed with the calibration(s) and adjustment(s).

If upon any test of Meter(s), the percentage of inaccuracy of such metering equipment is found to be in excess of five percent (5%), registration thereof shall be corrected for a period extending back to the time when such inaccuracy began, if such time is ascertainable. If such time is not ascertainable, then registration thereof shall be corrected for a period extending to the time elapsed since the last date of calibration, or sixty (60) days, whichever is less. Ingram shall have the right to request such additional meter calibrations as Ingram deems necessary and such additional calibrations will be provided for at Ingram's sole expense

If any Meter(s) is out of service or out of repair such that the amount of wastewater delivered cannot be ascertained or computed from the reading thereof, the wastewater delivered through the period such Meter(s) is out of service, or out of repair, shall be estimated and agreed upon by the Parties upon the basis of the best data available. If the Parties fail to agree on the amount of wastewater delivered during any period in which a Meter(s) is out of service, or out of repair, the volume delivered may be estimated by:

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(a) correcting the error if the percentage of the error is ascertainable by calibration tests or mathematical calculation; or

(b) estimating the quantity of delivery by deliveries during the preceding period(s) under similar conditions when the Meter(s) was registering accurately.

5.03 Billing. Kerrville shall bill Ingram on a monthly basis for the transportation, treatment and disposal of Ingram's Contributed Wastewater Service Volume generated within the Ingram Wastewater Service Area, as metered into the Kerrville System. The amount of the monthly charge shall be computed by dividing Ingram's Contributed Wastewater Service Volume measured by the Meter(s) contemplated in Section 5.01 above, by one thousand (1,000) then multiplying the result by the then current Ingram Wastewater Service Rate. The amount so calculated is the monthly Ingram Wastewater Service Charge.

5.04 Monthly Lump Sum Payment. The billing and collection of fees and charges from Ingram's retail customers shall be the responsibility of Ingram. Payment of the monthly Ingram Wastewater Service Charge to Kerrville shall be made by Ingram on a monthly lump-sum basis. All payments by Ingram for Wastewater Services shall be made from the current revenues available to Ingram, but are in no way contingent upon the collection of Wastewater Services Fees by Ingram from its customers.

5.05 Date, Place, and Method of Payment. All payments due Kerrville under this Agreement shall be mailed, or hand-delivered, by Ingram to 800 Junction Highway, Attention: Utility Billing, Kerrville, Texas 78028. Payments by Ingram to Kerrville are to be received by Kerrville on or before the fifteenth (15^{th}) day following the date appearing on the Kerrville invoice requesting payment. Checks shall be made payable to the City of Kerrville. Should Ingram choose to make an electronic transfer, the procedures for such transfers shall be agreed upon in writing by Ingram and Kerrville.

Kerrville may extend the payment due date for Ingram to accommodate unforeseen and excusable circumstances preventing timely payment. Ingram shall submit any such extension requests in writing and such requests will be subject to review and approval by Kerrville, whose decision shall be final.

5.06 Adjustment to Ingram Wastewater Service Charge. Adjustments to Ingram Wastewater Service Charge, shall, when possible, be credited or adjusted to the Ingram account in the monthly statement within two (2) months following the month within which the event necessitating the adjustment occurs. In no event shall such credit or adjustment be made later than three (3) months following the month within which the event necessitating the adjustment occurs, unless Ingram has provided notice of, and requested the adjustment, within said three-month period.

Article VI
Flow and Service Limits

6.01 General. The obligation of Kerrville to accept and treat Ingram Contributed Wastewater Service Volume is specifically limited as follows:

(a) Ingram Contributed Wastewater Service Volume shall not exceed the following waste load factors:

(1) 425,000 gallons of Ingram Contributed Wastewater Service Volume per day; and

(2) 250 mg/l of TSS per average annual day; and

(3) 250 mg/l of B.O.D. per average annual day.

(b) Ingram Contributed Wastewater Service Volume shall only be generated within the Ingram Wastewater Service Area.

(c) Ingram shall insure that no user of the Ingram Wastewater System discharges any wastewater or industrial waste that will interfere with the normal operation or performance of the Kerrville System or cause it to violate its permit or exceed water quality standards. This provision applies to all users of the Kerrville System whether or not the user is subject to national categorical pretreatment standards or any other federal, state or local pretreatment standards or requirements.

6.02 Increasing Ingram Contributed Wastewater Service Volume.

(a) Should the Ingram Contributed Wastewater Service Volume exceed an average of 75% of the total volume authorized in Section 6.01(a)(1) above for any three (3) consecutive calendar months, Kerrville shall notify Ingram in writing that Ingram must begin negotiations with Kerrville to increase Ingram's Contributed Wastewater Service Volume. Such negotiation, if necessary, shall include an analysis of the total capacity of the Kerrville System and the impact on that system from projected increases in the Ingram Contributed Wastewater Service Volume above 425,000 gallons per day, similar wastewater service agreements that Kerrville has entered into, as well as the Kerrville Wastewater Service Area.

(b) Should Ingram's Contributed Wastewater Service Volume exceed an average of 90% of the total volume authorized in Section 6.01(a)(1) above for any three (3) consecutive calendar months, Kerrville shall notify Ingram that Ingram must immediately cease permitting and/or connecting any additional wastewater connections to the Ingram Wastewater System until such time as additional capacity in the Kerrville System has been

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placed into operation and Kerrville provides written notice to Ingram of such action.

6.03 Expansion of Ingram Wastewater Service Area. In the event Ingram wishes to extend the Ingram Wastewater Service Area, Ingram shall notify Kerrville in writing of such request and the Parties shall enter into negotiations regarding possible expansion. Such negotiations shall include an analysis of the proposed area Ingram wishes to provide service to, the total number of customers presently served by Ingram within the Ingram Wastewater Service Area, and the total capacity of the Kerrville System and the impact that the proposed additional service area, and the Ingram Contributed Wastewater Service Volume generated therein, would have on the Kerrville System. Kerrville reserves the right to refuse to accept additional Wastewater Flow from the Ingram Wastewater System beyond those limits specified in Section 6.01(a)(1) above for Ingram Contributed Wastewater Service Volume, and/or to enter into a contract with Ingram to expand the Ingram Wastewater Service Area.

6.04 Infiltration and Inflow. It shall be the responsibility of the Parties to undertake such measures as are necessary and/or prudent to minimize Infiltration and eliminate Inflow within their respective wastewater collection systems.

Article VII
Payment of Capital Recovery Fees and other Fees

7.01 Capital Recovery Fees. Both Parties recognize that pursuant to Chapter 395, TEX. LOCAL GOV'T CODE, "Capital Recovery Fees" may be lawfully assessed and collected to offset the costs of capital improvements and facility expansions to the Kerrville System which are necessitated by increased connections made within the Kerrville System and Ingram Wastewater System, respectively. The Parties further recognize that connections within the Ingram Wastewater System shall contribute to increased demand and may require the expansion and/or new construction of wastewater facilities within the Kerrville System. Based upon studies conducted by Kerrville pursuant to Chapter 395, Kerrville has developed and imposes, and may, from time to time, amend and uniformly impose Capital Recovery Fees. The Parties may develop, impose and collect lawfully adopted Capital Recovery Fees. Ingram acknowledges that this may result in Ingram customers paying both Ingram and Kerrville Capital Recovery Fees to the extent Kerrville lawfully charges Capital Recovery Fees to Ingram for service within the Ingram Wastewater Service Area.

Ingram shall collect and pay Kerrville's Capital Recovery Fees in the following manner: i) at the time of connection between the Ingram Wastewater System and the Kerrville System, Ingram shall pay Kerrville a lump sum payment equivalent to the connection of one hundred and fifty (150) of its Residential customers multiplied by the amount of the Capital Recovery Fee in existence at the time of this Agreement, said amount being $500.00; ii) thereafter, Ingram shall pay such fee for all remaining Residential customers within one (1) year of each such connection, without penalty or accrued interest; and iii)

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all Commercial connections shall be paid to Kerrville within thirty (30) days of each such connection.

Ingram hereby contracts with Kerrville: (i) to provide capital improvements and facility expansions necessary for the Kerrville System to provide Wastewater Services to Ingram on behalf of customers within the Ingram Wastewater Service Area; and (ii) for Ingram to collect Kerrville's Capital Recovery Fees to fund and recoup the costs of such capital improvements and facility expansions as required to service Ingram's customers. The Parties recognize that such Capital Recovery Fee is a charge of Kerrville. Ingram assumes no obligation to defend such fee as to its validity, amount and/or method of calculation, and in the event that such fee is ever invalidated for any reason, Kerrville shall be responsible for all refunds and other costs, expenses or obligations that may arise under Chapter 395, TEX. GOV'T CODE.

7.02 Other Fees. Kerrville reserves the right to adopt and lawfully impose other fees as may be authorized from time to time so long as the fee is:

(a) necessary for Kerrville to provide the Wastewater Services contemplated by this Agreement,

(b) applied to all customers utilizing the Kerrville System including, as applicable, those customers receiving Wastewater Services under a similar agreement.

(c) in accordance with the cost of service methodology and other requirements set forth in this Agreement; or

(d) imposed by state law or regulation.

Article VIII
Service to New Subdivisions

8.01 Requests for Service and Wastewater Connections. Within thirty (30) days of Ingram's receipt of a request for wastewater service for a new subdivision for which Ingram desires Wastewater Services from Kerrville, Ingram shall furnish Kerrville with copies of the same. Such applications shall be reviewed by Ingram to determine whether the intended development materially and/or adversely affects the existing capacity of the Ingram Wastewater System or those standards specified in Section 6.01 above. Prior to Kerrville's approval of any plat or replat, or of Ingram's execution of a wastewater service agreement for such a new subdivision, Ingram shall consult with Kerrville to determine whether such development will materially and/or adversely affect the existing capacity of the Kerrville System. Kerrville shall respond to Ingram's consultation in a timely manner so that Ingram may timely respond to each request for service. In no case shall any wastewater service commitment or connection be made that would violate the provisions of this Agreement.

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Article IX
Construction, Maintenance, and Operation

9.01 Construction Contracts. Ingram is not authorized by this Agreement to own any facilities outside the Ingram Wastewater Service Area and within Kerrville's Wastewater Service Area. Unless otherwise specifically provided for herein, or by separate construction and/or maintenance contract with Kerrville, the construction, maintenance, operation, re-construction, expansion and/or replacement of any part of the Ingram Wastewater System (including any connector lines to the Kerrville System which are owned and operated by Ingram, but are neither physically located within the Ingram Wastewater Service Area nor the Kerrville Wastewater Service Area), shall be the sole responsibility of Ingram with all construction being in accordance with all federal, state and Kerrville construction standards. Construction of all pipes, individual customer service lines, meters, lift stations and other appurtances contemplated by this Article IX shall be promptly inspected by Kerrville before backfill occurs on any portion thereof. All connections by Ingram to the Kerrville System shall be made pursuant to Section 5.01 above.

If Kerrville determines that the existing configurations and capacities of the Ingram Wastewater System and/or the Kerrville System connector outfall lines and mains are inadequate to provide the requested Wastewater Services associated with newly proposed development, subdivision plat or replat, for properties lying within the Ingram Wastewater Service Area, Kerrville may, subject to the limitations provided for in Section 6.01 above, enter into negotiations with Ingram and the developer of the subdivision or development to establish an agreement whereby Ingram's internal collection system and any existing or proposed Kerrville System outfall lines and mains can be expanded through oversizing or paralleling at the cost of the developer of the subdivision or development. Such agreement may require the imposition of Capital Recovery Fees to generate revenue to recover the costs for Wastewater Services collection and treatment system expansion, or new construction, required to accommodate new development within the Ingram Wastewater Service Area.

9.02 Wastewater Connections. Ingram shall require all Wastewater Connections to be made in conformity with Kerrville standards, as may be amended, and shall adopt similar ordinances and/or regulations to accomplish this purpose and shall enforce same. All new connections to the Ingram Wastewater System shall be made only after application therefore has been made to, and approval has been issued by, Ingram. Coinciding with the payment deadline specified in Section 5.05 above, on or before the fifteenth (15th) day following the date appearing on the Kerrville invoice, Ingram shall furnish Kerrville with a cumulative monthly record of all existing and any new connections established during the preceding month.

Article X
Enforcement of Kerrville Regulation of Waste Discharge Requirements

10.01 Kerrville's Right to Inspect. Ingram hereby grants Kerrville the right to inspect all wastewater lines, facilities, and wastewater service flows, both public and private

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(including sampling points for businesses located on private property), that are located within the Ingram Wastewater Service Area to the extent that Ingram has a right of inspection that may lawfully be assigned to Kerrville. Any such Kerrville inspections shall be reasonable as to the time, place and manner and shall be for the purpose of taking samples of the Ingram Contributed Wastewater Service Volume and conducting tests on same to determine compliance. If such tests show harmful substances are being generated within the Ingram Wastewater Service Area in excess of the quantity or concentrations permitted by applicable standards, Kerrville shall notify Ingram of such in writing. Upon receipt of such notice, Ingram shall immediately and with due diligence: (i) use its best efforts to identify the source(s) within the Ingram Wastewater Service Area discharging such harmful substances in excess of the quantity or concentrations permitted by federal, state, or local laws as well as the standards set out in Section 6.01(a)(2) and (3) above; (ii) immediately disconnect from the Ingram Wastewater System any such source that is identified if the source fails to discontinue discharging the identified harmful substances in unlawful quantities or concentrations immediately upon receipt of notice from Ingram; and (iii) not reconnect any such source to the Ingram Wastewater System until receiving notice in writing from Kerrville that Kerrville concurs that such source has demonstrated that it will not discharge harmful substances in excess of the quantity or concentrations specified above in the future. Prior to the commencement of service to any source connected to the Ingram Wastewater System that discharges harmful substances in excess of quantity or concentrations permitted by federal, state, or local laws as well as the standards set out in Section 6.01(a)(2) and (3) above, Ingram agrees to adopt surcharges in an amount at least equal to surcharges adopted by Kerrville to be assessed against such a source; and, in the event of delivery by the Ingram Wastewater System to the Kerrville System of wastewater containing such harmful substances, to pay to Kerrville any surcharges that Kerrville may impose on account of such delivery by the Ingram Wastewater System to the Kerrville System.

IN ADDITION, TO THE EXTENT AUTHORIZED BY THE LAWS OF TEXAS, INGRAM WILL INDEMNIFY, DEFEND AND HOLD KERRVILLE AND ITS OFFICERS, AGENTS, EMPLOYEES, CONTRACTORS AND SUBCONTRACTORS HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, JUDGMENTS, LOSSES, LIABILITIES, EXPENSES (INCLUDING REASONABLE ATTORNEYS' FEES) AND DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING FINES, PENALTIES AND COSTS OF REMEDIATION, THAT ARISE FROM, ARE ASSERTED AS A RESULT OF, OR ARE ATTRIBUTABLE TO, ANY HARMFUL SUBSTANCES IN EXCESS OF THE QUANTITY OR CONCENTRATIONS PERMITTED BY FEDERAL, STATE, OR LOCAL LAWS, AS WELL AS THE STANDARDS SET OUT IN SECTION 6.01(A)(2) AND (3) ABOVE, THAT ARE DELIVERED BY THE INGRAM WASTEWATER SYSTEM TO THE KERRVILLE SYSTEM.

10.02 Ingram's Enforcement Obligation. To the extent allowed by law, Ingram shall enforce all federal, state and local laws as they relate to the development, construction, maintenance and operation of the Ingram Wastewater System including all pre-treatment provisions.

Article XI
Interruption, Suspension, and/or Termination of Wastewater Services, Default and Related Remedies

11.01 Interruption and/or Suspension of Wastewater Services. Ingram further agrees that nothing herein shall be construed to prohibit Kerrville from interrupting and/or suspending Wastewater Services in the event of a maintenance operation or emergency repairs for a reasonable period of time necessary to respond to such operations or repairs. Ingram shall cooperate with Kerrville during such periods of maintenance operation and emergency repairs in a manner consistent with the preservation and protection of the public health, safety, and welfare. In addition, Ingram shall be solely responsible for providing notice to its customers of such interruptions and/or suspensions. Ingram's obligation to provide notice to its customers shall be subject to the following:

(a) In the event of a scheduled, non-emergency interruption or suspension of Wastewater Services, Kerrville shall provide Ingram with at least ten (10) days prior written notice of the dates which the interruption/suspension shall commence and terminate; and

(b) in the event of an emergency generated interruption or suspension of Wastewater Service, Kerrville shall provide actual notice to Ingram within one (1) hour of the event, and confirm the interruption/suspension in writing within twenty-four (24) hours, which written notice shall include the anticipated time of recommencement of Wastewater Service within the Ingram Wastewater Service Area. The Parties shall provide each other with twenty-four (24) emergency contact information which shall include information and procedures to be utilized for emergencies during non-work days, weekends and holidays.

11.02 Termination. This Agreement may be terminated at anytime upon the mutual written consent of the Parties. However, notwithstanding any other provision herein to the contrary, and for so long as this Agreement has been pledged, by Ingram, to the Rural Utilities Service of the United States Department of Agriculture ("RUS"), the Agreement may not be terminated as provided herein without the prior written consent of the RUS.

11.03 Termination Upon Material Breach. Either Party shall have the right to terminate this Agreement in the event of a material breach of the provisions of this Agreement by the other if the defaulting Party has not cured such material breach within thirty (30) days after the non-defaulting Party has made written demand to cure the same. Events that shall constitute a "material breach" of this Agreement, may include, but are not limited to, either Party's:

(a) failure to cease making new connections to the Ingram Wastewater System, when required by Article VI;

(b) excedance of the daily maximum volume limitation set forth in Section 6.01(a)(1);

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(c) excedance of either the TSS or the B.O.D limitation in Sections 6.01(a)(2) and 6.01(a)(3), respectively;

(d) failure to pay Capital Recovery Fees to Kerrville, as required by Article VII, so long as such fees remain valid and enforceable;

(e) failure to take the actions set forth in Article X in the event tests show that harmful substances in excess of the quantity or concentrations permitted by applicable federal and state laws or Section 6.01(a)(3) have been delivered by the Ingram Wastewater System to the Kerrville System;

(f) failure to enforce any federal, state, or local rules, regulations, laws or procedures as they relate to the development, maintenance or operation of a wastewater collection system, including but not limited to, the failure to obtain a fully executed Customer Service Agreements prior to each connection to the Ingram Wastewater System in accordance with Article III, or the failure to comply with any pretreatment provisions, in violation of Articles IX and X; and

(g) failure to perform any material covenant or obligation in this Agreement.

11.04 Option to Assume Operation. In the event Ingram becomes unable or unwilling to continue to operate and maintain the Ingram Wastewater System, the Parties recognize that it is advisable to make provision for continued operation of such system to protect the public heath and safety. Accordingly, upon the occurrence of:

(a) a material breach of this Agreement by Ingram as set forth in Section 11.03 above which renders Ingram unable or unwilling to continue to operate and maintain the Ingram Wastewater System;

(b) a failure of Ingram to pay any other creditor an undisputed amount when due and payable, which failure is not cured within any applicable cure period and which failure renders Ingram unable or unwilling to continue to operate and maintain the Ingram Wastewater System; or

(c) the occurrence of any other event which reasonably indicates that Ingram is unable or unwilling to continue to operate and maintain the Ingram Wastewater System,

Ingram agrees that Kerrville shall have the option to, but at its sole discretion need not, assume the operation of the Ingram Wastewater System, as Ingram's agent. Kerrville acknowledges that any such assumption of the operation of the Ingram Wastewater System will neither include the conveyance of or ownership in the Ingram Wastewater System and as such, Kerrville shall have no right or basis to transfer ownership of the Ingram Wastewater System. In the event Kerrville elects to exercise such option and assumes operation of the Ingram Wastewater System, as Ingram's agent, Kerrville may

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perform all acts that Ingram would perform on its own behalf to ensure continued operation of the Ingram Wastewater System and the provision of continuous adequate services to Ingram's customers, including, but not limited to, the power to (a) read meters, (b) bill for services, (c) collect revenues, (d) disburse funds, and (e) access all system components. Ingram agrees that should Kerrville choose to act as Ingram's agent to operate the Ingram System under the foregoing option, Kerrville shall be entitled to withhold and deduct from revenues it collects as Ingram's agent, an amount equal to all the reasonable costs, including treatment costs, and expenses Kerrville actually incurs in performing such functions. Kerrville shall forward the remaining funds, if any, and an accounting of the revenues collected and Kerrville's incurred costs to Ingram in a timely manner. In the event that the Parties disagree as to whether Ingram is rendered unable or unwilling to continue to operate and maintain the Ingram Wastewater System for any reason, then either Party make seek a determination from a court of competent jurisdiction.

11.05 Option to be Appointed Temporary Manager or Receiver. Upon the occurrence of any event listed, and in accordance with the procedures set forth, in TEX. WATER CODE § 13.4132(a), Ingram agrees that Kerrville shall have the option to, but at its sole discretion need not, apply to the TCEQ to be appointed as the temporary manager of the Ingram Wastewater System under TEX. WATER CODE § 13.4132. Upon the occurrence of any event listed in TEX. WATER CODE § 13.412(a), Ingram agrees that Kerrville shall have the option to, but at its sole discretion need not, apply to the TCEQ to be appointed as the receiver of the Ingram Wastewater System under TEX. WATER CODE § 13.412.

11.06 Effect of Options. The options that Kerrville is granted under Sections 11.04 and 11.05 above are at Kerrville's sole discretion and each may be exercised separately or together. The existence of any such option shall not confer any right, whatsoever, on Ingram or any other person or entity, and shall not be construed to impose any obligation, whatsoever, on Kerrville. Likewise, a subsequent decision by Kerrville to decline to exercise any such option shall not be construed to impose any obligation, whatsoever, on Kerrville, and shall not confer any right, whatsoever, on Ingram or any other person or entity. The options contained in Sections 11.04 and 11.05 above shall, to the extent applicable, survive the termination of this Agreement.

11.07 Rights After Termination. Except as specifically provided otherwise in this Agreement, all of the rights and obligations of the Parties under this Agreement shall terminate upon termination of this Agreement; provided, however, that termination shall not affect the rights or liabilities of the Parties accruing prior to such termination, as provided herein. In the event this Agreement terminates pursuant to Section 11.02 or 11.03 above, Kerrville shall not be obligated to provide Wastewater Services to Ingram after the effective date of the termination without the execution of a new contract for such service.

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Article XII
Miscellaneous

12.01 Force Majeure.

(a) Definition. The term *Force Majeure* as used herein shall mean a cause or causes beyond the reasonable control of the Party claiming *Force Majeure*, and shall include but not be limited to, natural disasters, strikes, lockouts or other industrial disturbances, acts of public enemy, orders of any kind of the United States of America or the State of Texas or any civil or military authority, insurrections, riots, epidemics, lightning, fires, hurricanes, storms, floods, washouts, earthquakes, droughts, arrests, restraint of government and people, civil disturbances, explosions and breakage or accidents to machinery, pipelines, or facilities. Provided, however, that the Parties agree that a mere increase in operating costs shall not, by itself, constitute an event of Force Majeure.

(b) Notice; suspension of obligations. By reason of *Force Majeure*, if any Party shall be rendered partially or wholly unable to carry out its obligations under this Agreement, then if such Party shall give notice in writing and full particulars of such *Force Majeure* to the other Party immediately after occurrence of the event or cause relied on, the obligation of the Party giving such notice, so far as it is affected by such *Force Majeure*, with the exception of the obligation of Ingram to pay for services actually received from Kerrville hereunder, shall be suspended during the continuance of the inability then claimed, and such Party shall endeavor to use its best efforts to remove or overcome such inability with all reasonable dispatch.

12.02 INDEMNITY.

(a) TO THE GREATEST EXTENT ALLOWED BY LAW, THE PARTIES SHALL INDEMNIFY, DEFEND AND HOLD EACH OTHER, AND THEIR RESPECTIVE OFFICERS, AGENTS, EMPLOYEES, CONTRACTORS AND SUBCONTRACTORS, HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, JUDGMENTS, LOSSES, LIABILITIES, EXPENSES (INCLUDING REASONABLE ATTORNEYS' FEES) AND DAMAGES OF ANY NATURE WHATSOEVER (EXCEPT WORKERS' COMPENSATION CLAIMS) IN RELATION TO PERSONAL INJURY, DEATH OR PROPERTY DAMAGE ASSERTED, INCURRED OR MADE BY THIRD PARTIES, TO THE EXTENT CAUSED BY ANY ACT OR OMISSION OF THE INDEMNIFYING PARTY, OR ITS OFFICERS, AGENTS,

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EMPLOYEES, CONTRACTORS, SUBCONTRACTORS, OR CUSTOMERS, OR TO THE EXTENT SUCH CLAIMS, JUDGMENTS, LOSSES, LIABILITIES, EXPENSES AND DAMAGES ARISE OUT OF, OR ARE IN ANY MANNER CONNECTED WITH THE PERFORMANCE OF THIS AGREEMENT BY THE INDEMNIFYING PARTY. THE INDEMNIFICATION IN THIS SECTION 12.02(a) IS IN ADDITION TO ANY OTHER INDEMNIFICATION PROVISIONS IN THIS AGREEMENT.

(b) Nothing in the foregoing Section 12.02(a) will be construed to require either Party to indemnify the other Party or its officers, agents, employees, contractors or subcontractors for any cost or expense that is to be borne by the other Party pursuant to any express provision of this Agreement or for injury or damage caused by the gross negligence or willful misconduct of the other Party or its officers, agents, employees, contractors or subcontractors.

(c) The indemnities in Section 12.02(a) above shall apply to all claims, judgments, losses, liabilities, expenses and damages against the indemnified Party, or its officers, agents, employees, contractors or subcontractors, including, but not limited to, claims, judgments, losses, liabilities, expenses and damages made by, asserted by or threatened by the indemnifying Party's employees, or its contractors' or subcontractors' employees, for personal injury (including death), which arise in the course of their employment.

(d) The Parties expressly acknowledge and agree that this Section 12.02 and any other indemnification provisions in this Agreement shall survive the termination and expiration of this Agreement.

12.03 Liability. EXCEPT TO THE EXTENT THAT EITHER PARTY IS EXPRESSLY OBLIGATED TO INDEMNIFY THE OTHER PARTY AGAINST THIRD PARTY CLAIMS UNDER THIS AGREEMENT, NEITHER PARTY SHALL BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, PUNITIVE, EXEMPLARY OR INDIRECT DAMAGES, BY STATUTE, IN TORT, OR CONTRACT. IT IS THE INTENT OF THE PARTIES THAT THE LIMITATIONS HEREIN IMPOSED ON REMEDIES AND THE MEASURE OF DAMAGES BE WITHOUT REGARD TO THE CAUSE OR CAUSES RELATED THERETO, INCLUDING THE NEGLIGENCE OF ANY PARTY, WHETHER SUCH NEGLIGENCE BE SOLE, JOINT OR CONCURRENT, OR ACTIVE OR PASSIVE.

12.04 Insurance.

(a) Kerrville and Ingram hereby agree to purchase and maintain fire, casualty, public liability, public official, and other insurance on their respective wastewater systems for purposes and in amounts which ordinarily would be carried by a publicly owned utility company owning and operating such

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facilities, except that neither Party shall be required to carry liability insurance except to insure itself against risk of loss due to claims for which it can, in the opinion of the respective Party's legal counsel, be liable under the Texas Tort Claims Act or any similar law or judicial decision. Such insurance shall provide to the extent feasible and practicable, for the restoration of damaged or destroyed properties and equipment, in an effort to minimize the interruption of services of such facilities. All premiums for such insurance shall constitute an operation and maintenance expense for the respective system.

(b) The Parties each shall, at their own expense, maintain in force through the period of this Agreement and until released by Kerrville and Ingram the following minimum insurance coverages, with insurers authorized to do business in Texas:

(i) Employers Liability and Workers' Compensation Insurance providing statutory benefits in accordance with the laws and regulations of the State of Texas. The minimum limits for the Employer's Liability insurance shall be One Million Dollars ($1,000,000) each accident bodily injury by accident, One Million Dollars ($1,000,000) each employee bodily injury by disease, and One Million Dollars ($1,000,000) policy limit bodily injury by disease.

(ii) Commercial General Liability Insurance including premises and operations, personal injury, products and completed operations coverage, coverage for explosion, collapse and underground hazards, coverage for sudden and accidental pollution, with minimum limits of One Million Dollars ($1,000,000) per occurrence/One Million Dollars ($1,000,000) aggregate combined single limit for personal injury, bodily injury, including death and property damage: provided, however, that the minimum limits for sudden and accidental pollution shall be One Hundred Thousand ($100,000) per occurrence.

(iii) Comprehensive Automobile Liability Insurance for coverage of owned, non-owned, and hired vehicles, trailers or semi-trailers designed for travel on public roads, with a minimum combined single limit of One Million Dollars ($1,000,000) per occurrence for bodily injury, including death, and property damage.

(c) The Commercial General Liability Insurance and Comprehensive Automobile Liability Insurance policies shall name the other Party and its officers, agents, employees as additional insureds. All policies shall contain provisions whereby the insurers waive all rights of subrogation in accordance with the provisions of this Agreement against the other Party

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and provide thirty (30) days advance written notice to the other Party prior to anniversary date of cancellation or any material change in coverage or condition.

(d) The Commercial General Liability Insurance, and Comprehensive Automobile Liability Insurance policies, if written on a Claims First Made basis, shall be maintained in full force and effect for two (2) years after termination of this Agreement, which coverage may be in the form of tail coverage or extended reporting period coverage if agreed by the Parties.

(e) The requirements contained herein as to the types and limits of all insurance to be maintained by Ingram are not intended to and shall not in any manner, limit or qualify the liabilities and obligations assumed by the Parties under this Agreement.

(f) Within thirty (30) days following execution of this Agreement, and as soon as practicable after the end of each fiscal year or at the renewal of the insurance policy and in any event within ninety (90) days thereafter, the Parties shall provide certification of all insurance required in this Agreement, executed by each insurer or by an authorized representative of each insurer.

12.05 Non-Assignable Agreement. Neither Party may assign any right under this Agreement, and any purported assignment will be null and void and a breach of this Agreement.

12.06 Pledge as Security. Kerrville acknowledges that Ingram has pledged this Agreement to the United States Department of Agriculture/Rural Development ("USDA/RD") as part of the security for a loan from USDA/RD to Ingram.

12.07 Notices. All written notices required by the terms of this Agreement shall be in writing and either deposited in the United States mail addressed to such Party at the address set forth below or delivered by hand to the offices of the Party and representative listed below:

If to Kerrville:

City of Kerrville
Attn: City Manager
800 Junction Hwy.
Kerrville, Texas 78028

If to Ingram:

City of Ingram
Attn: Mayor
214 Highway 39
Ingram, Texas 78025

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These addresses may be changed by either Party by notice in writing given to the other Party; provided, however, that any such change of address shall not become effective until ten (10) days after the date of receipt of such notice.

12.08 Interpretation of Agreement. This Agreement, or any portion thereof, shall not be interpreted by a court of law to the detriment of a Party based solely upon that Party's authorship of the Agreement or any portion thereof. Each Party has had the opportunity to be represented by counsel of its choice in negotiating this Agreement. This Agreement shall therefore be deemed to have been negotiated and prepared at the joint request, direction, and construction of the Parties, at arms length, with the advice and participation of counsel, and will be interpreted in accordance with its terms without favor to any Party.

12.09 Captions. The section titles and captions contained herein are for convenience of reference only and are not intended to define, extend or limit any provision to this Agreement.

12.10 Severability. The provisions of this Agreement are severable. If, for any reason, any one or more of the provisions contained in this Agreement shall be held to be invalid, illegal or unenforceable in any respect, the invalidity, illegality or unenforceability shall not affect any other provision of this Agreement, and this Agreement shall remain in effect and be construed as if the invalid, illegal or unenforceable provision had never been contained in this Agreement; provided, however, that such determination does not materially frustrate the intent of the Parties expressed in this Agreement, in which event either Party may seek to terminate this Agreement pursuant to Section 11.02 of this Agreement.

12.11 Permitting and Related Costs. The Parties shall be solely responsible for acquiring and maintaining any and all permits, licenses, or any other regulatory approvals together with the payment for all costs associated with the use, benefit and maintenance of their respective systems, including, but not limited to, any lawfully assessed fee, tax or other cost charged or assessed pursuant to federal or state law or regulation. The Parties agree to cooperate with each other in their respective efforts to secure any such required permits, licenses, or any other regulatory approvals provided, however, that neither Party shall be required to expend any money or incur any expense in connection with their efforts to support the other Party absent an agreement for reimbursement of such costs. The costs incurred by Kerrville with respect to the Kerrville System will be included in accordance with generally accepted cost of service principles and rate-making methodologies in the development of rates charged to users including the Ingram Wastewater Service Rate.

12.12 Ownership of the Ingram Contributed Wastewater Service Volume. Ingram Contributed Wastewater Service Volume, once delivered to the Meter(s), shall become the property of Kerrville without further rights thereto by Ingram.

12.13 Regulatory Requirements. This Agreement is subject to all applicable federal, state and local laws and regulations. This Agreement is specifically subject to all applicable

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sections of the Texas Water Code and the rules of the Texas Commission on Environmental Quality, or any successor agency.

12.14 Entire Agreement. This Agreement constitutes the entire Agreement between the Parties hereto and supersedes all prior Agreements, understandings and arrangements, oral or written, between the Parties hereto with respect to the collection, transportation, treatment and disposal of wastewater. Kerrville agrees that nothing in this Agreement shall prohibit, or otherwise limit Ingram's right to establish, assess and collect lawful rates for providing wastewater collection and transmission services to its customers within the Ingram Wastewater Service Area, nor shall this Agreement limit Ingram's authority to provide retail wastewater services to other customers within Ingram's jurisdiction provided Kerrville does not provide wastewater treatment or disposal services in connection therewith.

12.15 Governing Law and Venue. This Agreement shall be construed and enforced in accordance with and governed by the laws of the State of Texas. This Agreement is entered into and fully performable in Kerr County, Texas. Accordingly, venue for any cause of action arising pursuant to this Agreement shall be proper only in Kerr County, Texas.

12.16 Execution In Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be deemed to be an original and all of which together shall be deemed to be one and the same instrument.

12.17 Amendments and Waivers. This Agreement may not be modified or amended except by an instrument or instruments in writing signed by the authorized representative of the Party against whom enforcement of any such modification or amendment is sought. The waiver by any Party hereto of a breach of any term or provision of this Agreement shall not be construed as a waiver of any subsequent breach.

12.18 Remedies. Subject to and in addition to previously provided provisions, if Ingram or Kerrville fails or refuses to timely comply with any of their respective obligations hereunder, or if any representations, warranties or covenants of any party contained herein are not true or have been breached, then the non-defaulting party will have the right to enforce this Agreement by any remedy at law or in equity.

Article XIII
Representations and Warranties of Kerrville

Kerrville represents and warrants to Ingram as follows:

13.01 Existence and Qualification of Kerrville. Kerrville is a duly formed and validly existing municipality created under the laws of the State of Texas. Kerrville has all requisite power and authority to provide Wastewater Services and to carry on its business as presently conducted.

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13.02 Authority, Approval and Enforceability with Respect to Kerrville. Kerrville has all requisite power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement. The execution and delivery of the Agreement by Kerrville and the performance of the transactions contemplated hereby by Kerrville have been duly and validly approved and adopted by resolution of its City Council. A copy of said resolution is attached hereto as **Exhibit** D and incorporated herein by reference for all purposes. This Agreement has been duly executed and delivered on behalf of Kerrville and constitutes the legal, valid and binding obligation of Kerrville enforceable in accordance with its terms. All documents required hereunder to be executed and delivered by Kerrville will have been duly authorized, executed and delivered and will constitute legal, valid and binding obligations of Kerrville enforceable in accordance with their terms.

XIV
Representations and Warranties of Ingram

Ingram represents and warrants to Kerrville as follows:

14.01 Existence and Qualification of Ingram. Ingram is a duly formed and validly existing Type A general-law municipality created under the laws of the State of Texas. Ingram has all requisite power and authority to provide retail wastewater service and to carry on its business as presently conducted.

14.02 Authority, Approval and Enforceability With Respect to Ingram. Ingram has all requisite power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement. The execution and delivery of this Agreement by Ingram and the performance of the transactions contemplated hereby by Ingram have been duly and validly approved and adopted by resolution of its City Council. A copy of said resolution is attached hereto as **Exhibit E** and incorporated herein by reference for all purposes. This Agreement has been duly executed and delivered on behalf of Ingram and constitutes the legal, valid and binding obligation of Ingram enforceable in accordance with its terms. All documents required hereunder to be executed and delivered by Ingram will have been duly authorized, executed and delivered and will constitute legal, valid and binding obligations of Ingram enforceable in accordance with their terms.

In Witness of which the Parties have executed this Agreement in duplicate on the dates reflected in the signature blocks below.

CITY OF KERRVILLE, TEXAS	CITY OF INGRAM, TEXAS
BY: Paul A Hofmann	BY: Monroe Schlabach
Paul A. Hofmann, City Manager	Monroe Schlabach, Mayor

C 2005-45

CITY OF INGRAM, TEXAS
CUSTOMER SERVICE AGREEMENT FORM

CONTRACT FOR WASTEWATER SERVICES

STATE OF TEXAS §
COUNTY OF KERR §

DEPOSIT AMOUNT: $ **RECEIPT #**

I certify that I am the **OWNER [ ] BUILDER [ ] LESSEE [ ] AGENT OF OWNER [ ]** ("Customer") and contract with the City of Ingram, Texas ("City") to provide wastewater service to the following property.

SERVICE ADDRESS: ____

BILLING ADDRESS: ____

Customer agrees to pay all established rates, charges and fees and to comply with all rules and regulations of City now existing or revised. City will maintain a copy of this contract as long as Customer and/or the property is connected to the Wastewater System.

Customer grants to City any easements or rights-of-way for the purpose of installing, inspecting, maintaining, and operating pipelines, meters, valves and any other equipment that may be required to extend or improve service for existing or future Customers. Customer, in accordance with state law (including but not limited to, Tx. Civ. Prac. & Rem. Code Ch. 101), agrees to waive, release and hold City harmless from any claims and damages resulting from malfunction or failure of any equipment or interruption or cessation of service including, without limitation, damages to persons or property, direct damages, special damages, incidental damages, consequential damages, or loss of profit or revenue.

DEPOSITS - A non-interest bearing Security Deposit is required for each new service account. City reserves the right to increase the amount of the deposit for any existing account. If service is terminated for non-payment, where previously a Security Deposit was not required, a Security Deposit and payment of all other applicable fees will be required prior to the restoration of service. If the account is finaled, the deposit, if any, will be applied upon termination of the account to the final bill and any remaining amount refunded.

BILLING AND PAYMENT - Bills are mailed out on or around the first day of each month. A late penalty is added if payment is not received by the due date. City may, by agreement with your water service provider, cause your water service to be terminated if you fail to provide payment for sewer service. A notice of termination will be furnished prior to termination. Customer's obligation to make timely payments for service is not released or diminished because a bill was not received.

Exhibit A

O 2005-45

PAYMENTS - All payments must be made to the address and by the due date specified on the bill.

CUSTOMER CONFIDENTIALITY - The 1993 Texas Legislature provided for any customer who wishes to exercise the privilege of keeping confidential their address, telephone number, or social security number, to file same with the providing utility company. This request for confidentiality does not prohibit City from disclosing personal information in a customer's account record to an official or employee of the state, an employee of City acting in connection with the employee's duties, a consumer reporting agency, a contractor or subcontractor approved by and providing services to City, a person for whom the customer has contractually waived confidentiality for personal information, or another entity that provides utility services. If you wish to exercise this right, please initial in the following space: ____________

RESTRICTIONS - City is responsible for protecting its Wastewater System and the City of Kerrville's Wastewater System (Publicly Owned Treatment Works or POTW) from discharges which may cause pass through or interference. The following restrictions and requirements are in place to provide this protection.

1. No user shall introduce or cause to be introduced into the POTW any pollutant or wastewater which causes pass through or interference, as defined by the City of Kerrville Code of Ordinances. These general prohibitions apply to all users of the POTW whether or not they are subject to categorical pretreatment standards or any other federal, state, or local pretreatment standards or requirements,

2. No user shall introduce or cause to be introduced into the POTW any pollutants, substances or wastewater as specified in the City of Kerrville Code of Ordinances as amended.

3. Pollutants, substances or wastewater prohibited by this section shall not be processed or stored in such a manner that they could be discharged into the POTW.

4. Persons discharging industrial wastes shall be required to pretreat said wastes or otherwise dispose of such wastes so as to make the remaining waste acceptable to the POTW prior to admission of said waste into the POTW.

5. Pretreatment facilities or interceptors shall be required as specified in the City of Kerrville Code of Ordinances as amended.

6. Customer shall allow their property to be inspected for potential sources of prohibited discharges. These inspections shall be conducted by City, its designated agent, or the City of Kerrville prior to initiating new wastewater service; when there is reason to believe that prohibited discharges are occurring or have occurred; or after any changes to the private wastewater facilities. The inspections shall be conducted during City's normal business hours.

C 2005-45

7. City or the City of Kerrville shall notify Customer in writing of violation(s) which has been identified during the initial inspection or the periodic re-inspection. Customer agrees to abide by all requirements of ART. 9-VIII of the City of Kerrville Code of Ordinances, as may be amended.

8. Customer shall, at their expense, properly install, test and operate any pretreatment system required by City or the City of Kerrville. Copies of all testing and maintenance records shall be provided to City and the City of Kerrville.

ENFORCEMENT - If Customer fails to comply with the terms of this Agreement, City shall suspend service until all violations of this Agreement have been eliminated and/or corrected, and may exercise any and all other remedies available under the laws of the State of Texas. Any expenses associated with the enforcement of this Agreement shall be billed to Customer.

CITY OF KERRVILLE - Customer acknowledges and agrees that City may contract with the City of Kerrville to operate and maintain City's wastewater collection system on behalf of City. In such an event, the City of Kerrville will serve as an independent contractor only. Customer further acknowledges and agrees that City may assign this Agreement at any time to the City of Kerrville without notice to, or consent by, Customer.

CUSTOMER NAME (Print): ________________________________

CUSTOMER SIGNATURE: ________________________________

DATE: __________

APPROVED AND ACCEPTED BY THE CITY OF INGRAM:

____

DATE: ______________

C 2005 - 45

EXHIBIT "B"
Ingram Sewer CCN
Ingram, TX

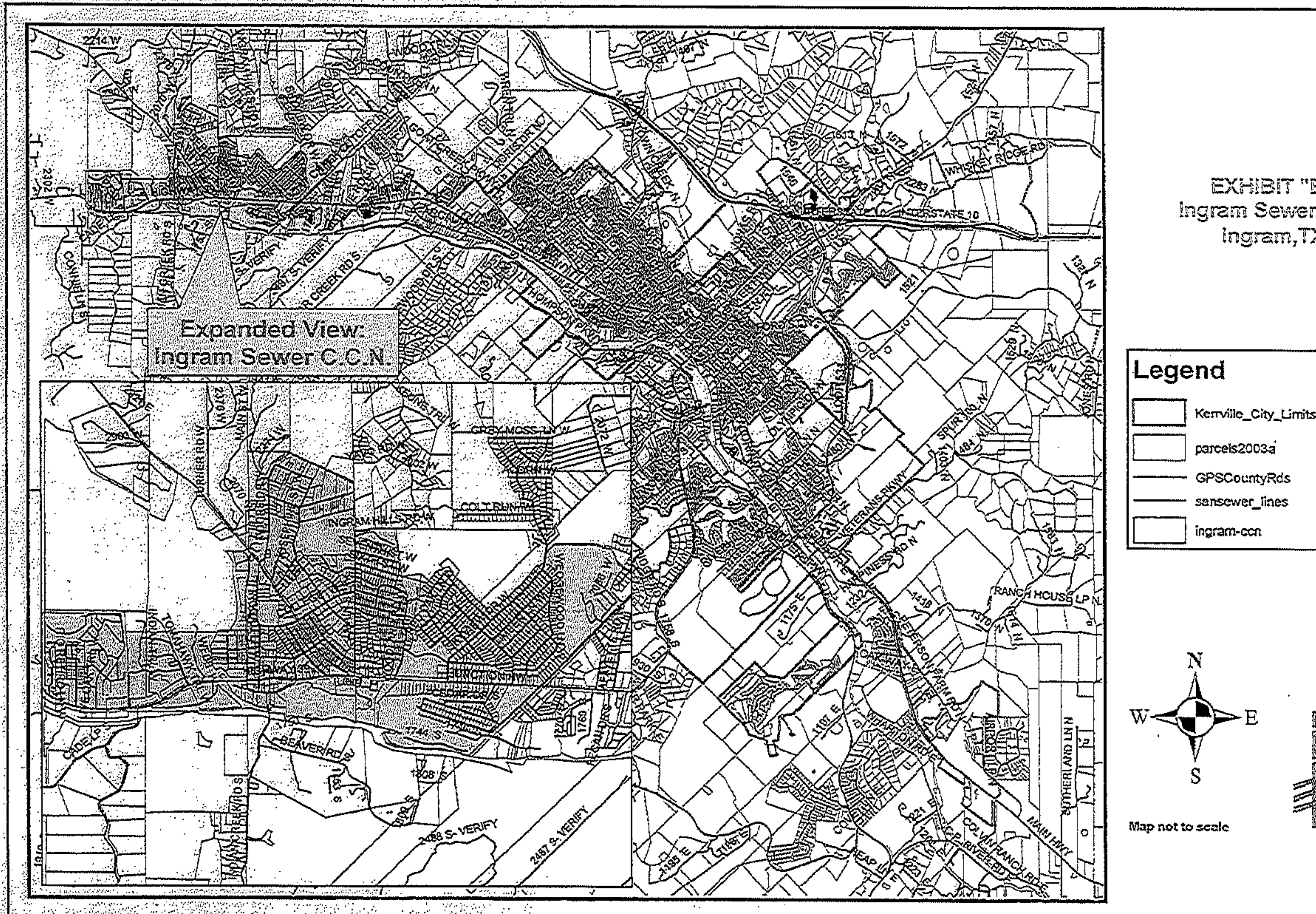


EXHIBIT "C"
Kerrville Sewer CCN
City of Kerrville, TX

Legend

- Kerrville_City_Limits
- parcels2003a
- GPSCountyRds
- sansewer_lines

N
W E
S

Map not to scale

City of Ingram
(830) 367-5115 230 Hwy 39 • Ingram, TX 78025 Fax (830) 367-3175

October 20, 2005

I, Jannell Bullock, City Secretary of the City of Ingram, In the performance of the functions of my office, hereby certify that in a regular meeting of the City Council on October 18, 2005, on item number 7 of the agenda posted October 14, 2005, the Ingram City Council moved to approve the proposed Resolution No. 1-101805 relative to Interlocal Agreement for Wholesale Wastewater Service with the City of Kerrville. The following members were present and voted as follows.

Monroe Schlabach (Mayor)
Marvin Gazaway – Yes
Ray Lynch – Yes
Shirley Klug – Yes
Gerald Johnson – Yes
Wanda Lucas – Yes

The attached Resolution No. 1-101805 is a true and correct copy of the ordinance as adopted by the City Council and executed by the Mayor and on file in this office.

Jannell Bullock
City Secretary
City of Ingram

WITNESS MY HAND AND SEAL of the City of Ingram this the 20th day October 2005.

Rose M. Robbins
Notary Public, State of Texas
My Commission expires: _______

Exhibit E

C 2005-45

CITY OF INGRAM, TEXAS
RESOLUTION NO. 1-101805

WHEREAS, on the 18th day of October, 2005, the City Council of the City of Ingram took up for deliberation an Interlocal Agreement for Wholesale Wastewater Service with the City of Kerrville, Texas, and

WHEREAS, the City Council, acting on Agenda Item No. 7 of the posted agenda, by unanimous vote did approve the Interlocal Agreement as drafted and presented to the Council,

NOW THEREFORE, BE IT RESOLVED THAT:

"The Mayor of the City of Ingram should be and is hereby authorized to act on behalf of the City of Ingram for purposes of executing the "Interlocal Agreement for Wholesale Wastewater Service with the City of Kerrville" together with all exhibits and/or other documents as may be required by the terms of the Agreement or otherwise, to fully consummate the agreement on behalf of the City of Ingram and with the City of Kerrville."

Approved and signed this the 18th day of October 2005, pursuant to section 52.003(a) of the Texas Local Government Code.

Monroe Schlabach

Monroe Schlabach, Mayor

Attest:

Jannell Bullock

Jannell Bullock, City Secretary

Approved as to form:

Danny Edwards

Danny Edwards, City Attorney

C2005-45

CITY OF KERRVILLE, TEXAS
RESOLUTION NO. 110-2005

A RESOLUTION AUTHORIZING INTERLOCAL AGREEMENT WITH THE CITY OF INGRAM, TEXAS, PROVIDING FOR CITY'S RECEIPT, TREATMENT AND DISPOSAL OF WASTEWATER

WHEREAS, the City of Ingram, Texas, ("Ingram") is taking part in the development of a wastewater system for the area within their city limits; and

WHEREAS, the City of Kerrville, Texas, recognizes the mutual benefits which will be achieved through the development of a centralized wastewater collection and treatment facility on a regional basis; and

WHEREAS, the City is willing to receive, treat and dispose of the wastewater collected by the City of Ingram, pursuant to the terms of the agreement referenced below; and

WHEREAS, the City Council of the City of Kerrville, Texas, finds it to be in the public interest to enter into an agreement with the City of Ingram which provides for the City to receive, treat and dispose of wastewater;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF KERRVILLE, KERR COUNTY, TEXAS:

That the City Manager and City Clerk are hereby authorized to execute and attest, respectively, on behalf of the City of Kerrville, Texas, the *Interlocal Agreement for Wholesale Wastewater Service* by and between the City of Kerrville and the City of Ingram, the provisions of which agreement shall be substantially as set forth in **Exhibit A**, attached hereto and incorporated herein by reference.

PASSED AND APPROVED ON this the 25 day of October, A.D., 2005.

Eugene C. Smith, Mayor

ATTEST:

Brenda G. Craig, City Clerk

APPROVED AS TO FORM:

Michael C. Hayes, City Attorney

H:\Legal\Wastewater\Contract\Regional wastewater\City of Ingram\Reso-Regional WW Agreement-101905.doc

Approved by City Council
Date: October 25, 2005
Volume 35 Page 419
Contract No. 2005-45
Resolution No. 110-2005

APPENDIX C

City of Kerrville Lift Station Inventory

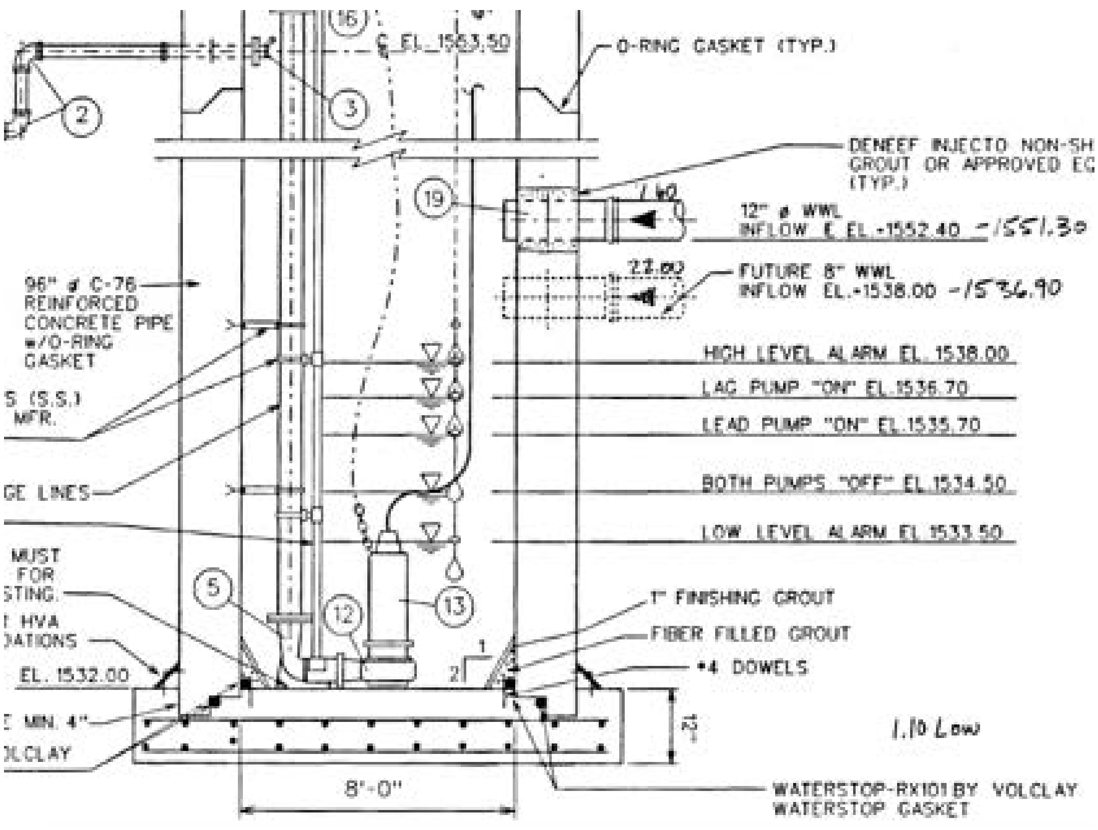
City of Kerrville
Airport/Al Mooney Lift Station

Wet Well	
Size [ft]	8
Bottom Elevation [ft]	1532
Low Alarm [ft]	2
High Alarm [ft]	12

Pumps						
Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Fairbanks Morse (4" Dry Submersibles)	D5433MU		150	6	4
2	Fairbanks Morse (4" Dry Submersibles)	D5433MU		150	8	4

As Defined by As Built Specifications

As Defined by S.C.A.D.A



City of Kerrville
Airport/Commerce Park Lift Station

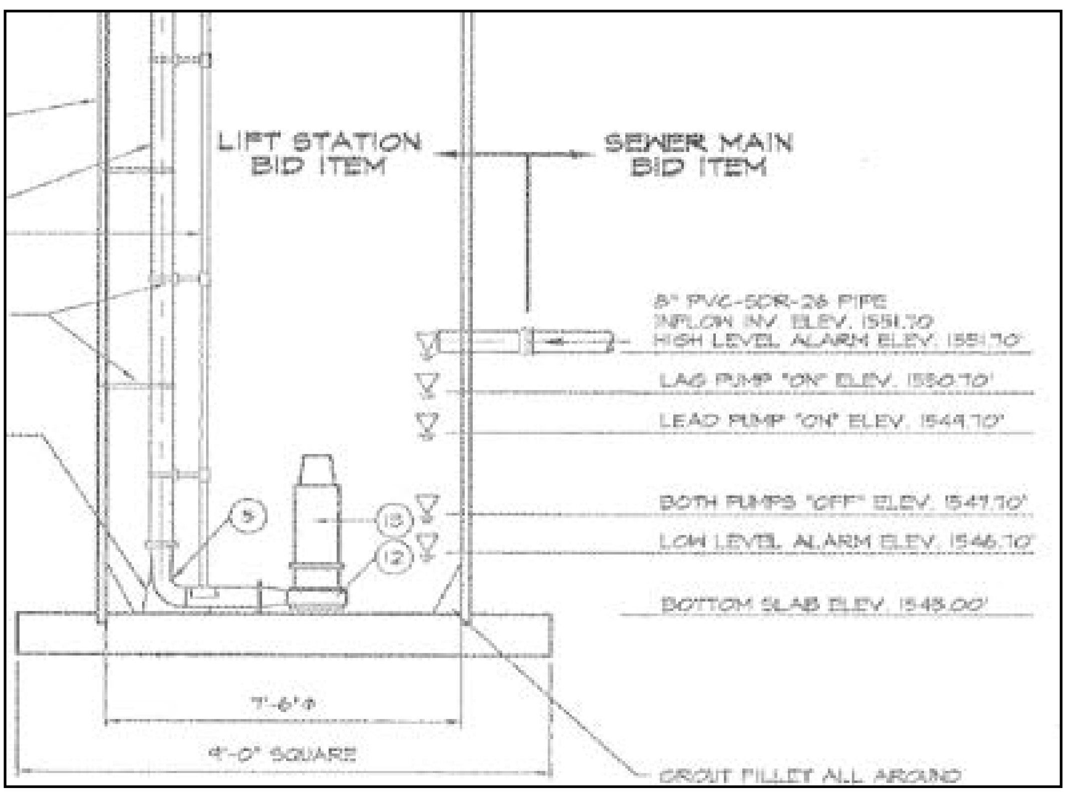
Wet Well	
Size [ft]	7.5
Bottom Elevation [ft]	1545
Low Alarm [ft]	1.7
High Alarm [ft]	6.7

Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity**	**On-Point [ft]**	**Off-Point [ft]**
1	Fairbanks Morse (4" Dry Submersibles)	D5433MU		150	4.7	2.7
2	Fairbanks Morse (4" Dry Submersibles)	D5433MU		150	5.7	2.7

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes information obatined from City Staff



City of Kerrville

Birkdale Lift Station

Wet Well	
Size [ft]	15' 4" x 15' 4"
Bottom Elevation [ft]	1561
Low Alarm [ft]	2
High Alarm [ft]	6.5

Pumps

Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Gorman-Rupp	T-4A3		360	4	3
2	Gorman-Rupp	T-4A3	825353		5	3
3	Gorman-Rupp	T-4A4			6	3

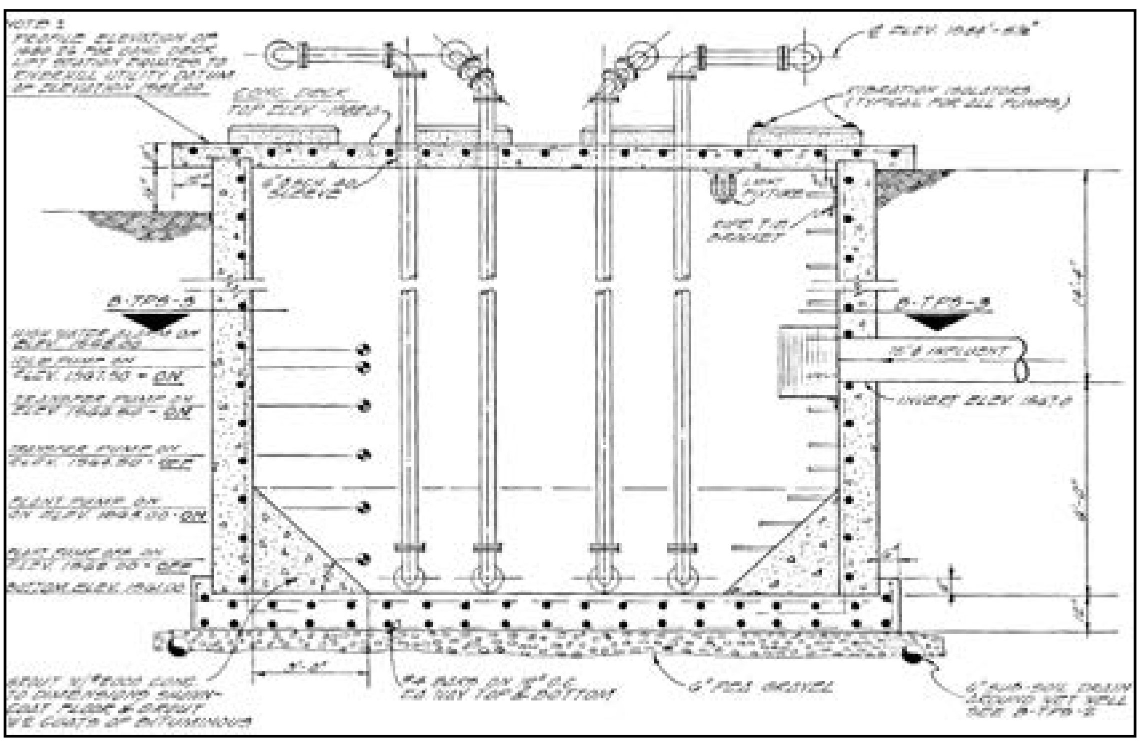
Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

S.C.A.D.A Derived Flow Report indicates that this pump capacity with all pumps on

Denotes information obatined from City Staff

*Note on R.T.U. 03 states that there is no low level alarm



City of Kerrville

Broadway Lift Station

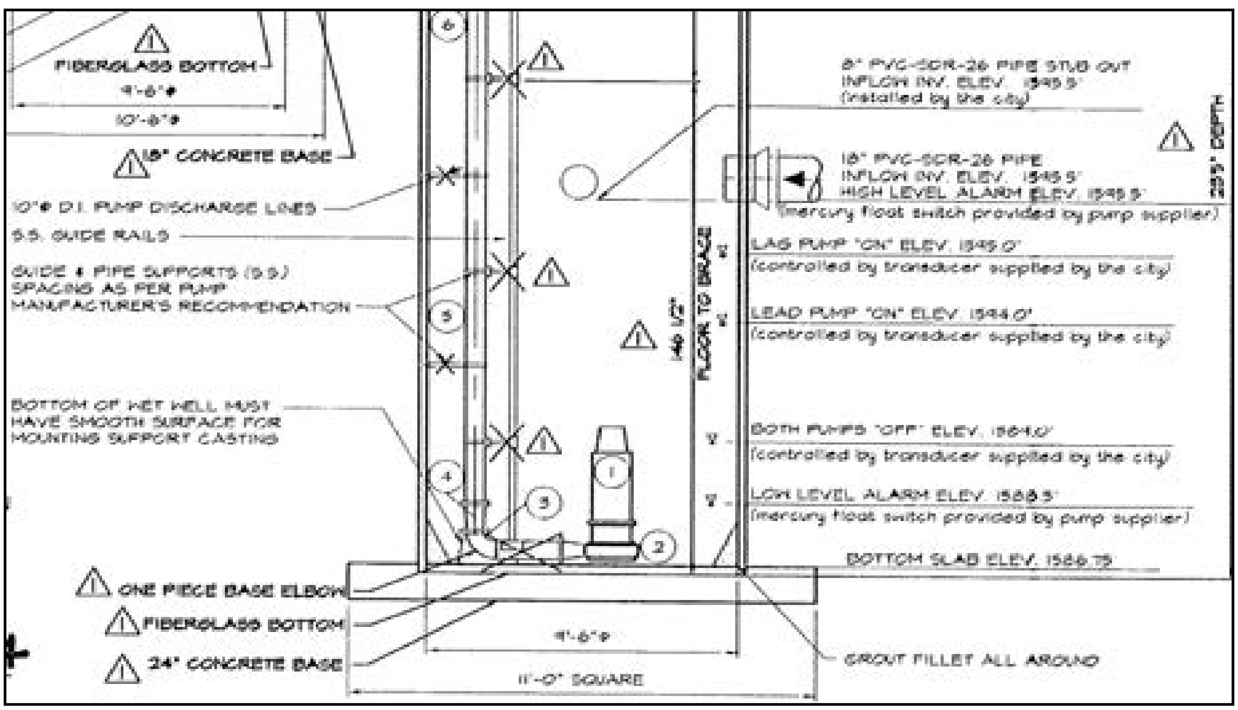
Wet Well	
Size [ft]	9.5
Bottom Elevation [ft]	1586.75
Low Alarm [ft]	0.5
High Alarm [ft]	7.5

Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity [GPM]**	**On-Point [ft]**	**Off-Point [ft]**
1	Barnes	6 SE-L		2000	5	2
2	Barnes	6 SE-L		2000	7	2

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes information obatined from City Staff



CPC

COURREGES PUMP COMPANY, INC.

START UP REPORT
2 / 3 / 2004

Customer: The City of Kerrville
Equipment Location: Broadway Lift Station
CPC Job # 700375

PUMP INFORMATION

Mfg- Barnes Pumps a Div. of Crane Pumps & Systems
Mod- 6SE48044HL
Size- 6" Discharge, 48 HP, 1750 RPM, 460 Volt, 3 Phase
Type- Submersible Sewage Pump

Conditions- 2,000 GPM @ 58' TDH

Full Load Amps listed- 65

	P1	P2
Voltage/Actual		
	T1- 492	T1- 494
	T2- 495	T2- 495
	T3- 496	T3- 495
Running Amps / Actual		
	T1- 56.3	T1- 58.2
	T2- 57.2	T2- 58.8
	T3- 58.3	T3- 60.1

Notes: This station was on line at time of start up.

Start up performed by Courreges Pump Rep. – George Worth

Prepared by Stan DeVore

MAIN OFFICE (D/FW):
8204 NORTHEAST PARKWAY, SUITE 101
NORTH RICHLAND HILLS, TX 76180
(817) 656-8478
(817) 498-5137 METRO
(817) 428-1506 FAX

SAN ANTONIO OFFICE:
PUMPS UNLIMITED (A Division of Courreges Pump)
7131 ECKHERT ROAD
SAN ANTONIO, TEXAS 78238
(210) 684-4111
(800) 729-4111 TOLL FREE
(210) 684-7125 FAX

SECTION	1F
PAGE	4
DATE	11/02
REPLACES	2/99

BARNES® 6SE-L

SUBMERSIBLE NON-CLOG PUMPS
4" Spherical Solids Handling

Specification:

DISCHARGE:		6" (152mm) 125 lb, Horizontal.
LIQUID TEMPERATURE:		104°F (40°C) Continuous.
VOLUTE:		Cast Iron, ASTM A-48 Class 30, With Bronze Wear Ring.
MOTOR HOUSING:		Cast Iron ASTM A-48, Class 30.
SEAL PLATE:		Cast Iron ASTM A-48 Class 30.
IMPELLER:	*Design:*	Single Vane (2 Vane on 48 thru 75 HP), Enclosed, With Pump Out Vanes On Back Side. Dynamically Balanced. ISO G6.3.
	Material:	Cast Iron ASTM A-48 Class 30.
SHAFT:		416 Stainless Steel
SQUARE RINGS:		Buna-N
DIAPHRAGM:		Buna-N
HARDWARE:		300 Series Stainless Steel.
PAINT:		Air Dry Enamel.
SEAL:	*Design:*	Double Mechanical in Oil Filled Pressure Equalized Reservoir.
	Material:	Rotating Faces - Carbon Stationary Faces - Ceramic Elastomer - Buna-N Hardware -300 Series Stainless
CABLE ENTRY:		25 ft. (7.6M) Cord. Epoxy Sealed Housing with Secondary Pressure Grommet for Sealing and Strain Relief.
SPEED:		1750 RPM (Nominal)
UPPER BEARING:		
	Design:	Single Row, Ball
	Lubrication:	Oil
	Load:	Radial
LOWER BEARING:		
	Design:	Double Row, Ball
	Lubrication:	Oil
	Load:	Radial & Thrust
MOTOR:		
	Design:	NEMA B Torque Curve. Completely Oil-Filled, Squirrel Cage Induction.
	Insulation:	Class F.
THREE PHASE:		Dual Voltage 230/460; Requires Overload Protection to be Included in Control Panel.
MOISTURE SENSOR:		N/O, Requires Relay in Control Panel.
TEMPERATURE SENSOR:		N/C,Requires Relay in Control Panel.
OPTIONAL EQUIPMENT:		Seal Material, Impeller Trims, Additional Cable.

Series: 6SE 18-75 HP
1750 RPM

® Canadian Standards Association
File No. LR16567

Description:

SUBMERSIBLE NON-CLOG SEWAGE PUMP DESIGNED FOR TYPICAL RAW SEWAGE APPLICATIONS.

Sample Specifications: Section 1 Page 16.

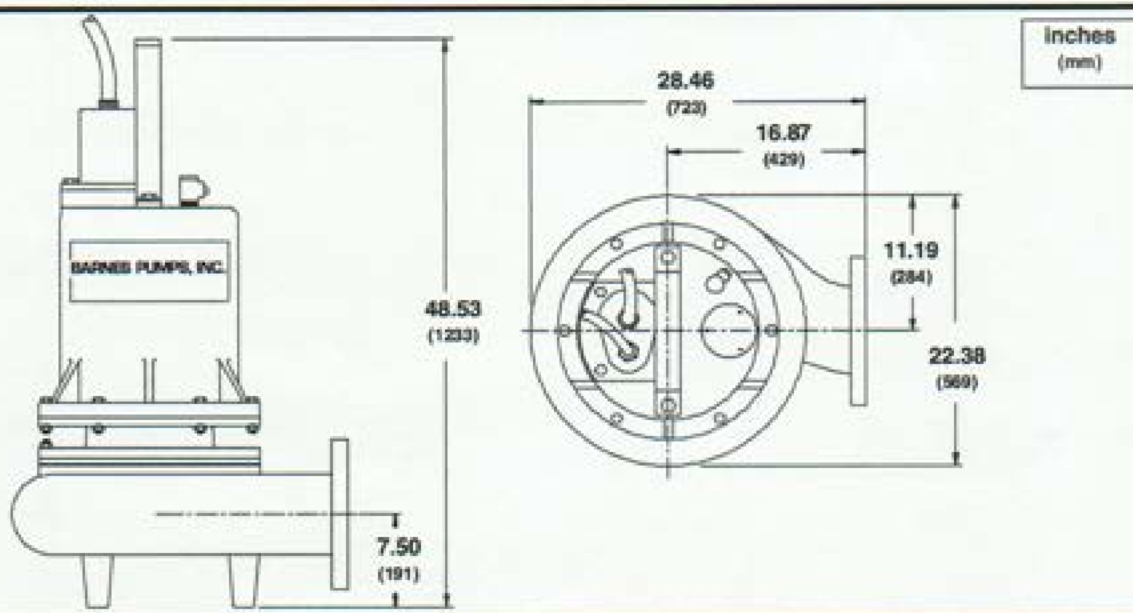
CRANE.
A Crane Co. Company

PUMPS & SYSTEMS

1485 Lexington Ave.
Mansfield, Ohio 44907-2674
Ph: (937) 778-8947
Fax: (419) 774-1530
www.barnespumps.com

420 Third Street/P.O. Box 603
Piqua, Ohio 45356-0603
Ph: (937) 778-8947
Fax: (937) 773-7157
www.cranepumps.com

83 West Drive
Brampton, Ontario
Canada L6T 2J6
Ph: (905) 457-6223
Fax: (905) 457-2650



MODEL NO.	PART NO.	HP	VOLT	PH	RPM (NOM)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D.
6SE18034L	084663	18	230	3	1750	F	50.6	232.0	6/3-3G	G	1.010
6SE18044L	084664	18	460	3	1750	F	25.3	116.0	6/3-3G	G	1.010
6SE18054L	089187	18	575	3	1750	F	20.0	92.8	6/3-3G	G	1.010
6SE24034L	084665	24	230	3	1750	E	62.8	290.0	6/3-3G	G	1.010
6SE24044L	084666	24	460	3	1750	E	31.4	145.0	6/3-3G	G	1.010
6SE24054L	089188	24	575	3	1750	E	25.6	116.0	6/3-3G	G	1.010
6SE30034L	084667	30	230	3	1750	E	75.8	364.0	2/3-3G	G	1.340
6SE30044L	084668	30	460	3	1750	E	37.9	182.0	2/3-3G	G	1.340
6SE30054L	089189	30	575	3	1750	E	30.3	145.6	2/3-3G	G	1.340
6SE36034L	084669	36	230	3	1750	E	90.0	434.0	2/3-3G	G	1.340
6SE36044L	084670	36	460	3	1750	E	45.0	217.0	2/3-3G	G	1.340
6SE36054L	089190	36	575	3	1750	E	36.0	173.6	2/3-3G	G	1.340
6SE48044L	084671	48	460	3	1750	E	65.0	290.0	2/3-3G	G	1.340
6SE48054L	089191	48	575	3	1750	E	52.0	232.0	2/3-3G	G	1.340
6SE60044L	084672	60	460	3	1750	E	78.0	363.0	2/3-3G	G	1.340
6SE60054L	089192	60	575	3	1750	E	62.4	290.4	2/3-3G	G	1.340
6SE75044L	084673	75	460	3	1750	G	96.0	576.0	2/3-3G	G	1.340
6SE75054L	089193	75	575	3	1750	G	76.8	460.8	2/3-3G	G	1.340

Moisture/temperature sensor cable for all models is 18/5 SOW, 0.476 OD.

IMPORTANT !

1.) PUMP MAY BE OPERATED **"DRY"** FOR EXTENDED PERIODS WITHOUT DAMAGE TO MOTOR AND/OR SEALS.
2.) THIS PUMP **IS** APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION II HAZARDOUS LOCATIONS.
3.) THIS PUMP IS **NOT** APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION I HAZARDOUS LOCATIONS.
4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.

1485 Lexington Ave.
Mansfield, Ohio 44907-2674
Ph: (937) 778-8947
Fax: (419) 774-1530
www.barnespumps.com

420 Third Street/P.O. Box 603
Piqua, Ohio 45356-0603
Ph: (937) 778-8947
Fax: (937) 773-7157
www.cranepumps.com

83 West Drive
Brampton, Ontario
Canada L6T 2J6
Ph: (905) 457-6223
Fax: (905) 457-2650

PERFORMANCE CURVE
Series: 6SE-L, 48, 60 & 75 HP, 1750 RPM

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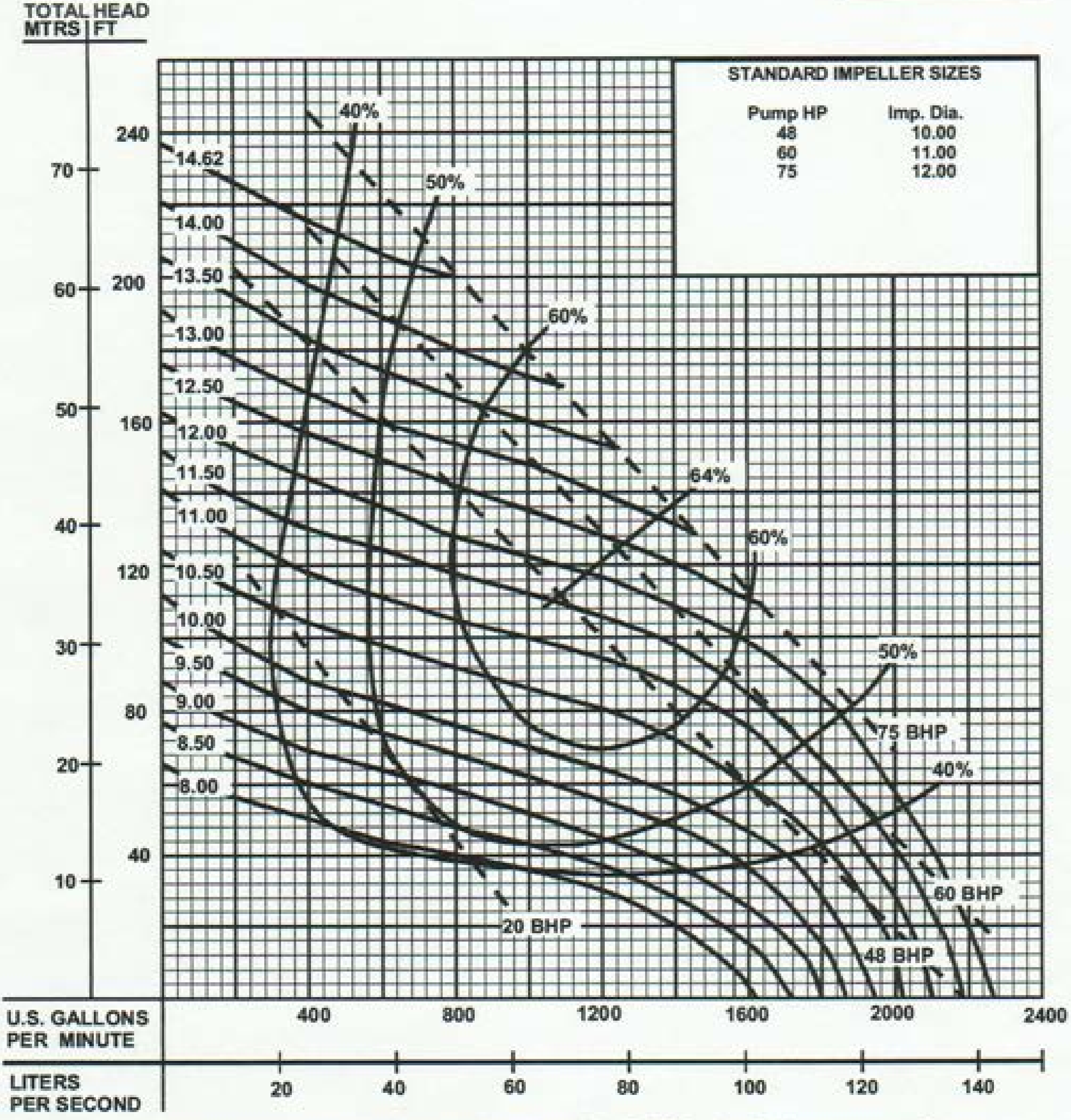

Testing is performed with water, specific gravity of 1.0 @ 68° F, other fluids may vary performance.

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A Crane Co. Company
PUMPS & SYSTEMS

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83 West Drive
Brampton, Ontario
Canada L6T 2J6
Ph: (905) 457-6223
Fax: (905) 457-2650

City of Kerrville
Comanche Trace Lift Station

Wet Well	
Size [ft]	8
Bottom Elevation [ft]	1545.5
Low Alarm [ft]	4.5
High Alarm [ft]	10.5

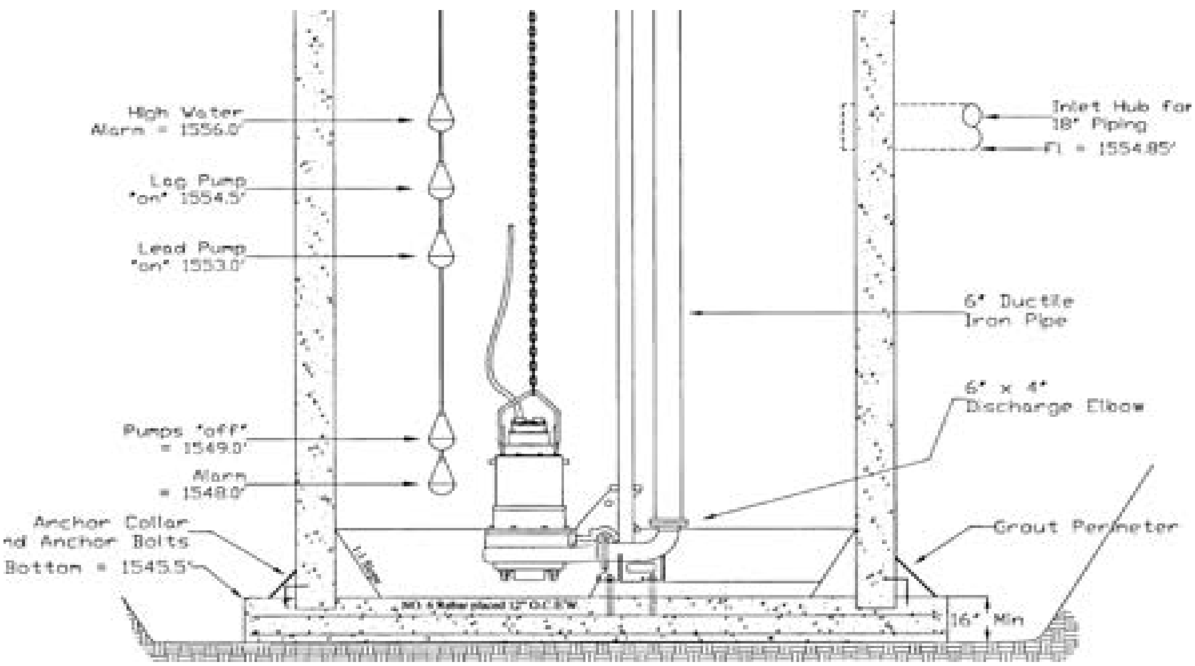
Pumps

Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Fairbanks Morse	5430 Non-Clog Submersible Pump		600	7.5	5
2	Fairbanks Morse	5430 Non-Clog Submersible Pump		600	9	5

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes information obatined from City Staff



Pumps

Of Houston, Inc.

Engineered Wastewater Systems

Sewage Pumps: Myers, Pumpex, Yeomans
Treatment Plants: Cromaglass
Aluminum Covers : U.S. Foundry
Package Fiberglass Lift Stations
Custom Control Panels

May 3, 2000

Project: Comanche TraceLift Station, Kerrville Texas

Customer: DW Contractors, Kerrville, Texas

Owner: City of Kerrville

Engineer: City of Kerrville

Project Description:

Two (2) Myers Model 4VC200M4-43 Non-clog Pumps with quick disconnect discharge base elbows, stainless steel upper guide brackets, lifting bales with grip-eye lifting assemblies, hatch doors and control panels.

Conditions of Service:	**600 GPM at 80' TDH**
Discharge Connection:	**4" x 4" Elbow, 4" ANSI Flange, Cast Iron ASTM A-48, Class 30B, Anchor bolts by others**
Pump Construction:	**Cast Iron, ASTM A-48, Class 30B, ANSI Flanged Connection**
Motor Housing:	**Cast Iron, ASTM A-48, Class 30B**
Impeller:	**Ductile iron, ASTM A-536-80, enclosed 2 vane, 3 1/16" solids handling**
Shaft:	**Heavy duty 416 Stainless Steel**
Fasteners:	**Series 300 Stainless Steel**
Mechanical Seals:	**Double tandem, Type 21,**
Wear Ring:	**Bronze**
Bearings:	**Upper and lower Heavy duty with lower sleeve bearing, rated to exceed 100,000 hrs. B-10 life**

Houston Corporate Office
P.O. Box 670625 Houston, Tx. 77267-0625
2705 Frick Road Houston, Tx. 77038
Ph.: 281-448-1352 Fax: 281-448-7120
5602

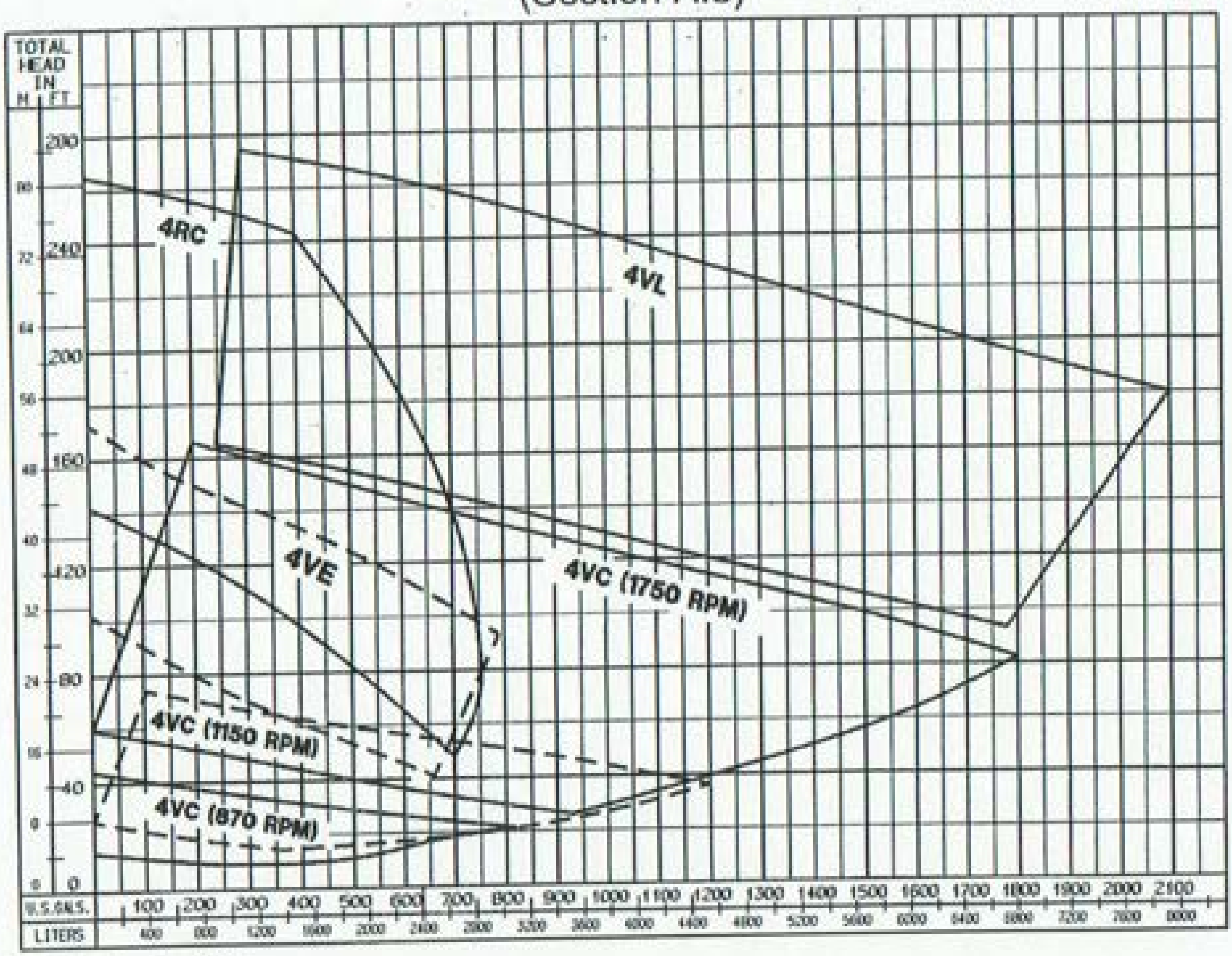
Austin Sales Office
10300 Golden Meadow Drive # 401
Austin, Texas 78758
Ph.: 800-255-1352 Fax: 512-836-

E MAIL: [illegible]

Submersible Non-Clog Pumps

Composite Curves

4" Discharge
4RC/4VC/4VE/4VL Series
(Section A.3)



4family 17aug99 pm

Company: Freese and Nichols Inc.
Name: Kendall
Date: 9/19/2012

Pump:

Size: 4VC/4VCX

Type: Non-clog
Synch speed: 1800 rpm

Speed: 1750 rpm
Dia: 9.75 in

Curve:

Impeller:

Specific Speeds:

Ns: ---
Nss: ---

Dimensions:

Suction: ---
Discharge: 4 in

Pump Limits:

Temperature: ---
Pressure: ---
Sphere size: 3.1875 in

Power: ---
Eye area: ---

Search Criteria:

Flow: 600 US gpm

Head: 80 ft

Fluid:

Water
Density: 62.25 lb/ft³
Viscosity: 1.105 cP

NPSHa: ---

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
Enclosure: TEFC
Sizing criteria: Max Power on Design Curve

Size: 30 hp
Speed: 1800
Frame: 286T

---- Data Point ----

Flow:	600 US gpm
Head:	80.8 ft
Eff:	67.8%
Power:	17.9 hp
NPSHr:	---

---- Design Curve ----

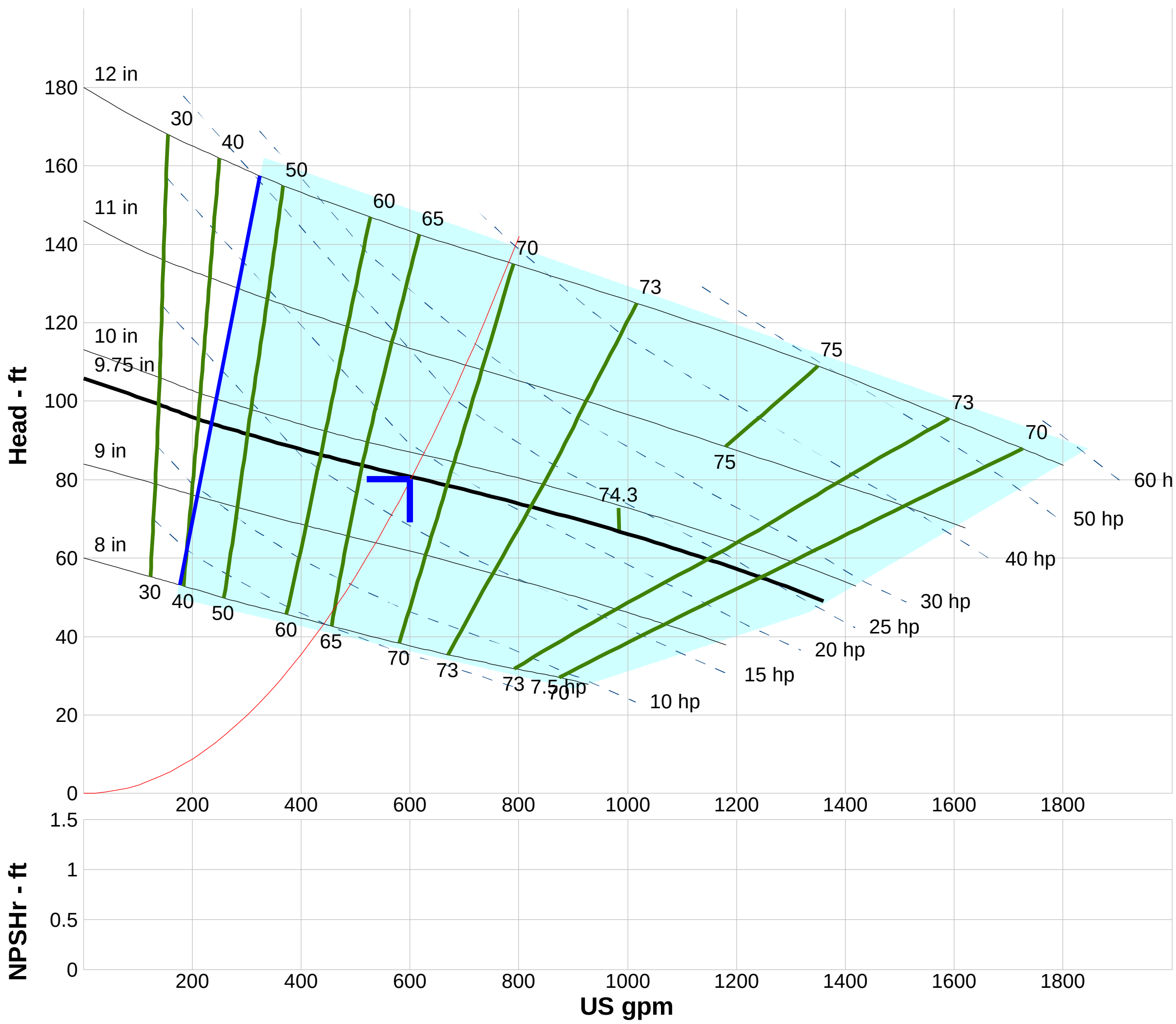
Shutoff head:	106 ft
Shutoff dP:	45.8 psi
Min flow:	236 US gpm

BEP: 74.3% @ 984 US gpm

NOL power:
25.9 hp @ 1359 US gpm

-- Max Curve --

Max power:
56.5 hp @ 1800 US gpm



Pump not available with 7.5hp and 10hp motors.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
720	1750	76.7	71	19.5	---
600	1750	80.8	67.8	17.9	---
480	1750	84.8	62.9	16.3	---
360	1750	89.3	54.4	14.8	---
240	1750	94.2	43.3	13.1	---

City of Kerrville
G Street Lift Station

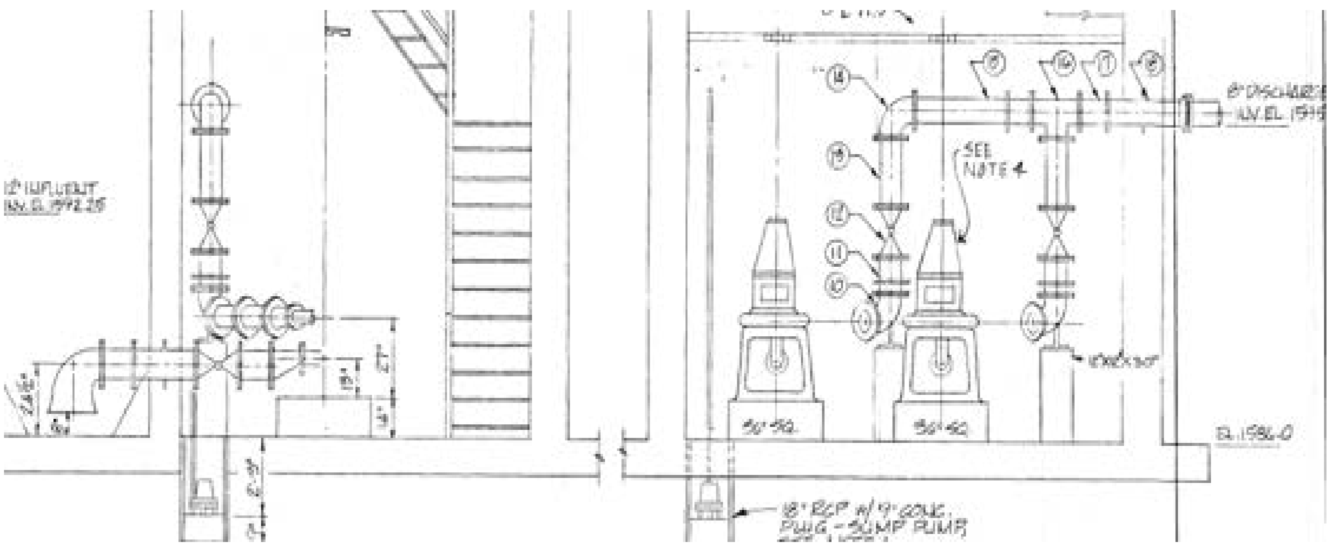
Wet Well	
Size [ft]	5' x 15'
Bottom Elevation [ft]	1586.0
Low Alarm [ft]	
High Alarm [ft]	

Pumps						
Pump	**Type**	**Model/Make**	**Serial No.**	**Pump Capacity**	**On-Point [ft]**	**Off-Point [ft]**
1	Allis-Chalmers	200/NSWV	751-18108-3-1	500		
2	Myers (Dry Well Submersible)	6VCDP200M4-43	993018	1000		

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

As Built: 4" Aurora 612 pumps; pump curves only go down to 6" pumps for this model



City of Kerrville
Jefferson Lift Station

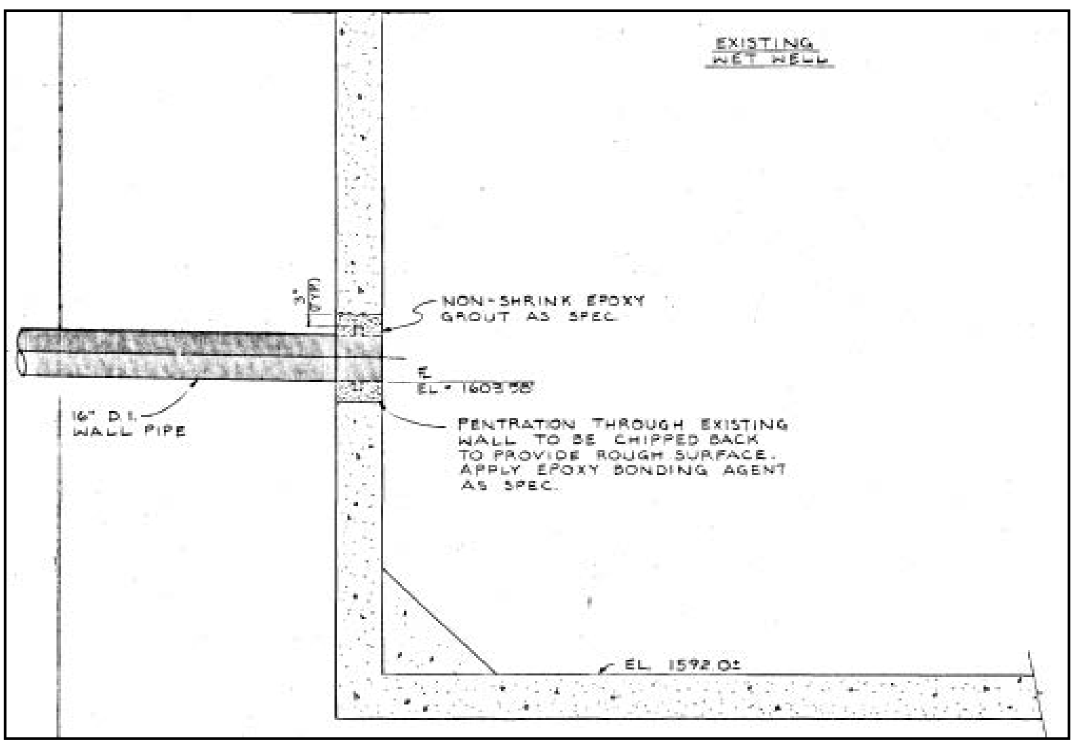
Wet Well	
Size [ft]	8 feet x 6 feet
Bottom Elevation [ft]	1592
Low Alarm [ft]	0.6
High Alarm [ft]	7

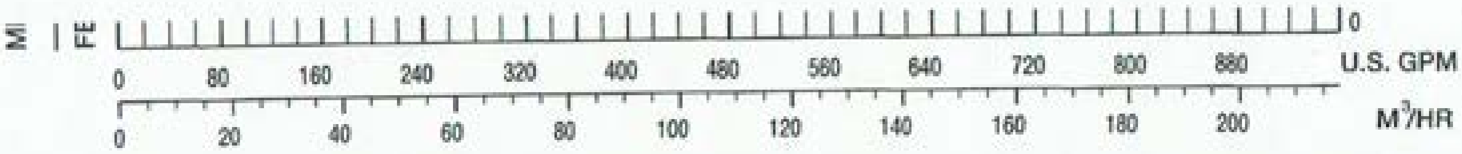
Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Fairbanks Morse (4" Dry Submersible)	DJ 5432WD	K4E1-077750	1100	4	1.5
2	Fairbanks Morse (4" Dry Submersible)	DJ 5432WD	K4E1-077749-2	1100	4.5	1.5
3	Fairbanks Morse (4" Dry Submersible)	DJ 5432WD	K4E1-077749-1	1100	5	1.5
4	Fairbanks Morse (4" Dry Submersible)	DJ 5432WD	K4E1-077749-0	1100		1.5

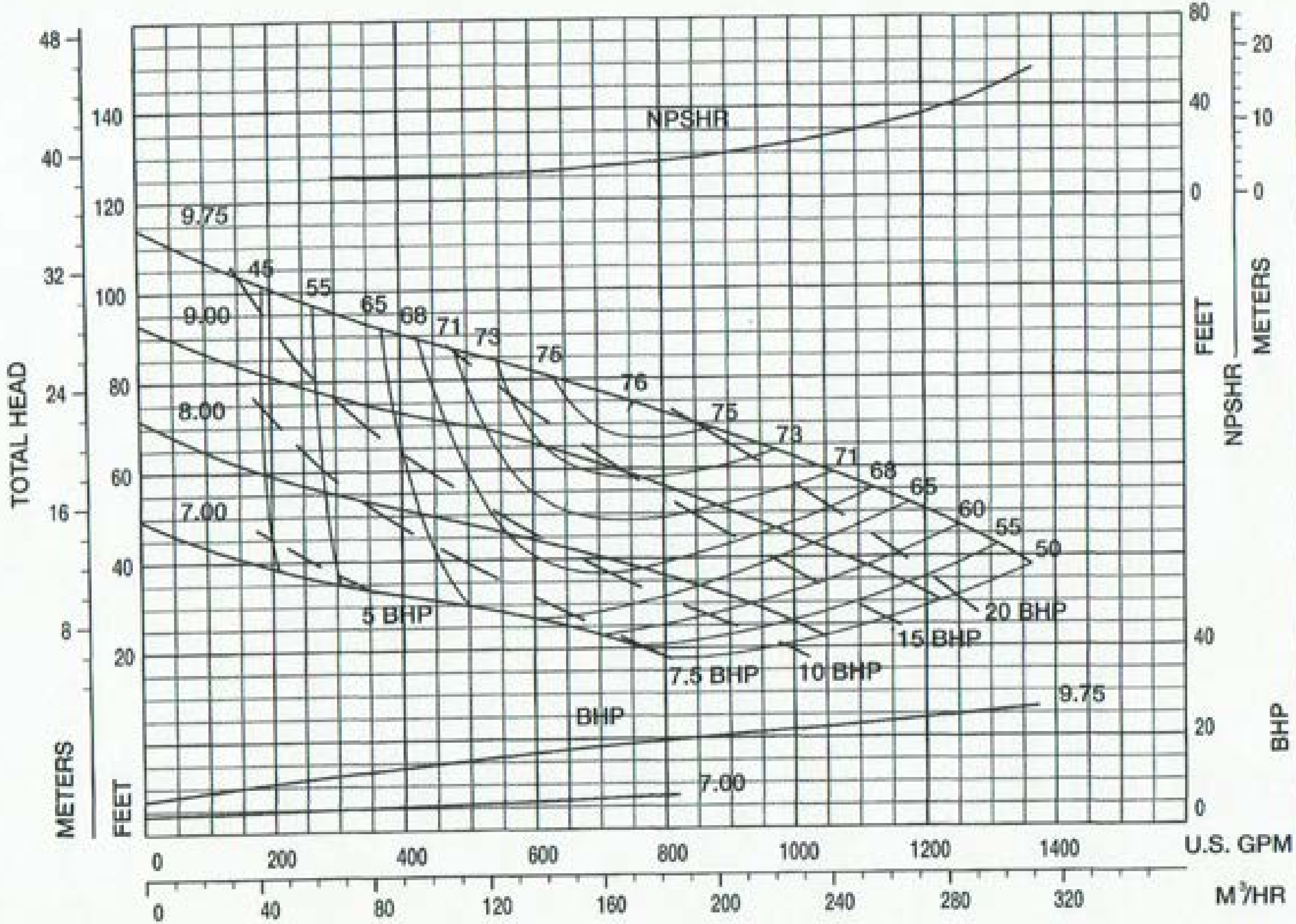
Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes information obtained from Pump Curves







4" 5432
MT, W, WD, CWD

SUBMERSIBLE

1765 RPM

NO. OF VANES
2

SUCTION SIZE
4"
(WD: 4" OR 6")

IMPELLER
T4B1A

INLET AREA
26.22 SQ.IN.

MAX. SPHERE
3"

City of Kerrville

Kerrville South Lift Station

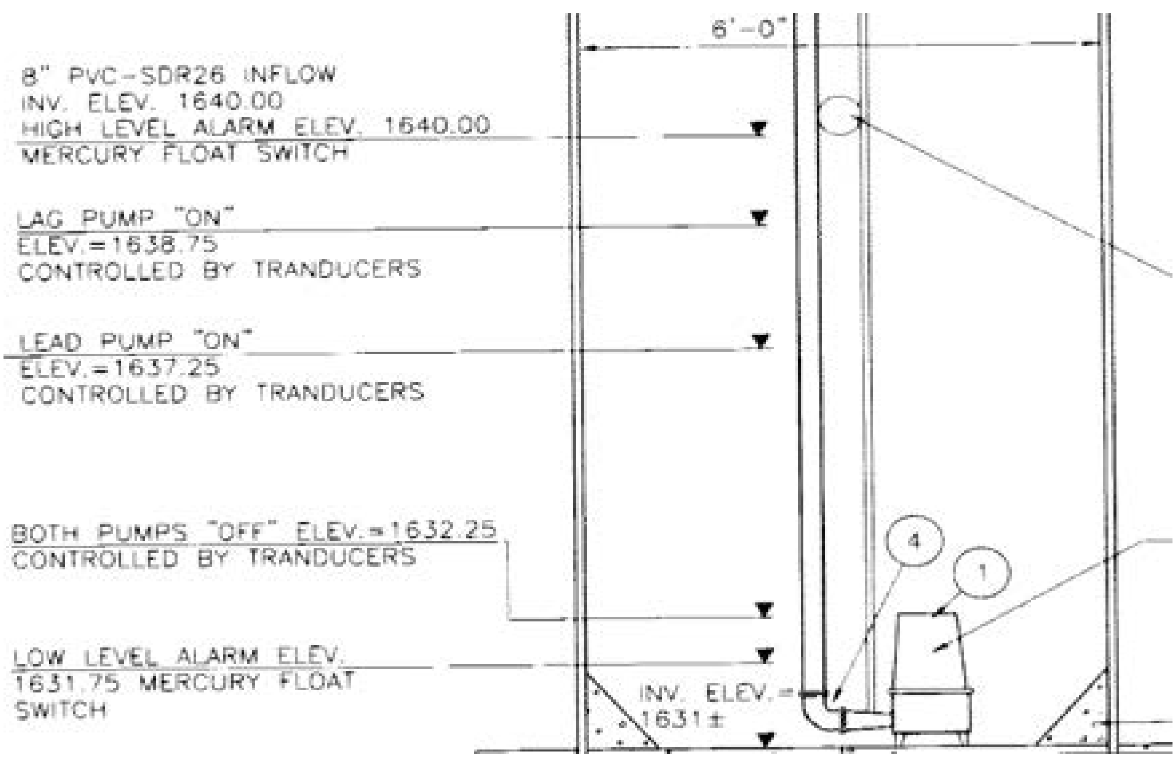
Wet Well	
Size [ft]	6
Bottom Elevation [ft]	1631
Low Alarm [ft]	0.75
High Alarm [ft]	9

Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity**	**On-Point [ft]**	**Off-Point [ft]**
1	Hydrmatic Non-clog submersible pump	HPG F500M2-4		100	6	4
2	Hydrmatic Non-clog submersible pump	HPG F500M2-4		100	7.75	4

As Defined by As Built Specifications

As Defined by S.C.A.D.A

Denotes information obatined from City Staff



City of Kerrville
Knapp Road Lift Station

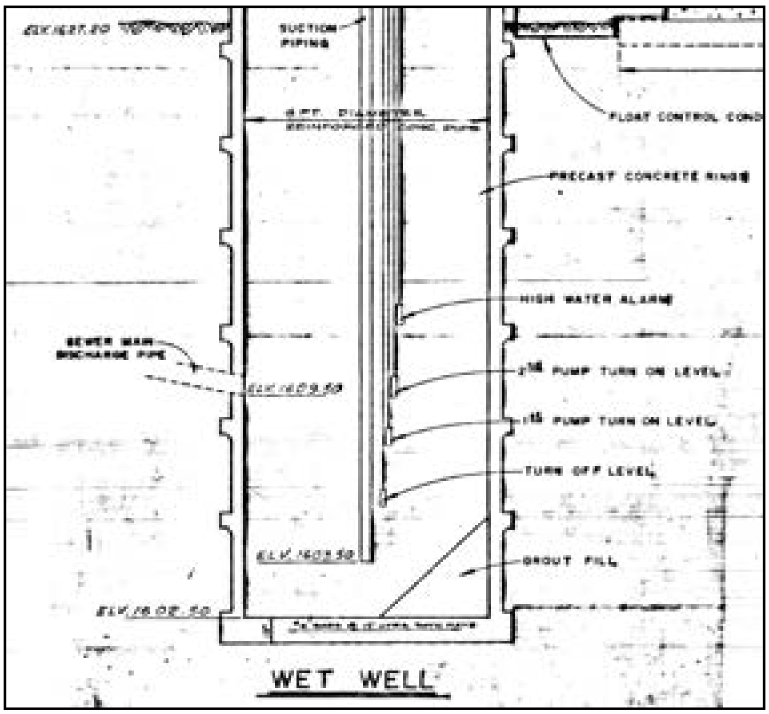
Wet Well	
Size [ft]	6
Bottom Elevation [ft]	1603.5
Low Alarm [ft]	
High Alarm [ft]	2

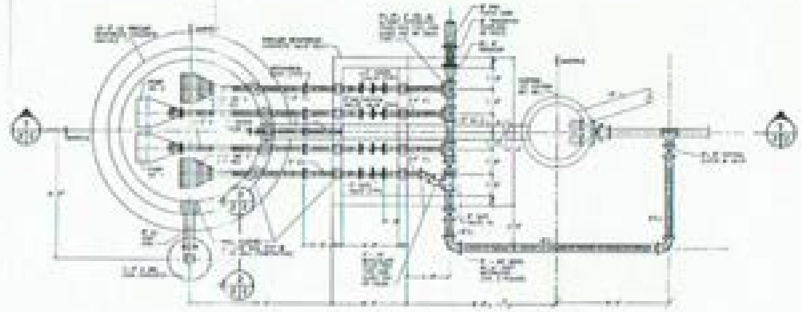
Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity [GPM]**	**On-Point [ft]**	**Off-Point [ft]**
1	Hydromatic-S4M (Submersible Pump)			669		
2	Hydromatic-S4M (Submersible Pump)			669		

Denotes Information obtained from As Built Specifications

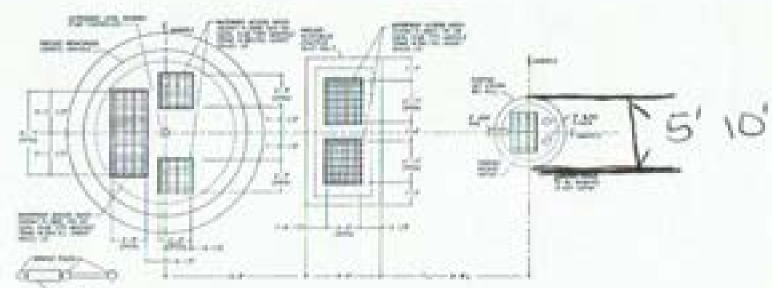
Denotes information obtained from S.C.A.D.A

Denotes information obtained from Pump Curves

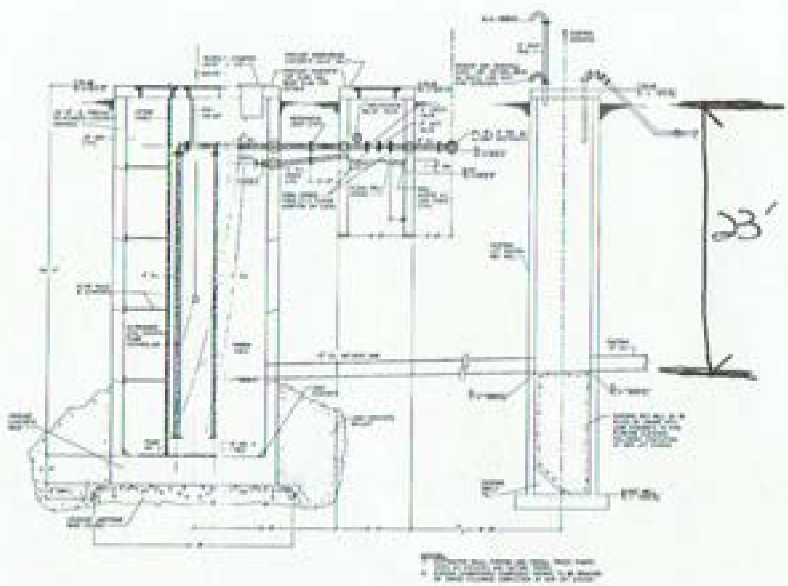




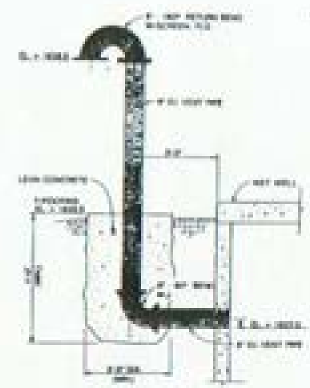
PIPING PLAN
SCALE: 1/4" = 1'-0"



ROOF PLAN
SCALE: 1/4" = 1'-0"



LIFT STATION SECTION
SCALE: 1/4" = 1'-0"



VENT PIPE SECTION
SCALE: 1/2" = 1'-0"

AIR PRODUCTS

CITY OF KERRVILLE, TEXAS

KERRVILLE SANITARY SYSTEM IMPROVEMENTS

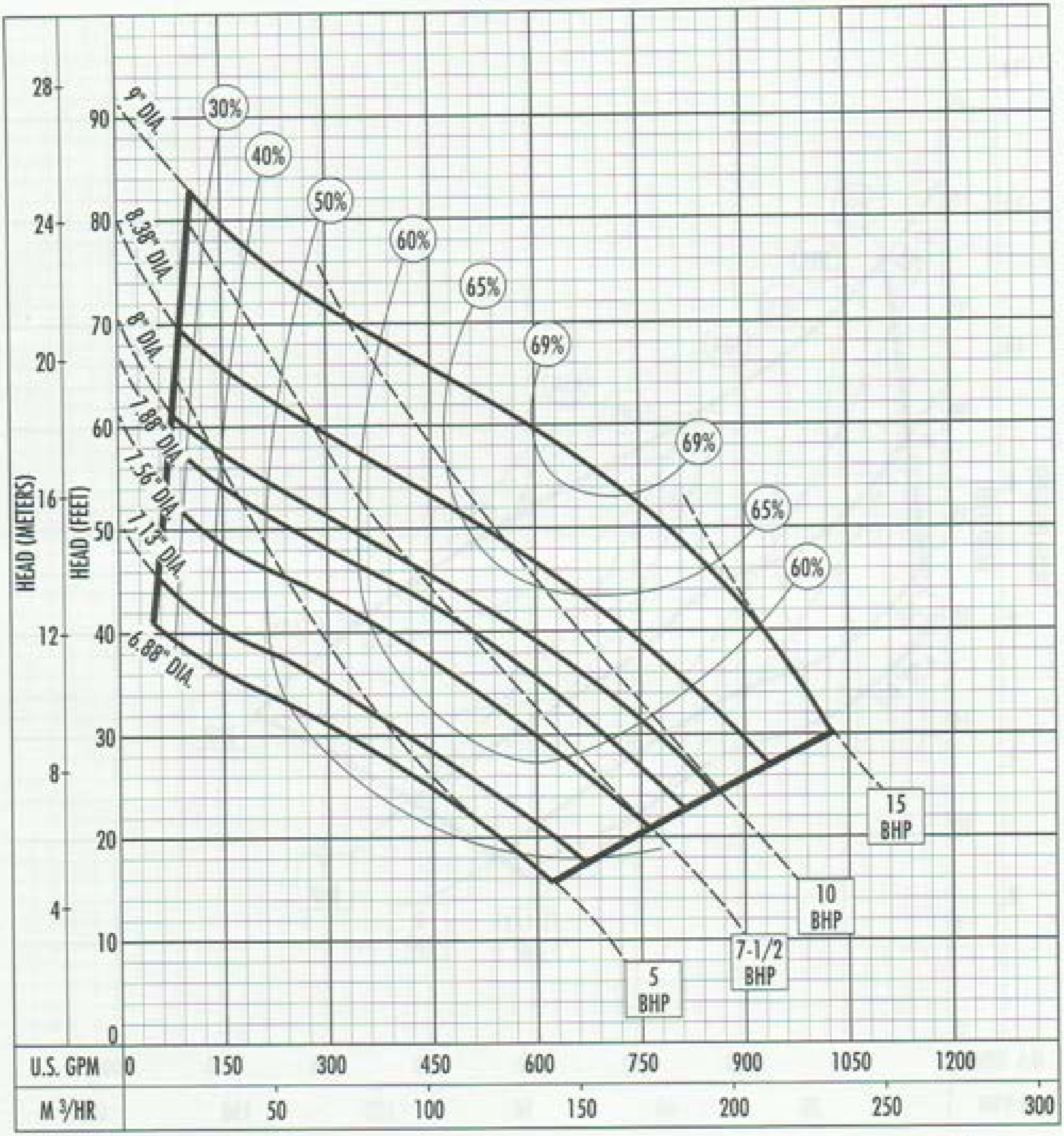
KNAPP ROAD LIFT STATION

2

RECORD DRAWING

Performance Curve S4M/S4MX

RPM: **1750** Discharge: **4"** Solids: **3"**



The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

Conditions of Service:

GPM: ________ TDH: ______

HYDROMATIC®

City of Kerrville
Legion Lift Station

Wet Well	
Size [ft]	8' x 16' 6"
Bottom Elevation [ft]	
Low Alarm [ft]	3
High Alarm [ft]	9

Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity**	**On-Point [ft]**	**Off-Point [ft]**
1	Gorman Rupp	T-10		**Emergency Only***		
2	Fairbanks Morse (Dry Well Submersible)	543600D		2000**	6	3.5
3	Fairbanks Morse (Dry Well Submersible)	543600D		2000**	7	3.5
4	Fairbanks Morse (Dry Well Submersible)	543600D		2000**	8	3.5

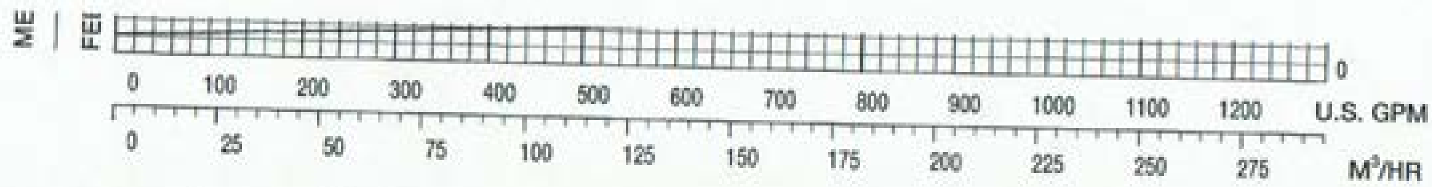
Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A
**From SCADA online data, all three pumps appear to be 2000 GPM pumps

Denotes information obatined from City Staff

*Note on R.T.U. 16 from S.C.A.D.A

** On 5/25 with two pumps on, 3200 GPM
** On 5/25 with three pumps on, 4100 GPM



5" 5436
MT, W, WD
SUBMERSIBLE

1780 RPM

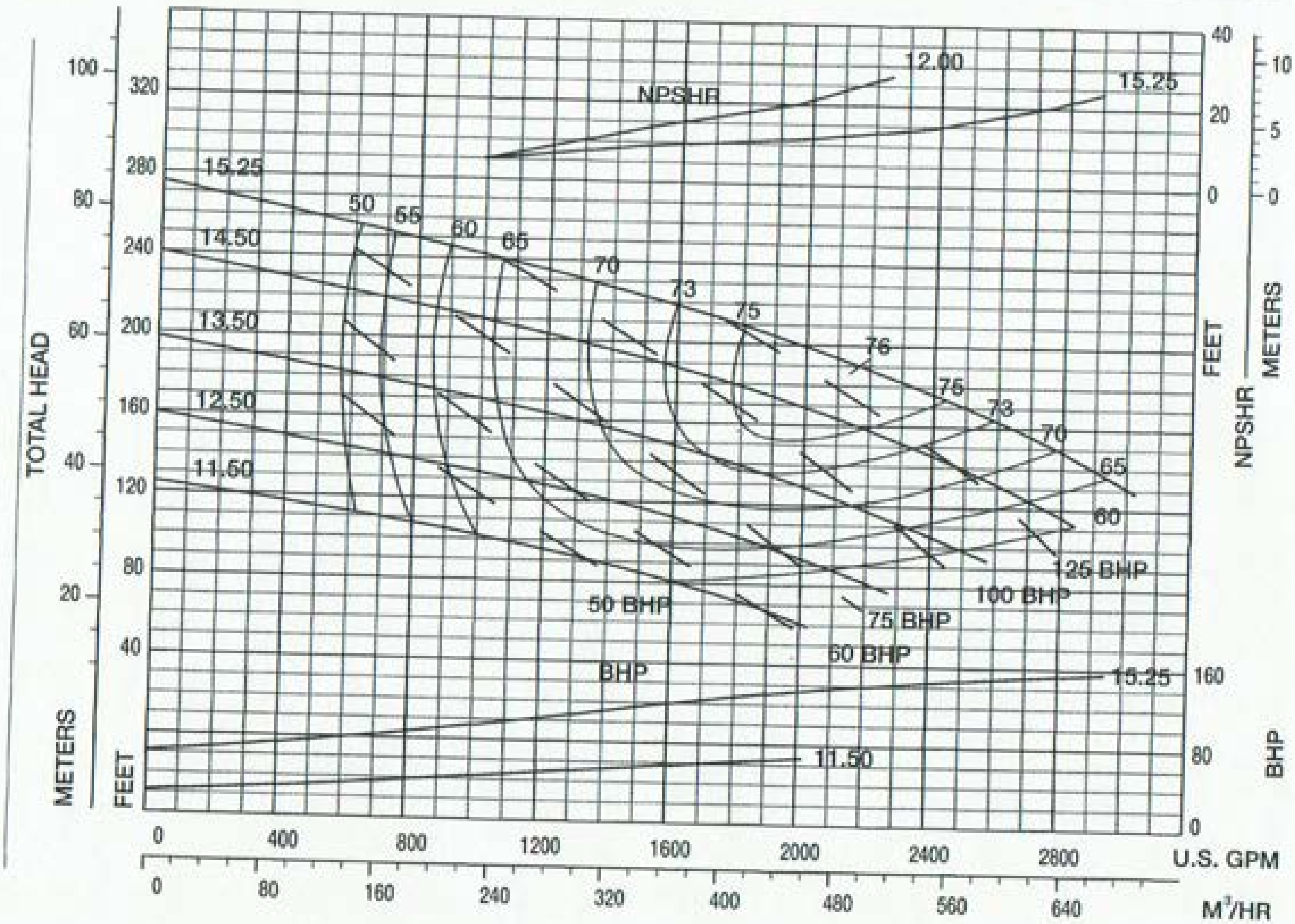
NO. OF VANES
2

SUCTION SIZE
8"
(WD: 8" OR 10")

IMPELLER
T5D1AS

INLET AREA
52.05 SQ.IN.

MAX. SPHERE
3"



Fairbanks Morse Pump

City of Kerrville

Loop 534 Lift Station

Wet Well	
Size [ft]	10
Bottom Elevation [ft]	
Low Alarm [ft]	1
High Alarm [ft]	9

Pumps

Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Fairbanks Morse	5435MV		1700	6.5	3.5
2	Fairbanks Morse	5435MV		1700	7.5	3.5

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes average pumping rate from S.C.A.D.A Derived Flow Report

Denotes information obatined from City Staff

City of Kerrville
Meridian Lift Station

Wet Well	
Size [ft]	10
Bottom Elevation [ft]	1681
Low Alarm [ft]	1
High Alarm [ft]	9.26

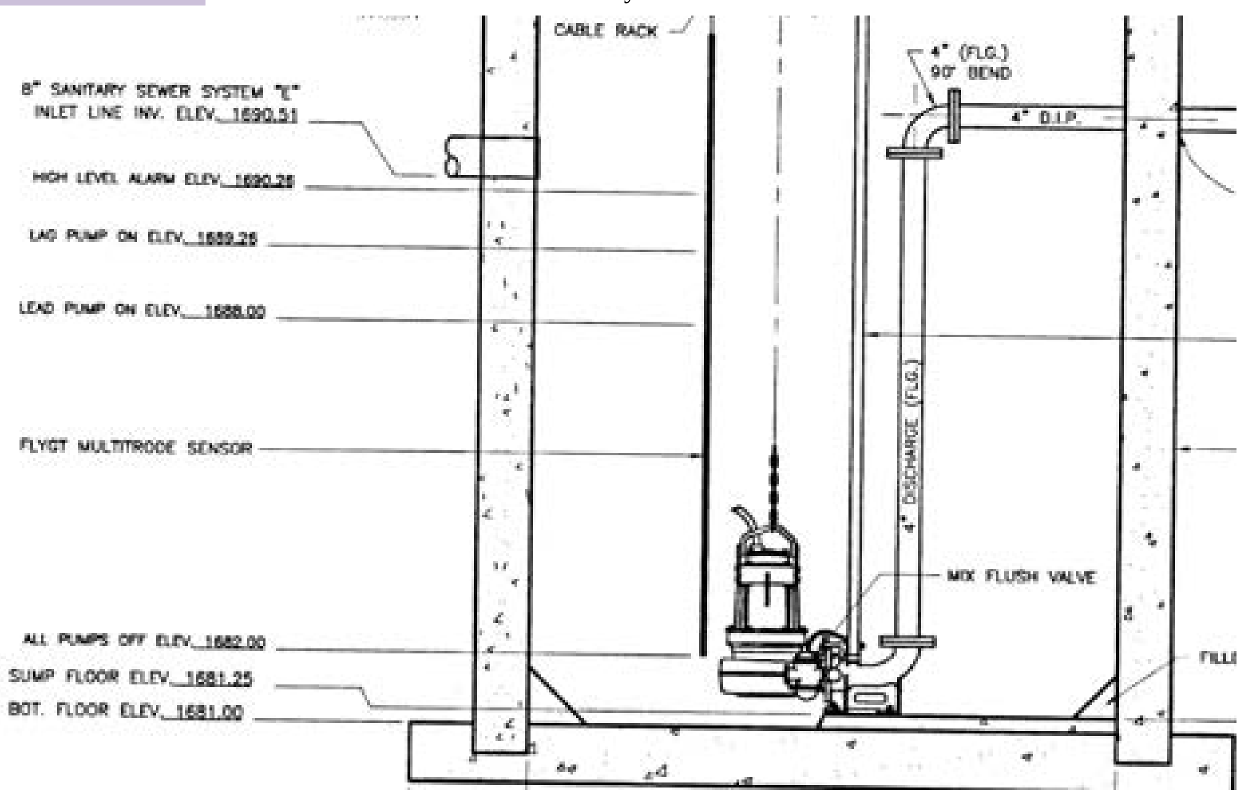
Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Ingersol Dresser (Submersible Pump)	MSX-1		175	7	1
2	Ingersol Dresser (Submersible Pump)	MSX-1		175	8.26	1

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A

Denotes Information obtained from Flow Monitoring

Denotes information obatined from City Staff



City of Kerrville
Quinlan Lift Station

Wet Well	
Size [ft]	9.5
Bottom Elevation [ft]	1600
Low Alarm [ft]	1.3
High Alarm [ft]	8.8

Pumps						
Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Fairbanks Morse (Submersible Pump)	5434MV		*See Note	1606	1601.5
2	Fairbanks Morse (Submersible Pump)	5434MV		*See Note	1607	1601.5
3	Fairbanks Morse (Submersible Pump)	5434MV		*See Note	1607.5	1601.5

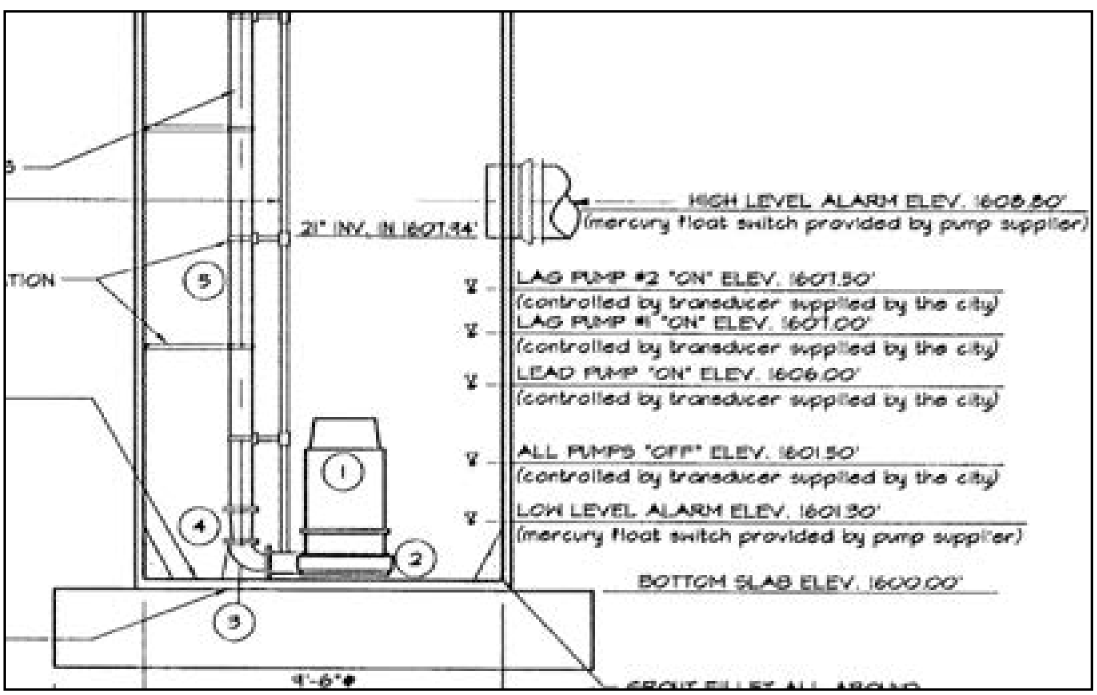
Denotes Information obtained from As Built Specifications

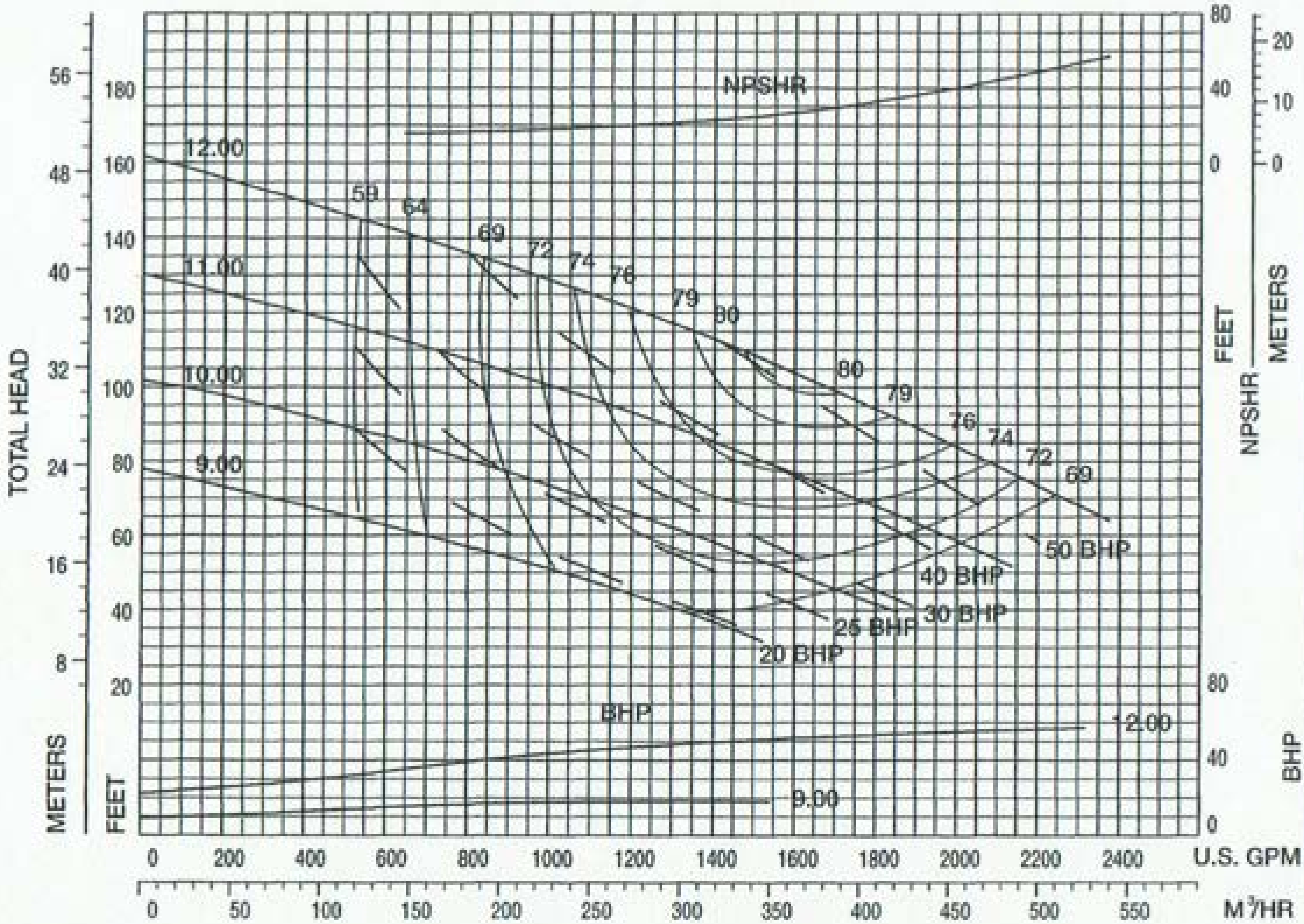
Denotes information obtained from S.C.A.D.A

Denotes information obatined from City Staff

*Note regarding pumps as per As Built Design Specifications

60 Hp Non-Clog Submersible Pump,
1,600 GPM @ 90.8 feet TDH (single pump operation)
2,400 GPM @ 106.4 feet TDH (two pumps operating in parallel)
2,800 GPM @ 116.3 feet TDH (three pumps operating in parallel)
Single pump operation efficiency = 79% minimum





5" 5433
MV, MT, W, WD
SUBMERSIBLE

1770 RPM

NO. OF VANES
2

SUCTION SIZE
5"
(WD: 5", 6" OR 8")

IMPELLER
T5C1A

INLET AREA
46.43 SQ.IN.

MAX. SPHERE
3 1/2"

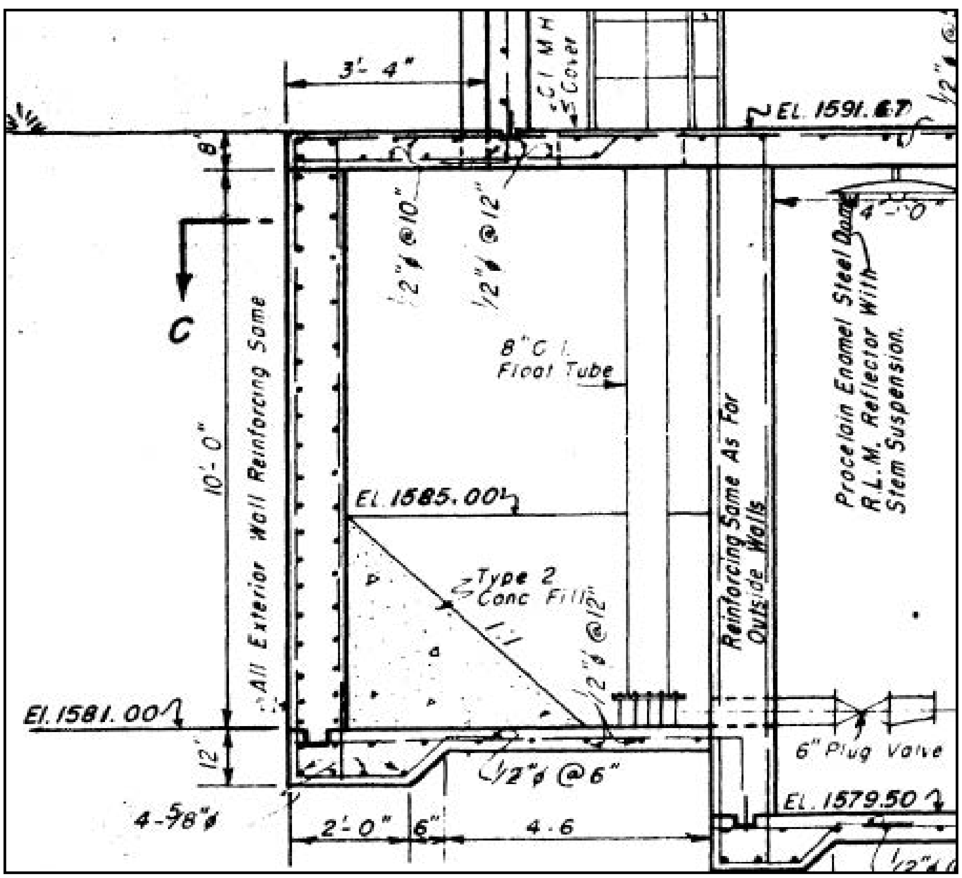
City of Kerrville
Schreiner Lift Station

Wet Well	
Size [ft]	4
Bottom Elevation [ft]	1581
Low Alarm [ft]	2
High Alarm [ft]	25

Pumps						
Pump	Type	Model	Serial No.	Pump Capacity	On-Point [ft]	Off-Point [ft]
1	Hydromatic (MP-30)			150	10	5
2	Hydromatic (MP-30)			150	15	5

Denotes Information obtained from As Built Specifications

Denotes information obtained from S.C.A.D.A



City of Kerrville
Turtle Creek Lift Station

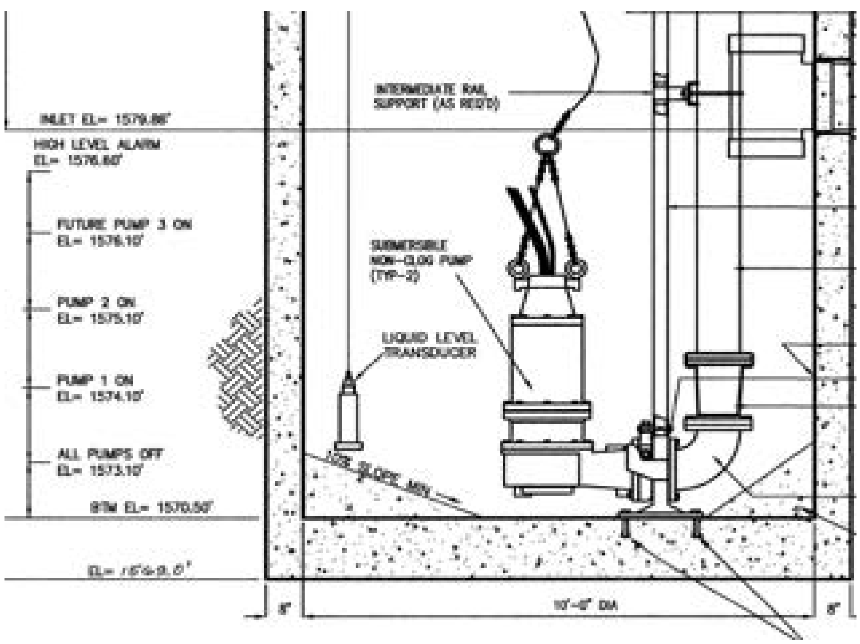
Wet Well	
Size [ft]	10
Bottom Elevation [ft]	1570.5
Low Alarm [ft]	
High Alarm [ft]	6.1

Pumps						
Pump	**Type**	**Model**	**Serial No.**	**Pump Capacity**	**On-Point [ft]**	**Off-Point [ft]**
1	Meyers	4RC		450	3.6	2.6
2	Meyers	4RC		450	4.6	2.6
3	Non-clog - FUTURE				5.6	2.6

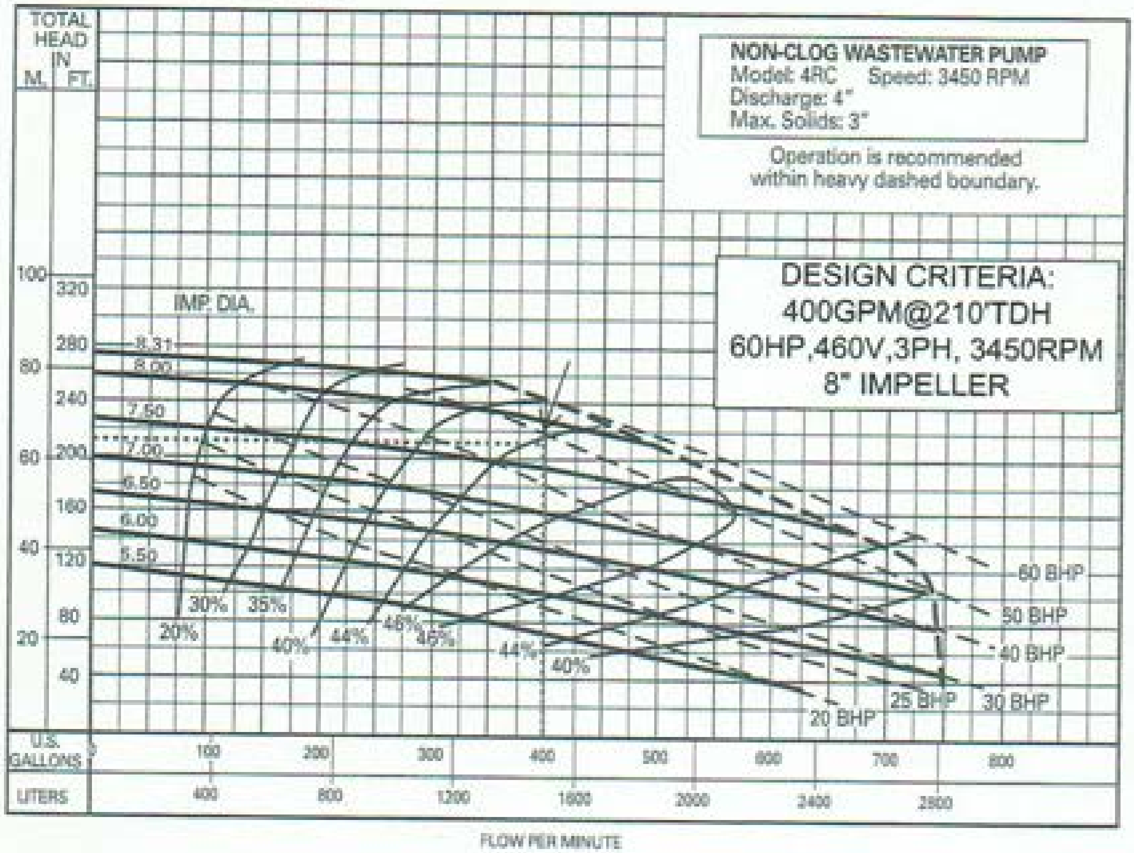
Denotes Information obtained from Construction Drawings

Denotes information obtained from S.C.A.D.A

Denotes information obatined from City Staff



PERFORMANCE CURVE



Available Models		Motor Electrical Data												
Standard	Explosion Proof	HP	Volts	Phase	Hz	Start Amps	Run Amps	Service Factor Amps	Run KW	Service Factor KW	Start KVA	Run KVA	NEC Code Letter	Service Factor
4RC200M2-23	4RCX200M2-23	20	230	3	60	280	68	80	24	27.5	112	27.1	G	1.2
4RC200M2-43	4RCX200M2-43	20	460	3	60	140	34	40	24	27.5	112	27.1	G	1.2
4RC200M2-53	4RCX200M2-53	20	575	3	60	112	27.2	32	24	27.5	112	27.1	G	1.2
4RC250M2-23	4RCX250M2-23	25	230	3	60	352	83	96	28.6	32.5	140	33.1	G	1.2
4RC250M2-43	4RCX250M2-43	25	460	3	60	176	41.5	48	28.6	32.5	140	33.1	G	1.2
4RC250M2-53	4RCX250M2-53	25	575	3	60	140	33.2	38.4	28.6	32.5	140	33.1	G	1.2
4RC300M2-23	4RCX300M2-23	30	230	3	60	406	95	115	33.4	38.6	162	37.8	G	1.2
4RC300M2-43	4RCX300M2-43	30	460	3	60	203	47.5	57.5	33.4	38.6	162	37.8	G	1.2
4RC300M2-53	4RCX300M2-53	30	575	3	60	162	38	46	33.4	38.6	162	37.8	G	1.2
4RC400M2-23	4RCX400M2-23	40	230	3	60	550	118	140	42	49.5	217	47	G	1.2
4RC400M2-43	4RCX400M2-43	40	460	3	60	275	59	70	42	49.5	217	47	G	1.2
4RC400M2-53	4RCX400M2-53	40	575	3	60	220	47.2	56	42	49.5	217	47	G	1.2
4RC500M2-43	4RCX500M2-43	50	460	3	60	275	74	89	51	61	217	58.9	D	1.2
4RC500M2-53	4RCX500M2-53	50	575	3	60	220	59.2	71.2	51	61	217	58.9	D	1.2
→ 4RC600M2-43	4RCX600M2-43	60	460	3	60	275	89	89	61	61	217	70.8	C	1
4RC600M2-53	4RCX600M2-53	60	575	3	60	220	71.2	71.2	61	61	217	70.8	C	1

Motor Efficiencies and Power Factor

		Motor Efficiency %				Power Factor %			
HP	Phase	Service Factor Load	100% Load	75% Load	50% Load	Service Factor Load	100% Load	75% Load	50% Load
20	3	65	63	58	50	83.5	83	82	80
25	3	67	66	61	54	85	85	84.5	82
30	3	71	70	66	60	88	86.5	86	84
40	3	75.5	75	72	66	86.6	87.7	87.5	86
50	3	75	75.4	74.3	69.5	84.6	86.8	87.8	87.5
→ 60	3	75	75	75.5	72	84.6	84.6	87.5	87.7

Turtle Creek

APPENDIX D

Wastewater Collection System

Opinion of Probable Construction Cost (OPCC)

City of Kerrville

Wastewater CIP Projects - 2013

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 1

Project Description

New Jefferson Lift Station

Detailed Description

Expand Jefferson Lift Station to 7.2 MGD, install new 12" Force Main to G-Street Interceptor and new 16" Force Main replacing the existing parallel Legion Force Mains

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 7.2 MGD Lift Station	1	LS	$2,500,000	2,500,000
2	12" Force Main	3,300	LF	$84	277,200
3	16" Force Main	1,000	LF	$112	112,000
4	20" Boring and Casing under Guadalupe River	1	EA	$400,000	400,000
		SUBTOTAL:			$3,289,200
		MOBILIZATION		5%	$164,500
		E, O & P:		10%	$329,000
		SUBTOTAL:			$3,782,700
		CONTINGENCY:		20%	$756,600
		SUBTOTAL:			$4,539,300

PROJECT TOTAL **$4,539,300**

City of Kerrville

Wastewater CIP Projects - 2013

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 2

Project Description

Reduce Broadway Lift Station Capacity to 500 gpm

Detailed Description

Reduce the capacity of Broadway Lift Station in order to alleviate downstream interceptors and Legion Lift Station

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Replace with 2 - 500 GPM Pumps	1	LS	$200,000	200,000
2	8" Force Main	2,000	LF	$56	112,000
		SUBTOTAL:			$312,000
		MOBILIZATION		5%	$15,600
		E, O & P:		25%	$78,000
		SUBTOTAL:			$405,600
		CONTINGENCY:		20%	$81,200
		SUBTOTAL:			$486,800

PROJECT TOTAL **$486,800**

City of Kerrville

Wastewater CIP Projects - 2014 to 2019

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 3

Project Description

New Knapp Wet Well & 12" Force Main

Detailed Description

New Knapp Wet Well and 12" Force Main from Knapp Lift Station to Interceptor along Lois Street

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Knapp LS Expansion	1	EA	$806,000	806,000
		SUBTOTAL:			$806,000
		MOBILIZATION		5%	$40,300
		E, O & P:		25%	$201,500
		SUBTOTAL:			$1,047,800
		CONTINGENCY:		20%	$209,600
		SUBTOTAL:			$1,258,000

PROJECT TOTAL	**$1,258,000**
PROJECT TOTAL WITH 3% INFLATION	**$1,547,214**

City of Kerrville

Wastewater CIP Projects - 2014 to 2019

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 4

Project Description

G-Street Lift Station Decommission

Detailed Description

Upon completion of the G-Street Interceptor, the G-Street Lift Station will be decommissioned

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station- Decommission	1	LS	$50,000	50,000

SUBTOTAL:		$50,000
MOBILIZATION	5%	$2,500
E, O & P:	25%	$12,500
SUBTOTAL:		$65,000
CONTINGENCY:	20%	$13,000
SUBTOTAL:		$78,000

PROJECT TOTAL	**$78,000**
PROJECT TOTAL WITH 3% INFLATION	**$95,932**

City of Kerrville

Wastewater CIP Projects - 2014 to 2019

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 5

Project Description

21" Interceptor Downstream of Jefferson Lift Station

Detailed Description

21" Interceptor along Jefferson St. from Force Main to Sydney Baker to replace existing parallel lines

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	21" Sanitary Sewer	4,600	LF	$147	676,200
2	32" Boring and Casing	200	LF	$560	112,000
3	Pavement Repair	1,900	LF	$30	57,000

SUBTOTAL:		$905,200
MOBILIZATION	5%	$45,260
E, O & P:	25%	$226,300
SUBTOTAL:		$1,176,800
CONTINGENCY:	20%	$235,400
SUBTOTAL:		$1,412,200

PROJECT TOTAL	**$1,412,200**
PROJECT TOTAL WITH 3% INFLATION	**$1,736,865**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 6

Project Description

15"/18"/21" Interceptor Downstream of Knapp Lift Station

Detailed Description

New 12"/15" Interceptor upstream of Jefferson Lift Station to meet existing capacity needs

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Sanitary Sewer	1,000	LF	$105	105,000
2	18" Sanitary Sewer	6,600	LF	$126	831,600
3	21" Sanitary Sewer	300	LF	$147	44,100
4	60" Diameter Manhole	22	EA	$5,000	110,000
5	36" Boring and Casing	150	LF	$630	94,500

SUBTOTAL:		$1,185,200
MOBILIZATION	5%	$59,260
E, O & P:	25%	$296,300
SUBTOTAL:		$1,540,800
CONTINGENCY:	20%	$308,200
SUBTOTAL:		$1,849,000

PROJECT TOTAL	**$1,849,000**
PROJECT TOTAL WITH 3% INFLATION	**$3,339,479**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 7

Project Description

New 5900 gpm Legion Lift Station

Detailed Description

Expand Legion Lift Station to 8.5 MGD

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 8.5 MGD Lift Station	1	LS	$2,750,000	2,750,000

SUBTOTAL:		$2,750,000
MOBILIZATION	5%	$137,500
E, O & P:	25%	$687,500
SUBTOTAL:		$3,575,000
CONTINGENCY:	20%	$715,000
SUBTOTAL:		$4,290,000

PROJECT TOTAL	**$4,290,000**
PROJECT TOTAL WITH 3% INFLATION	**$7,748,169**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 8

Project Description

New 1600 gpm Comanche Trace Lift Station

Detailed Description

New 12" Force Main to New Birkdale Lift Station; New Lift Station with a Firm Capacity of 2.3 MGD

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Comanche Trace LS Expansion	1	LS	$991,000	991,000
	SUBTOTAL:				$991,000
	MOBILIZATION			5%	$49,550
	E, O & P:			25%	$247,800
	SUBTOTAL:				$1,288,400
	CONTINGENCY:			20%	$257,700
	SUBTOTAL:				$1,547,000

PROJECT TOTAL	**$1,547,000**
PROJECT TOTAL WITH 3% INFLATION	**$2,794,037**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 9

Project Description

Quinlan Basin 10"/12"/15" Interceptor

Detailed Description

New 10”/12”/15” gravity line from Sydney Baker and I-10 to the existing 18" line near 3rd & Ross

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10" Sanitary Sewer	1,700	LF	$70	119,000
2	12" Sanitary Sewer	2,200	LF	$84	184,800
3	15" Sanitary Sewer	9,000	LF	$105	945,000
4	20" Boring and Casing	200	LF	$350	70,000
5	Pavement Repair	4,000	LF	$30	120,000
6	48" Diameter Manhole	10	EA	$3,500	35,000
7	60" Diameter Manhole	30	EA	$5,000	150,000
8	26" Boring and Casing	150	LF	$455	68,250

SUBTOTAL:		$1,692,100
MOBILIZATION	5%	$84,605
E, O & P:	25%	$423,100
SUBTOTAL:		$2,199,900
CONTINGENCY:	20%	$440,000
SUBTOTAL:		$2,639,900

PROJECT TOTAL	**$2,639,900**
PROJECT TOTAL WITH 3% INFLATION	**$4,767,923**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 10

Project Description

Comanche Trace 12"/15" Interceptors

Detailed Description

New 12” line from Trail Head Court, along Comanche Trace Drive to Mulligan Way. New 15” line from Mulligan Way to Rock Barn Drive.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Sanitary Sewer	3,500	LF	$84	294,000
2	15" Sanitary Sewer	2,400	LF	$105	252,000
3	48" Diameter Manhole	9	EA	$3,500	31,500
4	60" Diameter Manhole	7	EA	$5,000	35,000
5	R.O.W. & Permits	6,100	LF	$40	244,000

SUBTOTAL:		$856,500
MOBILIZATION	5%	$42,825
E, O & P:	25%	$214,200
SUBTOTAL:		$1,113,600
CONTINGENCY:	20%	$222,800
SUBTOTAL:		$1,336,400

PROJECT TOTAL	**$1,336,400**
PROJECT TOTAL WITH 3% INFLATION	**$2,413,672**

City of Kerrville

Wastewater CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST November 2012

Construction Project Number 11

Project Description

15" Interceptor Upstream of Knapp Lift Station

Detailed Description

New 15” line from Goat Creek Rd. to Knapp Rd. in the Jefferson Basin

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Sanitary Sewer	3,000	LF	$105	315,000
2	60" Diameter Manhole	8	EA	$5,000	40,000
3	Pavement Repair	1,100	LF	$30	33,000

SUBTOTAL:		$388,000
MOBILIZATION	5%	$19,400
E, O & P:	25%	$97,000
SUBTOTAL:		$504,400
CONTINGENCY:	20%	$100,900
SUBTOTAL:		$605,300

PROJECT TOTAL	**$605,300**
PROJECT TOTAL WITH 3% INFLATION	**$1,093,232**

APPENDIX E

City of Kerrville WWTP

TCEQ TPDES Permit

TPDES PERMIT NO. WQ0010576001
For TCEQ office use only - EPA I.D. No. TX0047333

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. Box 13087
Austin, Texas 78711-3087

This is a renewal that replaces TPDES Permit No. WQ0010576001 issued June 20, 2005.

PERMIT TO DISCHARGE WASTES
under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

City of Kerrville

whose mailing address is

800 Junction Highway
Kerrville, Texas 78028

is authorized to treat and discharge wastes from the City of Kerrville Wastewater Treatment Facility, SIC Code 4952

located at 3650 Loop 534, at the end of Beach Street, on the City Farm, in the southeast section of the City of Kerrville, in Kerr County, Texas 78028

to Third Creek; thence to Guadalupe River Above Canyon Lake in Segment No. 1806 of the Guadalupe River Basin

only according with effluent limitations, monitoring requirements and other conditions set forth in this permit, as well as the rules of the Texas Commission on Environmental Quality (TCEQ), the laws of the State of Texas, and other orders of the TCEQ. The issuance of this permit does not grant to the permittee the right to use private or public property for conveyance of wastewater along the discharge route described in this permit. This includes, but is not limited to, property belonging to any individual, partnership, corporation, or other entity. Neither does this permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the discharge route.

This permit shall expire at midnight, **February 1, 2015.**

ISSUED DATE:

For the Commission

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Outfall Number 001

1. During the period beginning upon the date of issuance and lasting through the date of expiration the permittee is authorized to discharge subject to the following effluent limitations:

   The annual average flow of effluent shall not exceed 4.5 million gallons per day (MGD); nor shall the average discharge during any two-hour period (2-hour peak) exceed 4,861 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Minimum Self-Monitoring Requirements	
	Daily Avg mg/l(lbs/day)	7-day Avg mg/l	Daily Max mg/l	Single Grab mg/l	Report Daily Avg. & Daily Max. Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Continuous	Totalizing Meter
Carbonaceous Biochemical Oxygen Demand (5-day)	5 (188)	8	13	18	Two/week	Composite
Total Suspended Solids	5 (188)	10	15	20	Two/week	Composite
Ammonia Nitrogen						
Flow > 50 cfs*	2 (75)	4	7	10	Two/week	Composite
Flow ≤ 50 cfs*	1 (38)	2	4	5	Two/week	Composite
Total Phosphorus**						
Flow > 50 cfs*	1 (38)	2	4	5	Two/week	Composite
Flow ≤ 50 cfs*	0.5 (19)	1	2	3	Two/week	Composite
E. coli, colonies per 100 ml	126	N/A	394	N/A	One/week	Grab

* The flow in the Guadalupe River shall be measured at least once per day by the City of Kerrville at the TCEQ Stream Monitoring network Station No. 1806.0242 located at the City of Kerrville Dam. When this flow is measured to be 50 cubic feet per second (cfs) or less for five consecutive days, the more stringent effluent parameters for Ammonia Nitrogen and Total Phosphorus shall be required. These more stringent parameters shall remain in effect until the flow exceeds 50 cfs for five (5) consecutive days, at which time the less stringent parameters for Ammonia Nitrogen and Total Phosphorus shall be in effect. The parameters of 5 mg/l for Carbonaceous Biochemical Oxygen Demand and 5 mg/l for Total Suspended Solids shall be in effect for all flow conditions.

2. The effluent shall contain a chlorine residual of at least 1.0 mg/l after a detention time of at least 20 minutes (based on peak flow) and shall be monitored daily by grab sample. The permittee shall dechlorinate the chlorinated effluent to less than 0.1 mg/l chlorine residual and shall monitor chlorine residual daily by grab sample after the dechlorination process. An equivalent method of disinfection may be substituted only with prior approval of the Executive Director.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

3. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of visible oil.

5. Effluent monitoring samples shall be taken at the following location(s): Following the final treatment unit.

6. The effluent shall contain a minimum dissolved oxygen of 4.0 mg/l and shall be monitored twice per week by grab sample.

7. The annual average flow and maximum 2-hour peak flow shall be reported monthly.

** See Other Requirements No. 7, Page 23.

DEFINITIONS AND STANDARD PERMIT CONDITIONS

As required by Title 30 Texas Administrative Code (TAC) Chapter 305, certain regulations appear as standard conditions in waste discharge permits. 30 TAC § 305.121 - 305.129 (relating to Permit Characteristics and Conditions) as promulgated under the Texas Water Code (TWC) §§ 5.103 and 5.105, and the Texas Health and Safety Code (THSC) §§ 361.017 and 361.024(a), establish the characteristics and standards for waste discharge permits, including sewage sludge, and those sections of 40 Code of Federal Regulations (CFR) Part 122 adopted by reference by the Commission. The following text includes these conditions and incorporates them into this permit. All definitions in TWC § 26.001 and 30 TAC Chapter 305 shall apply to this permit and are incorporated by reference. Some specific definitions of words or phrases used in this permit are as follows:

1. Flow Measurements

   a. Annual average flow - the arithmetic average of all daily flow determinations taken within the preceding 12 consecutive calendar months. The annual average flow determination shall consist of daily flow volume determinations made by a totalizing meter, charted on a chart recorder and limited to major domestic wastewater discharge facilities with one million gallons per day or greater permitted flow.

   b. Daily average flow - the arithmetic average of all determinations of the daily flow within a period of one calendar month. The daily average flow determination shall consist of determinations made on at least four separate days. If instantaneous measurements are used to determine the daily flow, the determination shall be the arithmetic average of all instantaneous measurements taken during that month. Daily average flow determination for intermittent discharges shall consist of a minimum of three flow determinations on days of discharge.

   c. Daily maximum flow - the highest total flow for any 24-hour period in a calendar month.

   d. Instantaneous flow - the measured flow during the minimum time required to interpret the flow measuring device.

   e. 2-hour peak flow (domestic wastewater treatment plants) - the maximum flow sustained for a two-hour period during the period of daily discharge. The average of multiple measurements of instantaneous maximum flow within a two-hour period may be used to calculate the 2-hour peak flow.

   f. Maximum 2-hour peak flow (domestic wastewater treatment plants) - the highest 2-hour peak flow for any 24-hour period in a calendar month.

2. Concentration Measurements

   a. Daily average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar month, consisting of at least four separate representative measurements.

      i. For domestic wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values in the previous four consecutive month period consisting of at least four measurements shall be utilized as the daily average concentration.

      ii. For all other wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values taken during the month shall be utilized as the daily average concentration.

   b. 7-day average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar week, Sunday through Saturday.

   c. Daily maximum concentration - the maximum concentration measured on a single day, by the sample type specified in the permit, within a period of one calendar month.

   d. Daily discharge - the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the sampling day.

      The daily discharge determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily discharge determination of concentration shall be the arithmetic average (weighted by flow value) of all samples collected during that day.

e. Bacteria concentration (Fecal coliform, *E. coli*, or Enterococci) - the number of colonies of bacteria per 100 milliliters effluent. The daily average bacteria concentration is a geometric mean of the values for the effluent samples collected in a calendar month. The geometric mean shall be determined by calculating the nth root of the product of all measurements made in a calendar month, where n equals the number of measurements made; or, computed as the antilogarithm of the arithmetic mean of the logarithms of all measurements made in a calendar month. For any measurement of bacteria equaling zero, a substituted value of one shall be made for input into either computation method. If specified, the 7-day average for bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.

f. Daily average loading (lbs/day) - the arithmetic average of all daily discharge loading calculations during a period of one calendar month. These calculations must be made for each day of the month that a parameter is analyzed. The daily discharge, in terms of mass (lbs/day), is calculated as (Flow, MGD x Concentration, mg/l x 8.34).

g. Daily maximum loading (lbs/day) - the highest daily discharge, in terms of mass (lbs/day), within a period of one calendar month.

3. Sample Type

a. Composite sample - For domestic wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (a). For industrial wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (b).

b. Grab sample - an individual sample collected in less than 15 minutes.

4. Treatment Facility (facility) - wastewater facilities used in the conveyance, storage, treatment, recycling, reclamation and/or disposal of domestic sewage, industrial wastes, agricultural wastes, recreational wastes, or other wastes including sludge handling or disposal facilities under the jurisdiction of the Commission.

5. The term "sewage sludge" is defined as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in 30 TAC Chapter 312. This includes the solids that have not been classified as hazardous waste separated from wastewater by unit processes.

6. Bypass - the intentional diversion of a waste stream from any portion of a treatment facility.

MONITORING AND REPORTING REQUIREMENTS

1. Self-Reporting

Monitoring results shall be provided at the intervals specified in the permit. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall conduct effluent sampling and reporting in accordance with 30 TAC §§ 319.4 - 319.12. Unless otherwise specified, a monthly effluent report shall be submitted each month, to the Enforcement Division (MC 224), by the 20th day of the following month for each discharge which is described by this permit whether or not a discharge is made for that month. Monitoring results must be reported on an approved self-report form that is signed and certified as required by Monitoring and Reporting Requirements No. 10.

As provided by state law, the permittee is subject to administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Clean Water Act (CWA); TWC §§ 26, 27, and 28; and THSC § 361, including but not limited to knowingly making any false statement, representation, or certification on any report, record, or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, or falsifying, tampering with or knowingly rendering inaccurate any monitoring device or method required by this permit or violating any other requirement imposed by state or federal regulations.

2. Test Procedures

a. Unless otherwise specified in this permit, test procedures for the analysis of pollutants shall comply with procedures specified in 30 TAC §§ 319.11 - 319.12. Measurements, tests, and calculations shall be accurately accomplished in a representative manner.

b. All laboratory tests submitted to demonstrate compliance with this permit must meet the requirements of 30 TAC § 25, Environmental Testing Laboratory Accreditation and Certification.

3. Records of Results

   a. Monitoring samples and measurements shall be taken at times and in a manner so as to be representative of the monitored activity.

   b. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), monitoring and reporting records, including strip charts and records of calibration and maintenance, copies of all records required by this permit, records of all data used to complete the application for this permit, and the certification required by 40 CFR § 264.73(b)(9) shall be retained at the facility site, or shall be readily available for review by a TCEQ representative for a period of three years from the date of the record or sample, measurement, report, application or certification. This period shall be extended at the request of the Executive Director.

   c. Records of monitoring activities shall include the following:

      i. date, time and place of sample or measurement;
      ii. identity of individual who collected the sample or made the measurement.
      iii. date and time of analysis;
      iv. identity of the individual and laboratory who performed the analysis;
      v. the technique or method of analysis; and
      vi. the results of the analysis or measurement and quality assurance/quality control records.

      The period during which records are required to be kept shall be automatically extended to the date of the final disposition of any administrative or judicial enforcement action that may be instituted against the permittee.

4. Additional Monitoring by Permittee

   If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit using approved analytical methods as specified above, all results of such monitoring shall be included in the calculation and reporting of the values submitted on the approved self-report form. Increased frequency of sampling shall be indicated on the self-report form.

5. Calibration of Instruments

   All automatic flow measuring or recording devices and all totalizing meters for measuring flows shall be accurately calibrated by a trained person at plant start-up and as often thereafter as necessary to ensure accuracy, but not less often than annually unless authorized by the Executive Director for a longer period. Such person shall verify in writing that the device is operating properly and giving accurate results. Copies of the verification shall be retained at the facility site and/or shall be readily available for review by a TCEQ representative for a period of three years.

6. Compliance Schedule Reports

   Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date to the Regional Office and the Enforcement Division (MC 224).

7. Noncompliance Notification

   a. In accordance with 30 TAC § 305.125(9) any noncompliance which may endanger human health or safety, or the environment shall be reported by the permittee to the TCEQ. Report of such information shall be provided orally or by facsimile transmission (FAX) to the Regional Office within 24 hours of becoming aware of the noncompliance. A written submission of such information shall also be provided by the permittee to the Regional Office and the Enforcement Division (MC 224) within five working days of becoming aware of the noncompliance. The written submission shall contain a description of the noncompliance and its cause; the potential danger to human health or safety, or the environment; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.

   b. The following violations shall be reported under Monitoring and Reporting Requirement 7.a.:

      i. Unauthorized discharges as defined in Permit Condition 2(g).
      ii. Any unanticipated bypass that exceeds any effluent limitation in the permit.
      iii. Violation of a permitted maximum daily discharge limitation for pollutants listed specifically in the Other Requirements section of an Industrial TPDES permit.

c. In addition to the above, any effluent violation which deviates from the permitted effluent limitation by more than 40% shall be reported by the permittee in writing to the Regional Office and the Enforcement Division (MC 224) within 5 working days of becoming aware of the noncompliance.

d. Any noncompliance other than that specified in this section, or any required information not submitted or submitted incorrectly, shall be reported to the Enforcement Division (MC 224) as promptly as possible. For effluent limitation violations, noncompliances shall be reported on the approved self-report form.

8. In accordance with the procedures described in 30 TAC §§ 35.301 - 35.303 (relating to Water Quality Emergency and Temporary Orders) if the permittee knows in advance of the need for a bypass, it shall submit prior notice by applying for such authorization.

9. Changes in Discharges of Toxic Substances

All existing manufacturing, commercial, mining, and silvicultural permittees shall notify the Regional Office, orally or by facsimile transmission within 24 hours, and both the Regional Office and the Enforcement Division (MC 224) in writing within five (5) working days, after becoming aware of or having reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D, Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. One hundred micrograms per liter (100 μg/L);
ii. Two hundred micrograms per liter (200 μg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
iii. Five (5) times the maximum concentration value reported for that pollutant in the permit application; or
iv. The level established by the TCEQ.

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. Five hundred micrograms per liter (500 μg/L);
ii. One milligram per liter (1 mg/L) for antimony;
iii. Ten (10) times the maximum concentration value reported for that pollutant in the permit application; or
iv. The level established by the TCEQ.

10. Signatories to Reports

All reports and other information requested by the Executive Director shall be signed by the person and in the manner required by 30 TAC § 305.128 (relating to Signatories to Reports).

11. All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Executive Director of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to CWA § 301 or § 306 if it were directly discharging those pollutants;

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit; and

c. For the purpose of this paragraph, adequate notice shall include information on:

i. The quality and quantity of effluent introduced into the POTW; and
ii. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

PERMIT CONDITIONS

1. General

   a. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in an application or in any report to the Executive Director, it shall promptly submit such facts or information.

   b. This permit is granted on the basis of the information supplied and representations made by the permittee during action on an application, and relying upon the accuracy and completeness of that information and those representations. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked, in whole or in part, in accordance with 30 TAC Chapter 305, Subchapter D, during its term for good cause including, but not limited to, the following:

      i. Violation of any terms or conditions of this permit;
      ii. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
      iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

   c. The permittee shall furnish to the Executive Director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending or terminating the permit. The permittee shall also furnish to the Executive Director, upon request, copies of records required to be kept by the permit.

2. Compliance

   a. Acceptance of the permit by the person to whom it is issued constitutes acknowledgment and agreement that such person will comply with all the terms and conditions embodied in the permit, and the rules and other orders of the Commission.

   b. The permittee has a duty to comply with all conditions of the permit. Failure to comply with any permit condition constitutes a violation of the permit and the Texas Water Code or the Texas Health and Safety Code, and is grounds for enforcement action, for permit amendment, revocation, or suspension, or for denial of a permit renewal application or an application for a permit for another facility.

   c. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

   d. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal or other permit violation that has a reasonable likelihood of adversely affecting human health or the environment.

   e. Authorization from the Commission is required before beginning any change in the permitted facility or activity that may result in noncompliance with any permit requirements.

   f. A permit may be amended, suspended and reissued, or revoked for cause in accordance with 30 TAC §§ 305.62 and 305.66 and TWC§ 7.302. The filing of a request by the permittee for a permit amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

   g. There shall be no unauthorized discharge of wastewater or any other waste. For the purpose of this permit, an unauthorized discharge is considered to be any discharge of wastewater into or adjacent to water in the state at any location not permitted as an outfall or otherwise defined in the Other Requirements section of this permit.

   h. In accordance with 30 TAC § 305.535(a), the permittee may allow any bypass to occur from a TPDES permitted facility which does not cause permitted effluent limitations to be exceeded or an unauthorized discharge to occur, but only if the bypass is also for essential maintenance to assure efficient operation.

   i. The permittee is subject to administrative, civil, and criminal penalties, as applicable, under TWC §§ 7.051 - 7.075 (relating to Administrative Penalties), 7.101 - 7.111 (relating to Civil Penalties), and 7.141 - 7.202 (relating to Criminal Offenses and Penalties) for violations including, but not limited to, negligently or knowingly violating the federal CWA §§ 301, 302, 306, 307, 308, 318, or 405, or any condition or limitation implementing any sections in a permit issued under the CWA § 402, or any requirement imposed in a pretreatment program approved under the CWA §§ 402 (a)(3) or 402 (b)(8).

3. Inspections and Entry

   a. Inspection and entry shall be allowed as prescribed in the TWC Chapters 26, 27, and 28, and THSC § 361.

   b. The members of the Commission and employees and agents of the Commission are entitled to enter any public or private property at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state or the compliance with any rule, regulation, permit or other order of the Commission. Members, employees, or agents of the Commission and Commission contractors are entitled to enter public or private property at any reasonable time to investigate or monitor or, if the responsible party is not responsive or there is an immediate danger to public health or the environment, to remove or remediate a condition related to the quality of water in the state. Members, employees, Commission contractors, or agents acting under this authority who enter private property shall observe the establishment's rules and regulations concerning safety, internal security, and fire protection, and if the property has management in residence, shall notify management or the person then in charge of his presence and shall exhibit proper credentials. If any member, employee, Commission contractor, or agent is refused the right to enter in or on public or private property under this authority, the Executive Director may invoke the remedies authorized in TWC § 7.002. The statement above, that Commission entry shall occur in accordance with an establishment's rules and regulations concerning safety, internal security, and fire protection, is not grounds for denial or restriction of entry to any part of the facility, but merely describes the Commission's duty to observe appropriate rules and regulations during an inspection.

4. Permit Amendment and/or Renewal

   a. The permittee shall give notice to the Executive Director as soon as possible of any planned physical alterations or additions to the permitted facility if such alterations or additions would require a permit amendment or result in a violation of permit requirements. Notice shall also be required under this paragraph when:

      i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in accordance with 30 TAC § 305.534 (relating to New Sources and New Dischargers); or

      ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the permit, nor to notification requirements in Monitoring and Reporting Requirements No. 9;

      iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

   b. Prior to any facility modifications, additions, or expansions that will increase the plant capacity beyond the permitted flow, the permittee must apply for and obtain proper authorization from the Commission before commencing construction.

   c. The permittee must apply for an amendment or renewal at least 180 days prior to expiration of the existing permit in order to continue a permitted activity after the expiration date of the permit. If an application is submitted prior to the expiration date of the permit, the existing permit shall remain in effect until the application is approved, denied, or returned. If the application is returned or denied, authorization to continue such activity shall terminate upon the effective date of the action. If an application is not submitted prior to the expiration date of the permit, the permit shall expire and authorization to continue such activity shall terminate.

   d. Prior to accepting or generating wastes which are not described in the permit application or which would result in a significant change in the quantity or quality of the existing discharge, the permittee must report the proposed changes to the Commission. The permittee must apply for a permit amendment reflecting any necessary changes in permit conditions, including effluent limitations for pollutants not identified and limited by this permit.

   e. In accordance with the TWC § 26.029(b), after a public hearing, notice of which shall be given to the permittee, the Commission may require the permittee, from time to time, for good cause, in accordance with applicable laws, to conform to new or additional conditions.

   f. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under CWA § 307(a) for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition. The permittee shall comply with effluent standards or prohibitions established under CWA § 307(a) for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. Permit Transfer

   a. Prior to any transfer of this permit, Commission approval must be obtained. The Commission shall be notified in writing of any change in control or ownership of facilities authorized by this permit. Such notification should be sent to the Applications Review and Processing Team (MC 148) of the Water Quality Division.

   b. A permit may be transferred only according to the provisions of 30 TAC § 305.64 (relating to Transfer of Permits) and 30 TAC § 50.133 (relating to Executive Director Action on Application or WQMP update).

6. Relationship to Hazardous Waste Activities

   This permit does not authorize any activity of hazardous waste storage, processing, or disposal that requires a permit or other authorization pursuant to the Texas Health and Safety Code.

7. Relationship to Water Rights

   Disposal of treated effluent by any means other than discharge directly to water in the state must be specifically authorized in this permit and may require a permit pursuant to TWC Chapter 11.

8. Property Rights

   A permit does not convey any property rights of any sort, or any exclusive privilege.

9. Permit Enforceability

   The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

10. Relationship to Permit Application

    The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

11. Notice of Bankruptcy.

    a. Each permittee shall notify the Executive Director, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (11 USC) by or against:
       i. the permittee;
       ii. an entity (as that term is defined in 11 USC, § 101(14)) controlling the permittee or listing the permit or permittee as property of the estate; or
       iii. an affiliate (as that term is defined in 11 USC, § 101(2)) of the permittee.

    b. This notification must indicate:
       i. the name of the permittee and the permit number(s);
       ii. the bankruptcy court in which the petition for bankruptcy was filed; and
       iii. the date of filing of the petition.

OPERATIONAL REQUIREMENTS

1. The permittee shall at all times ensure that the facility and all of its systems of collection, treatment, and disposal are properly operated and maintained. This includes, but is not limited to, the regular, periodic examination of wastewater solids within the treatment plant by the operator in order to maintain an appropriate quantity and quality of solids inventory as described in the various operator training manuals and according to accepted industry standards for process control. Process control, maintenance, and operations records shall be retained at the facility site, or shall be readily available for review by a TCEQ representative, for a period of three years.

2. Upon request by the Executive Director, the permittee shall take appropriate samples and provide proper analysis in order to demonstrate compliance with Commission rules. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall comply with all applicable provisions of 30 TAC Chapter 312 concerning sewage sludge use and disposal and 30 TAC §§ 319.21 - 319.29 concerning the discharge of certain hazardous metals.

3. Domestic wastewater treatment facilities shall comply with the following provisions:

   a. The permittee shall notify the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, in writing, of any facility expansion at least 90 days prior to conducting such activity.

   b. The permittee shall submit a closure plan for review and approval to the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, for any closure activity at least 90 days prior to conducting such activity. Closure is the act of permanently taking a waste management unit or treatment facility out of service and includes the permanent removal from service of any pit, tank, pond, lagoon, surface impoundment and/or other treatment unit regulated by this permit.

4. The permittee is responsible for installing prior to plant start-up, and subsequently maintaining, adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures by means of alternate power sources, standby generators, and/or retention of inadequately treated wastewater.

5. Unless otherwise specified, the permittee shall provide a readily accessible sampling point and, where applicable, an effluent flow measuring device or other acceptable means by which effluent flow may be determined.

6. The permittee shall remit an annual water quality fee to the Commission as required by 30 TAC Chapter 21. Failure to pay the fee may result in revocation of this permit under TWC § 7.302(b)(6).

7. Documentation

   For all written notifications to the Commission required of the permittee by this permit, the permittee shall keep and make available a copy of each such notification under the same conditions as self-monitoring data are required to be kept and made available. Except for information required for TPDES permit applications, effluent data, including effluent data in permits, draft permits and permit applications, and other information specified as not confidential in 30 TAC §§ 1.5(d), any information submitted pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted in the manner prescribed in the application form or by stamping the words confidential business information on each page containing such information. If no claim is made at the time of submission, information may be made available to the public without further notice. If the Commission or Executive Director agrees with the designation of confidentiality, the TCEQ will not provide the information for public inspection unless required by the Texas Attorney General or a court pursuant to an open records request. If the Executive Director does not agree with the designation of confidentiality, the person submitting the information will be notified.

8. Facilities that generate domestic wastewater shall comply with the following provisions; domestic wastewater treatment facilities at permitted industrial sites are excluded.

   a. Whenever flow measurements for any domestic sewage treatment facility reach 75% of the permitted daily average or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the domestic wastewater treatment and/or collection facilities. Whenever the flow reaches 90% of the permitted daily average or annual average flow for three consecutive months, the permittee shall obtain necessary authorization from the Commission to commence construction of the necessary additional treatment and/or collection facilities. In the case of a domestic wastewater treatment facility which reaches 75% of the permitted daily average or annual average flow for three consecutive months, and the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility, the permittee shall submit an engineering report supporting this claim to the Executive Director of the Commission.

      If in the judgment of the Executive Director the population to be served will not cause permit noncompliance, then the requirement of this section may be waived. To be effective, any waiver must be in writing and signed by the Director of the Enforcement Division (MC 149) of the Commission, and such waiver of these requirements will be reviewed upon expiration of the existing permit; however, any such waiver shall not be interpreted as condoning or excusing any violation of any permit parameter.

   b. The plans and specifications for domestic sewage collection and treatment works associated with any domestic permit must be approved by the Commission and failure to secure approval before commencing construction of such works or making a discharge is a violation of this permit and each day is an additional violation until approval has been secured.

c. Permits for domestic wastewater treatment plants are granted subject to the policy of the Commission to encourage the development of area-wide waste collection, treatment, and disposal systems. The Commission reserves the right to amend any domestic wastewater permit in accordance with applicable procedural requirements to require the system covered by this permit to be integrated into an area-wide system, should such be developed; to require the delivery of the wastes authorized to be collected in, treated by or discharged from said system, to such area-wide system; or to amend this permit in any other particular to effectuate the Commission's policy. Such amendments may be made when the changes required are advisable for water quality control purposes and are feasible on the basis of waste treatment technology, engineering, financial, and related considerations existing at the time the changes are required, exclusive of the loss of investment in or revenues from any then existing or proposed waste collection, treatment or disposal system.

9. Domestic wastewater treatment plants shall be operated and maintained by sewage plant operators holding a valid certificate of competency at the required level as defined in 30 TAC Chapter 30.

10. For Publicly Owned Treatment Works (POTWs), the 30-day average (or monthly average) percent removal for BOD and TSS shall not be less than 85%, unless otherwise authorized by this permit.

11. Facilities that generate industrial solid waste as defined in 30 TAC § 335.1 shall comply with these provisions:

a. Any solid waste, as defined in 30 TAC § 335.1 (including but not limited to such wastes as garbage, refuse, sludge from a waste treatment, water supply treatment plant or air pollution control facility, discarded materials, discarded materials to be recycled, whether the waste is solid, liquid, or semisolid), generated by the permittee during the management and treatment of wastewater, must be managed in accordance with all applicable provisions of 30 TAC Chapter 335, relating to Industrial Solid Waste Management.

b. Industrial wastewater that is being collected, accumulated, stored, or processed before discharge through any final discharge outfall, specified by this permit, is considered to be industrial solid waste until the wastewater passes through the actual point source discharge and must be managed in accordance with all applicable provisions of 30 TAC Chapter 335.

c. The permittee shall provide written notification, pursuant to the requirements of 30 TAC § 335.8(b)(1), to the Environmental Cleanup Section (MC 127) of the Remediation Division informing the Commission of any closure activity involving an Industrial Solid Waste Management Unit, at least 90 days prior to conducting such an activity.

d. Construction of any industrial solid waste management unit requires the prior written notification of the proposed activity to the Registration and Reporting Section (MC 129) of the Registration, Review, and Reporting Division. No person shall dispose of industrial solid waste, including sludge or other solids from wastewater treatment processes, prior to fulfilling the deed recordation requirements of 30 TAC § 335.5.

e. The term "industrial solid waste management unit" means a landfill, surface impoundment, waste-pile, industrial furnace, incinerator, cement kiln, injection well, container, drum, salt dome waste containment cavern, or any other structure vessel, appurtenance, or other improvement on land used to manage industrial solid waste.

f. The permittee shall keep management records for all sludge (or other waste) removed from any wastewater treatment process. These records shall fulfill all applicable requirements of 30 TAC § 335 and must include the following, as it pertains to wastewater treatment and discharge:

i. Volume of waste and date(s) generated from treatment process;
ii. Volume of waste disposed of on-site or shipped off-site;
iii. Date(s) of disposal;
iv. Identity of hauler or transporter;
v. Location of disposal site; and
vi. Method of final disposal.

The above records shall be maintained on a monthly basis. The records shall be retained at the facility site, or shall be readily available for review by authorized representatives of the TCEQ for at least five years.

12. For industrial facilities to which the requirements of 30 TAC § 335 do not apply, sludge and solid wastes, including tank cleaning and contaminated solids for disposal, shall be disposed of in accordance with THSC § 361.

SLUDGE PROVISIONS

The permittee is authorized to dispose of sludge only at a Texas Commission on Environmental Quality (TCEQ) authorized land application site or co-disposal landfill. **The disposal of sludge by land application on property owned, leased or under the direct control of the permittee is a violation of the permit unless the site is authorized with the TCEQ. This provision does not authorize Distribution and Marketing of sludge. This provision does not authorize land application of Class A Sludge. This provision does not authorize the permittee to land apply sludge on property owned, leased or under the direct control of the permittee.**

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE LAND APPLICATION

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 312 and all other applicable state and federal regulations in a manner that protects public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present in the sludge.

2. In all cases, if the person (permit holder) who prepares the sewage sludge supplies the sewage sludge to another person for land application use or to the owner or lease holder of the land, the permit holder shall provide necessary information to the parties who receive the sludge to assure compliance with these regulations.

3. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

B. Testing Requirements

1. Sewage sludge shall be tested annually in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I Toxicity Characteristic Leaching Procedure (TCLP) or other method that receives the prior approval of the TCEQ for the contaminants listed in 40 CFR Part 261.24, Table 1. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal. Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Remediation Support Division and the Regional Director (MC Region 13) within seven (7) days after failing the TCLP Test.

   The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Registration, Review, and Reporting Division (MC 129), Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 13) and the Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year.

2. Sewage sludge shall not be applied to the land if the concentration of the pollutants exceeds the pollutant concentration criteria in Table 1. The frequency of testing for pollutants in Table 1 is found in Section I.C.

TABLE 1

Pollutant	Ceiling Concentration (Milligrams per kilogram)*
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
PCBs	49
Selenium	100
Zinc	7500

* Dry weight basis

3. Pathogen Control

All sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following methods to ensure that the sludge meets either the Class A or Class B pathogen requirements.

a. Six alternatives are available to demonstrate compliance with Class A sewage sludge. The first 4 options require either the density of fecal coliform in the sewage sludge be less than 1000 Most Probable Number (MPN) per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge be less than three MPN per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. Below are the additional requirements necessary to meet the definition of a Class A sludge.

Alternative 1 - The temperature of the sewage sludge that is used or disposed shall be maintained at or above a specific value for a period of time. See 30 TAC § 312.82(a)(2)(A) for specific information.

Alternative 2 - The pH of the sewage sludge that is used or disposed shall be raised to above 12 std. units and shall remain above 12 std. units for 72 hours.

The temperature of the sewage sludge shall be above 52° Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12 std. units.

At the end of the 72-hour period during which the pH of the sewage sludge is above 12 std. units, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50%.

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(i-iii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(iv-vi) for specific information.

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed.

Alternative 5 (PFRP) - Sewage sludge that is used or disposed of shall be treated in one of the processes to Further Reduce Pathogens (PFRP) described in 40 CFR Part 503, Appendix B. PFRP include composting, heat drying, heat treatment, and thermophilic aerobic digestion.

Alternative 6 (PFRP Equivalent) - Sewage sludge that is used or disposed of shall be treated in a process that has been approved by the U. S. Environmental Protection Agency as being equivalent to those in Alternative 5.

b. Three alternatives are available to demonstrate compliance with Class B criteria for sewage sludge.

Alternative 1

i. A minimum of seven random samples of the sewage sludge shall be collected within 48 hours of the time the sewage sludge is used or disposed of during each monitoring episode for the sewage sludge.

ii. The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 MPN per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge that is used or disposed of shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in 40 CFR Part 503, Appendix B, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. An independent Texas Licensed Professional Engineer must make a certification to the generator of a sewage sludge that the wastewater treatment facility generating the sewage sludge is designed to achieve one of the PSRP at the permitted design loading of the facility. The certification need only be repeated if the design loading of the facility is increased. The certification shall include a statement indicating the design meets all the applicable standards specified in Appendix B of 40 CFR Part 503;

iii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U. S. Environmental Protection Agency final guidance;

iv. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review; and

v. If the sewage sludge is generated from a mixture of sources, resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the PSRP, and shall meet the certification, operation, and record keeping requirements of this paragraph.

Alternative 3 - Sewage sludge shall be treated in an equivalent process that has been approved by the U. S. Environmental Protection Agency, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U. S. Environmental Protection Agency final guidance;

iii. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review;

iv. The Executive Director will accept from the U. S. Environmental Protection Agency a finding of equivalency to the defined PSRP; and

v. If the sewage sludge is generated from a mixture of sources resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the Processes to Significantly Reduce Pathogens, and shall meet the certification, operation, and record keeping requirements of this paragraph.

In addition, the following site restrictions must be met if Class B sludge is land applied:

i. Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

ii. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.

iii. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than 4 months prior to incorporation into the soil.

iv. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

v. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.

vi. Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn.

vii. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of sewage sludge.

viii. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

ix. Land application of sludge shall be in accordance with the buffer zone requirements found in 30 TAC § 312.44.

4. Vector Attraction Reduction Requirements

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following Alternatives 1 through 10 for vector attraction reduction.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30° and 37° Celsius. Volatile solids must be reduced by less than 17% to demonstrate compliance.

Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20° Celsius. Volatile solids must be reduced by less than 15% to demonstrate compliance.

Alternative 4 - The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20° Celsius.

Alternative 5 - Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40° Celsius and the average temperature of the sewage sludge shall be higher than 45° Celsius.

Alternative 6 - The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali shall remain at 12 or higher for two hours and then remain at a pH of 11.5 or higher for an additional 22 hours at the time the sewage sludge is prepared for sale or given away in a bag or other container.

Alternative 7 - The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75% based on the moisture content and total solids prior to mixing with other materials. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 8 - The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90% based on the moisture content and total solids prior to mixing with other materials at the time the sludge is used. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 9 -
i. Sewage sludge shall be injected below the surface of the land.

ii. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

iii. When sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.

Alternative 10-
i. Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land.

ii. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

C. Monitoring Requirements

Toxicity Characteristic Leaching Procedure (TCLP) Test - annually

PCBs - annually

All metal constituents and fecal coliform or Salmonella sp. bacteria shall be monitored at the appropriate frequency shown below, pursuant to 30 TAC § 312.46(a)(1):

Amount of sewage sludge (*) metric tons per 365-day period			Monitoring Frequency
0	to less than	290	Once/Year
290	to less than	1,500	Once/Quarter
1,500	to less than	15,000	Once/Two Months
15,000 or greater			Once/Month

(*) *The amount of bulk sewage sludge applied to the land (dry weight basis).*

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 30 TAC § 312.7

SECTION II. REQUIREMENTS SPECIFIC TO BULK SEWAGE SLUDGE FOR APPLICATION TO THE LAND MEETING CLASS A or B PATHOGEN REDUCTION AND THE CUMULATIVE LOADING RATES IN TABLE 2, OR CLASS B PATHOGEN REDUCTION AND THE POLLUTANT CONCENTRATIONS IN TABLE 3

For those permittees meeting Class A or B pathogen reduction requirements and that meet the cumulative loading rates in Table 2 below, or the Class B pathogen reduction requirements and contain concentrations of pollutants below listed in Table 3, the following conditions apply:

A. Pollutant Limits

Table 2

Pollutant	Cumulative Pollutant Loading Rate (pounds per acre)*
Arsenic	36
Cadmium	35
Chromium	2677
Copper	1339
Lead	268
Mercury	15
Molybdenum	Report Only
Nickel	375
Selenium	89
Zinc	2500

Table 3

Pollutant	Monthly Average Concentration (milligrams per kilogram)*
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	Report Only
Nickel	420
Selenium	36
Zinc	2800

*Dry weight basis

B. Pathogen Control

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, a reclamation site, shall be treated by either Class A or Class B pathogen reduction requirements as defined above in Section I.B.3.

C. Management Practices

1. Bulk sewage sludge shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk sewage sludge enters a wetland or other waters in the State.

2. Bulk sewage sludge not meeting Class A requirements shall be land applied in a manner which complies with the Management Requirements in accordance with 30 TAC § 312.44.

3. Bulk sewage sludge shall be applied at or below the agronomic rate of the cover crop.

4. An information sheet shall be provided to the person who receives bulk sewage sludge sold or given away. The information sheet shall contain the following information:

   a. The name and address of the person who prepared the sewage sludge that is sold or given away in a bag or other container for application to the land.

   b. A statement that application of the sewage sludge to the land is prohibited except in accordance with the instruction on the label or information sheet.

   c. The annual whole sludge application rate for the sewage sludge application rate for the sewage sludge that does not cause any of the cumulative pollutant loading rates in Table 2 above to be exceeded, unless the pollutant concentrations in Table 3 found in Section II above are met.

D. Notification Requirements

1. If bulk sewage sludge is applied to land in a State other than Texas, written notice shall be provided prior to the initial land application to the permitting authority for the State in which the bulk sewage sludge is proposed to be applied. The notice shall include:

   a. The location, by street address, and specific latitude and longitude, of each land application site.

   b. The approximate time period bulk sewage sludge will be applied to the site.

   c. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who will apply the bulk sewage sludge.

2. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

E. Record keeping Requirements

The sludge documents will be retained at the facility site and/or shall be readily available for review by a TCEQ representative. The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at the facility site and/or shall be readily available for review by a TCEQ representative for a period of <u>five years</u>. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply.

1. The concentration (mg/kg) in the sludge of each pollutant listed in Table 3 above and the applicable pollutant concentration criteria (mg/kg), <u>or</u> the applicable cumulative pollutant loading rate and the applicable cumulative pollutant loading rate limit (lbs/ac) listed in Table 2 above.

2. A description of how the pathogen reduction requirements are met (including site restrictions for Class B sludge, if applicable).

3. A description of how the vector attraction reduction requirements are met.

4. A description of how the management practices listed above in Section II.C are being met.

5. The following certification statement:

   "I certify, under penalty of law, that the applicable pathogen requirements in 30 TAC § 312.82(a) or (b) and the vector attraction reduction requirements in 30 TAC § 312.83(b) have been met for each site on which bulk sewage sludge is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification including fine and imprisonment."

6. The recommended agronomic loading rate from the references listed in Section II.C.3. above, as well as the actual agronomic loading rate shall be retained. The person who applies bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at the facility site and/or shall be readily available for review by a TCEQ representative <u>indefinitely</u>. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply:

a. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii), as applicable, and to the permittee's specific sludge treatment activities.

b. The location, by street address, and specific latitude and longitude, of each site on which sludge is applied.

c. The number of acres in each site on which bulk sludge is applied.

d. The date and time sludge is applied to each site.

e. The cumulative amount of each pollutant in pounds/acre listed in Table 2 applied to each site.

f. The total amount of sludge applied to each site in dry tons.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

F. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 13) and Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division, by September 30 of each year the following information:

1. Results of tests performed for pollutants found in either Table 2 or 3 as appropriate for the permittee's land application practices.
2. The frequency of monitoring listed in Section I.C. that applies to the permittee.
3. Toxicity Characteristic Leaching Procedure (TCLP) results.
4. Identity of hauler(s) and TCEQ transporter number.
5. PCB concentration in sludge in mg/kg.
6. Date(s) of disposal.
7. Owner of disposal site(s).
8. Texas Commission on Environmental Quality registration number, if applicable.
9. Amount of sludge disposal dry weight (lbs/acre) at each disposal site.
10. The concentration (mg/kg) in the sludge of each pollutant listed in Table 1 (defined as a monthly average) as well as the applicable pollutant concentration criteria (mg/kg) listed in Table 3 above, or the applicable pollutant loading rate limit (lbs/acre) listed in Table 2 above if it exceeds 90% of the limit.
11. Level of pathogen reduction achieved (Class <u>A</u> or Class <u>B</u>).
12. Alternative used as listed in Section I.B.3.(a. or b.). Alternatives describe how the pathogen reduction requirements are met. If Class B sludge, include information on how site restrictions were met.
13. Vector attraction reduction alternative used as listed in Section I.B.4.
14. Annual sludge production in dry tons/year.

15. Amount of sludge land applied in dry tons/year.

16. The certification statement listed in either 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii) as applicable to the permittee's sludge treatment activities, shall be attached to the annual reporting form.

17. When the amount of any pollutant applied to the land exceeds 90% of the cumulative pollutant loading rate for that pollutant, as described in Table 2, the permittee shall report the following information as an attachment to the annual reporting form.

    a. The location, by street address, and specific latitude and longitude.

    b. The number of acres in each site on which bulk sewage sludge is applied.

    c. The date and time bulk sewage sludge is applied to each site.

    d. The cumulative amount of each pollutant (i.e., pounds/acre) listed in Table 2 in the bulk sewage sludge applied to each site.

    e. The amount of sewage sludge (i.e., dry tons) applied to each site.

    The above records shall be maintained on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

SECTION III. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE DISPOSED IN A MUNICIPAL SOLID WASTE LANDFILL

A. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 330 and all other applicable state and federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present. The permittee shall ensure that the sewage sludge meets the requirements in 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

B. If the permittee generates sewage sludge and supplies that sewage sludge to the owner or operator of a municipal solid waste landfill (MSWLF) for disposal, the permittee shall provide to the owner or operator of the MSWLF appropriate information needed to be in compliance with the provisions of this permit.

C. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

D. Sewage sludge shall be tested annually in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I (Toxicity Characteristic Leaching Procedure) or other method, which receives the prior approval of the TCEQ for contaminants listed in Table 1 of 40 CFR § 261.24. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal.

   Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Remediation Support Division and the Regional Director (MC Region 13) of the appropriate TCEQ field office within 7 days after failing the TCLP Test.

   The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Registration, Review, and Reporting Division (MC 129), Texas Commission on Environmental Quality, P. O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 13) and the Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year.

E. Sewage sludge shall be tested as needed, in accordance with the requirements of 30 TAC Chapter 330.

F. Record keeping Requirements

   The permittee shall develop the following information and shall retain the information for five years.

   1. The description (including procedures followed and the results) of all liquid Paint Filter Tests performed.

   2. The description (including procedures followed and results) of all TCLP tests performed.

   The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

G. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 13) and Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year the following information:

1. Toxicity Characteristic Leaching Procedure (TCLP) results.
2. Annual sludge production in dry tons/year.
3. Amount of sludge disposed in a municipal solid waste landfill in dry tons/year.
4. Amount of sludge transported interstate in dry tons/year.
5. A certification that the sewage sludge meets the requirements of 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.
6. Identity of hauler(s) and transporter registration number.
7. Owner of disposal site(s).
8. Location of disposal site(s).
9. Date(s) of disposal.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

OTHER REQUIREMENTS

1. The permittee shall employ or contract with one or more licensed wastewater treatment facility operators or wastewater system operations companies holding a valid license or registration according to the requirements of 30 TAC Chapter 30, Occupational Licenses and Registrations and in particular 30 TAC Chapter 30, Subchapter J, Wastewater Operators and Operations Companies.

   This Category B facility must be operated by a chief operator or an operator holding a Category B license or higher. The facility must be operated a minimum of five days per week by the licensed chief operator or an operator holding the required level of license or higher. The licensed chief operator or operator holding the required level of license or higher must be available by telephone or pager seven days per week. Where shift operation of the wastewater treatment facility is necessary, each shift that does not have the on-site supervision of the licensed chief operator must be supervised by an operator in charge who is licensed not less than one level below the category for the facility.

2. The facility is not located in the Coastal Management Program boundary.

3. There is no mixing zone established for this discharge to an intermittent stream. Acute toxic criteria apply at the point of discharge.

4. The permittee is hereby placed on notice that this permit may be reviewed by the TCEQ after the completion of any new intensive water quality survey on Segment No. 1806 of the Guadalupe River Basin and any subsequent updating of the water quality model for Segment No. 1806, in order to determine if the limitations and conditions contained herein are consistent with any such revised model. The permit may be amended, pursuant to 30 TAC §305.62, as a result of such review. The permittee is also hereby placed on notice that effluent limits may be made more stringent at renewal based on, for example, any change to modeling protocol approved in the TCEQ Continuing Planning Process.

5. The permittee shall maintain sufficient evidence of legal restrictions prohibiting residential structures within the part of the buffer zone not owned by the permittee according to 30 TAC Section 309.13(e)(3). The evidence of legal restrictions shall be submitted to the executive director in care of the TCEQ Wastewater Permitting Section (MC 148). The permittee shall comply with the requirements of 30 TAC § 309.13(a) through (d). (See Attachment A.)

6. The permittee shall provide facilities for the protection of its wastewater treatment facilities from a 100-year flood.

7. Notwithstanding any other provisions of this permit, the City shall not be allowed to discharge in total, more than 9,125 pounds of phosphorus in any twelve month period, at the point of discharge.

8. In accordance with 30 TAC §319.9, a permittee that has at least twelve months of uninterrupted compliance with its bacteria limit may notify the commission in writing of its compliance and request a less frequent measurement schedule. To request a less frequent schedule, the permittee shall submit a written request to the TCEQ Wastewater Permitting Section (MC 148) for each phase that includes a different monitoring frequency. The request must contain all of the reported bacteria values (Daily Avg. and Daily Max/Single Grab) for the twelve consecutive months immediately prior to the request. If the Executive Director finds that a less frequent measurement schedule is protective of human health and the environment, the permittee will be given a less frequent measurement schedule. For this permit, 1/week will be reduced to 2/month. **A violation of any bacteria limit by a facility that has been granted a less frequent measurement schedule will require the permittee to return** to the standard frequency schedule, and the permittee may not apply for another reduction in measurement frequency for at least 24 months from the date of the last violation. The Executive Director may establish a more frequent measurement schedule if necessary to protect human health or the environment.

CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS

1. The following pollutants may not be introduced into the treatment facility:

   a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit (60 degrees Celsius) using the test methods specified in 40 CFR § 261.21;

   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case shall there be discharges with pH lower than 5.0 standard units, unless the works are specifically designed to accommodate such discharges;

   c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, resulting in Interference;

   d. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;

   e. Heat in amounts which will inhibit biological activity in the POTW resulting in Interference but in no case shall there be heat in such quantities that the temperature at the POTW treatment plant exceeds 104 degrees Fahrenheit (40 degrees Celsius) unless the Executive Director, upon request of the POTW, approves alternate temperature limits;

   f. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

   g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and

   h. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

2. The permittee shall require any indirect discharger to the treatment works to comply with the reporting requirements of Sections 204(b), 307, and 308 of the Clean Water Act, including any requirements established under 40 CFR Part 403*rev. Federal Register/ Vol. 70/ No. 198/ Friday, October 14, 2005/ Rules and Regulations, pages 60134-60798.*

3. The permittee shall provide adequate notification to the Executive Director care of the Wastewater Permitting Section (MC 148) of the Water Quality Division within 30 days subsequent to the permittee's knowledge of either of the following:

   a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Sections 301 and 306 of the Clean Water Act if it were directly discharging those pollutants; and

   b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit.

   Any notice shall include information on the quality and quantity of effluent to be introduced into the treatment works, and any anticipated impact of the change on the quality or quantity of effluent to be discharged from the POTW.

Revised July 2007

CHRONIC BIOMONITORING REQUIREMENTS: FRESHWATER

The provisions of this Section apply to Outfall 001 for whole effluent toxicity testing (biomonitoring).

1. Scope, Frequency and Methodology

a. The permittee shall test the effluent for toxicity in accordance with the provisions below. Such testing will determine if an appropriately dilute effluent sample adversely affects the survival, reproduction, or growth of the test organisms.

b. The permittee shall conduct the following toxicity tests utilizing the test organisms, procedures and quality assurance requirements specified in this Part of the permit and in accordance with "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition (EPA-821-R-02-013), or the most recent update:

1) Chronic static renewal survival and reproduction test using the water flea (*Ceriodaphnia dubia*) (Method 1002.0 or the most recent update). This test should be terminated when 60% of the surviving adults in the control produce three broods or at the end of eight days, whichever comes first. This test shall be conducted once per quarter.

2) Chronic static renewal 7-day larval survival and growth test using the fathead minnow (*Pimephales promelas*) (Method 1000.0 or the most recent update). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution. This test shall be conducted once per quarter.

The permittee must perform and report a valid test for each test species during the prescribed reporting period. An invalid test must be repeated during the same reporting period. An invalid test is herein defined as any test failing to satisfy the test acceptability criteria, procedures, and quality assurance requirements specified in the test methods and permit. All test results, valid or invalid, must be submitted as described below.

c. The permittee shall use five effluent dilution concentrations and a control in each toxicity test. These additional effluent concentrations are 6%, 8%, 11%, 15%, and 20% effluent. The critical dilution, defined as 20% effluent, is the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions.

d. This permit may be amended to require a Whole Effluent Toxicity (WET) limit, Chemical-Specific (CS) effluent limits, a Best Management Practice (BMP), additional toxicity testing, and/or other appropriate actions to address toxicity. The permittee may be required to conduct additional biomonitoring tests and/or a Toxicity Reduction Evaluation (TRE) if biomonitoring data indicate multiple numbers of unconfirmed toxicity events.

e. Testing Frequency Reduction

1) If none of the first four consecutive quarterly tests demonstrates significant lethal or sub-lethal effects, the permittee may submit this information in writing and, upon approval, reduce the testing frequency to once per six months for the invertebrate test species and once per year for the vertebrate test species.

2) If one or more of the first four consecutive quarterly tests demonstrates significant sub-lethal effects, the permittee shall continue quarterly testing for that species until four consecutive quarterly tests demonstrate no significant sub-lethal effects.

At that time, the permittee may apply for the appropriate testing frequency reduction for that species.

3) If one or more of the first four consecutive quarterly tests demonstrates significant lethal effects, the permittee shall continue quarterly testing for that species until the permit is reissued. If a testing frequency reduction had been previously granted and a subsequent test demonstrates significant lethal effects, the permittee will resume a quarterly testing frequency for that species until the permit is reissued.

2. Required Toxicity Testing Conditions

a. Test Acceptance - The permittee shall repeat any toxicity test, including the control and all effluent dilutions, which fail to meet the following criteria:

1) a control mean survival of 80% or greater;

2) a control mean number of water flea neonates per surviving adult of 15 or greater;

3) a control mean dry weight of surviving fathead minnow larvae of 0.25 mg or greater;

4) a control Coefficient of Variation percent (CV%) of 40 or less in between replicates for the young of surviving females in the water flea reproduction and survival test; and the growth and survival endpoints in the fathead minnow growth and survival test.

5) a critical dilution CV% of 40 or less for young of surviving females in the water flea reproduction and survival test; and the growth and survival endpoints for the fathead minnow growth and survival test. However, if statistically significant lethal or nonlethal effects are exhibited at the critical dilution, a CV% greater than 40 shall not invalidate the test.

6) a Percent Minimum Significant Difference of 47 or less for water flea reproduction;

7) a Percent Minimum Significant Difference of 30 or less for fathead minnow growth.

b. Statistical Interpretation

1) For the water flea survival test, the statistical analyses used to determine if there is a significant difference between the control and an effluent dilution shall be Fisher's Exact Test as described in the "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013), or the most recent update thereof.

2) For the water flea reproduction test and the fathead minnow larval survival and growth tests, the statistical analyses used to determine if there is a significant difference between the control and an effluent dilution shall be in accordance with the methods described in the "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013), or the most recent update thereof.

3) The permittee is responsible for reviewing test concentration-response relationships to ensure that calculated test-results are interpreted and reported correctly. The EPA manual, "Method Guidance and Recommendation for Whole Effluent Toxicity (WET) Testing (40

CFR Part 136) (EPA 821-B-00-004) provides guidance on determining the validity of test results.

4) If significant lethality is demonstrated (that is, there is a statistically significant difference in survival at the critical dilution when compared to the control), the conditions of test acceptability are met, and the survival of the test organisms are equal to or greater than 80% in the critical dilution and all dilutions below that, then the permittee shall report a survival No Observed Effect Concentration (NOEC) of not less than the critical dilution for the reporting requirements.

5) The NOEC is defined as the greatest effluent dilution at which no significant effect is demonstrated. The Lowest Observed Effect Concentration (LOEC) is defined as the lowest effluent dilution at which a significant effect is demonstrated. A significant effect is herein defined as a statistically significant difference at the 95% confidence level between the survival, reproduction, or growth of the test organism(s) in a specified effluent dilution compared to the survival, reproduction, or growth of the test organism(s) in the control (0% effluent).

6) The use of NOECs and LOECs assumes either a monotonic (continuous) concentration-response relationship or a threshold model of the concentration-response relationship. For any test result that demonstrates a non-monotonic (non-continuous) response, the NOEC should be determined based on the guidance manual referenced in Item 3 above.

7) Pursuant to the responsibility assigned to the permittee in Part 2.b.3), test results that demonstrate a non-monotonic (non-continuous) concentration-response relationship may be submitted, prior to the due date, for technical review. The above-referenced guidance manual will be used when making a determination of test acceptability.

8) Staff will review test results for consistency with rules, procedures, and permit requirements.

c. Dilution Water

1) Dilution water used in the toxicity tests shall be the receiving water collected as close as possible to the point of discharge into the lake but unaffected by the discharge.

2) Where the receiving water proves unsatisfactory as a result of pre-existing instream toxicity (i.e. fails to fulfill the test acceptance criteria of item 2.a.), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

a) a synthetic lab water control was performed (in addition to the receiving water control) which fulfilled the test acceptance requirements of item 2.a;

b) the test indicating receiving water toxicity was carried out to completion (i.e., 7 days);

c) the permittee submitted all test results indicating receiving water toxicity with the reports and information required in Part 3 of this Section.

The synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water or a natural water in the drainage basin that is unaffected by the discharge, provided the magnitude of these parameters will not cause toxicity in a synthetic dilution water control that has been formulated to match the pH, hardness, and alkalinity naturally found in the receiving water. Upon approval, the permittee may substitute other appropriate dilution water with chemical and physical characteristics similar to that of the receiving water.

d. Samples and Composites

1) The permittee shall collect a minimum of three flow-weighted 24-hour composite samples from Outfall 001. The second and third 24-hour composite samples will be used for the renewal of the dilution concentrations for each toxicity test. A 24-hour composite sample consists of a minimum of 12 effluent portions collected at equal time intervals representative of a 24-hour operating day and combined proportionally to flow, or a sample continuously collected proportionally to flow over a 24-hour operating day.

2) The permittee shall collect the 24-hour composite samples such that the samples are representative of any periodic episode of chlorination, biocide usage, or other potentially toxic substance discharged on an intermittent basis.

3) The permittee shall initiate the toxicity tests within 36 hours after collection of the last portion of the first 24-hour composite sample. The holding time for any subsequent 24-hour composite sample shall not exceed 72 hours. Samples shall be maintained at a temperature of 0-6 degrees Centigrade during collection, shipping, and storage.

4) If Outfall 001 ceases discharging during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions, and the sample holding time, are waived during that sampling period. However, the permittee must have collected an effluent composite sample volume sufficient to complete the required toxicity tests with renewal of the effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days if the discharge occurs over multiple days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report.

5) The effluent samples shall not be dechlorinated after sample collection.

3. Reporting

All reports, tables, plans, summaries, and related correspondence required in any Part of this Section shall be submitted to the attention of the Standards Implementation Team (MC 150) of the Water Quality Division. All DMRs, including DMRs with biomonitoring data, should be sent to the Enforcement Division (MC 224).

a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this permit in accordance with the Report Preparation Section of "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013), or the most recent update, for every valid and invalid toxicity test initiated whether carried to completion or not. All full reports shall be retained for 3 years at the plant site and shall be available for inspection by TCEQ personnel.

b. A full report must be submitted with the first valid biomonitoring test results for each test species and with the first test results any time the permittee subsequently employs a different test laboratory. Full reports need not be submitted for subsequent testing unless specifically requested.

The permittee shall routinely report the results of each biomonitoring test on the Table 1 forms provided with this permit. All Table 1 reports must include the information specified in the Table 1 form attached to this permit.

1) Annual biomonitoring test results are due on or before January 20th for biomonitoring conducted during the previous 12 month period.

2) Semiannual biomonitoring test results are due on or before July 20th and January 20th for biomonitoring conducted during the previous 6 month period.

3) Quarterly biomonitoring test results are due on or before April 20th, July 20th, October 20th, and January 20th, for biomonitoring conducted during the previous calendar quarter.

4) Monthly biomonitoring test results are due on or before the 20th day of the month following sampling.

c. Enter the following codes on the DMR for the appropriate parameters for valid tests only:

1) For the water flea, Parameter TLP3B, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

2) For the water flea, Parameter TOP3B, report the NOEC for survival.

3) For the water flea, Parameter TXP3B, report the LOEC for survival.

4) For the water flea, Parameter TWP3B, enter a "1" if the NOEC for reproduction is less than the critical dilution; otherwise, enter a "0."

5) For the water flea, Parameter TPP3B, report the NOEC for reproduction.

6) For the water flea, Parameter TYP3B, report the LOEC for reproduction.

7) For the fathead minnow, Parameter TLP6C, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

8) For the fathead minnow, Parameter TOP6C, report the NOEC for survival.

9) For the fathead minnow, Parameter TXP6C, report the LOEC for survival.

10) For the fathead minnow, Parameter TWP6C, enter a "1" if the NOEC for growth is less than the critical dilution; otherwise, enter a "0."

11) For the fathead minnow, Parameter TPP6C, report the NOEC for growth.

12) For the fathead minnow, Parameter TYP6C, report the LOEC for growth

d. Enter the following codes on the DMR for retests only:

1) For retest number 1, Parameter 22415, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

2) For retest number 2, Parameter 22416, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

4. Persistent Toxicity

The requirements of this Part apply only when a test demonstrates a significant effect at the critical dilution. A significant effect is defined as a statistically significant difference, at the 95% confidence level, between a specified endpoint (survival, growth, or reproduction) of the test organism in a specified effluent dilution when compared to the specified endpoint of the test organism in the control. Significant lethality is defined as a statistically significant difference in survival at the critical dilution when compared to the survival of the test organism in the control. Significant sublethality is defined as a statistically significant difference in growth/reproduction at the critical dilution when compared to the growth/reproduction of the test organism in the control.

a. The permittee shall conduct a total of 2 additional tests (retests) for any species that demonstrates a significant effect (lethal or sublethal) at the critical dilution. The two retests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two retests in lieu of routine toxicity testing. All reports shall be submitted within 20 days of test completion. Test completion is defined as the last day of the test. The retests shall also be reported on the DMRs as specified in Part 3.d.

b. If the retests are performed due to a demonstration of significant lethality, and one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall initiate the TRE requirements as specified in Part 5. The provisions of item 4.a. are suspended upon completion of the two retests and submittal of the TRE Action Plan and Schedule defined in Part 5.

If neither test demonstrates significant lethality and the permittee is testing under the reduced testing frequency provision of Part 1.e., the permittee shall return to a quarterly testing frequency for that species.

c. If the two retests are performed due to a demonstration of significant sublethality, and one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall again perform two retests as stipulated in item 4.a.

d. If the two retests are performed due to a demonstration of significant sublethality, and neither test demonstrates significant lethality, the permittee shall continue testing at the quarterly frequency until such time that the permittee can invoke the reduced testing frequency provision specified in Part 1.e.

e. Regardless of whether retesting for lethal or sublethal effects, or a combination of the two, no more than one retest per month is required for a species.

5. Toxicity Reduction Evaluation

a. Within 45 days of the retest that demonstrates significant lethality, the permittee shall submit a General Outline for initiating a Toxicity Reduction Evaluation (TRE). The outline shall include, but not be limited to, a description of project personnel, a schedule for obtaining consultants (if needed), a discussion of influent and/or effluent data available for review, a sampling and analytical schedule, and a proposed TRE initiation date.

b. Within 90 days of the retest that demonstrates significant lethality, the permittee shall submit a TRE Action Plan and Schedule for conducting a TRE. The plan shall specify the approach and methodology to be used in performing the TRE. A TRE is a step-wise investigation combining toxicity testing with physical and chemical analysis to determine actions necessary to eliminate or reduce effluent toxicity to a level not effecting significant lethality at the critical dilution. The TRE Action Plan shall lead to the successful elimination of significant lethality for both test species defined in item 1.b. As a minimum, the TRE Action Plan shall include the following:

1) Specific Activities - The TRE Action Plan shall specify the approach the permittee intends to utilize in conducting the TRE, including toxicity characterizations, identifications, confirmations, source evaluations, treatability studies, and/or alternative approaches. When conducting characterization analyses, the permittee shall perform multiple characterizations and follow the procedures specified in the document entitled, "Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I" (EPA/600/6-91/005F), or alternate procedures. The permittee shall perform multiple identifications and follow the methods specified in the documents entitled, "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081). All characterization, identification, and confirmation tests shall be conducted in an orderly and logical progression;

2) Sampling Plan - The TRE Action Plan should describe sampling locations, methods, holding times, chain of custody, and preservation techniques. The effluent sample volume collected for all tests shall be adequate to perform the toxicity characterization/ identification/ confirmation procedures, and chemical-specific analyses when the toxicity tests show significant lethality. Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical-specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity;

3) Quality Assurance Plan - The TRE Action Plan should address record keeping and data evaluation, calibration and standardization, baseline tests, system blanks, controls, duplicates, spikes, toxicity persistence in the samples, randomization, reference toxicant control charts, as well as mechanisms to detect artifactual toxicity; and

4) Project Organization - The TRE Action Plan should describe the project staff, project manager, consulting engineering services (where applicable), consulting analytical and toxicological services, etc.

c. Within 30 days of submittal of the TRE Action Plan and Schedule, the permittee shall implement the TRE with due diligence.

d. The permittee shall submit quarterly TRE Activities Reports concerning the progress of the TRE. The quarterly reports are due on or before April 20th, July 20th, October 20th, and January 20th. The report shall detail information regarding the TRE activities including:

1) results and interpretation of any chemical-specific analyses for the identified and/or suspected pollutant(s) performed during the quarter;

2) results and interpretation of any characterization, identification, and confirmation tests performed during the quarter;

3) any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;

4) results of any studies/evaluations concerning the treatability of the facility's effluent toxicity;

5) any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution; and

6) any changes to the initial TRE Plan and Schedule that are believed necessary as a result of the TRE findings.

Copies of the TRE Activities Report shall also be submitted to the U.S. EPA Region 6 office.

e. During the TRE, the permittee shall perform, at a minimum, quarterly testing using the more sensitive species; testing for the less sensitive species shall continue at the frequency specified in Part 1.b.

f. If the effluent ceases to effect significant lethality (herein as defined below) the permittee may end the TRE. A "cessation of lethality" is defined as no significant lethality for a period of 12 consecutive months with at least monthly testing. At the end of the 12 months, the permittee shall submit a statement of intent to cease the TRE and may then resume the testing frequency specified in Part 1.b. The permittee may only apply the "cessation of lethality" provision once.

This provision accommodates situations where operational errors and upsets, spills, or sampling errors triggered the TRE, in contrast to a situation where a single toxicant or group of toxicants cause lethality. This provision does not apply as a result of corrective actions taken by the permittee. "Corrective actions" are herein defined as proactive efforts which eliminate or reduce effluent toxicity. These include, but are not limited to, source reduction or elimination, improved housekeeping, changes in chemical usage, and modifications of influent streams and/or effluent treatment.

The permittee may only apply this cessation of lethality provision once. If the effluent again demonstrates significant lethality to the same species, the permit will be amended to add a WET limit with a compliance period, if appropriate. However, prior to the effective date of the WET limit, the permittee may apply for a permit amendment removing and replacing the WET limit with an alternate toxicity control measure by identifying and confirming the toxicant and/or an appropriate control measure.

g. The permittee shall complete the TRE and submit a Final Report on the TRE Activities no later than 28 months from the last test day of the retest that confirmed significant lethal effects at the critical dilution. The permittee may petition the Executive Director (in writing) for an extension of the 28-month limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE. The report shall provide information pertaining to the specific control mechanism(s) selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism(s). A copy of the TRE Final Report shall also be submitted to the U.S. EPA Region 6 office.

h. Based upon the results of the TRE and proposed corrective actions, this permit may be amended to modify the biomonitoring requirements, where necessary, to require a compliance schedule for implementation of corrective actions, to specify a WET limit, to specify a BMP, and/or to specify CS limits.

TABLE 1 (SHEET 1 OF 4)

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

		Date Time		Date Time
Dates and Times Composites Collected	No. 1 FROM:	________	TO:	________
	No. 2 FROM:	________	TO:	________
	No. 3 FROM:	________	TO:	________

Test initiated: ____________ am/pm ____________ date

Dilution water used: _______ Receiving water ______ Synthetic Dilution water

NUMBER OF YOUNG PRODUCED PER ADULT AT END OF TEST

REP	Percent effluent (%)					
	0%	6%	8%	11%	15%	20%
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
Survival Mean						
Total Mean						
CV%*						
PMSD						

*Coefficient of Variation = standard deviation x 100/mean (calculation based on young of the surviving adults)
Designate males (M), and dead females (D), along with number of neonates (x) released prior to death.

TABLE 1 (SHEET 2 OF 4)

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

1. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean number of young produced per adult significantly less (p=0.05) than the number of young per adult in the control for the % effluent corresponding to significant nonlethal effects?

   CRITICAL DILUTION (15%): ______ YES ______ NO

PERCENT SURVIVAL

	Percent effluent (%)					
Time of Reading	0%	6%	8%	11%	15%	20%
24h						
48h						
End of Test						

2. Fisher's Exact Test:

   Is the mean survival at test end significantly less (p=0.05) than the control survival for the % effluent corresponding to lethality?

   CRITICAL DILUTION (20%): ______ YES ______ NO

3. Enter percent effluent corresponding to each NOEC\LOEC below:

   a.) NOEC survival = ________% effluent

   b.) LOEC survival = ________% effluent

   c.) NOEC reproduction = ________% effluent

   d.) LOEC reproduction = ________% effluent

TABLE 1 (SHEET 3 OF 4)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL

		Date Time		Date Time
Dates and Times Composites Collected	No. 1 FROM:	________________	TO:	________________
	No. 2 FROM:	________________	TO:	________________
	No. 3 FROM:	________________	TO:	________________

Test initiated: ____________________am/pm ____________________date

Dilution water used: ________ Receiving water ________ Synthetic dilution water

FATHEAD MINNOW GROWTH DATA

Effluent Concentration (%)	Average Dry Weight in milligrams in replicate chambers					Mean Dry Weight	CV%*
	A	B	C	D	E		
0%							
6%							
8%							
11%							
15%							
20%							
PMSD							

* Coefficient of Variation = standard deviation x 100/mean

1. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean dry weight (growth) at 7 days significantly less (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to significant nonlethal effects?

   CRITICAL DILUTION (20%): ______ YES ______ NO

TABLE 1 (SHEET 4 OF 4)

BIOMONITORING REPORTING

FATHEAD MINNOW GROWTH AND SURVIVAL TEST

FATHEAD MINNOW SURVIVAL DATA

Effluent Concentration (%)	Percent Survival in replicate chambers					Mean percent survival			CV%*
	A	B	C	D	E	24h	48h	7 day	
0%									
6%									
8%									
11%									
15%									
20%									

* Coefficient of Variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean survival at 7 days significantly less (p=0.05) than the control survival for the % effluent corresponding to lethality?

   CRITICAL DILUTION (20%): ______ YES ______ NO

3. Enter percent effluent corresponding to each NOEC\LOEC below:

   a.) NOEC survival = ________% effluent

   b.) LOEC survival = ________% effluent

   c.) NOEC growth = ________% effluent

   d.) LOEC growth = ________% effluent

24-HOUR ACUTE BIOMONITORING REQUIREMENTS: FRESHWATER

The provisions of this section apply to Outfall 001 for whole effluent toxicity testing (biomonitoring)

1. Scope, Frequency and Methodology

    a. The permittee shall test the effluent for lethality in accordance with the provisions in this Section. Such testing will determine compliance with the Surface Water Quality Standard, 307.6(e)(2)(B), of greater than 50% survival of the appropriate test organisms in 100% effluent for a 24-hour period.

    b. The toxicity tests specified shall be conducted once per six months. The permittee shall conduct the following toxicity tests utilizing the test organisms, procedures, and quality assurance requirements specified in this section of the permit and in accordance with "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition" (EPA-821-R-02-012), or the most recent update thereof:

        1) Acute 24-hour static toxicity test using the water flea (*Daphnia pulex* or *Ceriodaphnia dubia*). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution.

        2) Acute 24-hour static toxicity test using the fathead minnow (*Pimephales promelas*). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution.

    A valid test result must be submitted for each reporting period. The permittee must report, and then repeat, an invalid test during the same reporting period. The repeat test shall include the control and the 100% effluent dilution and use the appropriate number of organisms and replicates, as specified above. An invalid test is herein defined as any test failing to satisfy the test acceptability criteria, procedures, and quality assurance requirements specified in the test methods and permit.

    c. In addition to an appropriate control, a 100% effluent concentration shall be used in the toxicity tests. The control and/or dilution water shall consist of standard, synthetic, moderately hard, reconstituted water.

    d. This permit may be amended to require a Whole Effluent Toxicity (WET) limit, a Best Management Practice (BMP), Chemical-Specific (CS) limits, additional toxicity testing, and/or other appropriate actions to address toxicity. The permittee may be required to conduct additional biomonitoring tests and/or a Toxicity Reduction Evaluation (TRE) if biomonitoring data indicate multiple numbers of unconfirmed toxicity events.

2. Required Toxicity Testing Conditions

    a. Test Acceptance - The permittee shall repeat any toxicity test, including the control, if the control fails to meet a mean survival equal to or greater than 90%.

    b. Dilution Water - In accordance with item 1.c., the control and/or dilution water shall consist of standard, synthetic, moderately hard, reconstituted water.

    c. Samples and Composites

1) The permittee shall collect one flow-weighted 24-hour composite sample from Outfall 001. A 24-hour composite sample consists of a minimum of 12 effluent portions collected at equal time intervals representative of a 24-hour operating day and combined proportional to flow, or a sample continuously collected proportional to flow over a 24-hour operating day.

2) The permittee shall collect the 24-hour composite samples such that the samples are representative of any periodic episode of chlorination, biocide usage, or other potentially toxic substance discharged on an intermittent basis.

3) The permittee shall initiate the toxicity tests within 36 hours after collection of the last portion of the 24-hour composite sample. Samples shall be maintained at a temperature of 0-6 degrees Centigrade during collection, shipping, and storage.

4) If Outfall 001 ceases discharging during the collection of the effluent composite sample, the requirements for the minimum number of effluent portions are waived. However, the permittee must have collected a composite sample volume sufficient for completion of the required test. The abbreviated sample collection, duration, and methodology must be documented in the full report required in Part 3 of this Section.

5) The effluent samples shall not be dechlorinated after sample collection.

3. Reporting

All reports, tables, plans, summaries, and related correspondence required in any Part of this Section shall be submitted to the attention of the Standards Implementation Team (MC 150) of the Water Quality Division. All DMRs, including DMRs with biomonitoring data, should be sent to the Enforcement Division (MC 224).

a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this permit in accordance with the Report Preparation Section of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition" (EPA-821-R-02-012), or the most recent update thereof, for every valid and invalid toxicity test initiated. All full reports shall be retained for 3 years at the plant site and shall be available for inspection by TCEQ personnel.

b. A full report must be submitted with the first valid biomonitoring test results for each test species and with the first test results any time the permittee subsequently employs a different test laboratory. Full reports need not be submitted for subsequent testing unless specifically requested. The permittee shall routinely report the results of each biomonitoring test on the Table 2 forms provided with this permit. All Table 2 reports must include the information specified in the Table 2 form attached to this permit.

1) Semiannual biomonitoring test results are due on or before January 20th and July 20th for biomonitoring conducted during the previous 6 month period.

2) Quarterly biomonitoring test results are due on or before January 20th, April 20th, July 20th, and October 20th, for biomonitoring conducted during the previous calendar quarter.

c. Enter the following codes on the DMR for the appropriate parameters for valid tests only:

1) For the water flea, Parameter TIE3D, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

2) For the fathead minnow, Parameter TIE6C, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

d. Enter the following codes on the DMR for retests only:

1) For retest number 1, Parameter 22415, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

2) For retest number 2, Parameter 22416, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1." .

4. Persistent Mortality

The requirements of this Part apply when a toxicity test demonstrates significant lethality, here defined as a mean mortality of 50% or greater to organisms exposed to the 100% effluent concentration after 24-hours.

a. The permittee shall conduct 2 additional tests (retests) for each species that demonstrates significant lethality. The two retests shall be conducted once per week for 2 weeks. Five effluent dilution concentrations in addition to an appropriate control shall be used in the retests. These additional effluent concentrations are 6%, 13%, 25%, 50% and 100% effluent. The first retest shall be conducted within 15 days of the laboratory determination of significant lethality. All test results shall be submitted within 20 days of test completion of the second retest. Test completion is defined as the 24th hour. The retests shall also be reported on the DMRs as specified in Part 3.d.

b. If one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall initiate the TRE requirements as specified in Part 5 of this Section.

5. Toxicity Reduction Evaluation

a. Within 45 days of the retest that demonstrates significant lethality, the permittee shall submit a General Outline for initiating a Toxicity Reduction Evaluation (TRE). The outline shall include, but not be limited to, a description of project personnel, a schedule for obtaining consultants (if needed), a discussion of influent and/or effluent data available for review, a sampling and analytical schedule, and a proposed TRE initiation date.

b. Within 90 days of the retest that demonstrates significant lethality, the permittee shall submit a TRE Action Plan and Schedule for conducting a TRE. The plan shall specify the approach and methodology to be used in performing the TRE. A TRE is a step-wise investigation combining toxicity testing with physical and chemical analysis to determine actions necessary to eliminate or reduce effluent toxicity to a level not effecting significant lethality at the critical dilution. The TRE Action Plan shall lead to the successful elimination of significant lethality for both test species defined in item 1.b. As a minimum, the TRE Action Plan shall include the following:

1) Specific Activities - The TRE Action Plan shall specify the approach the permittee intends to utilize in conducting the TRE, including toxicity characterizations, identifications, confirmations, source evaluations, treatability studies, and/or alternative approaches. When conducting characterization analyses, the permittee shall perform multiple characterizations and follow the procedures specified in the document entitled, "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA/600/6-91/003), or alternate procedures. The permittee shall perform multiple identifications and follow the methods specified in the documents entitled, "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081). All characterization, identification, and confirmation tests shall be conducted in an orderly and logical progression;

2) Sampling Plan - The TRE Action Plan should describe sampling locations, methods, holding times, chain of custody, and preservation techniques. The effluent sample volume collected for all tests shall be adequate to perform the toxicity characterization/ identification/ confirmation procedures, and chemical-specific analyses when the toxicity tests show significant lethality. Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical-specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity;

3) Quality Assurance Plan - The TRE Action Plan should address record keeping and data evaluation, calibration and standardization, baseline tests, system blanks, controls, duplicates, spikes, toxicity persistence in the samples, randomization, reference toxicant control charts, as well as mechanisms to detect artifactual toxicity; and

4) Project Organization - The TRE Action Plan should describe the project staff, project manager, consulting engineering services (where applicable), consulting analytical and toxicological services, etc.

c. Within 30 days of submittal of the TRE Action Plan and Schedule, the permittee shall implement the TRE with due diligence.

d. The permittee shall submit quarterly TRE Activities Reports concerning the progress of the TRE. The quarterly TRE Activities Reports are due on or before April 20th, July 20th, October 20th, and January 20th. The report shall detail information regarding the TRE activities including:

1) results and interpretation of any chemical-specific analyses for the identified and/or suspected pollutant(s) performed during the quarter;

2) results and interpretation of any characterization, identification, and confirmation tests performed during the quarter;

3) any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;

4) results of any studies/evaluations concerning the treatability of the facility's effluent toxicity;

5) any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to eliminate significant lethality; and

6) any changes to the initial TRE Plan and Schedule that are believed necessary as a result of the TRE findings.

Copies of the TRE Activities Report shall also be submitted to the U.S. EPA Region 6 office.

e. During the TRE, the permittee shall perform, at a minimum, quarterly testing using the more sensitive species; testing for the less sensitive species shall continue at the frequency specified in Part 1.b.

f. If the effluent ceases to effect significant lethality (herein as defined below) the permittee may end the TRE. A "cessation of lethality" is defined as no significant lethality for a period of 12 consecutive weeks with at least weekly testing. At the end of the 12 weeks, the permittee shall submit a statement of intent to cease the TRE and may then resume the testing frequency specified in Part 1.b. The permittee may only apply the "cessation of lethality" provision once.

This provision accommodates situations where operational errors and upsets, spills, or sampling errors triggered the TRE, in contrast to a situation where a single toxicant or group of toxicants cause lethality. This provision does not apply as a result of corrective actions taken by the permittee. "Corrective actions" are herein defined as proactive efforts which eliminate or reduce effluent toxicity. These include, but are not limited to, source reduction or elimination, improved housekeeping, changes in chemical usage, and modifications of influent streams and/or effluent treatment.

The permittee may only apply this cessation of lethality provision once. If the effluent again demonstrates significant lethality to the same species, the permit will be amended to add a WET limit with a compliance period, if appropriate. However, prior to the effective date of the WET limit, the permittee may apply for a permit amendment removing and replacing the WET limit with an alternate toxicity control measure by identifying and confirming the toxicant and/or an appropriate control measure.

g. The permittee shall complete the TRE and submit a Final Report on the TRE Activities no later than 18 months from the last test day of the retest that demonstrates significant lethality. The permittee may petition the Executive Director (in writing) for an extension of the 18-month limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE. The report shall specify the control mechanism(s) that will, when implemented, reduce effluent toxicity as specified in item 5.g. The report will also specify a corrective action schedule for implementing the selected control mechanism(s). A copy of the TRE Final Report shall also be submitted to the U.S. EPA Region 6 office.

h. Within 3 years of the last day of the test confirming toxicity, the permittee shall comply with 307.6.(e)(2)(B), which requires greater than 50% survival of the test organism in 100% effluent at the end of 24-hours. The permittee may petition the Executive Director (in writing) for an extension of the 3-year limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE.

The requirement to comply with 307.6.(e)(2)(B) may be exempted upon proof that toxicity is caused by an excess, imbalance, or deficiency of dissolved salts. This exemption excludes instances where individually toxic components (e.g. metals) form a salt compound. Following the exemption, the permit may be amended to include an ion-adjustment protocol, alternate species testing, or single species testing.

i. Based upon the results of the TRE and proposed corrective actions, this permit may be amended to modify the biomonitoring requirements where necessary, to require a compliance schedule for implementation of corrective actions, to specify a WET limit, to specify a BMP, and/or to specify a CS limit.

TABLE 2 (SHEET 1 OF 2)

WATER FLEA SURVIVAL

GENERAL INFORMATION

	Time (am/pm)	Date
Composite Sample Collected		
Test Initiated		

PERCENT SURVIVAL

Time	Rep	Percent effluent (%)					
		0%	6%	13%	25%	50%	100%
24h	A						
	B						
	C						
	D						
	E						
	MEAN						

Enter percent effluent corresponding to the LC50 below:

24 hour LC50 = ________% effluent

TABLE 2 (SHEET 2 OF 2)

FATHEAD MINNOW SURVIVAL

GENERAL INFORMATION

	Time (am/pm)	Date
Composite Sample Collected		
Test Initiated		

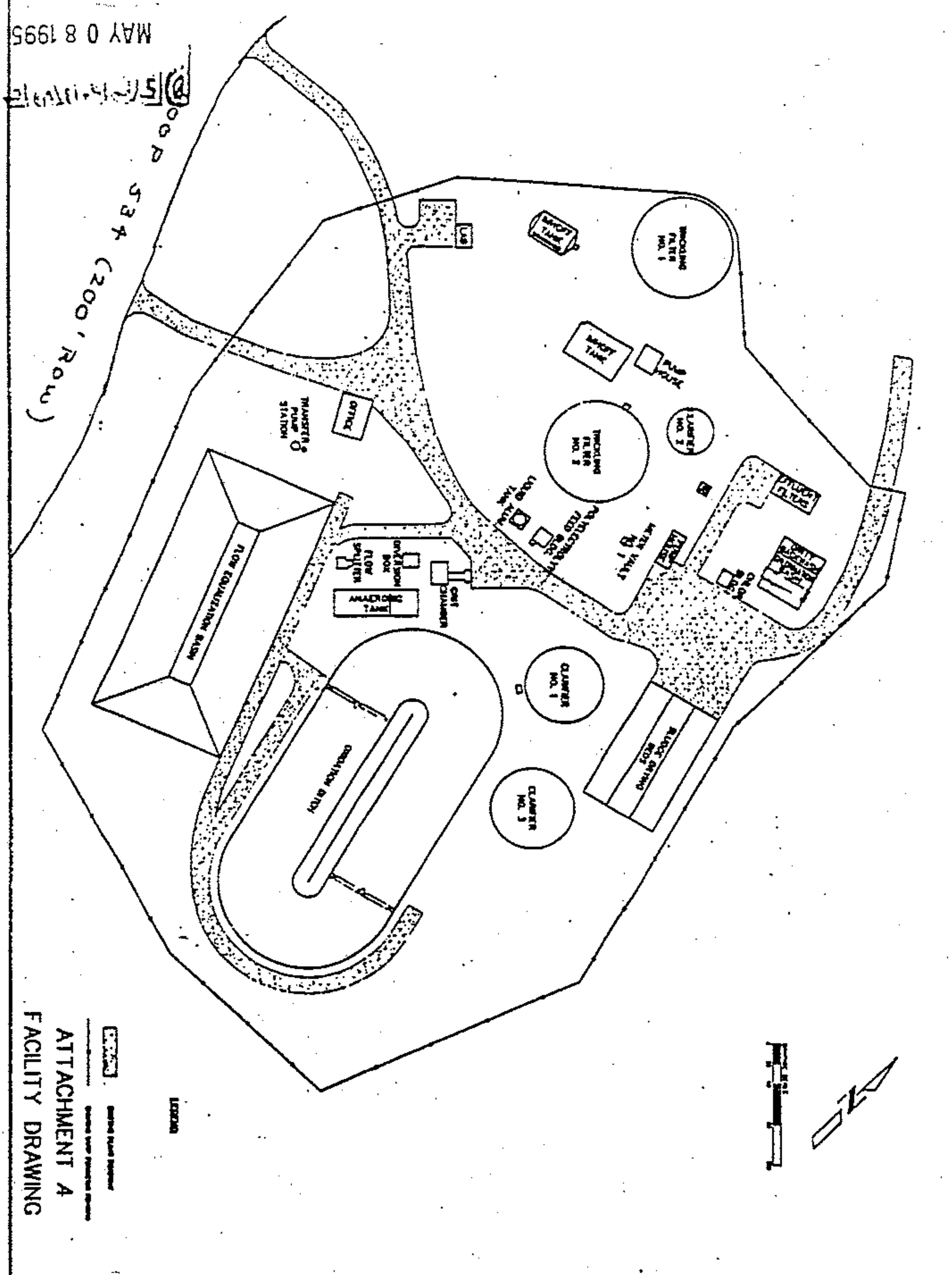
PERCENT SURVIVAL

Time	Rep	Percent effluent (%)					
		0%	6%	13%	25%	50%	100%
24h	A						
	B						
	C						
	D						
	E						
	MEAN						

Enter percent effluent corresponding to the LC50 below:

24 hour LC50 = _______% effluent

MAY 0 8 1995



LEGEND

ATTACHMENT A
FACILITY DRAWING

KERRVILLE
WASTEWATER TREATMEN_ _LANT

LOCA_ _ON MAP

2

RosinGroup, Inc.

APPENDIX F

Kerrville WWTP - Site Visit Evaluation Summary

Risk Assessment Summary					
Facility	Condition	Criticality	Condition Rating	Criticality Rating	Risk
Chemical Feed System	51.38	82.00	Fair	Very High Impact	High Risk
Clarifier 3	78.00	72.00	Poor	Very High Impact	High Risk
Electrical - main	62.50	100.00	Poor	Very High Impact	High Risk
Oxidation Ditch	47.75	88.00	Fair	Very High Impact	High Risk
RAS Pump Stations	46.75	82.00	Fair	Very High Impact	High Risk
Anaerobic Tank	39.50	63.00	Good	High Impact	Medium Risk
Chlorination Building	30.75	82.00	Good	Very High Impact	Medium Risk
Chlorine Contact Basin	60.00	47.00	Fair	Medium Impact	Medium Risk
Clarifier 1	37.50	62.50	Good	High Impact	Medium Risk
Dechlorination System	37.50	82.00	Good	Very High Impact	Medium Risk
Effluent Filters	40.88	40.00	Fair	Medium Impact	Medium Risk
Filter Backwash Handling	49.25	38.50	Fair	Medium Impact	Medium Risk
Flow Equalization Basin	35.50	58.00	Good	High Impact	Medium Risk
Belt Press - Old	31.75	8.00	Good	Low Impact	Low Risk
Belt Press - New	0.00	8.00	Very Good	Low Impact	Low Risk
Effluent Meter and Composite Sampling	27.50	21.00	Good	Low Impact	Low Risk
Headworks	30.00	48.00	Good	Medium Impact	Low Risk
Splitter Box @ Headworks	25.00	34.50	Good	Medium Impact	Low Risk
Water System - Plantwide	30.50	30.00	Good	Low Impact	Low Risk

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Anaerobic/Anoxic Tanks
Age: 1988

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	75	20.00	1500.00	Switches for mixers in poor condition.
Mechanical- Piping	25	15.00	375.00	
- Valves	25	15.00	375.00	
- Actuators	25	15.00	375.00	
Mixers	55	15.00	825.00	Old, Potential bearing problems due to shaft deflection.
Structure- Upper	25	10.00	250.00	
- Lower	25	10.00	250.00	
Overall Facility Rating		**100.00**	**39.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	10	30.00	300.00	
Process Impact	20	50.00	1000.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**21.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: New Belt Press

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	0	20.00	0.00	
Sludge Feed Pumps	0	10.00	0.00	
Mechanical- Piping	0	10.00	0.00	
- Valves	0	15.00	0.00	
- Actuators	0	15.00	0.00	
New Belt Press	0	10.00	0.00	
Metal Building	0	5.00	0.00	
- Floor	0	5.00	0.00	
Instrumentation	0	10.00	0.00	
Overall Facility Rating		**100.00**	**0.00**	**Building and Equipment are brand new.**

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	10	30.00	300.00	
Process Impact	20	50.00	1000.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**21.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Old Belt Press

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	35	20.00	700.00	Some external corrosion.
Sludge Feed Pumps	25	10.00	250.00	
Mechanical- Piping	25	10.00	250.00	
- Valves	25	15.00	375.00	
- Actuators	25	15.00	375.00	
Old Press - Rollers	60	10.00	600.00	Rollers in poor condition.
Metal Building	50	5.00	250.00	
- Floor	25	5.00	125.00	
Instrumentation	25	10.00	250.00	
Overall Facility Rating		**100.00**	**31.75**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	10	30.00	300.00	
Process Impact	20	50.00	1000.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**21.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Chemical Feed
Chemical: Alum/ Ferric chloride/Polymer Feed
Age:

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- Control Panel	75	15.00	1125.00	Corrosion
Mechanical - Piping	80	5.00	400.00	Numerous leaks
Mechanical - Valves	80	10.00	800.00	Numerous leaks
Bulk Storage - Alum	80	7.50	600.00	
Bulk Storage - Ferric	25	7.50	187.50	
Pumps/Feeders/ Motors	25	20.00	500.00	
Eyewash	25	5.00	125.00	Manual squeeze bottles
Emergency Showers	25	5.00	125.00	Absent
Meters - rotameters	25	10.00	250.00	
Structure- Walls	80	5.00	400.00	
- Roof	25	5.00	125.00	
- Foundation	25	5.00	125.00	
Overall Facility Rating		**100.00**	**47.63**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Chemical Feed
Chemical: Chlorination Building

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Mechanical- Emergency Ventilation	50	10.00	500.00	Should come on with light switch or leak.
- Piping	25	10.00	250.00	
- Valves	25	10.00	250.00	
Scales	70	5.00	350.00	
Feeders	35	20.00	700.00	
Eyewash	25	10.00	250.00	Manual squeeze bottle, located inside of the room. SCBA located inside of the room.
Emergency Showers	25	5.00	125.00	Absent
Structure- Walls	30	5.00	150.00	Door in poor condition.
- Roof	25	5.00	125.00	
- Foundation	25	5.00	125.00	
Instrumentation & Control Flow Pacing	50	5.00	250.00	Corrosion on cabinet.
Gas Detector	0	10.00	0.00	New.
Overall Facility Rating		**100.00**	**30.75**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Chlorine Contact Basin

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Control Panel	30	10.00	300.00	Reuse pump controls.
Reclaimed Water Pumps				
- Schriner and Commanche Trace	75	20.00	1500.00	
- Plant Water	50	20.00	1000.00	Undersized
Mechanical- Piping	50	15.00	750.00	
- Valves	80	15.00	1200.00	Equalization valve #1 (others are okay)
Structure- Upper	25	5.00	125.00	
- Lower	25	5.00	125.00	
Reuse Pump Control Building	100	10.00	1000.00	Very poor, makeshift building
Overall Facility Rating		**100.00**	**60.00**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	50	30.00	1500.00	
Process Impact	60	50.00	3000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**47.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Clarifier 1

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	25	20.00	500.00	
Mechanism - Overall	25	10.00	250.00	
Mechanism - Valves	40	10.00	400.00	Broken valve, can't control RAS flow
Influent Baffle	50	25.00	1250.00	Corrosion
Weirs	50	15.00	750.00	Leakage at seal to structure
Structure- Upper	30	10.00	300.00	corrosion on metal supports
- Lower	30	10.00	300.00	
Overall Facility Rating		**100.00**	**37.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	50	30.00	1500.00	
Process Impact	55	50.00	2750.00	
Outage Duration	100	20.00	2000.00	
Overall Criticality Rating	-	100.00	**62.50**	

Inspection Date:	January 12, 2012
Inspector Name:	GRS, SHH, JWM
Plant Name:	Kerrville WWTP
Facility Name:	Clarifier 3

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	50	20.00	1000.00	
Mechanism	100	25.00	2500.00	Centerwell - badly corroded, the rake is in poor condition, as is the scum skimmer.
Scum Baffle	100	20.00	2000.00	Corrosion
Weirs	100	15.00	1500.00	
Structure- Upper	40	10.00	400.00	
Structure- Lower	40	10.00	400.00	
Overall Facility Rating		**100.00**	**78.00**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	50	30.00	1500.00	
Process Impact	55	50.00	2750.00	
Outage Duration	100	20.00	2000.00	
Overall Criticality Rating	-	100.00	**62.50**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Dechlorination System

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Control Panel	25	20.00	500.00	
Mechanical- Piping	25	10.00	250.00	
- Valves	25	10.00	250.00	
Feed Pump	25	20.00	500.00	
Day Tank	80	10.00	800.00	Needs to be replaced
Bulk Tank	50	10.00	500.00	No containment
Building	100	5.00	500.00	Makeshift structure
Instrumentation - Chlorine Analyzer	40	5.00	200.00	
SCADA	25	5.00	125.00	
Turbidimeter	25	5.00	125.00	
Overall Facility Rating		**100.00**	**37.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Effluent Filters

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical	50	10.00	500.00	
Backwash Pumps	70	5.00	350.00	Age
Mechanical- Piping	60	5.00	300.00	Piping near pumps in poor condition
- Valves	80	12.50	1000.00	
- Actuators	25	12.50	312.50	
Media	25	10.00	250.00	
Underdrain	25	15.00	375.00	
Structure- Upper	25	5.00	125.00	
- Lower	25	5.00	125.00	
Filter Controls	75	10.00	750.00	Water entering cabinet
Air wash blower	65	5.00	325.00	
Compressor (Valves)	65	5.00	325.00	
Overall Facility Rating		**100.00**	**40.88**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	25	30.00	750.00	
Process Impact	20	50.00	1000.00	
Outage Duration	100	20.00	2000.00	
Overall Criticality Rating	-	100.00	**37.50**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, John Manning

Plant Name: Kerrville WWTp
Facility Name: Effluent Meter and Composite Sampler

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Mag Meter	25	20.00	500.00	
Composite Sampler	25	15.00	375.00	
Meter Vault	25	25.00	625.00	
Structure - Top	25	10.00	250.00	
- Walls	25	10.00	250.00	
- Foundation	25	10.00	250.00	
Sampler Housing	50	10.00	500.00	
Overall Facility Rating		**100.00**	**27.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	10	30.00	300.00	
Process Impact	20	50.00	1000.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**21.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM
Kerrville WWTP
Facility Name: Main Electrical

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Age	50	40.00	2000.00	Older than 30 years
Corrosion	25	20.00	500.00	
Generator	0	15.00	0.00	New in 2011
Conduit	50	25.00	1250.00	
MCC's	100	25.00	2500.00	Water in conduits leaks out under MCC's
Overall Facility Rating		**100.00**	**62.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	100	20.00	2000.00	
Overall Criticality Rating	-	100.00	**100.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Filter Backwash Handling

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel	50	20.00	1000.00	
Mechanical- Piping	25	15.00	375.00	
- Valves	25	10.00	250.00	Leaking
Pumps	80	35.00	2800.00	Three sets of pumps required to keep up with backwash waste flow.
Structure- Walls	25	10.00	250.00	small cracks
- Roof	25	5.00	125.00	
- Foundation	25	5.00	125.00	
Overall Facility Rating		**100.00**	**49.25**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	10	30.00	300.00	
Process Impact	55	50.00	2750.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**38.50**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Flow Equalization Basin

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Mechanical- Piping	25	25.00	625.00	
- Valves	25	10.00	250.00	
Structure	25	30.00	750.00	Capacity of the FEB is a bit undersized - occasional accidental discharge.
Lift Station	40	20.00	800.00	Undersized, rails are brand new
Electrical	75	15.00	1125.00	Corrosion on starters and junction box
Overall Facility Rating		**100.00**	**35.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	30	30.00	900.00	
Process Impact	60	50.00	3000.00	
Outage Duration	40	20.00	800.00	
Overall Criticality Rating	-	100.00	**47.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Headworks
Age: 2003

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical	25	15.00	375.00	
Mechanical- Piping	25	15.00	375.00	
- Valves	25	5.00	125.00	
Structure- Walls	25	15.00	375.00	
- Roof	25	15.00	375.00	
- Walls	50	15.00	750.00	Coating needs repair
- Foundation	25	15.00	375.00	
Screens and Conveyor	25	5.00	125.00	Have to clean out screens 2x a day
Grit removal and washer/classifier	25	5.00	125.00	
Odor Control	50	5.00	250.00	Good condition but not used.
Septage Receiving	25	5.00	125.00	
Overall Facility Rating		**100.00**	**30.00**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	50	30.00	1500.00	
Process Impact	20	50.00	1000.00	
Outage Duration	50	20.00	1000.00	
Overall Criticality Rating	-	100.00	**35.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Oxidation Ditch

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- Control Panel	75	15.00	1125.00	Push buttons
Mechanical- Valves/Gates	100	10.00	1000.00	Stem on mud valve missing
- Rotors (new)	5	10.00	50.00	Floating.
- Rotors (old)	50	10.00		Floating.
- Drive Shaft/Chain	50	20.00	1000.00	
Motors	50	5.00	250.00	
Baffles	80	5.00	400.00	Missing
Weirs	20	5.00	100.00	
Structure- Walls	35	10.00	350.00	
Handrail	50	10.00	500.00	
Overall Facility Rating		**100.00**	**47.75**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: RAS Pump stations

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Control Panel	100	20.00	2000.00	Old, poor condition
Mechanical- Piping	80	5.00	400.00	
- Valves	80	5.00	400.00	Check valves leak at seals
- Metermag	20	5.00	100.00	
Pumps	25	25.00	625.00	Possibly undersized
Motors	25	10.00	250.00	
Structure- Walls	25	5.00	125.00	
- Roof	50	5.00	250.00	
- Supports	25	5.00	125.00	
- Foundation	25	5.00	125.00	
Instrumentation	50	5.00	250.00	
SCADA	5	5.00	25.00	
Overall Facility Rating		**100.00**	**46.75**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Splitter Box

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Mechanical- Valves	25	25.00	625.00	
Structure				
- Roof	25	25.00	625.00	
- Walls	25	25.00	625.00	
- Foundation	25	25.00	625.00	
Overall Facility Rating		**100.00**	**25.00**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	50	30.00	1500.00	
Process Impact	35	50.00	1750.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**34.50**	

Inspection Date: January 12, 2012
Inspector Name: GRS, SHH, JWM

Plant Name: Kerrville WWTP
Facility Name: Water System - Plantwide

	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical-Control Panel	50	20.00	1000.00	Water line inside panel
Mechanical- Piping	25	20.00	500.00	
- Valves	25	15.00	375.00	
Pumps	50	20.00	1000.00	Undersized
Storage Tank	20	10.00	200.00	
Structure- Foundation (tank)	25	15.00	375.00	
Overall Facility Rating		**100.00**	**34.50**	

	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	100	30.00	3000.00	
Process Impact	100	50.00	5000.00	
Outage Duration	10	20.00	200.00	
Overall Criticality Rating	-	100.00	**82.00**	

APPENDIX G

Wastewater Treatment Plant Alternatives

Opinion of Probable Construction Cost (OPCC)

City of Kerrville

WWTP CIP Projects - 2013

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number 1

Project Description

Add New Clarifier

Detailed Description

Construct New 80' Diameter Clarifier

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	80' Clarifier and Mechanism	1	LS	$1,344,008	1,344,008
		SUBTOTAL:			$1,344,008
		MOBILIZATION		5%	$67,200
		E, O & P:		30%	$403,203
		SUBTOTAL:			$1,814,411
		CONTINGENCY:		25%	$453,603
		SUBTOTAL:			$2,268,014

PROJECT TOTAL **$2,268,014**

City of Kerrville

WWTP CIP Projects - 2013

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number 2

Project Description

Upgrade Plant Electrical System

Detailed Description

Add MCC/Switchgear, Panelboard, SCADA, Etc.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	MCC/Switchgear, Panelboard, SCADA	1	LS	$856,000	856,000
			SUBTOTAL:		$856,000
			MOBILIZATION	5%	$42,800
			E, O & P:	30%	$256,800
			SUBTOTAL:		$1,155,600
			CONTINGENCY:	25%	$288,900
			SUBTOTAL:		$1,444,500

PROJECT TOTAL **$1,444,500**

City of Kerrville

WWTP CIP Projects - 2014 to 2019

FREESE AND NICHOLS

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number 3

Project Description

Oxidation Ditch Rehabilitation

Detailed Description

Remove the solids that have collected on the bottom of the oxidation ditch and add 6 new 75 hp aerators to increase the aeration capacity of the ditch to comply with TCEQ regulations.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Oxidation Ditch Solids	1	LS	$150,000	150,000
2	Add (6) 75 hp Fixed Rotors	1	LS	$488,400	488,400
3	Electrical Upgrades	1	LS	$122,100	122,100

SUBTOTAL:		$760,500
MOBILIZATION	5%	$38,025
E, O & P:	30%	$228,150
SUBTOTAL:		$1,026,675
CONTINGENCY:	25%	$256,668.75
SUBTOTAL:		$1,283,344

PROJECT TOTAL	**$1,283,344**
PROJECT TOTAL WITH 3% INFLATION	**$1,578,384**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number 4

Project Description

Parallel Clarifier Effluent Pipe

Detailed Description

Add a 12" ductile iron pipe from the clarifiers to the junction box to relieve the hydraulic bottleneck at the plant.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Install parallel 12" DI Pipe	176	LF	$140	24,640
		SUBTOTAL:			$24,640
		MOBILIZATION		5%	$1,232
		E, O & P:		30%	$7,392
		SUBTOTAL:			$33,264
		CONTINGENCY:		25%	$8,316
		SUBTOTAL:			$41,580

PROJECT TOTAL	**$41,580**
PROJECT TOTAL WITH 3% INFLATION	**$75,098**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST | **December 2012**

Construction Project Number 5

Project Description

Clarifier No. 3 Rehabilitation and Clarifier No. 1 WAS Valve Repair

Detailed Description

Completely rehabilitate Clarfier No. 3 and provide the needed repairs for Clarifier No. 1 including the broken WAS valve.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Clarifier Equipment	1	LS	$290,500	290,500
2	10" DIP Plug Valve	1	LS	$7,520	7,520
				$150,000	

SUBTOTAL:		$298,020
MOBILIZATION	5%	$14,901
E, O & P:	30%	$89,406
SUBTOTAL:		$402,327
CONTINGENCY:	25%	$100,582
SUBTOTAL:		$502,909

PROJECT TOTAL	**$502,909**
PROJECT TOTAL WITH 3% INFLATION	**$908,303**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

OPINION OF PROBABLE COST December 2012

Construction Project Number 6

Project Description

Filter Capacity Increase

Detailed Description

Increase filter capacity by 4.4 MGD of new media filters

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Add 4.4 MGD Filter Capacity	1	LS	$2,093,306	2,093,306

SUBTOTAL:		$2,093,306
MOBILIZATION	5%	$104,665
E, O & P:	30%	$627,992
SUBTOTAL:		$2,825,963
CONTINGENCY:	25%	$706,491
SUBTOTAL:		$3,532,454

PROJECT TOTAL	**$3,532,454**
PROJECT TOTAL WITH 3% INFLATION	**$6,379,965**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number 7

Project Description

Equalization Basin (EQB) Capacity Increase

Detailed Description

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Concrete Emergency FEB	1	LS	$1,038,600	1,038,600
2	Add Diffusers	1	LS	$107,100	107,100
3	Uspize EQ Basin Lift Station Pumps	1	LS	$90,000	90,000

SUBTOTAL:		$1,235,700
MOBILIZATION	5%	$61,785
E, O & P:	30%	$370,710
SUBTOTAL:		$1,668,195
CONTINGENCY:	25%	$417,049
SUBTOTAL:		$2,085,244

PROJECT TOTAL **$2,085,244**

PROJECT TOTAL WITH 3% INFLATION **$3,766,159**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST | **December 2012**

Construction Project Number 8

Project Description

Chemical Feed System Rehabilitation

Detailed Description

Add new 12,000 gallon alum storage tank and chemical storage building

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12,000 Gallon Alum Storage Tank	1	LS	$30,000	30,000
2	Fiberglass Chemical Storage Building	1	LS	$30,000	30,000

SUBTOTAL:		$60,000
MOBILIZATION	5%	$3,000
E, O & P:	30%	$18,000
SUBTOTAL:		$81,000
CONTINGENCY:	25%	$20,250
SUBTOTAL:		$101,250

PROJECT TOTAL	**$101,250**
PROJECT TOTAL WITH 3% INFLATION	**$182,868**

City of Kerrville

WWTP CIP Projects - 2020 & Beyond

FREESE AND NICHOLS

OPINION OF PROBABLE COST | **December 2012**

Construction Project Number 9

Project Description

RAS Pump Station Rehabilitation

Detailed Description

Replace pump station exposed piping, valves, and fittings

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station Rehabilitation	1	LS	$27,098	27,098
		SUBTOTAL:			$27,098
		MOBILIZATION		5%	$1,355
		E, O & P:		30%	$8,129
		SUBTOTAL:			$36,582
		CONTINGENCY:		25%	$9,146
		SUBTOTAL:			$45,728

PROJECT TOTAL **$45,728**

PROJECT TOTAL WITH 3% INFLATION **$82,589**

City of Kerrville

Wastewater Treatment Plant Alternative 2

FREESE AND NICHOLS

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number — Alternative 2A

Project Description

Alternative No. 2

Detailed Description

Construct a new 1.5 MGD treatment train that is parallel to the existing train at the Kerrville WWTP

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	**Sitework**				$ 322,500
	Sitework	1.0	LS	$25,000	$ 25,000
	Hydromulching	1.0	AC	$2,500	$ 2,500
	Pavement	3,500	SY	$80	$ 280,000
	Site Grading	1	LS	$5,000	$ 5,000
	Demolition	1	LS	$10,000	$ 10,000
2	**Headworks**				$ 582,700
	Fine Screens Equipment w/ compactors	1	EA	$146,000	$ 146,000
	Grit Removal (Trap, Pump, Classifier, and Controls)	1	LS	$140,000	$ 140,000
	Installation	20%	%	$57,200	$ 57,200
	Grating	350	SF	$100	$ 35,000
	Wall Concrete	26	CY	$450	$ 11,900
	Base Slab Concrete	68	CY	$425	$ 28,800
	Excavation	1,530	CY	$12	$ 18,400
	Select Backfill	118	CY	$25	$ 3,000
	Common Backfill	1,282	CY	$15	$ 19,300
	Interior Coating	770	SF	$30	$ 23,100
	Miscellaneous Equipment	1	LS	$20,000	$ 20,000
	Odor Control	1	LS	$80,000	$ 80,000
4	**Anaerobic Tanks**				$ 700,100
	Anaerobic Zone Mechanical Mixers	3	EA	$15,000	$ 45,000
	Installation	20%	%	$9,000	$ 9,000
	Grating	1000	SF	$100	$ 100,000
	Wall Concrete	994	CY	$450	$ 447,400
	Base Slab Concrete	77	CY	$425	$ 32,800
	Excavation	531	CY	$12	$ 6,400
	Select Backfill	88	CY	$25	$ 2,200
	Common Backfill	360	CY	$15	$ 5,400
	Miscellaneous Equipment	1	LS	$30,000	$ 30,000
	Interior Coating	7,298	SF	$3	$ 21,900
5	**Anoxic Tanks**				$ 700,100
	Anoxic Zone Mechanical Mixers	3	EA	$15,000	$ 45,000
	Installation	20%	%	$9,000	$ 9,000
	Grating	1000	SF	$100	$ 100,000
	Wall Concrete	994	CY	$450	$ 447,400
	Base Slab Concrete	77	CY	$425	$ 32,800
	Excavation	531	CY	$12	$ 6,400
	Select Backfill	88	CY	$25	$ 2,200
	Common Backfill	360	CY	$15	$ 5,400
	Miscellaneous Equipment	1	LS	$30,000	$ 30,000
	Interior Coating	7,298	SF	$3	$ 21,900
6	**Aerobic Tanks**				$ 1,204,100
	Oxic Zone Mechanical Mixers	3	EA	$15,000	$ 45,000
	Fine Bubble Diffusers	1	LS	$48,450	$ 48,500
	Installation	20%	%	$18,690	$ 18,700
	Grating	1000	SF	$100	$ 100,000
	Wall Concrete	994	CY	$450	$ 447,400
	Base Slab Concrete	664	CY	$425	$ 282,100
	Excavation	5,631	CY	$12	$ 67,600
	Select Backfill	696	CY	$25	$ 17,400
	Common Backfill	2,627	CY	$15	$ 39,400
	Miscellaneous Equipment	1	LS	$30,000	$ 30,000
	Interior Coating	35,994	SF	$3	$ 108,000
7	**Blower Building**				$ 1,012,000
	Blowers	3	EA	$195,000	$ 585,000
	Installation	20%	%	$117,000	$ 117,000
	Building	2000	SF	$140	$ 280,000
	Blower Air Piping	1	LS	$15,000	$ 15,000
	Miscellaneous Equipment	1	LS	$15,000	$ 15,000

City of Kerrville

Wastewater Treatment Plant Alternative 2

FREESE AND NICHOLS

OPINION OF PROBABLE COST — December 2012

8	**Final Clarifiers**				$ 300,700
	Clarifier Mechanism Equipment and Bridge	1	EA	$95,500	$ 95,500
	Installation	20%	%	$19,100	$ 19,100
	Wall Concrete	129	CY	$450	$ 57,900
	Base Slab Concrete	137	CY	$425	$ 58,200
	Excavation	2,888	CY	$12	$ 34,700
	Select Backfill	209	CY	$25	$ 5,300
	Common Backfill	2,000	CY	$15	$ 30,000
9	**Chemical Feed**				$ 30,000
	Feed Equipment	1	LS	$25,000	$ 25,000
	Installation	20%	%	$5,000	$ 5,000
10	**Cloth Media Filters**				$ 458,500
	Cloth Media Filters (Fluidyne Quote)	1	LS	$ 445,000	$ 445,000
	24 304SS filtering modules				
	2 Concrete Basins				
	Underdrain, Support, and Framework				
	Air Distribution and Air Vent Manifolds; Air Scour Tanks				
	Controls, Delivery, O&M Manuals, Start-Up				
	Excavation	479	CY	$ 12	$ 5,800
	Select Backfill	76	CY	$25	$ 2,000
	Common Backfill	379	CY	$15	$ 5,700
	SUBTOTAL:				**$ 5,310,700**
11	**Electrical and Instrumentation**	**20%**	**%**		**$ 1,062,200**
	SUBTOTAL:				**$ 6,372,900**
12	**Yard Piping**	**15%**	**%**		**$ 956,000**
	SUBTOTAL:				**$ 7,328,900**
		SUBTOTAL:			$7,328,900
		MOBILIZATION		5%	$366,500
		E, O & P:		30%	$2,198,700
		SUBTOTAL:			$9,894,100
		CONTINGENCY:		25%	$2,473,600
		PARALLEL TRAIN TOTAL:			**$12,368,000**

Construction Project Number — Alternative 2B

Project Description

Alternative 1 Projects Required for Alternative 2

Detailed Description

Alternative 1 projects required to be implemented as part of Alternative 2.
Project totals were developed in Alternative 1 CIP and include Mobilization, E,O,&P, and Contingency.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Parallel Clarifier Effluent Pipe	Costs Developed in the Alternative 1 CIP			41,580
2	CL-3 Rehab and CL-1 WAS Valve				502,909
3	Electrical System Upgrade				1,413,000
4	Remove OD Ditch Solids				253,125
6	FEB and Lift Station				2,085,244
8	RAS Pump Station Rehab.				45,728
9	Chemical Feed System Rehab.				101,250
		ALTERNATIVE 1 TOTAL:			**$4,442,900**

ALTERNATIVE 2 PROJECT TOTAL — $16,811,000

City of Kerrville

Wastewater Treatment Plant Alternative 3

FREESE AND NICHOLS

OPINION OF PROBABLE COST — **December 2012**

Construction Project Number — Alternative 3

Project Description

Alternative No. 3

Detailed Description

Construct a new A2O WWTP with a 4.5 MGD average flow and a 7 MGD peak flow.

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	**Sitework**				**$ 922,800**
	Sitework	1.0	LS	$ 50,000	$ 50,000
	Hydromulching	15.0	AC	$ 2,500	$ 37,500
	Fencing	2,940	LF	$ 35	$ 102,900
	Pavement	3,500	SY	$ 80	$ 280,000
	Site Grading	1	LS	$ 20,000	$ 20,000
	Miscellaneous Improvements	1	LS	$ 25,000	$ 25,000
	Standby Generator	1	LS	$ 407,330	$ 407,400
2	**Influent Lift Station**				**$ 1,419,500**
	2" Asphalt Pavement On 11" Flex Base With Triaxial Geogrid	1,600	SY	$ 40	$ 64,000
	Driveway	1	LS	$ 1,000	$ 1,000
	Bollards	6	EA	$ 500	$ 3,000
	Bulk Excavation	9,500	CY	$ 12	$ 114,000
	Rock Excavation (Track Drill 2.5" Holes On 1' C-C Grid; Key)	525	CY	$ 136	$ 71,700
	Structural Backfill	8,790	CY	$ 12	$ 105,500
	Structural Concrete Foundation, Walls, And Top Slab	520	CY	$ 546	$ 284,000
	Drilled Shafts	96	LF	$ 125	$ 12,000
	3 - 2,344 Gpm Submersible Sewage Pumps And Piping And Rails For Future	1	LS	$ 341,670	$ 341,700
	4' X 5' Aluminum Double Leaf Access Door (Non Drainage)	4	EA	$ 2,500	$ 10,000
	Pump Monorail And Hoist System	1	LS	$ 20,000	$ 20,000
	Miscellaneous Metals	1	LS	$ 75,000	$ 75,000
	Protective Coatings And Wet Well Liner	5,680	SF	$ 30	$ 170,400
	Lift Station Ventilation	1	LS	$ 4,000	$ 4,000
	12" Blind Flange	1	EA	$ 250	$ 300
	14" Blind Flange	2	EA	$ 325	$ 700
	16" Blind Flange	1	EA	$ 415	$ 500
	14" Plug Valve	2	EA	$ 7,250	$ 14,500
	16" Plug Valve	3	EA	$ 9,500	$ 28,500
	20"X14" True Wye	1	EA	$ 3,200	$ 3,200
	20" Di 90° Bend	3	EA	$ 1,400	$ 4,200
	20"X16" Tee	4	EA	$ 2,500	$ 10,000
	20" Tee	1	EA	$ 2,700	$ 2,700
	16" Di Pipe	24	LF	$ 65	$ 1,600
	20" Di Pipe	38	LF	$ 85	$ 3,200
	16" Check Valve	3	EA	$ 12,750	$ 38,300
	16" Rfca	3	EA	$ 800	$ 2,400
	20" Flexible Restrained Coupling	1	EA	$ 800	$ 800
	2" Air Releave Valve	3	EA	$ 700	$ 2,100
	3" Air Release Valve	1	EA	$ 1,200	$ 1,200
	Pressure Gauge	3	EA	$ 250	$ 800
	3" Pvc Sch. 80	45	LF	$ 20	$ 900
	3" Duckbill Valve	1	EA	$ 750	$ 800
	30" Di Pipe	9	LF	$ 180	$ 1,700
	30" Rfca	1	EA	$ 2,000	$ 2,000
	6" Di Pipe	3	LF	$ 25	$ 100
	6" Di 90° Bend	2	EA	$ 100	$ 200
	6" Pvc	25	LF	$ 20	$ 500
	6" Flexible Restrained Coupling	4	EA	$ 150	$ 600
	6" Plug Valve	1	EA	$ 1,600	$ 1,600
	10"X6" Reducer	1	EA	$ 200	$ 200
	20"X10" Reducer	1	EA	$ 600	$ 600
	16"X12" Reducing 90° Bend	3	EA	$ 850	$ 2,600
	12" Di Pipe	152	LF	$ 45	$ 6,900
	12" Di 22.5° Bend	8	EA	$ 650	$ 5,200
	8"X12" Reducer	4	EA	$ 425	$ 1,700
	Concrete Pipe Supports	13	EA	$ 200	$ 2,600

City of Kerrville

Wastewater Treatment Plant Alternative 3

OPINION OF PROBABLE COST — December 2012

3	**Headworks**							$	660,800
	Fine Screens Equipment w/ compactors		1	EA	$	146,000		$	146,000
	Grit Removal (Trap, Pump, Classifier, and Controls)		1	LS	$	140,000		$	140,000
	Installation		20%	%	$	57,200		$	57,200
	Grating		350	SF	$	100		$	35,000
	Wall Concrete		40	CY	$	450		$	18,200
	Base Slab Concrete		164	CY	$	425		$	69,900
	Excavation		2,343	CY	$	12		$	28,200
	Select Backfill		203	CY	$	25		$	5,100
	Common Backfill		1,635	CY	$	15		$	24,600
	Interior Coating		1,220	SF	$	30		$	36,600
	Miscellaneous Equipment		1	LS	$	20,000		$	20,000
	Odor Control		1	LS	$	80,000		$	80,000
4	**Equalization Basin**							$	1,289,400
	Wall Concrete		1381	CY	$	450		$	621,600
	Base Slab Concrete		716	CY	$	425		$	304,200
	Excavation		4,999	CY	$	12		$	60,000
	Select Backfill		747	CY	$	25		$	18,700
	Common Backfill		2,052	CY	$	15		$	30,800
	Miscellaneous Equipment		1	LS	$	5,000		$	5,000
	Interior Coating		47,310	SF	$	3		$	142,000
	Coarse Bubble Aeration		1	LS	$	107,100		$	107,100
5	**Anaerobic Tanks**							$	963,900
	Anaerobic Zone Mechanical Mixers		6	EA	$	15,000		$	90,000
	Installation		20%	%	$	18,000		$	18,000
	Grating		1000	SF	$	100		$	100,000
	Wall Concrete		1223	CY	$	450		$	550,600
	Base Slab Concrete		208	CY	$	425		$	88,400
	Excavation		1,297	CY	$	12		$	15,600
	Select Backfill		233	CY	$	25		$	5,900
	Common Backfill		816	CY	$	15		$	12,300
	Miscellaneous Equipment		1	LS	$	30,000		$	30,000
	Interior Coating		17,675	SF	$	3		$	53,100
6	**Anoxic Tanks**							$	963,900
	Anoxic Zone Mechanical Mixers		6	EA	$	15,000		$	90,000
	Installation		20%	%	$	18,000		$	18,000
	Grating		1000	SF	$	100		$	100,000
	Wall Concrete		1223	CY	$	450		$	550,600
	Base Slab Concrete		208	CY	$	425		$	88,400
	Excavation		1,297	CY	$	12		$	15,600
	Select Backfill		233	CY	$	25		$	5,900
	Common Backfill		816	CY	$	15		$	12,300
	Miscellaneous Equipment		1	LS	$	30,000		$	30,000
	Interior Coating		17,675	SF	$	3		$	53,100
7	**Aerobic Tanks**							$	1,936,800
	Oxic Zone Mechanical Mixers		6	EA	$	15,000		$	90,000
	Fine Bubble Diffusers		1	LS	$	99,450		$	99,500
	Installation		20%	%	$	37,900		$	37,900
	Grating		1000	SF	$	100		$	100,000
	Wall Concrete		1223	CY	$	450		$	550,600
	Base Slab Concrete		987	CY	$	425		$	419,600
	Excavation		15,351	CY	$	12		$	184,300
	Select Backfill		2,053	CY	$	25		$	51,400
	Common Backfill		6,249	CY	$	15		$	93,800
	Miscellaneous Equipment		1	LS	$	30,000		$	30,000
	Interior Coating		93,209	SF	$	3		$	279,700
8	**Blower Building**							$	1,938,000
	Blowers		6	EA	$	195,000		$	1,170,000
	Installation		20%	%	$	234,000		$	234,000
	Building		3600	SF	$	140		$	504,000
	Blower Air Piping		1	LS	$	15,000		$	15,000
	Miscellaneous Equipment		1	LS	$	15,000		$	15,000
9	**Final Clarifiers**							$	833,300
	Clarifier Mechanism Equipment and Bridge		3	EA	$	95,500		$	286,500
	Installation		20%	%	$	57,300		$	57,300
	Wall Concrete		349	CY	$	450		$	157,000
	Base Slab Concrete		382	CY	$	425		$	162,200
	Excavation		6,997	CY	$	12		$	84,000
	Select Backfill		587	CY	$	25		$	14,700
	Common Backfill		4,772	CY	$	15		$	71,600

City of Kerrville

Wastewater Treatment Plant Alternative 3

FREESE AND NICHOLS

OPINION OF PROBABLE COST — December 2012

10	**Chemical Feed**					**$ 400,000**
	Feed Equipment		1	EA	$ 50,000	$ 50,000
	Installation		20%	%	$ 10,000	$ 10,000
	Building (Electrical/Chem Feed)		2,000	SF	$ 140	$ 280,000
	Alum Storage Tank		1	LS	$ 30,000	$ 30,000
	Ferric Chloride Storage Tank		1	LS	$ 30,000	$ 30,000
11	**RAS/WAS Pump Station**					**$ 290,000**
	Sludge Pumps		6	EA	$ 20,000	$ 120,000
	Installation		20%	%	$ 24,000	$ 24,000
	Building		900	SF	$ 140	$ 126,000
	Miscellaneous Equipment		1	LS	$ 20,000	$ 20,000
12	**Cloth Media Filters**					**$ 458,500**
	Cloth Media Filters (Fluidyne Quote)		1	LS	$ 445,000	$ 445,000
	24 304SS filtering modules					
	2 Concrete Basins					
	Underdrain, Support, and Framework					
	Air Distribution and Air Vent Manifolds; Air Scour Tanks					
	Controls, Delivery, O&M Manuals, Start-Up					
	Excavation		479	CY	$ 12	$ 5,800
	Select Backfill		76	CY	$ 25	$ 2,000
	Common Backfill		379	CY	$ 15	$ 5,700
13	**UltraViolet Disinfection System**					**$ 1,724,900**
	UV Disinfection System		1	LS	$ 563,000	$ 563,000
	Installation		20%	%	$ 112,600	$ 112,600
	Wall Concrete		1,994	CY	$ 450	$ 897,400
	Base Slab Concrete		116	CY	$ 425	$ 49,300
	Excavation		1,710	CY	$ 12	$ 20,600
	Select Backfill		193	CY	$ 25	$ 4,900
	Common Backfill		1,673	CY	$ 15	$ 25,100
	Steel Hoist		3	TON	$ 4,000	$ 12,000
	Miscellaneous Equipment		1	LS	$ 10,000	$ 10,000
	Retaning Wall		1	LS	$ 30,000	$ 30,000
14	**Sludge Holding Tank Modifications**					**$ 514,700**
	Sludge Holding Tank					
	Wall Concrete		522	CY	$ 450	$ 235,000
	Base Slab Concrete		222	CY	$ 425	$ 94,600
	Excavation		2,171	CY	$ 12	$ 26,100
	Select Backfill		241	CY	$ 25	$ 6,100
	Common Backfill		1,330	CY	$ 15	$ 20,000
	Interior Coating		22,542	SF	$ 3	$ 67,700
	Mechanical Aerator Mixers		2	EA	$ 23,000	$ 46,000
	Installation		20%	%	$ 9,200	$ 9,200
	Miscellaneous Equipment		1	LS	$ 10,000	$ 10,000
15	**Sludge Dewatering Building**					**$ 1,150,000**
	Belt Filter Press Unit and Appurtenances		1	LS	$ 620,000	$ 620,000
	Sludge Feed Pumps		2	EA	$ 15,000	$ 30,000
	Installation		20%	%	$ 130,000	$ 130,000
	Building		2,000	SF	$ 170	$ 340,000
	Miscellaneous Equipment		1	LS	$ 30,000	$ 30,000
16	**Administration/Lab Building**					**$ 290,000**
	Building		2,000	SF	$ 140	$ 280,000
	Miscellaneous Equipment		1	LS	$ 10,000	$ 10,000
17	**Grease and Septage Handling**					**$ 100,000**
			1	LS	$ 100,000	$ 100,000
		SUBTOTAL:				**$ 15,856,500**
18	**Electrical and Instrumentation**		**20%**	**%**		**$ 3,171,300**
		SUBTOTAL:				**$ 19,027,800**
19	**Yard Piping**		**15%**	**%**		**$ 2,854,200**
		SUBTOTAL:				**$ 21,882,000**
			SUBTOTAL:			$21,882,000
			MOBILIZATION		5%	$1,094,100
			E, O & P:		30%	$6,564,600
			SUBTOTAL:			$29,540,700
			CONTINGENCY:		25%	$7,385,200
			SUBTOTAL:			$36,925,900
ALTERNATIVE 3 PROJECT TOTAL						**$36,926,000**

APPENDIX H

City Council Presentation

October 4, 2012

May 31, 2012

Wastewater System Integrated Capital Improvements Plan

CITY OF KERRVILLE

October 4, 2012

Presentation Outline

- Population Projections
- Background on Wastewater Collection System
- Wastewater Collection System Capital Improvements
- Review of WWTP Capital Improvements
- Integrated Wastewater Capital Improvement Plan

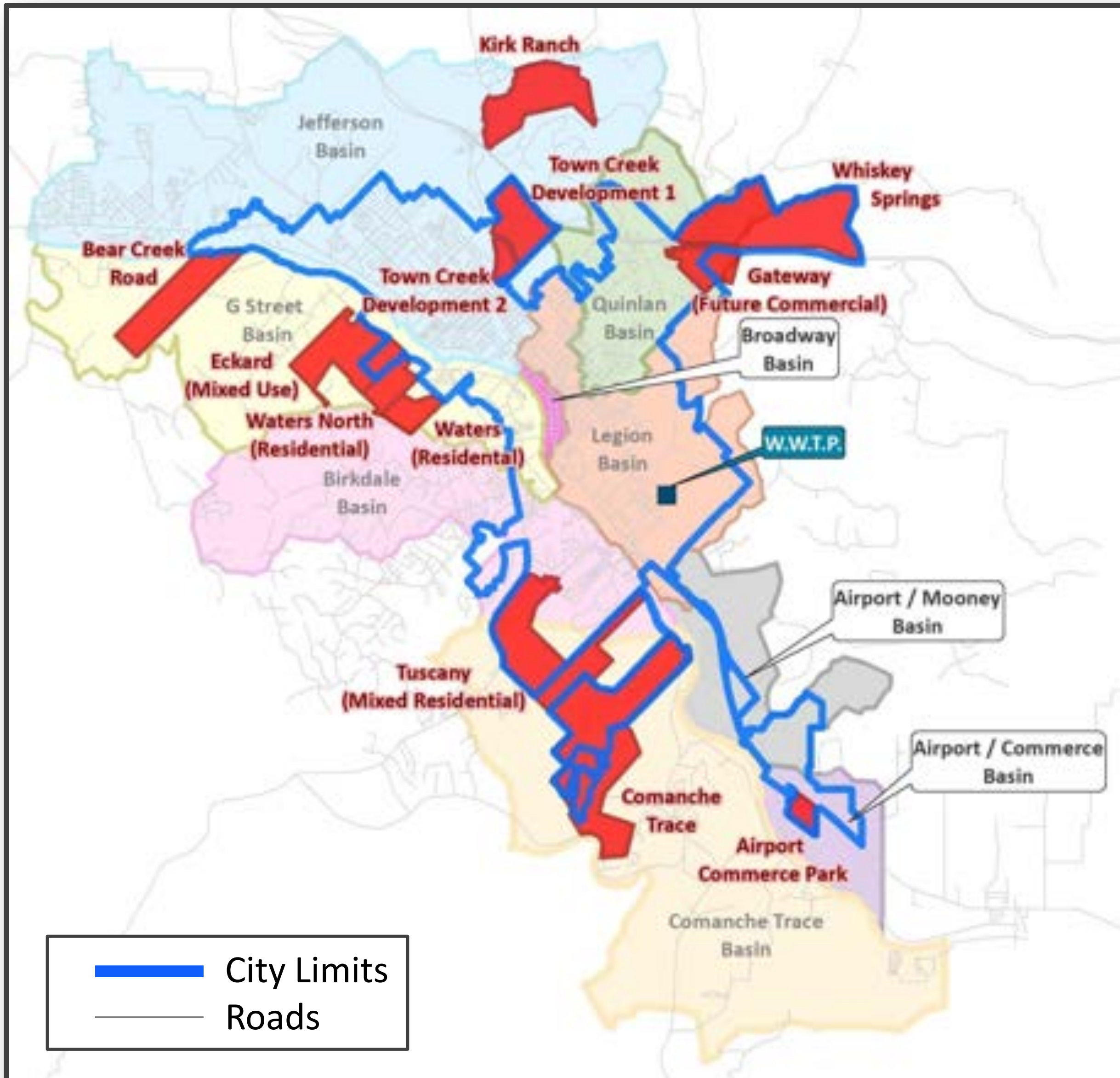
Population Projections

Population Projections

Year	Annual Growth Rate	Population
2012		22,347
2013	0.24%	22,401
2014	0.23%	22,452
2015	0.24%	22,505
2016	0.23%	22,558
2017	0.56%	22,684
2018	0.55%	22,809
2019	0.55%	22,934
2020	0.55%	23,060
2021	0.54%	23,185
2022	0.72%	23,352
2023	0.71%	23,518
2024	0.71%	23,685
2025	0.70%	23,851
2026	0.70%	24,017
2027	0.69%	24,183
2028	0.69%	24,350
2029	0.68%	24,516
2030	0.68%	24,682
2031	0.68%	24,850
2032	1.00%	25,099

- Population previously adopted by City Council
- City will grow approximately 2,752 people over the next 20 years
  - 2012 – 2016: 25 permits/year
  - 2017 – 2021: 60 permits/year
  - 2022 – 2032: 80 permits/year

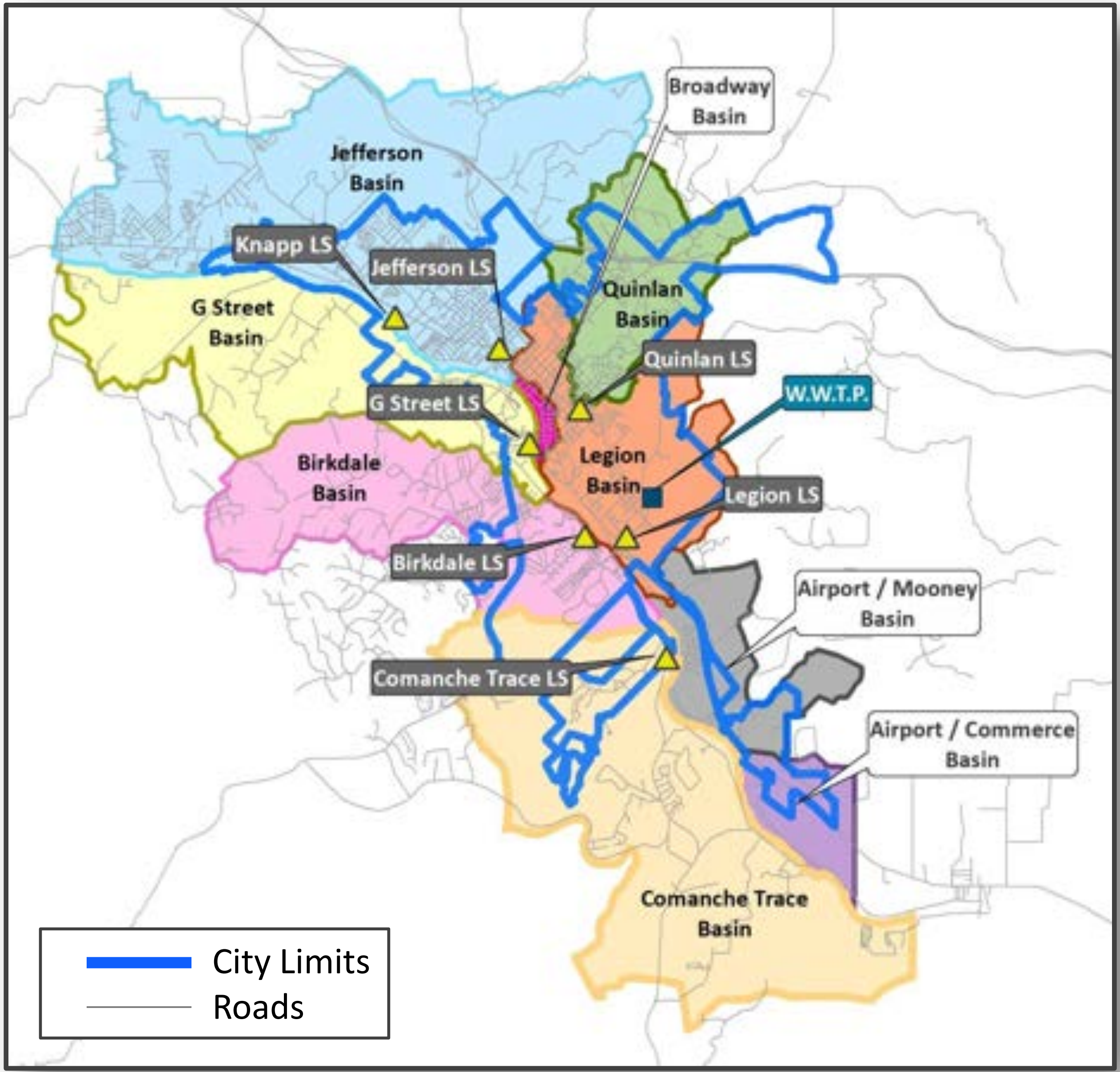
Proposed Developments



- It was assumed that development could occur in each of the lift station service areas

Background on Wastewater Collection System

Background on Wastewater Collection System



Wastewater Flow Projections

- Birkdale Service Area
  - Growth focused in Tuscany and Comanche Trace developments
  - Will receive flow from the Birkdale, Comanche Trace, G-Street & Jefferson Basins
  - **2012 = 1,268 LUE** → **2032 = 6,600 LUE**

	2012		2032	
Contributing Source	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**
Birkdale Basin	1.50	1,042	2.17	1,507
G-Street Basin (2032 Includes Jefferson LS Flow)			4.62	3,208
Comanche Trace LS Flow			2.30	1,600
Total Flows	**1.50**	**1,042**	**9.09**	**6,315**

Wastewater Flow Projections

- G - Street Service Area
  - Served by G-Street Interceptor
  - Growth focused in Eckard, Waters & Bear Creek developments & the 173 Commercial Corridor
  - Will receive 1,600 gpm of flow from Jefferson Lift Station
  - **2012 = 205 LUE** → **2032 = 3,705 LUE**

	2012		2032	
Contributing Source	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**
G-St Basin	0.76	528	2.32	1,611
Jefferson LS Flow			2.30	1,600
Total Flows	**0.76**	**528**	**4.62**	**3,211**

Wastewater Flow Projections

- Jefferson Service Area
  - Serves City of Ingram wholesale flow through Knapp Lift Station
  - Growth focused in Town Creek & Kirk Ranch developments and commercial infill on Highway 27
  - Jefferson Lift Station Flow is pumped to two basins

- **2012 = 4,814 LUE**
  - **33% to Legion**
  - **67% to Quinlan**

- **2032 = 7,552 LUE**
  - **68% to Legion**
  - **32% to Birkdale**

	2012		2032	
Contributing Source	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**
Jefferson Basin	4.13	2,868	5.66	3,931
Ingram Wholesale	0.76	528	1.45	1,000
Total Flows	**4.89**	**3,396**	**7.11**	**4,931**

Wastewater Flow Projections

- Legion Service Area
  - Receives flow from the Legion Basin and Broadway, Jefferson and Al Mooney Lift Stations
  - *Construction of the Birkdale Lift Station delays expansion of the Legion Lift Station (maintenance still required)*
  - **2012 = 7,530 LUE** → **2032 = 7,941 LUE**

	2012		2032	
Contributing Source	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**
Legion Basin	2.35	1,632	2.61	1,812
Broadway LS (2012 includes G-Street)	2.88	2,000	0.72	500
Al Mooney LS	0.26	181	0.26	181
Jefferson LS	1.58	1,100	4.90	3,400
Total Flows	**7.07**	**4,913**	**8.49**	**5,893**

Wastewater Flow Projections

- Quinlan Service Area
  - Growth focused in Whiskey Springs & Gateway developments
  - Temporarily receives flow from Jefferson Lift Station
  - **2012 = 4,352 LUE** → **2032 = 2,651 LUE**

	2012		2032	
Contributing Source	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**	**2 Hour Peak Flow (MGD)**	**2 Hour Peak Flow (gpm)**
Quinlan Basin	1.55	1,076	2.89	2,007
Jefferson LS Flow	3.17	2,200		
Total Flows	**4.72**	**3,276**	**2.89**	**2,007**

Wastewater Collection System
Capital Improvements

20 Year Wastewater Collection System CIP

Project #	Wastewater Collection System Capital Improvements Plan	Cost
1.	New 5,000 gpm Jefferson Lift Station and 12" & 16" Force Mains	$ 4,539,300
2.	Reduce Broadway Lift Station Capacity to 500 gpm	$ 486,800
3.	New Knapp Wet Well & 10" Force Main	$ 1,211,000
4.	G-Street Lift Station Decommission	$ 78,000
5.	21" Interceptor Downstream of Jefferson Lift Station	$ 1,412,200
6.	15"/18"/21" Interceptors Downstream of Knapp LS	$ 1,849,000
7.	New 5900 gpm Legion Lift Station	$ 4,290,000
8.	New 1,600 gpm Comanche Trace Lift Station & 12" Force Main	$ 1,547,000
9.	Quinlan Basin 10"/12"/15" Interceptors	$ 2,844,900
10.	Comanche Trace 12"/15" Interceptors	$ 1,336,400
11.	15" Interceptor Upstream of Knapp Lift Station	$ 605,300
	Total	*$ 20,199,900*

Critical Path Projects = $5,026,100

** Costs include Mobilization, Engineering, O&P and Contingency*

FY 2013 Wastewater Collection System Projects

1. New 5,000 gpm Jefferson LS and 12”and 16” Force Mains
   - Existing Jefferson LS capacity = 3,300 gpm
   - 2012 Peak Flow to Jefferson LS = 3,396 gpm
   - 2032 Peak Flow to Jefferson LS = 4,938 gpm
2. Reduce Broadway Lift Station capacity to 500 gpm
   - Avoid cost of excessive downstream pumping

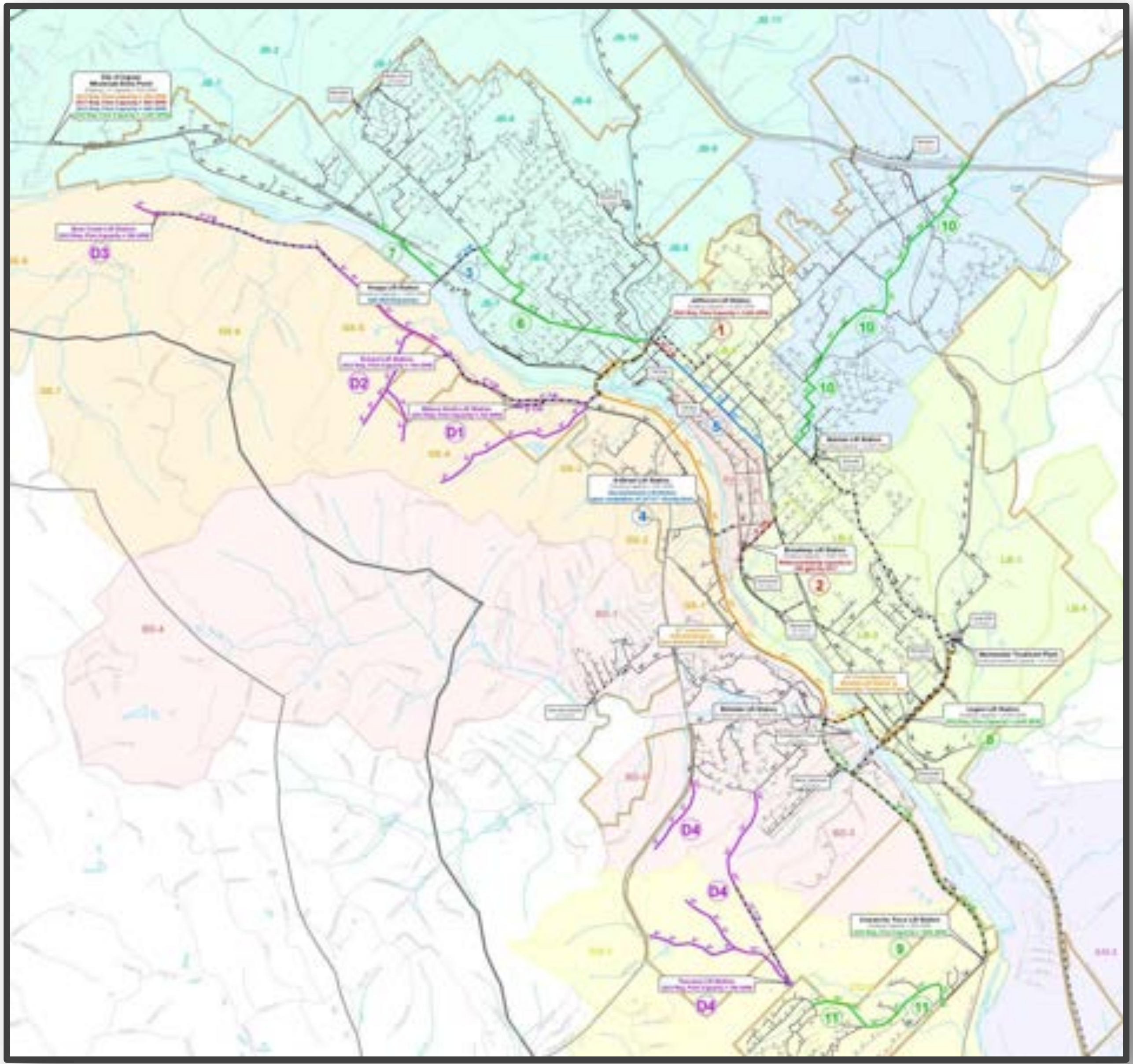
FY 2014 – 2019 Wastewater Collection System Projects

3. New Knapp Wet Well & 10” Force Main
   - Capacity for additional Knapp LS pumping
4. G Street Lift Station Decommission
5. 21” Interceptor downstream of Jefferson Lift Station
   - Capacity for Jefferson LS expansion

FY 2020 - 2032 Wastewater Collection System Projects

6. 15”/18”/21” Interceptors downstream of Knapp Lift Station
   - Capacity for Knapp LS Expansion & growth in Jefferson Basin
7. New 5,900 gpm Legion Lift Station
   - Existing Legion LS capacity = 4,000 gpm
   - 20-year peak flow to Legion LS = 5,900 gpm
8. New 1,600 gpm Comanche Trace Lift Station and 12” Force Main
   - Existing Comanche Trace LS capacity = 600 gpm
   - 20-year peak flow to Comanche Trace LS = 1,600 gpm
9. Quinlan Basin 10”/12”/15” Interceptors
   - Capacity for growth in Quinlan Basin
10. Comanche Trace 12”/15” Interceptors
    - Capacity for growth in Comanche Trace Basin
11. 15” Interceptor upstream of Knapp Lift Station
    - Capacity for additional flow from City of Ingram

Wastewater Collection System Capital Improvements Plan



Review of WWTP Recommendations

WWTP CIP Projects

Project	Scope	Project Cost
1. Add New Clarifier	Construct New 80' Diameter Clarifier	$2,218,000
2. Upgrade Electrical System	Upgrade MCC/Switchgear, Panelboard, SCADA	$1,413,000
3. Oxidation Ditch Rehab	Remove Solids and Add Aeration Capacity	$809,500
4. Parallel Clarifier Effluent Pipe	Install Parallel Pipe to Relieve Bottleneck	$41,000
5. Clarifier Rehab and Repair	Rehab CL-3 and Replace CL-1 WAS valve	$492,000
6. Increase Filter Capacity	Add 4.4 MGD of Filter Capacity	$3,454,000
7. FEB and Lift Station Capacity Increase	Concrete Emergency FEB, Add Aeration, and Pumping Capacity	$2,085,000
8. Rehab Chemical Feed System	New Alum Storage Tank and Chemical Feed Bldg	$99,000
9. Rehab RAS Pump Station	Replace Exposed Piping, Valves, and Fittings	$45,000
	Total	*$10,656,500*

Critical Path Projects = $3,631,000

** Costs include Mobilization, Engineering, O&P and Contingency*

Integrated Wastewater System Capital Improvement Plan

Wastewater System Integrated CIP 2013

Wastewater Collection System & Treatment Plant	
Project	**Total Project Cost**
1. Jefferson L.S. Expansion and 12"/16" Force Mains	$4,539,300
2. Add New Clarifier	*$2,218,000*
3. Upgrade Electrical System	*$1,413,000*
4. Reduce Broadway L.S. Capacity to 500 gpm	$486,800
Contingency	**$1,500,000**
Total	**$10,157,100**

** Costs include Mobilization, Engineering, O&P and Contingency*

Wastewater System Integrated CIP 2014 - 2019

Wastewater Collection System & Treatment Plant	
Project	**Total Project Cost**
1. Oxidation Ditch Rehab	*$809,500*
2. New Knapp Wet Well & 10" Force Main	$1,211,000
3. G-Street L.S. Decommission	$78,000
4. 21-inch Interceptor downstream of Jefferson L.S.	$1,412,200
Contingency	**$689,300**
Total	**$4,200,000**

** Costs include Mobilization, Engineering, O&P and Contingency*

Wastewater System CIP 2020 - 2032

Wastewater Collection System	
Project	**Total Project Cost**
15”/18”/21” Interceptors downstream of Knapp L.S.	$1,849,000
New 5,900 gpm Legion L.S.	$4,290,000
New 1,600 gpm Comanche Trace L.S. & 12” Force Main	$1,547,000
Quinlan Basin 10”/12”/15” Interceptors	$2,844,900
Comanche Trace 12”/15” Interceptors	$1,336,400
15” Interceptor upstream of Knapp L.S.	$605,300
Subtotal	***$12,472,600***

Wastewater Treatment Plant	
Project	**Total Project Cost**
Parallel Clarifier Effluent Pipe	*$41,000*
Clarifier Rehab & Repair	*$492,000*
Increase Filter Capacity	*$3,454,000*
FEB & Lift Station Capacity Increase	*$2,085,000*
Rehab Chemical Feed System	*$99,000*
Rehab RAS Pump Station	*$45,000*
Subtotal	***$6,216,000***
Total	**$18,644,900**

** Costs include Mobilization, Engineering, O&P and Contingency*

Questions and Discussion

CITY OF KERRVILLE

October 4, 2012

FREESE AND NICHOLS

Wastewater Treatment Plant Risk, Capacity, and Alternatives Assessment

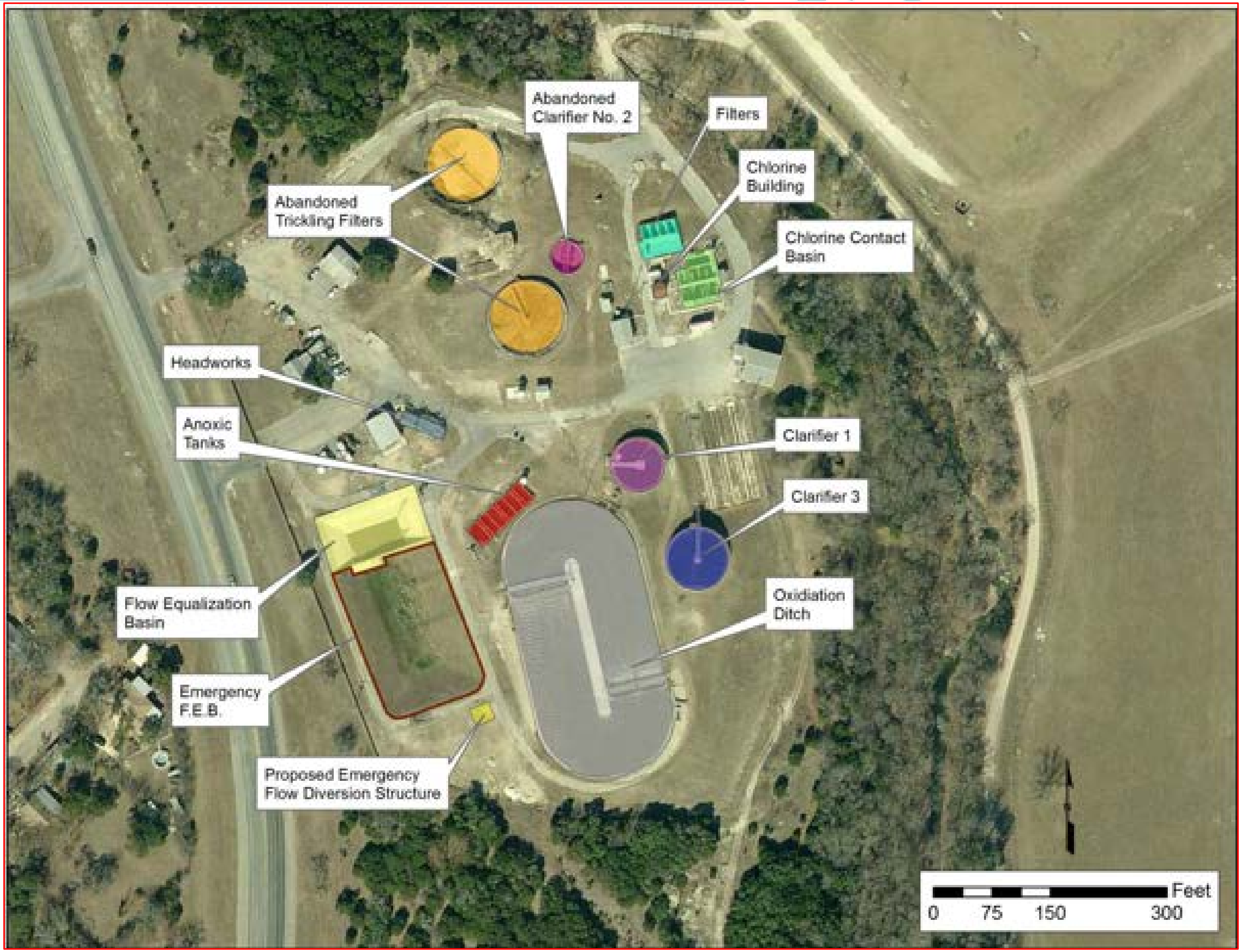
CITY OF KERRVILLE

May 31, 2012

Presentation Outline

- Wastewater Treatment Plant Overview
  - Plant History
- Condition, Criticality and Risk Assessment
- Capacity Assessment
  - Hydraulic
  - Process
  - EQ Basin
- Recommended Project Prioritization
- Odor Control
- Future Treatment Alternatives Analysis
- Recommendations

WWTP Plant Overview

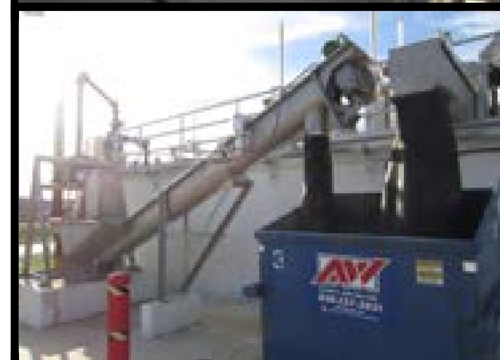


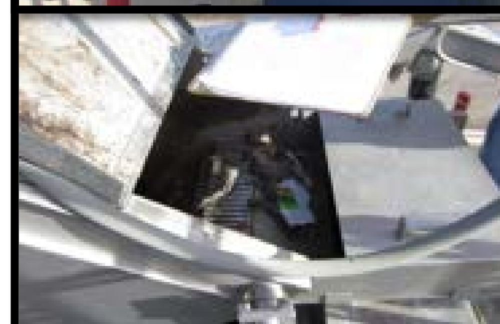
Plant History

Year	Treatment Process Improvement
1950's	Built trickling filter plant
1974	Constructed 2.0 million-gallons per day (MGD) oxidation ditch along with Clarifier No. 1
1984	Added Clarifier No. 3
1987	Plant upgraded to current capacity of 4.5 MGD. Added Anoxic Basin, Equalization Basin, Filters, Chlorine Contact Basin, etc.
2003	New 8 MGD capacity Headworks was added along with the rehabilitation of Clarifier No. 1
2011	New Belt Filter Press Facility added

Headworks

- 1st step in treatment process
- Wastewater is metered going into the plant
- Fine screens remove large debris
- Grit chamber then removes large inert settleable solids
- Hydraulic bottleneck if all lift station pumps are running





Equalization Basin and Lift Station

- Serves as a holding tank for raw wastewater during high flow periods
- Wastewater is sent to the basin from the Headworks
- The EQ Basin Lift Station can return approximately 1,389 gallons per minute (GPM) or 2 million gallons per day (MGD) back to the headworks to feed the plant during low flows (night time)

Anoxic Basins

- 1st step in biological treatment process

- Wastewater is mixed with “sludge” (microorganisms) to form Mixed Liquor

- Aids in the selection of bacteria to remove phosphorus

Oxidation Ditch

- 2nd step in the removal of nutrients

- Oxygen is added to the Mixed Liquor by horizontal rotors to facilitate growth of aerobic microorganisms and maintain suspension of solids

Clarifiers

- Allows solids to settle out of the water
- Settled solids are recycled or wasted
- Cleaner water at the top flows over the weirs and towards the filters
- Chemicals are added to enhance nutrient removal

Filters

- Filters out solids that did not settle in clarifier

- Water enters through the trough and trickles down through the sand media removing smaller solids

Chlorine Contact Basin

- Disinfection step to kill the pathogens in water
- Chlorine is mixed prior to the basin
- The length and shape of the basin ensures the water has proper contact time with the chlorine to eliminate bacteria and pathogens

- Effluent is dechlorinated (using sodium thiosulfate) before discharge to prevent harm to aquatic life
- Reuse water is pumped out of contact basin for resale

Condition, Criticality, and Risk Assessment

Condition Assessment Scoring

- FNI performed a site condition assessment of the Kerrville WWTP on January 12, 2012

Example Scoring Sheet

Inspection Date:	January 12, 2012			
Inspector Name:	GRS, SHH, JWM			
Plant Name:	Kerrville WWTP			
Facility Name:	Clarifier 3			
	Condition Evaluation			
Component Group	**Component Condition Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Electrical- MCC, Switch Gear, Control Panel, HVAC	50	20%	10	
Mechanism	100	25%	25	Center well - badly corroded, the rake is in poor condition, as is the scum skimmer.
Scum Baffle	100	20%	20	Corrosion
Weirs	100	15%	15	
Structure- Upper	40	10%	4	
Structure- Lower	40	10%	4	
Overall Facility Rating		100%	78	
	Criticality Evaluation			
Criticality Parameters	**Component Criticality Rating**	**Weight Factor**	**Weighted Component Rating**	**Comments**
Capacity Affected	65	30%	20	More significant impact if Clarifier 3 goes down since it is only clarifier with WAS capability.
Process Impact	65	50%	32	
Outage Duration	100	20%	20	
Overall Criticality Rating	-	100%	72	

Condition Deficiency Scoring

Condition Deficiency Score	Rating	Description
0 - 20	Very Good	New, perfect condition
21 - 40	Good	Good condition, no improvements recommended to maintain function
41 - 60	Fair	Fair condition, improvements recommended to improve performance or efficiency
61 - 80	Poor	Poor condition, improvements recommended to maintain reliability
81 - 100	Very Poor	Eminent failure, rehabilitation or replacement required

Criticality Criteria

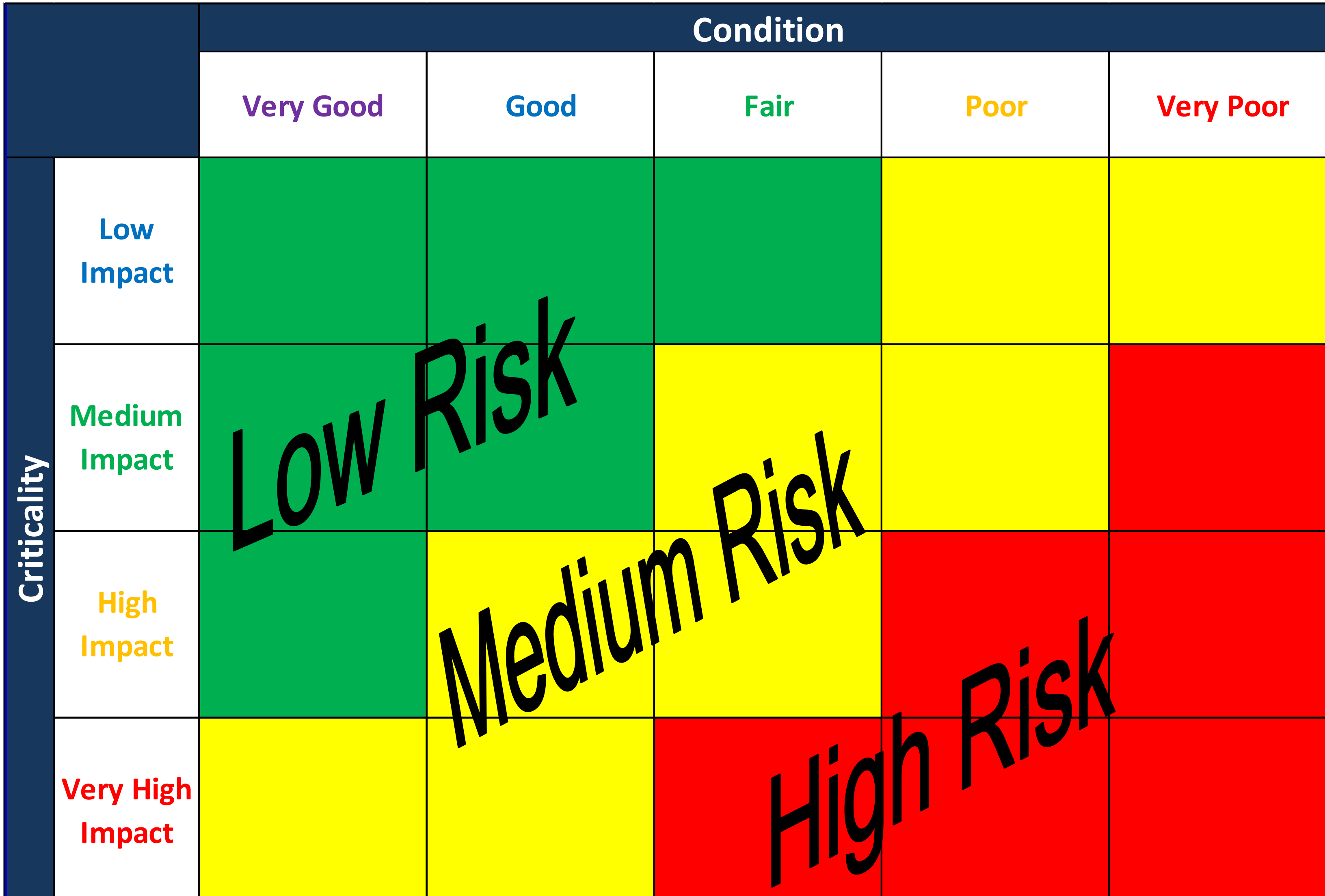
PROPOSED CRITICALITY PARAMETERS & WEIGHTING SYSTEM
Capacity Affected (30%) **Based on Percent of Total Plant Capacity Lost** (≤ 13%) Capacity Lost = 3 (14 – 25%) Capacity Lost = 9 (26 – 50%) Capacity Lost = 15 (51 – 85%) Capacity Lost = 21 (≥ 86%) Capacity Lost = 30
Process Impact (50%) **Based on Treatment Process Effectiveness w/o Component** Mild = 10 Moderate = 28 Severe = 50
Outage Duration (20%) **Based on Estimated Response Time, Parts Availability and Length of Repair** ≤ 2 Days = 2 3 – 15 Days = 8 16 – 29 Days = 14 ≥ 30 Days = 20

Criticality Scoring

- Determine the total criticality score for each asset and group into four general categories:

CRITICALITY ASSESSMENT SCORING LEGEND	
Rating	**Criticality Assessment Scoring Definition**
Low Impact	**Total Score < 30**
Medium Impact	**30 ≤ Total Score < 50**
High Impact	**50 ≤ Total Score ≤ 70**
Very High Impact	**Total Score > 70**

Risk Based Assessment



Risk Assessment Results

Component	Condition Rating	Criticality Rating	Risk
Electrical - main	*Poor*	*Very High Impact*	High Risk
Clarifier 3	*Poor*	*Very High Impact*	High Risk
Chemical Feed System	*Fair*	*Very High Impact*	High Risk
Oxidation Ditch	*Fair*	*Very High Impact*	High Risk
RAS Pump Stations	*Fair*	*Very High Impact*	High Risk
Dechlorination System	*Good*	*Very High Impact*	Medium Risk
Chlorine Contact Basin	*Fair*	*Medium Impact*	Medium Risk
Chlorination Building	*Good*	*Very High Impact*	Medium Risk
Anaerobic Tank	*Good*	*High Impact*	Medium Risk
Clarifier 1	*Good*	*High Impact*	Medium Risk
Flow Equalization Basin	*Good*	*High Impact*	Medium Risk
Filter Backwash Handling	*Fair*	*Medium Impact*	Medium Risk
Effluent Filters	*Fair*	*Medium Impact*	Medium Risk
Headworks	*Good*	*Medium Impact*	Low Risk
Water System - Plantwide	*Good*	*Low Impact*	Low Risk
Splitter Box @ Headworks	*Good*	*Medium Impact*	Low Risk
Effluent Meter and Composite Sampling	*Good*	*Low Impact*	Low Risk
Belt Press - Old	*Good*	*Low Impact*	Low Risk
Belt Press - New	*Very Good*	*Low Impact*	Low Risk

WWTP Hydraulic and Treatment Capacity Assessment

Capacity Assessment

- The capacity assessment of the plant consisted of 3 separate analyses:

1. Hydraulic Analysis
2. Treatment Process and Regulatory Analysis
3. Flow Equalization Capacity Analysis

Hydraulic Analysis

- A hydraulic model of the entire plant was created to determine how the plant basins and piping handle the design and peak flow provided in the Texas Pollution Discharge Elimination System (TPDES) Permit
  - Permitted Flow = 4.5 MGD
  - 2-hr Permitted Peak Flow = 7 MGD (4861 GPM)

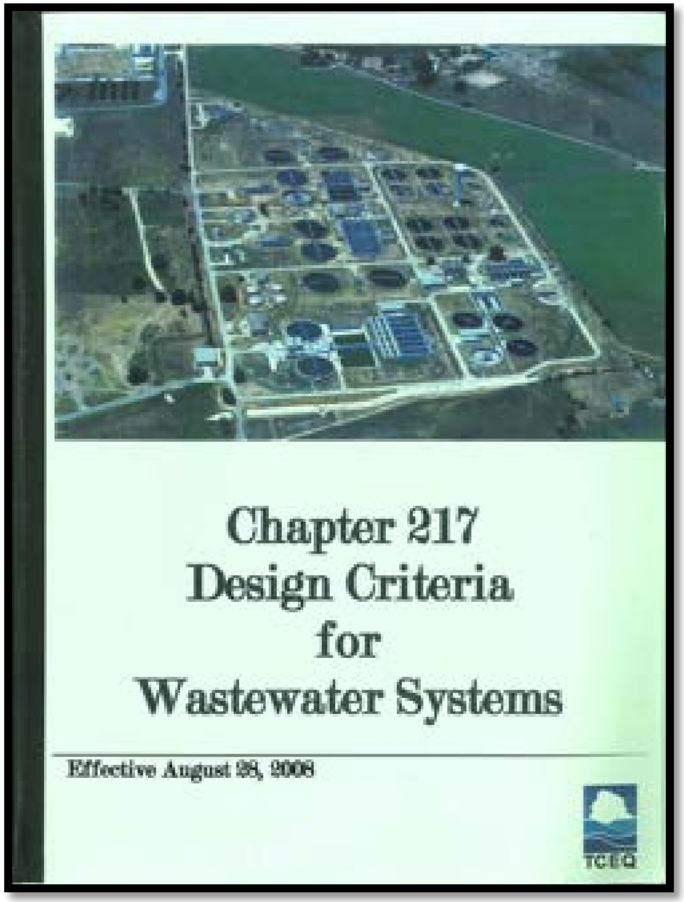
- The analysis identified a **hydraulic bottleneck** in the piping between the clarifiers and filters that limits 2-hr peak flow to 5.4 MGD (3750 GPM)

- If all lift stations pumps are running, the headworks becomes a hydraulic bottleneck for the plant

Treatment Process Analysis

- FNI compared the plant configuration to current design parameters in "Chapter 217 Design Criteria for Wastewater Systems" at permit and peak flow

- FNI then identified which processes limit the capacity of the plant based on TCEQ recommendations



TCEQ Regulatory Treatment Criteria

- The critical design criteria for the main treatment processes are listed below:

Component	Parameter	TCEQ Requirement	Actual Value	Units	Notes
Anoxic Tank/ Oxidation Ditch	BOD Loading Capacity	≤ 35	30	lb BOD/ day/ 1,000 cf	Organic loading for both the oxidation ditch and anaerobic tank at design flow
Oxidation Ditch (Aeration)	Motor Requirement for Rotors	≥ 370	**295.0**	hp	Plant capacity shown is with largest motor (75-hp) out of service
Clarifiers	Overflow Rate	≤ 1200	789	gpd/sf	Based on 2-hr peak flow and surface area of clarifiers
Chlorine Contact Basin (Disinfection)	Minimum Contact Time	≥ 20	26.1	min	Based on 2-hr peak flow and basin volume
Filters	Filter Application Rate	≤ 3	**7.0**	gpm/sf	Based on peak flow rate and assuming one filter (200 sf) is out of service

** gpd = gallons per day; gpm = gallons per minute; sf = square feet; cf = cubic feet*

Summary of WWTP Assessment Conclusions

Recommended Project Prioritization

	Project	Justification	Cost
1.	Add Additional Clarifier	Will provide overflow capacity for the plant during wet weather events and redundancy before rehabilitating the other clarifiers.	$2,218,000
2.	Rehabilitate Clarifier No. 3 and repair Clarifier No. 1 WAS valve	Determined to be High Risk. As the largest clarifier, it is very critical to the treatment process. The center well is badly corroded. The rake and scum skimmer are in poor condition. Repairing the WAS valve will allow for solids wasting in Clarifier No. 1 to improve redundancy.	$492,000

Recommended Project Prioritization

	Project	Justification	Cost
3.	Upgrade Electrical System	Determined to be High Risk. Poor condition due to age, failure would result in a total plant outage.	$1,413,000
4.	Oxidation Ditch a) Add aeration b) Repair mud valve stem and remove solids	Determined to be High Risk. Majority of permit compliance depends on this process. Additional rotors needed for dissolved oxygen input and TCEQ redundancy requirements The stem of the mud valve is broken and solids have accumulated on the bottom of the tank. Solids need to be removed to restore the full basin capacity.	$ 809,500

Recommended Project Prioritization

	Project	Justification	Cost
5.	Increase Filter Capacity	Additional capacity needed to meet TCEQ loading requirements and prevent overflows	$3,454,000
6.	Flow Equalization Basin and Lift Station	Concrete existing Emergency FEB, add aeration, and increase transfer pumping capacity	$2,085,000
7.	Parallel 12” Pipe	Prevent overflows during peak events	$41,000
8.	Rehabilitate RAS Pump Station	Determined to be High Risk. Piping in poor condition, failure would result in a total plant outage	$45,000
9.	Rehabilitate Chemical Feed System	Determined to be High Risk. Poor condition, affects permit compliance	$99,000
		Total	***$10,657,000***

FREESE AND NICHOLS

Odor Control

Potential Odor Sources

Odor Causing Compound - H_2S

- Headworks
  - H_2S formed in the collection system is released here
  - Current Odor Control Device at the Headworks is not used because it forms excess sulfuric acid (↓pH)
- Flow Equalization Basin
  - Aeration is required in FEB for odor control by TCEQ 217

Potential Solutions

- Add iron salts, nitrates, or aeration at lift stations
- Aerate the Flow Equalization Basin per TCEQ
- Change septic and chemical toilet hauler discharges to a different location

Alternatives for Future Treatment

Future Conditions

- Future Flow Projections:

Year	2012	2017	2022	2032
ADF (MGD)	**2.38**	**2.42**	**2.49**	**2.68**
% of Permit	53%	54%	55%	60%

- Basis for Alternatives:
  - Provide sufficient treatment capacity for 20 year planning period
  - Increase reliability of treatment
  - Modernize facilities
  - Increase gravity flows if possible

Treatment Alternatives

- *Alternative 1* – Rehabilitate current plant to address high risk components and eliminate hydraulic bottlenecks

- *Alternative 2* – Add new parallel 1.5 MGD treatment train to existing site to provide redundancy and additional firm treatment capacity

- *Alternative 3* – Construct new plant off-site

Alternative 1

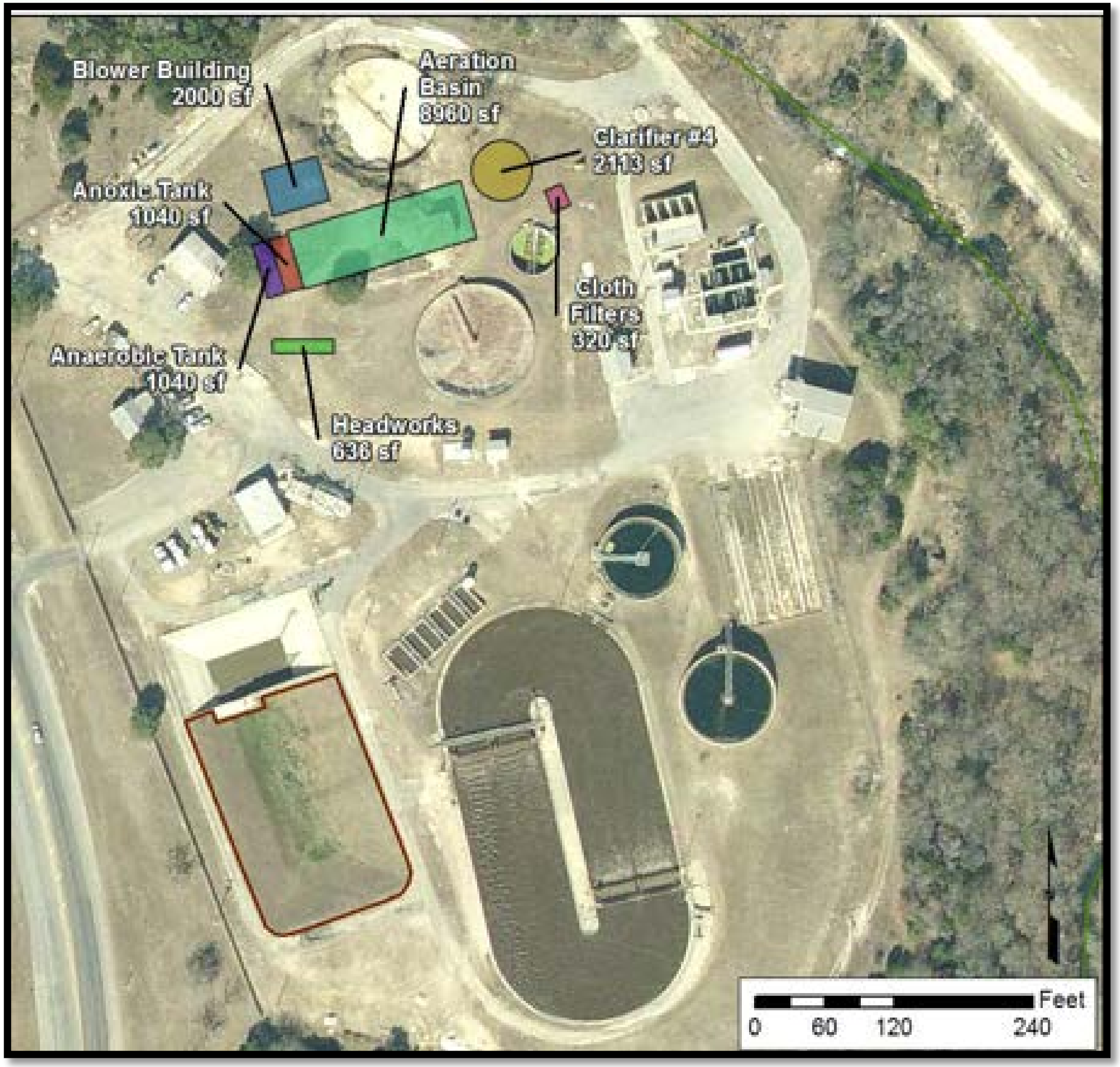
Project	Scope	Project Cost
1. Add New Clarifier	Construct New 80' Diameter Clarifier	$2,218,000
2. Clarifier Rehab and Repair	Rehab CL-3 and Replace CL-1 WAS valve	$492,000
3. Upgrade Electrical System	Upgrade MCC/Switchgear, Panelboard, SCADA	$1,413,000
4. Oxidation Ditch Rehab	Remove Solids and Add Aeration Capacity	$809,500
5. Increase Filter Capacity	Add 4.4 MGD of Filter Capacity	$3,454,000
6. FEB and Lift Station Capacity Increase	Concrete Emergency FEB, Add Aeration, and Pumping Capacity	$2,085,000
7. Parallel Clarifier Effluent Pipe	Install Parallel Pipe to Relieve Bottleneck	$41,000
8. Rehab RAS Pump Station	Replace Exposed Piping, Valves, and Fittings	$45,000
9. Rehab Chemical Feed System	New Alum Storage Tank and Chemical Feed Bldg	$99,000
	Total	***$10,657,000***

** Costs include Mobilization, Engineering, O&P and Contingency*

Alternative 2 - Layout

- 1.5 MGD Parallel Biological Nutrient Removal Train at current plant site
- Most Alternative 1 Projects will still be required
- Potential to reuse existing infrastructure

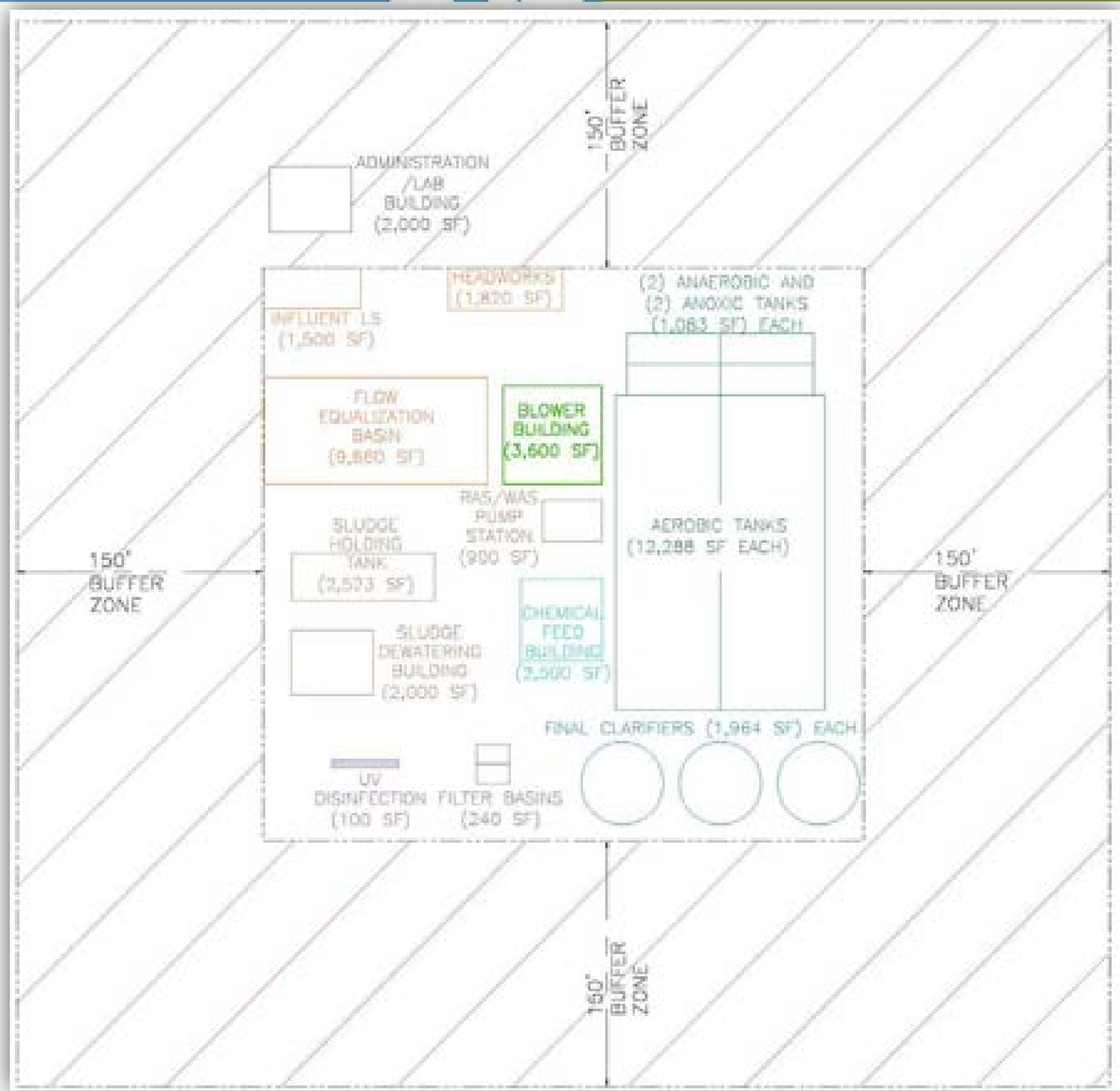
Description	Cost
Construction	$8,762,000
Mobilization (5%)	$439,000
OH&P (15%)	$1,380,000
Contingency (25%)	$2,645,000
Engineering (15%)	$1,984,000
Alternative 1 Projects	$2,129,000
Project Total:	***$17,339,000***



Alternative 3 – Conceptual

- Total Site Area
  - 15 Acres
- BNR Process for enhanced Ammonia and Phosphorus removal

Description	Cost
Construction	$21,868,800
Mobilization (5%)	$1,094,000
OH&P (15%)	$3,445,000
Contingency (25%)	$6,602,000
Engineering (15%)	$4,952,000
Project Total	***$37,960,000***



** Land, Environmental, and Off-Site Piping costs would substantially increase Alt 3 costs*

Alternatives Matrix

Treatment Alternative	Land Acquisition	Discharge Permit	Capital Cost	Reliability	Future Considerations
Alternative 1	None required	No Change	*≈ 10,657,000*	Experience with current plant. Old equipment prone to failure.	Aging Infrastructure
Alternative 2	None required	Possible Permit Amendment	≈ $17,339,000	Increased reliability and redundancy from new train	Would provide redundancy for rehabilitating existing plant
Alternative 3	Purchase 15 acres	Must apply for a new permit	≈ $37,960,000 (Does not include land, environmental, or off-site piping)	Modernized facilities, automation	Could be designed for future expansion and increased population growth

* *Land, Environmental, and Off-Site Piping costs would substantially increase Alt 3 costs*

Recommendation

✓ **Alternative 1**

- o This alternative addresses peak flow hydraulic bottleneck and aging infrastructure issues
- o Current plant meets TCEQ permitted effluent limits
- o Existing plant capacity is able to support growth through 20 year planning period
- o Lowest Capital Cost

× Alternative 2 was not selected due the additional capacity not being necessary

× Alternative 3 was not selected because it was cost prohibitive

Questions and Discussion

CITY OF KERRVILLE

May 31, 2012